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Proposals for

COUNCIL DECISIONS

concerning the specific programmes implementing the Framework Programme 2002-2006 of the European Community for research, technological development and demonstration activities

concerning the specific programmes implementing the Framework Programme 2002-2006 of the European Atomic Energy Community for research and training activities

(presented by the Commission)

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EXPLANATORY MEMORANDUM

At its meeting on 23 and 24 March 2001, continuing its support for the European Research Area project as expressed in Lisbon, Feira and Nice, the European Council called upon the Council and the European Parliament to adopt the research Framework Programme 2002-2006 proposed by the Commission by June 2002.

In doing so, it stressed in particular that, in the context of a set of well defined priorities, full benefit should be derived from the new instruments designed to give this new Framework Programme the means to help bring about the European Research Area, in accordance with its objective.

The Commission submitted its Framework Programme proposal on 21 February 2001. Since then, Council and Parliament have had the opportunity to begin examining and discussing the proposal. On 2 and 3 March, at their informal meeting in Uppsala, the Research Ministers held a first exchange of views on it, and the Council bodies have started to examine it.

For its part, the European Parliament has had three opportunities to debate this proposal, the last time on the basis of answers given by the Commission to a detailed questionnaire.

By presenting its proposals concerning the specific programmes through which the Framework Programme is to be implemented at this point in time, the Commission intends to facilitate the debate that has begun within the institutions, thus enabling it to take place in the best possible conditions of information.

With the same aim in mind, the Commission is at the same time presenting a communication on the possible ways of implementing Article 169 of the Treaty to enable participation by the Community in programmes implemented jointly by several Member States, within the general context of the networking of national research programmes.

The Commission will also be submitting proposals shortly concerning the "rules for participation and dissemination" applying to the Framework Programme.

The following main elements of these proposals, in particular, will help to give a better picture of the organisation, content and implementation arrangements proposed for the new Framework Programme:

- the structure in terms of specific programmes;
- the new instruments and the way they will operate;
- the scientific and technological content that is envisaged;
- the activities foreseen in the EURATOM area.

The structure

For the implementation of the Framework Programme, a structure based on five specific programmes is proposed:

1 *COM (2001) 94.*

- For the EC Framework Programme:
 - A specific programme on “Integrating and strengthening the European Research Area” for the two blocks of activities “Integrating research” and “Strengthening the foundations of the European Research Area” of the Framework Programme proposal.
 - A specific programme on “Structuring the European Research Area”.
 - A specific programme for JRC activities.
- For the EURATOM Framework Programme:
 - A specific programme for all the indirect actions in the fields of nuclear fission and fusion.
 - A specific programme for JRC activities.

This structure derives directly from that of the Framework Programme and is a faithful reflection of the underlying policy objectives. Simple and easy to follow, it will make it possible to ensure the coherent implementation of the different categories of actions proposed, while respecting the overall objective of making a reality of the European Research Area and taking account of the specific features of these actions.

It brings together, on the one hand, all research and research-coordination activities and, on the other, activities aimed at structuring several key aspects of research activity on a European scale.

In each case, coherent implementation can be ensured in particular by means of a single programme committee with a composition varying according to the fields concerned.

In addition, the particular nature of the JRC’s activities justifies a separate specific programme both for the EC and for EURATOM.

On the basis of the indications given in Annex II to the Framework Programme proposal, and thanks to them, correspondence is ensured with the various activities foreseen in the Treaty both in terms of content and budget.

The new instruments

The contribution of the new Framework Programme to bringing about the European Research Area is based mainly on the means of intervention envisaged for implementing it, in particular the three new instruments, namely the networks of excellence, integrated projects and participation by the Community in jointly implemented national programmes.

The introduction of these new instruments, which was favourably received by the Council and the European Parliament in their resolutions on the European Research Area, is in response to the need for a change in the ways in which the Community intervenes in the research field, as stressed in various reports on Community research policy, and in particular the recent five-year assessment of the Framework Programme.

Work on the development of these instruments started as soon as the Framework Programme proposal was presented. Many contacts and detailed discussions about the way in which they

will operate in practice have taken place between the Commission Services, the national authorities and the relevant programme users within research organisations, universities and businesses.

Two seminars were specifically organised on this topic on 19 and 20 April 20012.

On the basis of the results of this detailed work and discussions, the basic principles and the general conditions governing the operation of these new instruments have been established. They are presented in Annex III to the specific programme proposals and concern in particular:

- the objectives specifically pursued with each of the instruments;
- the type of activities involved;
- the general conditions governing the formation, operation and development of partnerships;
- the general conditions governing support by the Community.

These principles and conditions are designed to ensure that the new instruments will make an effective contribution towards attaining the objectives set, namely the deep integration of research and innovation activities in Europe under conditions of operational autonomy and flexibility, characteristics of the means of intervention foreseen for the new Framework Programme.

Their application will be accompanied by measures designed to derive full benefit from all the research and innovation potential present in Europe, in particular by encouraging SME participation in the activities concerned.

These remarks apply essentially to the networks of excellence and the integrated projects. Community participation in jointly implemented national programmes under Article 169 of the Treaty is of a different nature, necessitating and justifying separate treatment. The objective of the communication which the Commission is presenting on this subject, in parallel with these proposals, is to launch the political debate that needs to take place on this means of implementation within the Framework Programme.

The scientific and technological content

Alongside its organisation as a structuring instrument designed to integrate research efforts, a basic feature of the new Framework Programme underlined by the Stockholm European Council is the concentration of resources on a limited number of well defined priorities.

This is reflected in the specific programme proposals which explain in more detail, expand upon and clarify the indications given in the Framework Programme proposal as regards objectives, fields covered and, within each field, the particular themes taken into consideration.

The precise subjects of research that will be carried out will be determined when the work programmes are drawn up and the programmes of activities for the networks of excellence and integrated projects are formulated.

The objectives, content and implementation arrangements for activities to be carried out under the specific programmes have been the subject of an *ex ante* evaluation. In this context, a special effort has been made to define, in accordance with the indications given in the Framework Programme proposal, verifiable, measurable objectives where this is possible and useful.

Alongside the activities carried out in the context of the major priority themes, the specific programme on “Integrating and strengthening the European Research Area” will comprise several categories of activities that are new or carried out in new ways.

These are:

- Activities carried out under the heading “Anticipating the EU’s scientific and technological needs” in response to the needs of Community policies, research at the frontiers of knowledge and new unforeseen requirements.

They will be conducted on the basis of a procedure for the multiannual programming of activities, carried out partly by means of an annual exercise of evaluation and selection of research themes.

- Activities in support of the networking of national research programmes and the coordination of research and innovation activities and policies. Light and flexible mechanisms will be used to this end.

International cooperation represents an important dimension of the Framework Programme. Activities will be carried out in this field in various forms: in the specific programme on “Integrating and strengthening the European Research Area” on the one hand by opening up the networks of excellence and integrated projects to third country researchers and entities and, on the other hand, through certain specific activities; in the programme “Structuring the European Research Area” by means of support for the international mobility of European researchers and third country researchers.

Under the heading of strengthening the foundations of the European Research Area, activities will be carried out in support of cooperation with and between the organisations concerned with European science and technology cooperation. These organisations will in fact have full access to all the activities under the programmes.

The description of the content of the programme on “structuring the European Research Area” specifies the implementation conditions and the possible themes for structuring activities, including a strengthening of the networking of innovation stakeholders; the various new forms of support for mobility; the integrated initiatives with regard to infrastructures and the themes and arrangements for activities in the field of relations between science and society.

In the implementation of the specific programmes, the regional dimension of European research will be fully taken into account in its different aspects, as well as the recognised role of regions in the process of innovation.

EURATOM activities

By their nature and on account of their different legal basis, the activities carried out in the EURATOM field have a particular character. In addition, in the nuclear field the issue of the European Research Area takes a specific form.

It might seem easier to make a reality of the European Research Area in the field of nuclear fission than in the rest of science and technology, given the limited size of the scientific and industrial community concerned and the existence within it of long-standing collaboration links.

The European Research Area is already to a large extent a reality in the field of controlled nuclear fusion thanks to the existence of an integrated European programme on research into magnetic fusion.

The proposal for a specific programme for indirect nuclear research activities substantially expands upon and clarifies the indications given in the corresponding part of the EURATOM Framework Programme proposal.

In the field of fission, the Framework Programme proposal identifies a thematic area: waste treatment and storage. Activities could be carried out in this area by means of two of the new instruments for the priority thematic areas of the programme on "Integrating and strengthening the European Research Area" of the EC Framework programme, namely the networks of excellence and integrated projects.

The rest of the activities relating to fission concern other aspects of nuclear safety: radiation protection, the study of innovative concepts and training concerning nuclear matters. These activities could be carried out in the form of projects of limited size and the networking of national activities, with the possibility of making use of the new instruments where necessary.

In the field of thermonuclear fusion, the specific programme proposal expands upon and clarifies the guidelines given in the EURATOM Framework Programme proposal following on from the results of the Ministerial Meeting held on 19 January 2001 on the basis in particular of a Commission staff working document³.

It specifies the priorities proposed and the activities to be carried out during the period 2002-2006 in accordance with the "reactor" orientation of Community activities in this field which it is thought desirable to maintain: participation in the Next Step and use of the JET facilities.

Choices will need to be made in order to put this orientation into practice. In order to increase the impact of Community efforts in this area, and in accordance with the spirit of the European Research Area, it is proposed that resources should be concentrated on multilateral activities bringing together European research players on joint projects such as JET today, and ITER in due course if a decision is taken to build this new machine.

Overall coordination at European level, the usefulness of which has been demonstrated, would be maintained, but the Member States would take responsibility for a larger proportion

3 *SEC (2001)385.*

than at present of the activities where the "reactor" orientation and the link with the Next Step are less marked.

The period 2002-2006 should be a period of transition towards a programme dominated by commitments connected with the Next Step. Of the EUR 700 million proposed for the whole of fusion research, EUR 200 million are foreseen as a contribution to the construction of ITER which could commence during the second half of the period of implementation of the Framework Programme, i.e. 2005-2006, and which necessitates a specific decision.

The bulk of the Community fusion research activities for 2002-2006 are therefore intended to ensure the transition between the activities at present carried out in the associations and what should become a fusion physics and technology accompanying programme once the ITER project has reached "cruising speed" after 2006 if a decision is taken to go ahead and start building the machine.

Efficient implementation

Designed to help bring about the European Research Area, the Framework Programme 2002-2006 is based on three fundamental principles: concentration on a selected number of priorities; structuring effect by means of close liaison with the national efforts; simplification and streamlining of implementation conditions.

The need for this sort of improvement in the conditions governing the implementation of the Framework Programme and the specific programmes has been stressed repeatedly: by the Council and the European Parliament, by the Framework Programme five-year assessment panel, and by the Court of Auditors, in particular.

For the most part, the improvement in implementation conditions will be brought about by adopting the new means of intervention and the new instruments designed to help achieve the twin objectives of concentration and of strengthening the links between efforts at the various levels.

The networks of excellence and the integrated projects have been designed with this in mind, based on a more decentralised approach enabling the participants to have a large measure of operational autonomy as well as the requisite degree of flexibility in implementation. The partnerships, more particularly, are designed to be able to evolve so that new participants can join, and the initial participants can withdraw, throughout their duration.

The basic principles applying to the new instruments are described in Annex III to the specific programme proposals. The detailed rules for implementing them will be set out in the "Rules for participation and dissemination" taking account of the objectives of protecting the Communities' financial interests.

Other aspects of the management of the activities under the programmes will also be "externalised", more particularly certain aspects of the management of research activities for SMEs and activities in support of mobility.

An essential debate

When the Commission submits a proposal for a new EU Research Framework Programme there is always a wide-ranging and intense debate.

This debate, which is already under way, should go beyond a discussion of the priorities and areas to which it is often reduced:

- because the Framework Programme 2002-2006 is essentially characterised by the introduction of new means of intervention with considerable potential to have positive effects on the European research fabric, which should be put into effect under the best possible conditions;
- because implementing the Framework Programme for this reason requires greater involvement on the part of those responsible for research in Europe, at a high level of decision taking, in the national research organisations, universities and industry, and greater initiative and the assumption of greater responsibility on the part of the participants.

Proposal for a

COUNCIL DECISION

**adopting a specific programme 2002-2006 for research,
technological development and demonstration aimed at**

integrating and strengthening the European Research Area

Proposal for a

COUNCIL DECISION

adopting a specific programme 2002-2006 for research, technological development and demonstration aimed at integrating and strengthening the European Research Area

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission⁴

Having regard to the opinion of the European Parliament⁵

Having regard to the opinion of the Economic and Social Committee⁶

Whereas:

- (1) In accordance with Article 166(3) of the Treaty, Decision No. .../..EC7 of the European Parliament and 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") is to be implemented through specific programmes that define detailed rules for their implementation, fix their duration and provide for the means deemed necessary.
- (2) The framework programme is structured in three main blocks of activities, "integrating research", "structuring the European Research Area", and "strengthening the foundations of the European Research Area", the first and the third of which, as regards indirect actions, should be implemented by this specific programme.
- (3) The rules for the participation of undertakings, research centres and universities and for the dissemination of research results, for the framework programme, adopted by the European Parliament and Council in Decision No. .../..EC8 (hereinafter referred to as "the rules for participation and dissemination") should apply to this programme.
- (4) New instruments, involving simplified and decentralised management, and the exploitation of external technical support should, if fully exploited in this programme,

4 OJ No.
5 OJ No.
6 OJ No.
7 OJ No.
8 OJ No

enable personnel and administrative expenses to be reduced to a maximum of 5.5% of the overall amount deemed necessary for its implementation.

- (5) In implementing this programme, emphasis should be given to promoting mobility of researchers, and innovation, in the Community and encouraging the participation of SMEs, as well as international co-operation activities with third countries and international organisations. Special attention should be paid to the Accession countries.
- (6) Research activities carried out within this programme should respect fundamental ethical principles, notably those which appear in the Charter of Fundamental Rights of the European Union.
- (7) Following the Commission Communication “Women and Science”⁹ and the Resolutions of the Council¹⁰ and the European Parliament¹¹ 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. Gender aspects in research will be taken into account in implementing this programme.
- (8) To achieve the full potential of this programme, the active engagement of all relevant parties, in particular the Member States and Associated States, should be encouraged in a common endeavour to step up the co-ordination of research activities carried out in Europe, including through the opening up and networking of national programmes and the free circulation of information pertaining to research activities at all levels.
- (9) This programme should be implemented in a flexible, efficient and transparent manner, taking account of relevant interests, in particular of the scientific, industrial, user and policy communities; the research activities carried out under it should be adapted where appropriate to the needs of Community policies and to scientific and technological developments.
- (10) Since the measures necessary for the implementation of this Decision are management measures within the meaning of Article 2 of Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission¹², they should be adopted by use of the management procedure provided for in Article 4 of that Decision.
- (11) The Commission should in due course arrange for an independent assessment to be conducted concerning the activities carried out in the fields covered by this programme.
- (12) Within this programme, thematic priority areas of research should be implemented exclusively by means of three types of instruments: networks of excellence, integrated projects, and Community participation in national research activities implemented jointly pursuant to Article 169 of the Treaty.

9 COM(1999)76.

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

11 Resolution of 3 February 2000, PE 284.656.

12 OJL 184, 17.7.1999, p.23

HAS ADOPTED THIS DECISION

Article 1

1. In accordance with the framework programme, a specific programme on Integrating and strengthening the European research area (hereinafter referred to as "the specific programme") is hereby adopted for the period from [.....] to 31 December 2006.
2. The objectives and scientific and technological priorities for the specific programme are set out in Annex I.

Article 2

In accordance with Annex II of the framework programme, the amount deemed necessary for the execution of the specific programme is EUR 12 505 million, including a maximum of 5.5% for the Commission's administrative expenditure. An indicative breakdown of this amount is given in Annex II.

Article 3

1. The detailed rules for financial participation by the Community in the specific programme shall be those referred to in Article 2(2) of the framework programme.
2. The specific programme shall be implemented by means of the instruments defined in Annexes I and III to the framework programme and described in Annex III.
3. The rules for participation and dissemination shall apply to the specific programme.

Article 4

1. The Commission shall draw up a work programme for the implementation of the specific programme, setting out in greater detail the objectives and scientific and technological priorities set out in Annex I, and the timetable for implementation.
2. The work programme shall take account of relevant research activities carried out by the Member States, Associated States and European and international organisations. It shall be updated where appropriate.

Article 5

1. The Commission shall be responsible for the implementation of the specific programme.
2. The procedure laid down in Article 6 shall apply for the adoption of the following measures:
 - the drawing up and updating of the work programme referred to in Article 4(1),

- any adjustment to the indicative breakdown of the amount as set out in Annex II.

Article 6

1. The Commission shall be assisted by a committee, composed of representatives of the Member States and chaired by the representative of the Commission.
2. Where reference is made to this paragraph, the management procedure laid down in Article 4 of Decision 1999/468/EC¹³ shall apply, in compliance with Article 7 (3) thereof.
3. The period provided for in Article 4(3) of Decision 1999/468/EC shall be two months.

Article 7

1. The Commission shall regularly report on the overall progress of the implementation of the specific programme, in accordance with Article 4 of the framework programme.
2. The Commission shall arrange for the independent assessment provided for in Article 5 of the framework programme to be conducted concerning the activities carried out in the fields covered by the specific programme.

Article 8

This Decision is addressed to the Member States.

Done at Brussels, [...]

For the Council
The President
[...]

13 OJL 184, 17.7.1999, p. 23

ANNEX I

Scientific and technological objectives and broad lines of the activities

Introduction

This programme will promote world class research in key priority areas of exceptional interest and added value to Europe and the competitiveness of its industry, which have been identified in the framework programme 2002-2006, as well as on topics that are identified as being of high importance during the course of implementation of the framework programme in view of the EU's policy needs and the opportunities arising in novel, leading edge research areas.

The programme will strive towards greater integration of research in Europe by means of:

- focused action in priority thematic research areas, using powerful financing instruments (integrated projects and networks of excellence) which bring together the research actors in appropriate configurations for the new challenges that these priority research areas represent, and with critical mass;
- promoting the networking and joint action of national and European frameworks for research and innovation, and the opening up of national programmes, in these priority areas, including where appropriate by the use of actions under Article 169 of the Treaty, as well as in other areas where such action would be of benefit to the performance of Europe's research base.

The programme is complementary to the programme “structuring the European Research Area” and the specific programme for the JRC, and its implementation will be co-ordinated with them.

1. Integrating research

1.1. PRIORITY THEMATIC AREAS OF RESEARCH

The priority thematic areas represent the bulk of expenditure under the framework programme 2002-2006. Through a highly focused Community research effort, the intention is to generate a substantial leveraging effect which, together with actions in other parts of the framework programme 2002-2006 and through open co-ordination with other – regional, national, European and international – frameworks, will result in a coherent and highly effective common endeavour towards their overall objectives.

The priority thematic areas of research are :

- Genomics and biotechnology for health
- Information Society technologies
- Nanotechnologies, intelligent materials and new production processes
- Aeronautics and space
- Food Safety and health risks
- Sustainable development and global change
- Citizens and Governance in the European Knowledge-based society

The actions are therefore described in terms of:

- the overall objectives and expected achievements which are sought in each priority area;
- the research priorities to be pursued by means of Community action.

The priority thematic areas of research are described in terms of their overall objectives and the main research focus. The associated work programme will elaborate further on the detailed research content.

Community action in each priority area will be pursued through integrated projects and networks of excellence which, in addition to research and technological development, may incorporate the following types of activity, where they are of specific relevance to the objectives sought: *demonstration, dissemination and exploitation; co-operation with researchers and research teams from third countries; human resource development, including the promotion of training of researchers; development of research facilities and infrastructure of specific relevance to the research being undertaken; and promotion of better links between science and society, including women in science.*

In order to attain the objectives of one or more of the priority thematic areas, it may also be appropriate to implement research activities falling within the scope of Article 169 of the Treaty.

Participation of small and medium sized enterprises (SMEs) will be encouraged and gender equity will, overall, be assured in the implementation of the activities.

Innovation is an important dimension which must be taken into account in the design and implementation of RTD activities. In particular, networks of excellence and integrated projects will include activities relating to dissemination and exploitation of knowledge and, where relevant, to ensure transfer of technology and facilitate exploitation of results. Where appropriate, special attention will be given to technology transfer to SMEs and to the creation of research – based enterprises as a means of exploiting research results.

Participation of the candidate countries in this programme will be encouraged.

International co-operation represents an important dimension of the Framework Programme. In the specific programme "Integrating Research", international activities are carried out on the two forms of:

- Participation of researchers, teams and institutions from third countries in networks of excellence and integrated projects, in particular on topics, within the different thematic priority fields, related to issues arising at world level and being subjects of international efforts;
- Specific international co-operation activities with some groups of countries, as a support to Community external relations and development aid policies.

The objectives and forms of the international co-operation activities in the Framework Programme are described under the heading "Anticipating the EU's scientific and technological needs".

The priority research areas include, in certain cases, research at the borders of traditional disciplines where advances will require interdisciplinary and multidisciplinary effort. In such cases a particular attention will be given during the implementation of the programme to the co-ordination between the different priority areas, and between these areas and actions under the heading "anticipating the EU's scientific and technological needs".

Consideration of the ethical social and legal aspects of the research to be undertaken and its potential applications, as well as socio-economic impacts of scientific and technological development and foresight, will where relevant form a part of the activities under this heading. Research on ethics related to scientific and technological developments will be carried out in the programme "Structuring the European Research Area".

During the implementation of this programme and in the research activities arising from it, fundamental ethical principles are to be respected, including the following: protection of human dignity, data and privacy, as well as animals and the environment in accordance with Community law; relevant international conventions and codes of conduct, e.g. the Helsinki Declaration, the Convention of the Council of Europe on Human Rights and Biomedicine, the Universal Declaration on the human genome and human rights adopted by UNESCO; current legislation and regulations in the countries where the research will be carried out. Where appropriate, participants in research projects must seek the approval of the relevant ethics committees prior to the start of the RTD activities. An ethical review will be implemented systematically for proposals dealing with sensitive issues. In specific cases, an ethical review may take place during the implementation of a project.

1.1.1 Genomics and biotechnology for health¹⁴

The sequencing of the human genome and many other genomes heralds a new age in human biology, offering unprecedented opportunities to improve human health and to stimulate industrial and economic activity. In making its contribution to realising these benefits, this theme will focus on integrating post-genomic research into the more established biomedical and biotechnological approaches, and will facilitate the integration of research capacities (both public and private) across Europe to increase coherence and achieve critical mass. Integrated multidisciplinary research, which enables a strong interaction between technology and biology, is vital in this theme for translating genome data into practical applications. In addition, an essential element will be to involve key stakeholders, in particular, industry, healthcare providers and practitioners, policy makers, regulatory authorities and patient associations, in implementing the theme. Gender equity in the research will also be ensured¹⁵.

This thematic priority area will stimulate and sustain multidisciplinary basic research to exploit the full potential of genome information to underpin applications to human health.

It will be an integral component of the European Community effort to enhance the European biotechnology industry in line with the conclusions of the Stockholm Council. It will endeavour to create strong links with all activities that improve the framework conditions for innovation in the health sector of the biotechnology industry, especially in SMEs, including stimulating entrepreneurship and opportunities for investment through venture capital and the involvement of the European Investment Bank. Attention will also be paid to the identification of regulatory bottlenecks in the development of new applications for genomics, to the anticipation at the earliest possible stage of the ethical implications and to the broader implications of developments in genomics research for society and citizens.

This thematic priority area will also foster the implementation and development of the health strategy of the European Community.

Throughout the thematic priority, international collaboration will be encouraged. Where appropriate, due account will be given to the European Community's commitment to poverty reduction in developing countries and the importance that improved health will bring to the process – in line with Article 177 of the Treaty and with the European Community's accelerated actions to combat HIV/AIDS, malaria and tuberculosis.

14 *In this and other areas of activity within the framework programme, human cloning for reproductive purposes will not be supported; no research activities modifying or aiming to modify the genetic heritage of human beings will be carried out; nor will any research activity involving the creation of a human embryo for research or therapeutic purposes be carried out. As far as possible, animal experiments and testing should be replaced by in vitro or alternative methods. Animal suffering must be avoided or kept to a minimum and, in this regard, special attention must be paid to animal experimentation involving species that are the closest to human beings (in accordance with Directive 86/609/CEE). The modification of the genetic heritage of animals and animal cloning will be envisaged only for objectives that are justified on ethical grounds and when carried out under conditions respecting animal welfare and the principles of genetic diversity.*

15 *Causes, clinical manifestation, consequences and treatment of disease and disorders often differ between women and men. Therefore, all activities funded within this thematic priority must take the possibility of gender differences into account in their research protocols, methodologies and analysis of results.*

Research priorities

i) Fundamental knowledge and basic tools for functional genomics

The strategic objective of this line is to foster the basic understanding of genomic information, by developing the knowledge base, tools and resources needed to decipher the function of genes and gene products relevant to human health (including animal and plant model genomes and microbial genomes) and to explore their interactions with each other and with their environment. Research actions will encompass the following:

- ***Gene expression and proteomics:*** The objectives are to enable researchers to better decipher the functions of genes and gene products as well as to define the complex regulatory networks (biocomplexity) that control fundamental biological processes.

Research will focus on: developing high throughput tools and approaches for monitoring gene expression and protein profiles and for determining protein function and protein interactions.

- ***Structural genomics:*** The objectives are to enable researchers to determine, more effectively and at a higher rate than is currently feasible, the 3-D structure of proteins and other macromolecules, which is important for elucidating protein function and essential for drug design.

Research will focus on: developing high throughput approaches for determining high-resolution 3-D structures of macromolecules.

- ***Comparative genomics and population genetics:*** The objectives are to enable researchers to use well-characterised model organisms for predicting and testing gene function and to take full advantage of specific population cohorts available in Europe to determine the relationship between gene function and health or disease.

Research will focus on: developing model organisms and transgenic tools; developing genetic epidemiology tools and standardised genotyping protocols.

- ***Bioinformatics:*** The objectives are to enable researchers to access efficient tools for managing and interpreting the ever-increasing quantities of genome data and for making it available to the research community in an accessible and usable form.

Research will focus on: developing bioinformatic tools and resources for data storage, mining and processing; developing computational biology approaches for in silico prediction of gene function and for the simulation of complex regulatory networks.

ii) Applications of genomics and biotechnology for health

The strategic objective of this line is to foster the competitiveness of Europe's biotechnology industry by exploiting the wealth of biological data produced by genomics and advances in biotechnology. Research actions will encompass the following:

- ***Technological platforms for the development of new diagnostic, prevention and therapeutic tools:*** The objectives are to foster academic and industrial collaboration through technological platforms where multidisciplinary approaches using cutting

edge technologies arising from genomic research (such as pharmacogenomics) may contribute to health care progress and cost reduction through more precise diagnosis, individualised treatment and more efficient development pathways for new drugs and therapies, and other novel products of the new technologies.

Research will focus on: rational and accelerated development of new, safer, more effective drugs; development of new diagnostics; development of new in vitro tests to replace animal experimentation; development and testing of new preventive and therapeutic tools, such as somatic gene and cell therapies (including stem cell therapies) and immunotherapies.

- **Support for innovative research in genomics start-up companies:** The objectives are to facilitate the creation of research-based start-ups in Europe, to help sustain their early growth and to foster their further development in a multinational environment.

Research will focus on: innovative aspects of post-genomics, which have high potential for application to health related issues and which are also expected to lead to entrepreneurial initiatives in start-up companies.

With a view to ensuring socially responsible choices, public acceptance and an efficient development pathway for these new technologies, an active and early involvement of regulators, patients and society at large will be necessary.

iii) Applications in medicine and public health

The strategic objective of this line is to develop improved strategies for the prevention and management of human disease and for living and ageing healthily. It will concentrate exclusively on integrating the genomic approach into more established medical approaches for investigating disease and health determinants. Research actions will focus on the following:

- **Combating cancer, cardiovascular disease and rare diseases:** The objectives are to improve the prevention and management of the two major causes of ill health and mortality in Europe and to pool Europe's research resources for tackling rare diseases.

Research will focus on: integrating clinical expertise and resources with relevant model systems and advanced tools in functional genomics to generate breakthroughs in the prevention and management of these diseases.

- **Combating resistance to drugs:** The objectives are to confront the major threat to public health caused by drug resistant pathogens.

Research will focus on: exploitation of the knowledge of microbial genomes and on host-pathogen interactions for the development of vaccines and alternative therapeutic strategies to circumvent the problem of antimicrobial drug resistance; development of strategies for optimal usage of antimicrobials; support to the European Community network for epidemiological surveillance and control of communicable diseases.

- ***Studying the brain and combating diseases of the nervous system:*** The objectives are to use genome information to understand better the functioning and dysfunctioning of the brain, in order to gain new insight into mental processes, to combat neurological disorders and diseases, and to improve brain repair.

Research will focus on: understanding the molecular and cellular bases of brain function, damage, plasticity and repair, learning, memory and cognition; developing strategies for prevention and management of neurological disorders and diseases.

- ***Studying human development and the ageing process:*** The objective is to better understand human development, with special emphasis on the ageing process, in order to develop the evidence base for improving public health strategies to promote healthy living and healthy ageing.

Research will focus on: understanding human development from conception to adolescence; exploring the molecular and cellular determinants of healthy ageing including their interactions with environmental, behavioural and gender factors.

iv) ***Confronting the major communicable diseases linked to poverty***

The strategic objective of this line is to confront the global emergency caused by the three major communicable diseases - HIV/AIDS, malaria and tuberculosis – through the development of effective disease interventions, particularly for use in developing countries. It is envisaged that developing countries will be significant partners in the implementation of this line, in particular through the European Clinical Trials Platform.

Research will focus on: developing promising candidate interventions (vaccines, therapies and HIV microbicides) against the target diseases by sponsoring research over the full spectrum from basic molecular research, taking advantage of microbial genomics, through to pre-clinical testing and proof-of-principle; establishing a European Clinical Trials Platform to unite and support Europe's clinical trial activities specifically targeted at interventions for use in developing countries; establishing an AIDS Therapy Trials Network in Europe to improve the coherence and complementarity of clinical trials of AIDS therapies for European use.

1.1.2 Information Society technologies

Information society technologies (IST) are transforming the economy and society. Not only are they creating new ways of working and new types of business, but provide solutions to major societal challenges such as healthcare, environment, safety, mobility and employment, and have far reaching implications on our everyday life. The IST sector is now one the most important of the economy, with an annual turnover of EUR 2000 billion, providing employment for more than 12 million people in Europe.

The IST thematic priority will contribute directly to realising European policies for the knowledge society as agreed at the Lisbon Council of 2000, the Stockholm Council of 2001, and reflected in the e-Europe Action Plan. It will ensure European leadership in the generic and applied technologies at the heart of the knowledge economy. It aims to increase innovation and competitiveness in European businesses and industry and to contribute to greater benefits for all European citizens.

Successes, like those achieved in Europe in mobile communications or consumer electronics, will not be repeated unless a real effort is made to achieve critical mass in key domains of IST research. The actions will therefore mobilise the community of researchers around medium to long term objectives, facilitating the integration of public and private effort on a European scale, to build essential competencies and strengthen innovation. They will involve high-risk and long term RTD such as the development of the next generation of mobile and wireless systems beyond 3G, and will include underpinning research to investigate and experiment with future and emerging technologies within the specific context of the priority research areas indicated

Although substantial advances have been achieved, we are still far from taking full advantage of the potential of knowledge-based services in real life. Products and services are still hard to use and out of reach for many people, and the “digital divide” is widening within Europe and across the world. Research will focus on the future generation of technologies in which computers and networks will be integrated into the everyday environment, rendering accessible a multitude of services and applications through easy-to-use human interfaces. This vision of "ambient intelligence" places the user, the individual, at the centre of future developments for an inclusive knowledge-based society for all.

The IST priority in support of the eEurope action plan, will help build an information and knowledge based society across Europe, encouraging the participation of least developed regions. It will also include activities linking the EU effort to the international context. The aim is to achieve thematic area global consensus when appropriate e.g. through the Intelligent Manufacturing Systems (IMS) initiative or the dialogue on dependability issues, to integrate further the research of the Newly Associated States within the EU effort and to facilitate co-operation with developing countries.

Research priorities

i) Applied IST research addressing major societal and economic challenges

The objective is to extend the scope and efficiency of IST-based solutions addressing major societal and economic challenges, and to make them accessible in the most trusted and natural way, anywhere and anytime to citizens, businesses and organisations.

- ***Research on technologies for trust and confidence:*** The objective is to develop technologies for key security challenges posed by the “all-digital” world and by the need to secure the rights of individuals and communities.

Research will focus on basic security mechanisms and their interoperability, dynamic security processes, advanced cryptography, privacy enhancing technologies, technologies to handle digital assets and technologies for dependability to support business and organisational functions in dynamic and mobile systems.

- ***Research addressing societal challenges:*** The focus is on “ambient intelligence” for a broader inclusion of citizens in the Information Society, for more effective health, security, mobility and environment management and support systems, and for the preservation of cultural heritage, integration of multiple functionalities across these different domains will be also supported.

Research activities on “**e-inclusion**” will concentrate on systems enabling access for all, on barrier-free technologies for full participation in the information society and on assistive systems that will restore functions or compensate for disabilities thereby enabling a higher quality of life for citizens with special needs and their carers. In the area of **health**, the work will focus on intelligent systems aimed at supporting health professionals, at providing patients with personalised healthcare and information, and at stimulating health promotion and disease prevention in the general population. Research will also address intelligent systems to enhance **the protection of people and property** and for securing and safeguarding civil infrastructures.

In the area of **mobility**, research will focus on vehicle infrastructure and portable systems to provide integrated safety, comfort and efficiency and allow for the provision of advanced logistics infomobility and location based services. Research in the area of **environment** will focus on knowledge-based systems for natural resource management and for risk prevention and crisis management. In the area of **leisure**, research will focus on intelligent and mobile systems and application for entertainment and tourism. For **cultural heritage**, the effort will focus on intelligent systems for dynamic access to and preservation of tangible and intangible cultural and scientific resources.

- **Research addressing work and business challenges:** The objective is to provide businesses, individuals, public administrations, and other organisations with the means to fully contribute to, and benefit from, the development of a trusted knowledge-based economy, whilst at the same time improving the quality of work and working life and support life-long continuous learning to improve work skills. Research will also aim at a better understanding of the socio-economic drivers and impact of IST development.

Research in **e-business and e-government** will focus on providing European organisations, private and public, and especially SMEs, with interoperable systems and services to enhance innovation capacities, value creation and competitive performance in the knowledge economy and on supporting new business ecosystems. Research in organisational knowledge management will aim at supporting organisational innovation and responsiveness through elicitation, sharing, trading, and delivery of knowledge. Work on **electronic and mobile commerce** will target interoperable, multimodal applications and services across heterogeneous networks. It will include anytime-anywhere trading, collaboration, workflow, and electronic services covering the whole value creation cycle of extended products and services.

Research into **eWork systems** will focus on new workplace designs incorporating innovative technologies to facilitate creativity and collaboration, on increasing resource-use efficiency and on extending work opportunities to all in local communities. Work on **eLearning** will focus on personalised access to, and delivery of, learning as well as on advanced learning environments at school, university and in the workplace that take advantage of the development of ambient intelligence.

- **Complex problem solving in science, engineering, businesses and for society:** The objective is to develop technologies for harnessing computing and storage resources which are distributed in geographically dispersed locations, and for making them accessible, in a seamless way, for complex problem solving in science, industry,

business and society. Application fields include environment, energy, health, transport, industrial engineering, finance and new media.

Research will focus on new computational models, including computing and information GRIDs, peer-to-peer technologies and the associated middleware to make use of large scale highly distributed computing and storage resources and to develop scalable, dependable and secure platforms. It will include novel collaborative tools and programming methods supporting interoperability of applications and new generations of simulation, visualisation and datamining tools.

ii) Communication and computing infrastructures

The objectives are to consolidate and further develop European strengths in areas such as mobile communications, consumer electronics and embedded software, and to improve the performance, cost-efficiency, functionality and adaptive capabilities of communications and computing technologies.

- **Communication and network technologies:** The objective is to develop the new generations of mobile and wireless systems and networks that allow optimal service connection anywhere as well as all-optical networks to increase network transparency and capacity, solutions to improve network interoperation and adaptability, and technologies for personalised access to networked audio-visual systems.

*Work on terrestrial and satellite¹⁶ based, **mobile and wireless systems and networks beyond 3G** will focus on the next generation of technologies, ensuring co-operation and seamless inter-working at service and control planes of multiple wireless technologies over a common IP (Internet Protocol) platform as well as novel **spectral efficient protocols**, tools and technologies, to build wireless re-configurable IP enabled devices, systems and networks.*

*Research in **all optical networks** will focus on the management of optical wavelength channels enabling flexibility and speed in service deployment and provisioning and solutions for fibre to the LAN. Research on **interoperable network solutions**, including end-to-end network management will support generic services provision and interworking, and interoperation between heterogeneous networks and platforms. It will include programmable networks to provide adaptive and real-time allocation of network resources and enhanced service management capabilities by customers.*

*Research will also address the enabling technologies for personalised access to **networked audio-visual systems** and applications as well as cross-media service platforms and networks, trusted digital TV architectures and appliances able to process, encode, store, sense and display hybrid 3D multimedia signals and objects.*

- **Software technologies, services and distributed systems** The objective is to develop new software technologies, multifunctional service creation environments as well as tools for the control of complex distributed systems for the realisation of an ambient

16 The activity on satellite communications is done in coordination with the activities in priority 4 “aeronautics and space”.

intelligence landscape and for coping with the expected growth and spread of applications and services.

*Research will focus on **new technologies for software, systems and services**, that address composability, scalability, reliability and robustness as well as autonomous self-adaptation. It will address middleware for the management, control and use of fully distributed resources. Work on **multifunctional service creation environments** and new component frameworks will aim at the development of service functionality, including meta-information, semantics and taxonomy of the building blocks. New strategies, algorithms, and tools for systematic and accurate design, prototyping and **control of complex distributed systems** will be addressed e.g. with embedded controllers and ubiquitous computing resources. Work will include cognitive techniques for generic object and event recognition.*

iii) Components and microsystems

- **Micro, Nano and Opto-electronics** The objective is to reduce the cost, increase the performance and improve reconfigurability, scalability, adaptability and self-adjusting capabilities of micro-, nano- and opto-electronic components and systems-on-a-chip.

*Research will focus on **pushing the limits of CMOS** process and equipment technologies and enhancing device functionality, performance and integration of functions. It will address alternative process technologies, device types, materials and architectures to meet demands of communication and computing. Particular emphasis will be put on RF, mixed-signal and low power design. Work on **optical, opto-electronic, and photonic functional components**, will address devices and systems for information processing, communication, switching, storage, sensing and imaging. Research on **electron based nano-devices**, as well as on molecular electronics devices and technologies, will target those that promise broad functionality and have integration- and mass fabrication potential.*

- **Micro and Nano Technologies, Microsystems, Displays:** The objective is to improve the cost-efficiency, performance and functionality of subsystems and microsystems and to increase the level of integration and miniaturisation allowing for improved interfacing with their surrounding and with networked services and systems.

*Research will focus on new applications and functions that take advantage of multi-disciplinary interactions (electronics, mechanics, chemistry, biology, etc.) combined with the use of micro and nano-structures and new materials. The aim is to develop innovative, cost-effective and reliable **microsystems** and reconfigurable, miniaturised subsystem modules. Work will also include low cost, information-rich and higher resolution **displays** as well as advanced **sensors** including low cost vision and bio-metric sensors, and haptic devices. Work on **nano-devices and nano-systems** will address the exploitation of basic phenomena, processes and structures that promise novel or improved sensing or actuating functionality as well as their integration and fabrication.*

iv) Knowledge and interface technologies

The objective is to improve usability of IST applications and services and access to the knowledge they embody in order to encourage their wider adoption and faster deployment.

- **Knowledge technologies and digital content:** The objective is to provide automated solutions for creating and organising virtual knowledge spaces (e.g. collective memories) so as to stimulate radically new content and media services and applications.

*Work will focus on technologies to support the process of **acquiring and modelling, representing and visualising, interpreting and sharing knowledge**. These functions will be integrated in new semantic-based and context-aware systems including cognitive and agent-based tools. Work will address extensible knowledge resources and ontologies so as to facilitate service interoperability and enable next-generation Semantic-web applications. Research will also address technologies to support the **design, creation, management and publishing of multimedia content**, across fixed and mobile networks and devices, with the ability to self-adapt to user expectations. The aim is to stimulate the creation of rich interactive content for personalised broadcasting and advanced trusted media and entertainment applications.*

- **Intelligent interfaces and surfaces :** The objective is to provide more effective ways of accessing ubiquitous information and easier and natural interaction modes with intelligence that surrounds us.

*Research will focus on **interfaces and interactive surfaces** that are natural, adaptive and multi-sensorial, for an ambient landscape that is aware of our presence, personality and needs, and which is capable of responding intelligently to speech or gesture. The aim is to hide the complexity of technology by supporting a seamless human interaction with devices, virtual and physical objects and the knowledge embedded in everyday environments.*

*Work will also address technologies for **multilingual and multicultural access and communication** that support timely and cost effective provisions of interactive information-rich services meeting the personal, professional and business requirements of all members of linguistically and culturally diverse communities.*

1.1.3 Nanotechnologies, intelligent materials and new production processes

The twofold transition toward a knowledge-based society and of sustainable development demands new paradigms of production and new concepts of product-services. European production industry as a whole needs to move from resource-based towards knowledge-based approaches, from quantity to quality, from mass produced single-use products to manufactured-on-demand multi-use, upgradable product-services; from “material and tangible” to “intangible” value-added products, processes and services.

These changes are associated with radical shifts in industrial structures, involving a stronger presence of innovative enterprises, with capabilities in networks and mastering new hybrid technologies combining nanotechnologies, material sciences, engineering, information technologies, bio and environmental sciences. Such an evolution implies a strong collaboration across traditional scientific frontiers. Leading edge industrial developments

involve also a strong synergy between technology and organisation, the performance of both being highly dependent on new skills.

Successful technological solutions have to be sought more and more upstream in the design and production processes; new materials and nanotechnologies have a crucial role to play in this respect, as drivers of innovation. This requires changes of emphasis in Community research activities from short to longer term and in innovation which must move from incremental to breakthrough strategies. Community research will benefit greatly from an international dimension.

Research priorities

i) Nanotechnologies

Nanotechnologies represent a new approach to materials science and engineering. Europe enjoys a strong position in the nanosciences, that needs to be translated into a real competitive advantage for European industry. The objective is twofold: to promote the creation of an RTD-intensive European nanotechnology related industry, and to promote the uptake of nanotechnologies in existing industrial sectors. Research may be long-term and high risk, but will be oriented towards industrial application. An active policy of encouraging industrial companies and SMEs, including start-ups, will be pursued, amongst others through the promotion of strong industry/research interactions in consortia undertaking projects with substantial critical mass.

- **Long-term interdisciplinary research into understanding phenomena, harnessing processes and developing research tools:** The objectives are to expand the generic underlying knowledge base of application oriented nano-science and nanotechnology, and to develop leading edge research tools and techniques.

Research will focus on : molecular and mesoscopic scale phenomena: self-assembling materials and structures; molecular and bio-molecular mechanisms and engines; multi-disciplinary and new approaches to integrate developments in inorganic, organic and biological materials and processes.

- **Nanobiotechnologies:** The objective is to support research into the integration of biological and non-biological entities, opening new horizons in many applications, such as for processing and for medical and environmental analysis systems.

Research will focus on: lab-on-chip, interfaces to biological entities, surface modified nano-particles, advanced drug delivery and other areas of integrating nano-systems or nanoelectronics with biological entities; processing, manipulation and detection of biological molecules or complexes, electronic detection of biological entities, micro-fluidics, promotion and control of growth of cells on substrates.

- **Nanometre-scale engineering techniques to create materials and components:** The objective is to develop novel functional and structural materials of superior performance, by controlling their nano-structure. This will include technologies for their production and processing.

Research will focus on : nano-structured alloys and composites, advanced functional polymeric materials, and nano-structured functional materials.

- ***Development of handling and control devices and instruments:*** The objective is to develop a new generation of instrumentation for analysis and manufacture at the nano-scale. A guiding target will be a feature size or resolution of the order of 10nm.

Research will focus on : a variety of advanced techniques for nano-scale manufacture (lithography or microscopy based techniques); breakthrough technologies, methodologies or instruments exploiting the self-assembling properties of matter and developing nano-scale machines.

- ***Applications in areas such as health, chemistry, energy, optics and the environment:*** The objective is to foster the potential of nanotechnologies in breakthrough applications through the integration of research developments in materials and technological devices in an industrial context.

Research will focus on: computational modelling, advanced production technologies; development of innovative materials with improved characteristics.

ii) Intelligent Materials

New, high knowledge-content materials, providing new functionalities and improved performance, will be critical drivers of innovation in technologies, devices and systems, benefiting sustainable development and competitiveness in sectors such as transport, energy, medicine, electronics, and construction. To assure Europe's strong positions in emerging technology markets, which are expected to grow by one or two orders of magnitude within the next decade, the various actors need to be mobilised through leading edge RTD partnerships, including high risk research and through integration between research on materials and industrial applications.

- ***Development of fundamental knowledge:*** The objective is to understand complex physico-chemical and biological phenomena relevant to the mastering and processing of intelligent materials with the help of experimental, theoretical and modelling tools. This will provide the basis for synthesising larger complex or self-assembling structures with defined physical, chemical or biological characteristics.

Research will focus on: long-term, trans-disciplinary and high industrial risk activities to design and develop new structures with defined characteristics; development of supra-molecular and macromolecular engineering, focusing on the synthesis, exploitation and potential use of novel highly complex molecules and their compounds.

- ***Technologies associated with the production and transformation of new materials:*** The objective is the sustainable production of new “smart” materials with tailor-made functionalities and for building up macro-structures. These novel materials, serving multisectorial applications should incorporate in-built characteristics to be exploited under predetermined circumstances as well as enhanced bulk properties or barrier and surface characteristics for higher performance.

Research will focus on: new materials; engineered and self-repairing materials; crosscutting technologies including surface science and engineering.

- ***Engineering support for materials development:*** The objective is to bridge the gap from ‘knowledge production’ to ‘knowledge use’, thus overcoming the EU industry’s

weaknesses in the integration of materials and manufacturing. This will be achieved by the development of new tools enabling the production of new materials in a context of sustainable competitiveness.

Research will focus on: inherent aspects of optimising materials design, processing and tools; mechanical testing, validation and up-scaling; incorporation of life-cycle approaches, obsolescence, bio-compatibility and eco-efficiency.

iii) New Production Processes

New production concepts which are more flexible, integrated, safe and clean will depend on breakthrough organisational and technological developments supporting new products, processes and services, and at the same time decreasing (internal and external) costs. The objective is to provide the industrial systems of the future with the necessary tools for efficient life-cycle design, production, use and recovery as well as appropriate organisational models and improved knowledge management.

- **Development of flexible and intelligent manufacturing systems.** The objective is to encourage industry's transition towards more knowledge-based production and systems organisation and to considering production from a more holistic perspective, encompassing not only hardware and software, but also people and the way in which they learn and share knowledge.

Research will focus on : innovative, reliable, smart and cost-effective manufacturing processes and systems and their incorporation into the factory of the future: integrating hybrid technologies based on new materials and their processing, micro-systems and automation, high-precision production equipment, as well as integration of ICT, sensing and control technologies.

- **Systems research and hazard control.** The objective is to contribute to an improved sustainability of industrial systems and a substantial and measurable reduction in environmental and health impact, through new industrial approaches as well as enhancement of resource efficiency and resource consumption.

Research will focus on: development of new devices and systems for clean, safe and less carbon-intensive production; enhancing company responsibility on products, resource consumption and industrial waste management; studying “production-use-consumption” interactions as well as socio-economic implications.

- **Optimising the life-cycle of industrial systems, products and services.** Products and production should become increasingly life-cycle and service oriented, in addition to the requirements of intelligence, cost-effectiveness, safety and cleanliness. The key challenge is therefore new industrial concepts based on life-cycle approaches, which must allow new products, organisational innovation and the efficient management of information and its transformation into useable knowledge within the value chain.

Research will focus on: innovative product-services systems, that optimise the “design-production-service-end-of-life” value chain through the development and use of hybrid technologies and new organisational structures.

1.1.4 Aeronautics and space

Over the last decades, Europe's outstanding technological and industrial capabilities in aeronautics and the exploitation of space have made many and various contributions to the standard of living of its citizens and the development and growth of its economies, as well as to those outside Europe. The economic benefits they bring can be seen in highly skilled employment and the balance of trade surplus, and they can have a strong leverage effect in upgrading the competitiveness of other related economic sectors.

Although aeronautics and space are distinct domains, they share common features, being extremely R&D intensive, with long development lead-times and very large investment requirements. Fierce competition, strategic significance, and increasingly severe environmental constraints combine to make it necessary to strive continually towards higher levels of technological excellence by consolidating and concentrating RTD efforts in Europe, with the ultimate aim of better serving society.

Aeronautics research will be planned against a Strategic Research Agenda (SRA) agreed by all stakeholders at European level in the context of the new *Advisory Council for Aeronautics Research in Europe*, which will also be the planning base for national programmes. The result will be a greater level of complementarity and co-operation between the national and Community efforts in the field. The European Strategy for Space will serve as a reference in planning space research, with the objective of gathering key players on projects of common interest and close liaison will be ensured with RTD activities carried out by other actors, such as space agencies, Eurocontrol and industry. Furthermore, the application of relevant Treaty articles will be explored to support, as appropriate, these initiatives.

Research priorities

i) Aeronautics

In their report "Vision 2020", leaders of the sector in Europe have highlighted the need to optimise the Community and national research efforts around a common vision and a strategic research agenda. Consistent with this, research will concentrate on the following 4 main strands. The scope of the research action will be medium and large sized commercial aircraft including their systems and components, as well as the on-board and ground-based elements of air-traffic management systems.

- ***Strengthening competitiveness***: The objective is to enable the 3 sectors of the manufacturing industry: airframe, engines and equipment, to increase their competitiveness, by reducing, in the short and long term, respectively, aircraft development costs by 20% and 50%, and aircraft direct operating cost by 20% and 50%, and improving passenger comfort.

Research will focus on: integrated design systems and processes for the realisation of the extended multi-site enterprise concept, as well as for more intelligent production technologies; new aircraft configurations, advanced aerodynamics, materials and structures, engine technologies; mechanical, electrical and hydraulic systems; improved cabin-environmental conditions and utilisation of multimedia services to improve passenger comfort.

- ***Improving environmental impact with regard to engine emissions and noise.*** Concerning emissions, the objectives are to meet Kyoto goals and to compensate for the increase in future air traffic, by reducing CO₂ by 50% in the long term and NO_x by 20% and 80%, in the short and long term, respectively. Concerning noise, to limit the noise nuisance outside the airport boundary, the target is to reduce noise levels by 4-5 dB in the short term, and 10 dB in the long term.

Work will focus on low-emission combustion and propulsion concepts, engine technologies and related control systems, low-drag aerodynamic concepts, low-weight airframe structures and high temperature materials, as well as improved flight operational procedures; engine and power-plant technologies, aeroacoustics for airframe noise reduction, advanced noise-control systems as well as novel flight operational procedures in the vicinity of airports.

- ***Improving aircraft safety.*** The objective is to obtain a two-fold reduction in accident rates in the short-term, and a five-fold reduction the long term, in order to compensate for the growth in air transport movements.

Concerning preventive safety, research will focus on: investigation of systemic safety models, improve fault-tolerant systems and human-centred cockpit design enabling a controllable situation awareness for the crew. Research on accident mitigation will focus on improved materials and structures as well as advanced safety systems.

- ***Increasing operational capacity and safety of the air transport system.*** The objective is to optimise airspace and airport utilisation, and consequently reduce flight delays, through a seamlessly integrated European air traffic management system, which would facilitate the achievement of the “Single European-Sky” initiative.

Research will focus on on-board and ground automation aids, communication, navigation and surveillance systems as well as flight operation procedures that will enable the introduction of new concepts including the free-flight concept in the future European ATM system.

ii) Space

The aim is to contribute to the implementation of the European Strategy for Space, notably by targeting and focusing efforts with ESA and Member States on a small number of joint actions of common interest. Emphasis will be put on activities complementing those of space agencies (integration of terrestrial and space systems/services and demonstration of end-to-end services). This will include the following areas of activity:

- ***Galileo:*** the European Satellite Navigation system GALILEO, developed by the Joint Undertaking in close co-operation with the European Space Agency, will be fully operational by 2008. The use of the services provided by this infrastructure will span over wide ranges of activities of European society. The availability of precise navigation and timing services will have profound impacts in many domains.

It is important to build the necessary expertise and knowledge in Europe in order to exploit this emerging technology in the most efficient way.

Research will focus on: development of multisectorial concepts, systems and tools, which will rely on precise navigation and timing service provision; spreading of high level, coherent and seamless quality services in all environments (cities, indoors and outdoors, land, sea, air, etc.), in synergy with other service provision (telecommunication, surveillance, observation, etc.).

- **GMES:** the objective is to stimulate the development of markets for satellite-based information services, by development of technologies to bridge the gap between supply and demand.

Research will focus on: sensors, data, and information models, developed in Europe or elsewhere, as well as developing prototypes of operational services responding to specific types of demand (for example global environment, land-use, desertification, disaster management). Research, including on data acquisition, assembly and qualification of models combining spatial and terrestrial data in an integrated operational information system, would use existing satellite data, for example provided by Envisat, future EarthWatch projects and other systems.

- **Satellite telecommunications:** Satellite communications should be integrated with the wider area of telecommunications systems, notably terrestrial systems¹⁷.

1.1.5 Food Safety and health risks

This priority area is aimed at assuring the health and well-being of European citizens through a better understanding of the influence of food intake and environmental factors on human health and to provide them with safer and health-promoting foods, including seafoods, relying on fully controlled and integrated production systems originating in agriculture and fisheries. By re-addressing the classical approach ‘from farm to fork’, this thematic priority area aims at ensuring that consumer protection is the main driver for developing new and safer food and feed production chains, i.e. ‘from fork to farm’.

This end-user driven approach is reflected in the seven specific research objectives. Priority will be given to integrated research approaches crossing several specific objectives.

Research priorities

- **Epidemiology of food-related diseases and genetic susceptibilities.** The objective is to examine the complex interactions between food intake and metabolism, immune system, genetic background and environmental factors to identify key risk factors and develop common European databases.

Research will focus on : epidemiological studies of the effect of diet, food composition and lifestyle factors, on health, and the prevention or development of specific diseases, allergies and disorders; methodologies for measuring and analysing food composition and dietary intake, risk assessment, epidemiological and intervention models; influences of genetic variability using advances in functional genomics.

¹⁷ Considering the tight links between communications satellites and terrestrial technologies, the related work is presented in the context of the relevant actions of the “Information society technologies” thematic priority area.

- ***Impact of food, and in particular products containing genetically modified organisms, on health*** : The objective is to provide the scientific basis for improving health through diet, and the development of new health-promoting foods, by means of an improved understanding of food metabolism and by harnessing the opportunities now available from proteomics and biotechnology.

Research will focus on: overall relationship between diet and health, food components, effects of pathogens, chemical contaminants and new agents of prion type on body function; disease prevention; nutrient requirements and health promoting intervention strategies; determinants of consumer attitudes towards food products and production; health promoting properties of foods; methodologies for risk/benefit assessment of nutrients and of bioactive compounds; specificities of different age groups, particularly older consumers.

- ***“Traceability” processes, in particular relating to genetically modified organisms, including systems based on recent biotechnology developments***: The objective is to strengthen the scientific and technological basis for ensuring complete traceability from raw material origin to purchased food products, and thereby increase consumer confidence in the food supply.

Research will focus on: development, validation and harmonisation of technologies and methodologies to ensure complete traceability throughout the food chain ; scale-up, implementation and validation of methods in whole food chains; assurance of authenticity; validity of labelling and new HACCP criteria.

- ***Methods of analysis and detection of chemical contaminants and pathogenic micro-organisms (viruses, bacteria, parasites, and new agents of the prion type)***: The objective is to contribute to the development, improvement, validation and harmonisation of reliable and cost-effective sampling and measurement strategies for controlling the safety of the food and feed supply and ensuring accurate data for risk analysis.

Research will focus on: methods and standards for analysing and detecting food-borne pathogens and chemical contaminants, including pre-normative aspects; modelling and approaches to improve existing prevention and measurement control strategies; detection tests and geographical mapping of prions; material transfer of prions and environmental influences .

- ***Safer production methods and healthier foodstuffs, including those based on biotechnologies, and on organic farming processes***: The objective is to develop lower input farming systems and improved transformation processes aimed at producing safer and health-promoting food and feed, and improving the quality of food and feed through innovative technologies.

Research will focus on: individual and comparative assessment of safety, quality and competitiveness aspects of conventional, organic, and GMO-based production, processing and foodstuffs, and their improvement through better animal welfare, husbandry and waste-management; modified production methods and innovative technologies.

- ***Impact of animal feed, and the use of sub-products of different origins for that feed, on human health:*** The objective is to improve understanding of the role of animal feed in food safety, to reduce the use of undesirable raw materials and to develop alternative new animal feed sources.

Research will focus on: epidemiological studies of animal-feed induced food-borne diseases; influence of raw materials, including waste and by-products of different origins, processing methods, additives and veterinary drugs used in animal feed on animal and human health; improved waste management, to ensure exclusion of specified high-risk and condemned materials from the feed chain; novel protein, fat and energy sources other than meat and bone meal for optimal animal growth, reproductive potential and food product quality.

- ***Environmental health risks:*** The objectives are to identify the environmental factors, that are detrimental to health, understand the mechanisms involved and determine how to prevent or minimise these effects and risks.

Research will focus on: identification of causal agents including contaminants, and physiological mechanisms, of environment-linked health impacts; understanding of exposure pathways, estimation of cumulative, low dose and combined exposures; long-term effects; definition and protection of susceptible sub-groups; environmental causes and mechanisms responsible for the increase in allergies; impact of endocrine disrupters; chronic chemical pollution and combined environmental exposures, transmission of illnesses linked to water (parasites, viruses, bacteria, etc).

1.1.6 Sustainable development and global change

The Treaty confirms Sustainable Development as a central objective of the European Community. Climate change, energy security, sustainable transport, protection of nature, and their interaction with human activities motivate this research action. The activities carried out within this priority area aim to strengthen the scientific and technological capacities needed for Europe to be able to implement a sustainable development model and make a significant contribution to the international efforts to understand and control global change and preserve the equilibrium of ecosystems.

1.1.6.1 Technologies for Sustainable Development

Strategic objectives address the reduction of greenhouse gases and pollutant emissions, the security of energy supply, the balanced use of the various transport modes, as well as to achieve an enhanced competitiveness of European industry. Achieving these objectives in the short term requires a large-scale research effort to encourage the deployment of technologies already under development and to help promote changes in energy consumption behaviour and transport demand patterns. The longer term implementation of sustainable development requires an equally strong RTD effort to assure the economically attractive availability, and overcome the potential barrier to adoption, of renewable energy sources, hydrogen and fuel cells that are intrinsically clean.

Research priorities

i) Research activities having an impact in the short and medium term

Community RTD activity is one of the main instruments which can serve to change significantly current unsustainable patterns of development, characterised by growing dependence on imported fossil fuels, continually rising energy demand, increasing congestion of the transport system, and growing CO₂ emissions, by offering new technological solutions which could positively influence consumer/user behaviour in the *short and medium term*. Proposed technological solutions are expected to emerge from, and to be demonstrated in, consumer/user pilot-environments, addressing technical but also organisational, institutional, financial and social issues.

- ***Renewable energy sources, more efficient and clean use of energy, especially in urban areas, new concepts of energy efficient and cleaner transport:*** the objective is to develop energy efficient technologies that reduce demand for fossil fuels by stimulating energy efficient behaviour in disparate user communities and bring about energy savings of 12% by 2010, as well as to tilt the energy balance towards more sustainable energy systems, which combine heat and power as well as new and renewable sources, and thereby increase the share of renewable energy systems from 6% to 12% by 2010.

Research will focus on : increased cost efficiency and reliability of the main new and renewable sources, and their combination with conventional large-scale and distributed generation; efficiency in building, district heating systems and CHP; demand side action for reducing gas and electricity consumption; new forms of clean urban transport; rationalisation of the use of the private vehicle; integration of new concepts for energy efficient vehicles and new/alternative fuels.

- ***Sustainable transport:*** The Common Transport Policy forecasts a transport demand growth by 2010 in the European Union of 38% for freight and 24% for passenger transport (base-year 1998). The already congested transport networks will have to absorb the additional traffic, and the trend suggests that the proportion absorbed by the less sustainable modes is likely to grow. The objective is consequently both to fight against congestion and to decelerate or even reverse this unsustainable trend by rebalancing transport modes. Short and medium term actions will develop and integrate new concepts and technologies into the transport system.

Research will focus on: safer and more environmentally friendly transport, in particular for the road and maritime sectors; integration of intelligent transport systems for the efficient management of infrastructure; enabling railway interoperability; development of intermodality for passengers and freight, in particular through better management of the logistic chain and standardisation of loading units.

ii) Research activities having an impact in the longer term

In the *longer term* the objective is to develop renewable energy sources, hydrogen technologies and fuel cells which are intrinsically clean and which can be well integrated in a sustainable energy supply mix both for stationary and for transport applications. This to bring about further reduction in greenhouse gas emissions beyond the Kyoto deadline of 2010. The

future large-scale development of these technologies will depend on significant improvement in their cost and other aspects of competitiveness against conventional energy sources.

- **Fuel cells:** these represent an emerging technology which is expected, in the longer term, to replace a large part of the current combustion systems in industry, buildings and road transport, as they have a higher efficiency, lower pollution levels and a potential for lower cost. The long term cost target is 50 euro/kW for road transport and 300 euro/kW for high-durability stationary applications and fuel cell/electrolysers.

Research will focus on : cost reduction in fuel cell production and in applications for buildings, transport and de-centralised electricity production; advanced materials related to low and high temperature fuel cells for the above applications.

- **Hydrogen:** the objective to establish hydrogen as an energy carrier is key in a future sustainable energy economy. The long term aim is to achieve an energy cost which is equivalent to that of conventional fuels without tax.

Research will focus on : clean cost-effective production of hydrogen from fossil fuels (including CO₂ capture and underground storage); cost-effective hydrogen production by electrolysis from renewable and nuclear energy; hydrogen infrastructure including transport, distribution, storage and utilisation.

- **Solar photovoltaic technologies and biomass:** photovoltaics have, in the long term, the potential to make a large contribution to the world and EU energy supply. The objective is to overcome the major bottleneck of high investment costs, which should be reduced by a factor of 4. The overall objective for biomass is to make bioenergy competitive with conventional fuels.

Research will focus on : (photovoltaics) the whole production chain from basic material to the PV system, as well as integration of PV in habitat and large scale MW-size PV systems for production of electricity; (biomass) barriers in the biomass supply-use chain in the following areas : combustion technologies, gasification technologies for electricity and H₂/syngas production and biofuels for transport.

1.1.6.2 Global Change

Global Change encompasses the complex dynamic changes over different time-scales in the physical, chemical and biological components of the Earth system (i.e. atmosphere, oceans and land) in particular those influenced by human activities. The objective of this priority area is to strengthen the capacity to understand, detect and predict global change and develop strategies for prevention, mitigation and adaptation, in particular in relation to all types of greenhouse gases, in close liaison with the relevant international research programmes and in the context of relevant conventions such as the Kyoto Protocol. Such an objective will be best achieved through activities aiming at the development of common and integrated approaches necessary to implement sustainable development, taking into account its environmental, economic and social aspects, as well as the impact of global change on all countries and regions of the world. It will foster the convergence of European and national research efforts for a consensual definition of the scientific thresholds of sustainability and estimation methods, and encourage international co-operation in order to achieve common strategies to respond to global change issues.

Research priorities

- **Impact and mechanisms of greenhouse gas emissions on climate and carbon sinks (oceans, forests and soil):** the objective is to detect and describe global change processes, improve prediction of their global and regional impacts, evaluate mitigation options and improve the access of European researchers to facilities and platforms for global change research.

Research will focus on: understanding and quantification of changes in the carbon and nitrogen cycles and the role of sources of all greenhouse gases, and sinks in the terrestrial and ocean biosphere; influence of and effects on climate dynamics and variability, ocean and atmospheric chemistry, and their interactions; understanding and prediction of global climatic change; associated phenomena (e.g. El Niño, stratospheric ozone depletion, changes in sea level and ocean circulation); and impacts.

- **Water cycle:** the objective is to assess the impact of global change and in particular climate change on the water cycle, water quality and availability, to provide the bases for management tools to mitigate the impacts.

Research will focus on: impact of climate change on hydrological variables, groundwater/surface water distribution, freshwater and wetland ecosystems and water quality; the driving role of oceans in the global water cycle; management strategies and their impacts; scenarios of water demand and availability.

- **Biodiversity, protection of genetic resources, functioning of terrestrial and marine ecosystems and interactions between human activities and the latter:** the objectives are to develop a better understanding of marine and terrestrial biodiversity and of ecosystem functioning, understand and minimise the impacts of human activities on them and ensure sustainability of natural resources.

Research will focus on: assessing and forecasting changes in biodiversity, structure, function and dynamics of ecosystems and their services; relationships between society, economy, biodiversity and habitats; integrated assessment of drivers affecting biodiversity and mitigation of biodiversity loss; risk assessment, management, conservation and rehabilitation options.

- **Mechanisms of desertification and natural disasters connected with climate change:** the objective is to elucidate the links between climatic change and the mechanisms of desertification and natural disasters, so as to improve risk and impact assessment and forecasting, decision support methodologies, and strategies for sustainable land and coastal management.

Research will focus on: large scale integrated assessment of land/soil degradation and desertification in Europe and related prevention and mitigation strategies; long term forecasting of hydro-geological hazards associated with global climate change; natural hazard monitoring, mapping and management strategies; improved disaster preparedness and mitigation.

- **Global climate change observing systems:** the objective is to make systematic observations of climate parameters so as to strengthen climate change research,

consolidate long-term observations for the modelling and forecasting of the marine, terrestrial and atmospheric environment, establish common European data bases and contribute to international programmes.

Research will focus on: observations of basic marine, terrestrial and atmospheric parameters necessary for global climate change research and management strategies, and of extreme events; large observing/monitoring/ surveying/modelling networks (taking into account the developments of GMES and providing the European dimension to G3OS).

1.1.7 Citizens and Governance in the European Knowledge-based society

The Lisbon European Council recognised that the transition towards a European knowledge based society will affect every aspect of people's lives. The overall objective is to provide a sound knowledge base for the management of this transition, which will be conditioned by national, regional and local policies, programmes and actions, as well as informed decision making by individual citizens, families and other societal units.

Given the complexity, breadth and interdependence of these challenges and the issues involved, the research approach adopted must be based on greatly enhanced research integration, multi and transdisciplinary cooperation, and on the mobilisation of the social sciences and humanities research communities in Europe in addressing them. Activities will also facilitate the identification of medium to long term societal challenges arising from research in social sciences and humanities and will ensure the active participation of key societal stakeholders and the targeted dissemination of the work carried out. In order to support the development of comparative transnational and interdisciplinary research, while at the same time preserving the diversity of research methodologies throughout Europe, the collection and analysis of better and more genuinely comparable data and the coordinated development of statistics and qualitative and quantitative indicators in particular in the context of the emerging knowledge society at the European level is essential.

Appropriate coordination of socio-economic research and foresight elements across all the Priorities of this programme will be assured .

Research priorities

i) Knowledge-based European Society

The building of a European knowledge society is a clear political objective for the European Community. The research aims to provide the basis of understanding needed to ensure this takes place in a manner which accords with specific European conditions and aspirations.

- ***Improving the generation, distribution and use of knowledge and its impact on economic and social development.*** The objective is to improve significantly understanding of the characteristics of knowledge and its functioning as a public and private good, and to provide the bases for policy formulation and decision making.

Research will focus on: characteristics of knowledge and its functioning in relation to the economy, society and innovation; and the transformation of economic and social institutions; the dynamics of knowledge production, distribution and use, role of knowledge codification and impact of ICTs ; the importance of territorial structures and social networks in these processes.

- ***Options and choices for the development of a knowledge-based society serving the EU objectives set at the Lisbon summit:*** The objective is to develop an integrated understanding of how a knowledge-based society can promote the societal objectives of sustainable development, social and territorial cohesion and improved quality of life, with due consideration to the variety of social models in Europe.

Research will focus on: features of a knowledge based society in line with European social models and the need to improve the quality of life; social and territorial cohesion, gender and intergenerational relations and social networks; implications of changes to work and employment; access to education and training, and life-long learning.

- ***The variety of paths towards a knowledge society.*** The objective is to provide comparative perspectives across Europe and thus provide an improved basis for the formulation and implementation of transition strategies towards a knowledge society at the national and regional levels.

Research will focus on: globalisation in relation to pressures for convergence; the implications for regional variation; challenges to European societies from a diversity of cultures and increased sources of knowledge; the role of the media in this context.

ii) *Citizens, democracy and new forms of governance*

The work will identify the main factors influencing changes in governance and citizenship, as well as the impacts of these changes and the possible options to enhance democratic governance, resolve conflicts, protect human rights and take account of cultural diversity and multiple identities.

- ***The implications of European integration and enlargement for governance and the citizen:*** The objective is to clarify the key interactions between European integration and enlargement, and issues of democracy, institutional arrangements and citizens' well-being.

Research will focus on: relationships between integration, enlargement and institutional change within a historical and comparative perspective; the implications of a changing global context and the role of Europe; the consequences of an enlarged European Union for the well-being of its citizens.

- ***Articulation of areas of responsibility and new forms of governance:*** The objective are to support the development of forms of multi-level governance which are accountable, legitimate, and sufficiently robust and flexible to address societal change including integration and enlargement, and to assure the effectiveness and legitimacy of policy making.

Research will focus on: the articulation of responsibilities between various territorial levels and between public and private sectors; democratic governance, representative institutions and roles of civil society organisations; privatisation, the public interest, new regulatory approaches, corporate governance; implications for legal systems.

- ***Security issues connected with the resolution of conflicts and restoration of peace and justice:*** the objectives are to support the development of institutional and social capacity in the field of conflict resolution, identify factors leading to success or failure in preventing conflict, and develop improved options for conflict mediation.

Research will focus on: early identification of factors leading to conflict within and between countries; comparative analysis of procedures for prevention and mediation of conflicts and achievement of justice in different fields; Europe's role in regional and international arenas in these respects.

- ***New forms of citizenship and identities:*** The objectives are to promote citizens' involvement and participation in European policy making, as well as to understand perceptions and impacts of European citizenship and human rights provisions, and factors that allow mobility and coexistence of multiple identities.

Research will focus on: relations between new forms of citizenship including rights of non-citizens; tolerance, human rights, racism and xenophobia; the role of the media in the development of a European public sphere; evolution of citizenship and identities in a context of cultural and other diversities and increasing population flows; implications for the development of a European knowledge based society.

1.2. ANTICIPATING THE EU'S SCIENTIFIC AND TECHNOLOGICAL NEEDS

Activities under this heading will have the following overall objectives:

- To provide support for policy in areas of high interest to the EU, and where specific research, or research complementing that carried out under the priority thematic areas, is needed
- To explore new and emerging scientific and technological problems and opportunities, including in particular interdisciplinary and multidisciplinary research areas, where European action is appropriate in view of the potential to develop strategic positions at the leading edge of knowledge and in new markets, or to anticipate major issues facing European society.

A common feature of these activities is that they will be implemented within a multi-annual perspective which takes direct account of the needs and viewpoints of the main associated actors (policymakers, industrial user groups, leading edge research groups, etc.)

The Joint Research Centre will contribute under its own programme to the aims of this part of the specific programme in accordance with its mission to support the development of EU policies.

i) Policy-orientated research and leading edge topics

These activities cover two categories of research:

- Research needed for the formulation, implementation and monitoring of the application of Community policies, bearing on the interests of possible future members of the Union as well as the existing member states, which may be described in the following non-exclusive terms:

- research in support of the implementation of common policies, including research for the common agricultural policy, and the common fisheries policy;
- research in support of Community policy objectives, including those set out in the 6th Environment Action Programme¹⁸ and the Green Paper “Towards a European strategy for the security of energy supply”;¹⁹ and the objectives of the Community transport policy;
- research in support of important objectives of the Community, such as those set by the European Commission for the five years of its mandate and those derived from the political orientations given by the European Council, for example in the Lisbon strategy, with regard to economic policy, in the fields of the Information Society and e-Europe, enterprise, social policy and employment, and education and culture, including the requisite statistical methods and tools;
- research needed for other Community policies, including in such fields as health, and in particular public health, regional development, trade, external relations and development aid, and justice and internal affairs.
- Research in response to needs in new interdisciplinary and multidisciplinary areas or areas at the leading edge of knowledge, in order to help European research cope with major specific and unforeseen developments, including in areas linked to the priority fields.

The activities will be carried out on the basis of a multiannual programming for each policy area and each leading edge topic identified as a priority. Multi-annual programming will be established from the outset for those research needs that can already be anticipated, complemented through annual evaluation procedures, in particular for those needs (relevant to either category of research) that can not be anticipated yet.

- For activities in support of Community policies, the evaluation will be conducted by a user group composed of different Commission Services, supported by the opinions of scientific committees in the relevant areas and of an independent consultation structure composed of high-level scientific and industrial experts. It will also be supported for the identification of needs by wide-ranging consulting of interested circles in the EU and the countries associated with the Framework Programme.
- The evaluation conducted by the user group will be based on the contribution of the research themes proposed to policy formulation and development (e.g. links with legislative proposals in preparation or with major deadlines in the area), as well as on the general criteria indicated below;
- For activities on leading edge topics, the evaluation will be conducted with the support of an independent consultation structure composed of high-level scientific and industrial experts.

18 *COM(2001)31.*
 19 *COM(2000)769.*

- For both types of activities, evaluation will be based on the following criteria:
 - the potential contribution of the research themes proposed for the EU’s competitiveness, the strengthening of its scientific and technological bases and the achievement of the European Research Area;
 - the scientific relevance and feasibility of the research themes and approaches proposed.

The programming may be altered by means of an emergency procedure based on the same evaluation criteria in the event of a crisis giving rise to urgent and unforeseen research needs.

The activities programmed will be carried out by means of calls for proposals. They will essentially take the form of:

- Targeted specific projects generally of a limited scale, carried out by means of partnerships of a size adapted to the needs to be covered.
- The networking of research activities carried out at national level where achieving the objectives pursued requires mobilising capacities existing in the Member States.

In certain duly justified cases, where the objectives pursued can be better attained in this way, limited use may be made of the instruments used in the priority thematic areas.

The proposals will be selected by the Commission following evaluation by independent experts.

ii) Specific research activities for SMEs

Objectives

Small and medium-sized enterprises (SMEs) play a crucial role in European competitiveness and job creation, not only because they represent the overwhelming majority of enterprises in Europe, but also because they are the source of dynamism and change in new markets, particularly those at the leading edge of technology. Although a heterogeneous community, they are all confronted by increased competition resulting from the completion of the European internal market and the need to innovate constantly and accommodate advances in technology. Besides this, an increasing number of SMEs both need and want to internationalise in search of new markets and business opportunities.

SMEs will participate, for the most part, in the activities implemented under the priority thematic areas of research within networks of excellence and integrated projects. In addition, specific schemes for SMEs in the form of actions on collective and cooperative research will be set up. These will be addressing primarily the large community of SMEs with a capacity to innovate but with limited research capability. However, the co-operative research scheme will be extended to provide support for new, high-tech SMEs through arrangements catering specifically for their needs.

Overall, at least 15% of the budget relating to the “integrating research” part of this programme will be allocated to SMEs.

Collective Research

Collective research is a form of research undertaken by RTD performers on behalf of industrial associations or industry groupings in order to expand the knowledge base of large communities of SMEs and thus improve their general standard of competitiveness. Conducted on a European basis, through substantial projects of several years duration, this is an efficient way of addressing technological needs of significant sections of the industrial community.

Based on schemes existing in many member states, this measure aims at allowing industrial groupings to identify and express research needs that are common to large numbers of SMEs at European level. It should allow to improve the overall European technological basis of whole industrial sectors. By inter-linking industrial groupings in different countries and in financing larger projects with an increased responsibility for project co-ordinators, it will contribute to structuring the landscape of collective research in line with the objectives of the European Research Area.

Collective research projects could cover, for example :

- ***Research aimed at addressing common problems/challenges (e.g. to meet regulatory requirements, environmental performance)***
- ***Pre-normative research (research to provide a scientific base for European norms and standards)***
- ***Research aimed at reinforcing the technological basis of particular sector(s)***
- ***Development of “technological tools” (e.g. diagnosis, safety equipment)***

Projects will be managed, on the basis of well-defined guidelines, by industrial associations or other groupings established at European level, or at least 2 national industrial associations/groupings established in different European countries. European Economic Interest Groups representing the interests of SMEs are also eligible. A “core group” of SMEs associated to each project will monitor progress from the definition phase of the research to the dissemination of the results obtained.

A 2-step approach is envisaged in identifying topics and selecting proposals (call for outline proposals and, after those selected in a first round evaluation have been developed into complete proposal(s), evaluation and selection from amongst these). The level of funding and contractual arrangements of Collective research projects will depend on their objectives:

- ***projects aimed at strengthening the competitiveness of a specific industrial sector would benefit from a maximum Community contribution of 50% of the total eligible costs. In such cases the contracting party (the industrial groupings) would own the results.***
- ***projects having a strong legislative or “public well-being” content (e.g. environmental protection, enhancement of public health), could obtain a higher funding. In such cases, the main emphasis will be on a Europe-wide dissemination of the research results.***

In all cases, dissemination of the results amongst the SMEs would be foreseen through, for example, special training and demonstration (“take-up”) actions.

Co-operative Research

Co-operative research is a scheme whereby a limited number of SMEs from different countries having specific problems or needs, outsource the required research to an RTD performer, while retaining ownership of the results. Projects are relatively short term and may address any research topic or field, being based on the specific needs and problems of the SMEs concerned. Other (non-SME) enterprises and end-users will be able to participate in co-operative research projects, under conditions ensuring they do not assume a dominant role, and have restricted access to the results.

Young high-technology SMEs, including "start-ups", may need to outsource specific basic research requirements to extend or renew the knowledge base underpinning their own research activities. In this case, the co-operative research scheme can be used by a single SME which needs to co-operate with an RTD performer from another country having the required specialised complementary research skills. Special provisions regarding access to the results will apply for such cases.

Co-operative research will be implemented via an open call for proposals. This activity will also be responsible for the co-ordination of a dedicated network of SME National Contact Points in the Member States and Associated States, providing SMEs at regional and national level with information and assistance on their participation in the Framework Programme, including in Networks of Excellence and Integrated Projects. Close co-ordination with the Economic and Technological Intelligence Actions and with the innovation support services, implemented under the heading "Research and Innovation", will ensure that SMEs benefit from all the foreseen instruments and activities.

iii) Specific international co-operation activities

The general objective of the international cooperation activities carried out under the Framework Programme is to help open up the European Research Area to the rest of the world. These activities represent the particular contribution of the Framework Programme to this opening-up process, which will require a joint effort by the Community and the Member States.

Under this heading, the activities in question have the following particular objectives:

- ***To help European researchers, businesses and research organisations in the EU and the countries associated with the Framework Programme to have access to knowledge and expertise existing elsewhere in the world.***
- ***To help ensure Europe's strong and coherent participation in the research initiatives conducted at international level in order to push back the boundaries of knowledge or help to resolve the major global issues, for example as regards health and environment.***
- ***To lend support, in the scientific and technological field, to the implementation of the Community's foreign policy and development aid policy.***

Apart from opening up the networks of excellence and the integrated projects to participation by third-country researchers and institutions, international cooperation activities will take the form of specific activities.

Carried out in support of the Community's foreign policy and development aid policy, these specific activities will concern three groups of countries: the Mediterranean third countries, Russia and the CIS countries, and the developing countries.

They will be carried out in such a way as to complement the participation of researchers and entities in those countries in the networks of excellence and integrated projects which are open to them and in which they will participate in a variable way depending on the themes and countries.

The research priorities in this category of activities are defined on the basis of the interests and objectives of the Community's political partnership with the different groups of countries, as well as their particular economic and social needs.

They will therefore cover more particularly:

- *In the case of the Mediterranean third countries, in support of the development of the Euro-Mediterranean partnership, issues relating to environment, health and water issues, as well as protection of the cultural heritage.*
- *In the case of Russia and the CIS countries, stabilisation of R&D potential, issues relating to changes in the industrial production system, environment and health protection and various safety aspects.*
- *In the case of the developing countries, the problems of health and public health, food safety, and the rational exploitation of resources.*

These activities will be carried out by means of research, technological development and demonstration projects of a limited scale, actions to coordinate national efforts and, where necessary, specific support measures.

Cooperation activities with Russia and the CIS will be carried out in particular through the INTAS structure set up jointly by the Community and the Member States.

In all three cases, one of the major objectives is to help strengthen, stabilise, develop or adapt the local research systems.

Accordingly, the Framework Programme activities will endeavour to strengthen coordination and complementarity with activities carried out by means of financial instruments such as, in the case of the Mediterranean third countries, the MEDA Programme, in the case of Russia and the CIS countries the Tacis Programme and in the case of the developing countries the EDF (European Development Fund) and the ALA (Latin America/Asia) Fund. These activities can help to promote the development in those countries of human resources for research, research infrastructures and capabilities relating to innovation and exploitation of results.

2. Strengthening the foundations of the European Research Area

The establishment of the European Research Area depends on improving the coherence and co-ordination of research and innovation activities and policies conducted at national, regional and European level.

The objectives of Community action in this field are to stimulate and support programme coordination and joint actions among Member States and among European organisations as well as to develop the common knowledge base necessary for the coherent development of policies. The activities may be implemented in any scientific and technological area, including in the thematic priority domains.

2.1 Co-ordination of research activities

Coordination of national activities

The objective is to encourage and support initiatives undertaken by several countries, in areas of common strategic interest, to develop synergy between their existing activities through coordination of their implementation, mutual opening and mutual access to research results, as well as to define and implement joint activities.

The activities concerned must be understood as programmes or parts of programmes, instruments, plans or other initiatives undertaken at national or regional levels and involving public funding to support RTD work, the development of research capabilities, and the promotion of innovation. The activities may be undertaken directly by public authorities or research agencies at national or regional levels or through European co-operation frameworks such as the European Science Foundation (e.g. the collaborative scheme EUROCORES).

The Community will encourage and support initiatives aimed at networking national and regional activities and programmes, by supporting:

- the coordination of independent activities including their mutual opening;
- the preparation and the management of joint activities.

For this purpose, the Community will :

- **support proposals** selected following their submission in response to an **open call for proposals** (2 evaluations per year). Where appropriate, calls for expressions of interest, followed by targeted calls may be published.

Proposals may cover for instance strategic studies and planning, consultation of the research and innovation community, joint calls for proposals and peer review panels, exchange and dissemination of information and results, programme monitoring and evaluation, exchange of personnel.

Proposals will be evaluated taking into account in particular the following aspects: the scope of the resources mobilised, the scientific and technological relevance and

impact, the expected improvement in the use of research resources at European level and where appropriate their contribution to promoting innovation.

- **Develop an integrated information system**, which will be easily accessible, user-friendly and updated regularly, to provide relevant information to:
 - policy makers and programme managers: information on national research programmes, instruments, research activities undertaken and planned to help identify opportunities for co-ordination, networking or joint initiatives;
 - the research community: information on national or joint programmes in which they can participate.

Co-ordination at European level

The objective is to enhance the complementarity and synergy between Community actions undertaken under the Framework Programme and those of other European scientific co-operation organisations as well as among these organisations themselves. Through increased co-ordination and collaboration the various European co-operation frameworks will contribute more effectively to the overall coherence of European research efforts and the establishment of a European Research Area. Community participation in international activities can be supported in duly justified cases.

- ***Scientific and technological co-operation activities carried out in other European co-operation frameworks***

COST is a long-standing bottom-up mechanism that facilitates co-ordination and exchanges between nationally funded scientists and research teams in a variety of areas. In order for COST to continue to ensure a cost-effective contribution to research co-ordination within the European research area, its management arrangements must be adapted to the new context. This will entail the establishment by COST member states of an appropriate organisation to which financial support may then be granted under this programme.

Coordination with **EUREKA** will be strengthened to improve strategic coherence and complementarity of funding, in particular in the thematic priority areas. Joint information and communication actions will also be organised where appropriate.

- ***Collaboration and joint initiatives of specialised European scientific cooperation organisations***

With regard to thematic European organisations, such as CERN, ESA, ESO, EMBL, ESRF, ILL, the Community will encourage and support specific initiatives aiming at strengthening the coherence and synergies between their activities and between them and Community actions, in particular through the development of joint approaches and actions on issues of common interest.

2.2 Coherent development of research and innovation policies

The objective of the activities to be carried out in this area is to encourage the coherent development of research and innovation policies in Europe thanks to the early identification

of challenges and areas of common interest as well as by providing national and Community policymakers with knowledge and decision-aiding tools that can help them formulate policy.

The activities to be carried out to this end will take place in the following areas:

– ***Analyses and studies; work relating to foresight, statistics and science and technology indicators***

These activities will include studies, analyses and foresight activities relating to scientific and technological activities and research and innovation policies in the context of the implementation of the European Research Area.

The activities relating to foresight will include in particular the development of thematic dialogue platforms and a knowledge base for users and producers of prospective analyses, the exploitation of good practices with regard to methodology, as well as the preparation of medium and long term scenarios for science and technology in Europe.

Work on indicators will involve the further development of relevant and harmonised indicators, taking into account the different dimensions of research and innovation and their impact on economy and society, for example for comparing the scientific and technological performance of the Member States and regions.

– ***Benchmarking of research and innovation policies at national, regional and European level***

The first exercise to benchmark national RTD policies, which began in 2000, will be completed by mid 2002. In the light of this exercise, the methodology of the next benchmarking cycles, including the indicators, will be adapted and the exercises will be enlarged geographically by opening them up to the countries in the process of acceding to the EU and the associated countries, and will be extended to include other themes. Special attention will be paid to the dissemination and monitoring of the application of best practices in close collaboration with the Member States and the research actors.

The benchmarking work in progress in the field of innovation (gathering of information about innovation policies in Europe, development of the “innovation scoreboard” and organisation of “peer reviews” of innovation policies by “thematic clubs” of policymakers) will be extended so as to open them up geographically, in social terms as a result of involving the innovation stakeholders, and in regional terms.

– ***Mapping scientific and technological excellence in Europe***

The activities on mapping excellence will be expanded according to two guidelines, increasing the number of themes covered and regularly updating the results.

Special attention will be paid to the very broad dissemination of the information available as well as to the coordination of mapping with the activities aimed at promoting the integration of research efforts in Europe.

– ***Improving the regulatory and administrative environment for research and innovation in Europe***

The objective here is to examine and analyse regulatory and administrative obstacles, to identify and disseminate good management practices and to help formulate new approaches. The following are some of the areas that will be concerned: intellectual and industrial property; public-private relations with regard to research and innovation; the exploitation and dissemination of knowledge; the rules governing access to new products or services on the market; mechanisms for funding research and innovation and encouraging investment, in particular by the private sector.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Types of activities	Amount (EUR million)
INTEGRATING RESEARCH²⁰	12 05521
<i>Priority thematic areas of research</i>	10 425
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
<i>Anticipating the EU's scientific and technological needs</i>	1 630
Policy orientated research and leading edge topics	880
Specific research activities for SMEs	450
Specific international cooperation activities	300
STRENGTHENING THE FOUNDATIONS OF THE EUROPEAN RESEARCH AREA	450
Support for the co-ordination of activities	400
Support for the coherent development of policies	50
Total	12 505

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

21 *Including EUR 600 million for international co-operation activities, and including any amounts provided for under decisions of the European Parliament and Council pursuant to Article 169 of the Treaty*

ANNEX III – MEANS FOR IMPLEMENTING THE PROGRAMME

In order to implement the specific programme, and in accordance with the Decisions 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 (2002/.../EC) and with the rules for the participation of undertakings, research centres and universities and for the dissemination of research results (2002/.../EC), the Commission will use various instruments.

The Commission will evaluate the proposals in accordance with the evaluation criteria set out in the above mentioned Decisions in order to verify their relevance with regard to the objectives of the programme, their scientific and technological excellence, their Community added value and the participants' management capacity.

The Community contribution will be granted in accordance with the above mentioned decisions. In the case of participation of bodies from regions lagging in development, it may be possible to obtain complementary funding from the Structural Funds within the limits specified by the Community framework for state aid for research.

A. NEW INSTRUMENTS 22

A.1 Networks of excellence

Networks of excellence are implemented in the seven priority thematic areas of the Framework Programme and, in duly justified cases, in research areas meeting the needs of Community policies and as well as in new and emerging areas.

The objective of this instrument is to strengthen European scientific and technological excellence by means of a progressive and lasting integration of research capacities existing or emerging in Europe at both national and regional level. Each network will aim at advancing knowledge in a particular area by assembling a critical mass of skills.

In general, the network will be organised around a core group of participants to which others may be added. In order to create a *virtual centre of excellence*, they will integrate a considerable part or even the totality of their research activities in the area concerned. These activities will often be multidisciplinary, and oriented towards long-term objectives and not precise predefined results in terms of products, processes or services.

In addition to these integrated research activities, the network's joint programme of activities will also comprise integration activities as well as activities related to spreading of excellence outside the network.

In pursuing its objectives, the network will therefore carry out:

- Research activities integrated by its participants

22 *As well as the funding of national programmes carried out by several Member States in accordance with Article 169 of the Treaty.*

- Integration activities which will comprise in particular:
 - adaptation of the participants' research activities in order to strengthen their complementarity;
 - development and utilisation of electronic information and communication means, and development of virtual and interactive working methods;
 - short-, medium- and long-term exchanges of personnel, the opening of positions to researchers from other members of the network, or their training;
 - development and use of joint research infrastructures, and adaptation of the existing facilities with a view to a shared use;
 - joint management and exploitation of the knowledge generated, and actions to promote innovation.
- Activities of spreading of excellence which will comprise, as appropriate:
 - training of researchers;
 - communication concerning the achievements of the network and the dissemination of knowledge;
 - services in support of technological innovation in SMEs, aimed in particular at the take-up of new technologies;
 - analyses of science/society issues related to the research carried out by the network.

In carrying out some of its activities (such as training of researchers), the network will endeavour to ensure publicity by publishing calls for applications.

The size of the network may vary according to the areas and subjects involved. As an indication, the number of participants should not be less than half a dozen. On average, in financial terms, the Community contribution to a network of excellence may represent several million euros per year.

The network proposals should comprise the following elements:

- a general outline of the joint programme of activities, and its content for the first year, broken down into research activities, integration activities, and activities for spreading excellence;
- the role of the participants, identifying the activities and resources that they will integrate;
- the operation of the network (coordination and management of activities);
- the plan for the dissemination of knowledge and the perspectives as regards exploitation of the results.

The partnership may evolve when necessary, within the limit of the initial Community contribution, by replacing participants or adding new ones. In most cases, this will be done through publication of a call for applications.

The programme of activities would be updated yearly and would entail a reorientation of certain activities or launching of new ones not initially foreseen, which could involve new participants. The Commission may launch calls for proposals with a view to the allocation of additional contribution in order to cover, for example, an extension of the integrated activities of the existing network or the integration of new participants.

The Community's financial contribution will be a specified amount linked to the implementation of a set of work, initially calculated on the basis of the resources dedicated to carrying out the joint programme of activity and paid on an annual basis, taking into account activities and financial reports. As a complement to the resources of the participants, it should be sufficient to act as an incentive for integration, but without creating a financial dependence that might jeopardise the lasting association of the network.

A.2 Integrated projects

Integrated projects will be implemented in the seven priority thematic areas of the Framework Programme and, in duly justified cases, in research areas meeting the needs arising from the implementation of Community policies as well as in new and emerging areas.

The objective of this instrument is to strengthen European competitiveness or contribute to resolve major societal problems by mobilising a critical mass of research and technological development resources and skills existing in Europe.

Accordingly, each integrated project will have the aim of obtaining identifiable scientific and technological results applicable to products, processes or services. The activities carried out in the context of an integrated project will have by definition clearly defined objectives even in the case of risky research.

In general, the participants in the projects will be organised around a core group made up of the main participants. All the activities carried out in the context of an integrated project will be defined in the general framework of an "execution plan" comprising activities relating to:

- research, technological development and/or demonstration;
- management, dissemination and transfer of knowledge with a view to promoting innovation;
- analysis and assessment of the technologies concerned, as well as the factors relating to their exploitation.

In pursuit of its objectives, it may also comprise activities relating to:

- training researchers, students, engineers and industrial executives, in particular for SMEs;
- support for the take-up of new technologies, in particular by SMEs;

- information and communication, and dialogue with the public concerning the science/society aspects of the research carried out within the project.

The size of an integrated project may vary according to the themes and subjects, depending on the critical mass necessary in order to obtain the expected results under the best possible conditions.

The combined activities of an integrated project may represent a financial size ranging from several million euros to several tens of millions of euros.

In most cases an integrated project will comprise a set of specific actions, relating to certain aspects of the research needed to achieve the objectives pursued, of variable sizes and structures according to the tasks to be executed, implemented in a closely coordinated manner. In some cases, however, an integrated project may take the form of a single large project with a single component.

Integrated project proposals should comprise the following elements:

- the scientific and technological objectives of the project;
- the main lines and timetable of the execution plan, highlighting the articulation of the various components;
- the stages of implementation and the results expected in each one of them;
- the role of the participants within the consortium and the specific skills of each of them;
- the organisation and management of the project;
- the plan for the dissemination of knowledge and the exploitation of results;
- the global budget estimate and the budget for the different activities, including a financial plan identifying the various contributions and their origin.

The partnership may evolve when necessary, within the limits of the initial Community contribution, by replacing participants or adding new ones. In most cases, this will be done through publication of a call for applications.

The execution plan will be updated yearly. This updating may entail the reorientation of certain activities and the launching of new ones. In the latter case, and where an additional Community contribution is needed, the Commission will identify these activities and the participants who will carry them out, by means of a call for proposals.

The Community contribution will be part of a financing plan which may involve recourse to other financing schemes, in particular Eureka or the instruments of the EIB or the EIF. It may amount to up to 50% of the total project budget, broken down into budgets per activity. It will be paid annually on the basis of the proposed execution plan, and adjusted according to the activities and the financial reports.

A.3 Collective research projects

Implemented across the whole field of science and technology, these projects will be carried out by research entities for the benefit of industrial associations or groupings, in areas and on subjects of interest to a large number of SMEs confronted with common problems.

B OTHER INSTRUMENTS

In order to implement the programme, la Commission may also have recourse to:

- specific targeted projects in order to carry out research or demonstration activities in areas meeting the needs of Community policies, new or emerging needs, and specific international cooperation activities.
- cooperative research projects across the whole field of science and technology, to enable SMEs to have access to entities with appropriate research capacities to carry out specific research activities.
- coordination and specific support actions in order to achieve the objectives identified in the programme and relating to the needs of Community policies, new or emerging needs, specific international cooperation activities, and the strengthening of the foundations of the European Research Area.
- accompanying actions by way of additional measures to achieve the objectives of the programme or prepare future activities in the context of the Community's research and technological development policy.

LEGISLATIVE FINANCIAL STATEMENT

Policy area(s): Research

Activity(ies): Research actions under the EC Treaty

TITLE OF ACTION:

Proposal for a Council Decision adopting a specific programme for research, technological development and demonstration activities aimed at «Integrating and strengthening the European Research Area».

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

Subsection B6 6 Indirect Actions: these lines will be specified at the beginning of the 2003 budget procedure, taking into account the ABB nomenclature, which is being drawn up.

2. OVERALL FIGURES

2.1. Total allocation for action (Part B): €12 505 million for commitments

2.2. Period of application:

2002-2006

2.3. Overall multiannual estimate of expenditure:

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

€ million (*to 3rd decimal place*)

	2003	2004	2005	2006	2007 +	Total
Commitments	2 706.400	2 904.300	3 053.300	3 153.200	-	11 817.200
Payments	376.100	1 627.900	2 278.900	2 679.300	4 855.000	11 817.200

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

This budget category does not apply in this field.

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

Commitments /Payments	173.900	172.100	171.100	170.700	-	687.800
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TOTAL a+b+c	2003	2004	2005	2006	2007 +	Total
Commitments	2 880.300	3 076.400	3 224.400	3 323.900	-	12 505.000
Payments	550.000	1 800.000	2 450.000	2 850.000	4 855.000	12 505.000

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 Specific Programme.

The association agreements are linked to a Framework Programme. Their renewal will be renegotiated following adoption of the new Framework Programme and it is therefore impossible to forecast the amount of revenue in question.

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

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 3

4. LEGAL BASIS

Article 166 of the EC Treaty.

Proposal for a Decision of the European Parliament and of the Council adopting the 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.

5. DESCRIPTION AND GROUNDS

5.1. Need for Community intervention

5.1.1 Objectives pursued

As recognised at the highest political level by the European Council in Lisbon, Feira, Nice and again recently in Stockholm, research is a central component of the knowledge-based economy and society developing worldwide. The objective set for the EU in Lisbon was "to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth, more and better jobs and greater social cohesion" over the next decade. More than ever, research is proving to be one of the main 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 at both EU and national level.

However, Europe still has structural weaknesses where research is concerned. These can be summed up in four main points:

- I. *Insufficient and dispersed investment in research and technological development and more generally in knowledge (RTD, education and software), with the result that we are lagging behind our competitors.* In 1999, the EU invested EUR 76 billion less than the US in research and development. It is now lagging behind its competitors in terms of research spending as a proportion of GDP (in 1999, the figure was 1.9% for the EU compared with 2.6% for the US and 2.9% for Japan²³). In 1999, the US invested some 9% in knowledge, ahead of the EU (7.6%) and Japan (6.9%). And the gap is continuing to widen.
- II. *Insufficient human resources in research.* Researchers represent 5.3/1000 of the workforce in the EU (1998), 7.4/1000 in the US (1993) and 8.9/1000 in Japan (1998) where there are twice as many researchers in industry. Direct public spending on higher education corresponds to 0.9% of GDP in the EU, 1.4% in the US and 0.5% in Japan (1997)
- III. *A limited capacity to translate scientific breakthroughs into innovative and competitive products and services, despite high-quality scientific production.* The figures for the number of patents granted by the European, American and Japanese patents offices per million inhabitants are 32 in the EU, 49 in the US and 88 in Japan. In 1998, the trade balance for high-tech products was a €28 billion deficit for the EU (a trend confirmed throughout the decade), compared with a €8 billion deficits for the US and an EUR 39 billion surplus for Japan. Risk capital investment in the advanced sectors corresponds to 80% in the US and, while it is on the increase, only 26 % in the EU and 23% in Japan.
- IV. *A fragmentation of research policies in Europe.* The EU has not yet adopted a fully-fledged research policy. The 15 national policies co-exist side by side and alongside the Community framework programme without adequate coordination between them to achieve efficient organisation and exploitation. This lack of coordination also affects the establishment and efficient exploitation of research infrastructures.

23 1998 figure.

To alleviate this situation, the Commission has proposed and Council and Parliament have endorsed the creation of a "*European Research Area*". Bringing it about will necessarily be the product of a joint effort by the Community, the Member States and research stakeholders. The Community research framework programmes (2002-2006) and the specific programmes will make a contribution to this in particular through the significant leverage effect that they can have for integrating, coordinating and structuring research in the EU and strengthening the foundations of the European Research Area.

A structural change in the EU's S&T fabric to remedy the above mentioned weaknesses will need resources commensurate with the objective. The Commission has proposed funding for the framework programme totalling EUR 17.5 billion, corresponding to the previous level of funding plus inflation and growth (but still representing only 5 to 6% of public spending on RTD). The Commission takes the view that this sort of amount could have a significant effect on the research system as such, improve at least some of the overall research indicators, and have a significant effect in the priority areas of the framework programme which will generate growth in the EU. In overall terms, this level of funding will make it possible to maintain the Community's RTD effort expressed as percentage of GDP at its present level during the period 2003-2006.

The plan is to implement the framework programmes by five specific programmes, three of which come under the European Community Treaty and two under the European Atomic Energy (Euratom) Treaty. Each specific programme is identified according to the nature of the instruments deployed, reflecting the objectives and organisation of the framework programme:

- A programme on "Integrating and strengthening the European Research Area" comprising the indirect actions proposed under the heading "Integrating research" and under the heading "Strengthening the foundations of the European Research Area", thus bring together research and coordination activities.
- A programme on "Structuring the European Research Area", comprising horizontal, support and structuring activities.
- Two "Joint Research Centre (JRC)" programmes comprising the direct actions carried out by the JRC in the non-nuclear and nuclear fields respectively.
- A "Nuclear energy" programme comprising the indirect actions carried out in the field of nuclear energy.

There is a clear correspondence between the first two programmes and the four activities mentioned in Article 164 of the EC Treaty. The amounts deemed necessary for these two specific programmes reflect the correspondence in Annex II to the framework programme proposal, on the one hand the respective shares of the various activities, and on the other the indicative breakdown of the maximum overall amount between the blocks and categories of activities.

The need for coherent utilisation of the three new instruments for the integration of research activities in Europe makes it necessary to implement the actions proposed in the various priority thematic areas by means of a single specific programme. Similarly, carrying out a substantial proportion of the international cooperation activities in the form of opening up networks and projects to participation of third country researchers and organisations makes it necessary to integrate activities in this area and the research activities in a single programme.

Lastly, the particular character of JRC activities, as well as the need to ensure that it has sufficient budgetary autonomy, justify a separate specific programme in the EC field and in the Euratom field.

The objectives of the specific programme on "Integrating and strengthening the European Research Area" are set out below by action areas, together with their justification and the European added value that they can provide.

1. INTEGRATING THE EUROPEAN RESEARCH AREA

1.1. Priority thematic areas

1.1.1. Genomics and biotechnologies for health

The actions carried out in this area are intended to help Europe to exploit, by means of an integrated research effort, the results of 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 and European added value

- Need to develop the knowledge base, tools and resources necessary for exploiting the full potential of genome information that underpins applications, by integration of the research capacities across Europe to increase coherence and achieve critical mass.
- Major breakthroughs are expected in the creation of new products, processes, services as regards health care and medicine in the field of postgenomics research
- There is a global emergency caused by the 3 major communicable diseases (HIV/AIDS, malaria, and tuberculosis) that make up 60 % of the total disease burden in developing countries.

1.1.2. Information society technologies (IST)

The actions 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 construction 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 and European added value

- Requirement for the development of Europe's knowledge-based economy and society as agreed at the Lisbon Council. Europe has to increase its research effort in IST: Half of RTD in IST in OECD countries is concentrated in the US, 25% in Japan and only 15% in Europe.
- Public sector has a critical role in supporting high-risk and/or long term research in IST and in bringing together key actors in the field from industry and academia so as to further develop key technologies and their applications,

to explore ground-breaking ideas and to improve efficiency and impact of research investment.

- Community effort in RTD in IST provides a unique opportunity to aggregate the fragmented research effort of the Member States and to build solutions which are interoperable and implementable across the Member States.
- Experience shows that only a sustained and appropriate research effort in IST can have the desired impact. In Europe, the effort of countries like Finland is a direct illustration of the benefit of RTD investment in IST. IST has been a research priority for more than 30 years and the relevant RTD investment is the highest as a percentage of GDP worldwide.
- The IST sector now has an annual turnover of € 2000 billion worldwide and employs more than 12 m. persons in Europe. Europe's role as an IST supplier is to be strengthened. The trade deficit of the EU in IST is of about 28 BEuro for an EU market of about 500 BEuro and the deficit is growing by 12 % a year despite Europe's lead in mobile communications.
- IST has become a motor for overall economic growth as a result both of its own expansion and its increasing integration in other sectors. Research in applied IST in businesses, for e-commerce and e-work, opens new market opportunities and provides substantial productivity gains and improves competitiveness of all industries. The life cycles of IST based products and services are quickening and shortening and technology adoption curves are faster, underlining the acceleration of technology change.
- The emerging generation of IST will introduce a radical shift from the current 'PC-based' systems and the 'keyboard, mouse and screen' towards ambient intelligence systems which will enable all citizens to benefit from IST services.
- IST innovations provide powerful solutions to major societal challenges in healthcare, environment, learning, safety, mobility, and preservation of cultural heritage and employment.
- Progress is needed in IST for the development of all other major research fields including biotechnologies, physics, energy, etc.

1.1.3. Nanotechnologies, intelligent materials, and new production processes

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

Justification and European added value

- Need to maintain a strong position for Europe in these emerging markets
- Medium-term market for nanomaterials estimated at over €6 billion (medical equipment sector) and intelligent materials market estimated at several hundreds of billions of euros.

- Impact of “intelligent” materials on the development of industrial technologies and systems and indirectly on sectors such as energy, medicine, electronics, transport or construction.
- Importance of the manufacturing sector in Europe: 40 million jobs and €4,000 billion.
- Investments to be stepped up in the field of new production processes (at present some €1000 per capita compared with € 2000 per capita in the US).

1.1.4. Aeronautics and space

The aim of the actions carried out in this area is twofold: 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 and European added value

- Scale of investments needed (US investment in RTD three to six times higher depending on the sectors).
- Foreseeable needs concerning air transport on a world scale: some 14,000 aircraft in the next 15 years (market worth €1000 billion). Increase in air traffic of around 5% per annum for the next few decades or a doubling in the next 20 years.
- Importance of the satellite related markets (world annual turnover for satellites and launchers estimated at €40 billion).
- Support for the "single European sky" policy.

1.1.5. Food safety and health risks

The actions 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 of food-related risks, relying in particular on biotechnology tools, as well as health risks associated with environmental changes.

Justification and European added value

- Recent food scares have highlighted the multi-factorial and trans-border nature of the issues at stake
- The development of powerful and validated risk assessment methods requires the pooling of a wide range of expertise
- The agri-food industry is a very large job provider in Europe with more than 10 million employees

- Environmental factors contributing significantly to increasing incidence of cancer, allergy, asthma
- Increased consumer demand regarding traceability of food products

1.1.6. Sustainable development and global change

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

1.1.6.1. Technologies for sustainable development

Justification and European added value

- Uncertainties, interruptions of, or reductions in, energy supply, and even instability of energy prices, may have a severe negative impact on society and the economy.
- The probability of major climate change is strongly enhanced by the high and increasing level of CO₂ emissions related to energy supply and use
- The EU's dependence on energy imports is already 50% and expected to rise over the coming years (if no action is taken), reaching 70% by 2020
- Renewable energy technologies typically have relatively higher costs than established fossil fuel based technologies

1.1.6.2. Global change

Justification and European added value

- Requirement for the faster development of Europe's capacity to predict, control and adapt to global change in order to maintain and improve the EU citizens' quality of life and contribute to the International Conventions (Kyoto protocol).
- The sustainable development concept needs to be integrated in the EU policies, in particular energy, transport, environment and enterprise.
- The estimated downward trend in ozone over Europe is of 7 % per decade and followed by an increasing trend of UV radiation.
- Climate change has an impact on natural resources in particular on water availability and quality, and on biodiversity.
- There will be an increased warming in the future with different not yet known impacts on Europe and its regions.
- The annual budget for this research area is estimated at € 2 billion world-wide and € 500 m at European level (FP 20% of the total EU contribution).

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

The actions 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 citizens and institutions.

Justification and European added value

- The need to understand the issues and options involved in the objective for the European Union “to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion”, by building a European knowledge society
- The need to understand and have an informed discussion on the issues and options involved in the development and evolution of new forms of governance in an enlarging Europe and its implications for European citizens;

1.2. Anticipating the EU's scientific and technological needs

1.2.1. Policy-oriented research and leading edge topics

The aim is to develop research activities in support of other Community policies, on the one hand, and, on the other hand, to be able to launch research activities rapidly as unforeseeable scientific and technological needs appear.

Justification and European added value

- Need to develop research activities in support of other Community policies. This need has been confirmed by all the Commission services which implement Community policies.
- Need to be able launch rapidly research activities as unforeseeable scientific and technological needs appear. The rapid emergence of unforeseen needs such as, in the past, those connected with BSE, for example, have demonstrated the importance of this.

1.2.2. Specific research activities for SMEs

Carried out in support of European competitiveness and enterprise and innovation policy, the specific activities for SMEs 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.

Justification and European added value

- SMEs account for 99.8% of European businesses, 66% of jobs and 55% of the EU's private sector turnover.
- It is estimated that SMEs contribute nearly 50% to the competitiveness of bigger businesses as suppliers or subcontractors.

- High-tech SMEs are making a growing contribution to research in sectors such as IT, multimedia and biotechnology.
- The framework programme for research and technological development (RDT) is an important instrument: over the last 5 years (1994-1999), over 20 000 European SMEs benefited from this opportunity and, according to a satisfaction survey, nearly 96% of them are satisfied with their choice.

1.2.3. Specific international cooperation activities

The general objective of the international cooperation activities carried out under the Framework Programme is to help open up the European Research Area to the world.

Specific activities will concern three groups of countries: the Mediterranean third countries, Russia and the States of the CIS, and the developing countries.

Justification and European added value

- Certain global issues (climate change, biodiversity, etc.) can only be addressed in partnership with third countries.
- Europe envisages privileged relations with certain groups of countries (NIS, Mediterranean countries, etc.). Scientific partnerships with those countries will facilitate the establishment and strengthening of these relations.
- Certain countries (developing countries, for example) are faced with specific problems necessitating coordinated action.
- The expertise and knowledge existing in the world is of interest to European researchers which should have access to them.

2. STRENGTHENING THE FOUNDATIONS OF THE EUROPEAN RESEARCH AREA

2.1. coordination of research activities

The objective is to encourage and support initiatives undertaken by several countries, in areas of common strategic interest and to develop synergy between their existing activities through coordination of their implementation.

It is also to enhance the complementarity and synergy between Community actions undertaken under the Framework Programme and those of other European scientific co-operation organisations as well as among these organisations themselves.

Justification and European added value

- Avoid duplication and fragmentation of effort
- Reduce gaps between the most advanced and less advanced regions.
- Exploit the efforts already made with a view to collaboration between Member States.

2.2. Coherent development of research and innovation policies

The objective of the activities carried out in this area is to promote the coherent development of research and innovation policies in Europe through the early identification of challenges and areas of common interest as well as by supplying national and Community policy makers with knowledge and decision-aid tools that can help them formulate these policies.

Justification and European added value

- Need to use more systematically foresight results, in order to strengthen the ability to anticipate S&T-related issues at stake for Europe, to develop shared views on such issues, and more generally to create a strategic basis for European S&T policy
- Necessity to respond to the reinforced demand from S&T policy makers for a common base of relevant and comparable indicators
- Need for a strategic tool to improve the quality and efficiency of research policies: benchmarking national policies
- Respond to the need for research players and users to be able to locate specific expertise easily in the context of their activities.

5.1.2 *Measures taken in connection with ex ante evaluation*

An ex-ante evaluation was carried out by the Commission services when preparing the specific programme proposals. Its results reflect in particular:

- 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;
- wide-ranging consultations among the protagonists relating to the two communications on the European Research Area in the course of the year 2000²⁴ and the framework programme proposal at the beginning of 2001;
- a series of internal and external Commission studies relating to economic, political and foresight areas and the impact of RTD activities.

The results of the ex-ante evaluation carried out are reflected in particular in the choices made with regard to the structure of the programmes, the objectives and priorities and the implementing instruments.

24 COM (2000) 6 of 18 January 2000
COM (2000) 612 of 4 October 2000

The objectives and priorities were selected in accordance with the rigorous application of the criterion of European added value.

This covers the following aspects applied to the priority themes and activities selected, the justification and European added value of which are described in greater detail in point 5.1. and the expected results in point 5.2.

- Cost and scale of research beyond the possibilities of a single country, and need to assemble a critical mass of financial and human resources (e.g. genomics, nanotechnologies, aeronautics);
- Economic interest of collaboration (economies of scale) and as a result of its beneficial effects on the private research effort and industrial competitiveness (e.g. information society technologies, nanotechnologies, intelligent materials, new production processes, aeronautics and space and specific research activities for SMEs);
- Maintenance or development of the EU's position in RTD areas strategic for the EU (e.g. maintaining the strong position in aeronautics and mobile phones and developing the, at present, relatively low potential in solar photovoltaic energy) ;
- Need to combine complementary expertise present in different countries, more particularly to deal with interdisciplinary problems (e.g. food safety and health risks, sustainable development and global change, support for the coordination of research and innovation activities and coherent development of research policies);
- Links with the priorities and interests of the EU as well as with Community legislation and policies (e.g. aeronautics and space, food safety and health risks, sustainable development and global change, citizens and governance in the European knowledge-based society, international cooperation, anticipating the EU's S&T needs);
- Necessarily transnational nature of the research by virtue of the scale at which problems occur or for scientific reasons (e.g. food safety and health risks, sustainable development and global change, citizens and governance in the European knowledge-based society, international cooperation, support for the coordination of research and innovation activities; coherent development of research policies);

With regard to the implementing instruments, three main new instruments, which by their nature can only be implemented at Community level, have been designed to contribute to the establishment of:

- a critical mass needed and the integration of research
- closer links between the programmes and Member States' activities and coordination of national programmes
- cooperation in areas strategic for the EU and solutions to major challenges facing the EU
- the excellence and attractiveness of S&T in Europe
- dissemination and exploitation of S&T results throughout the EU.

To ensure the impact of Community efforts in the seven priority thematic areas of the Framework Programme, these three instruments will be the only ones employed in these areas. They are:

a) *networks of excellence*

The purpose of this instrument is to strengthen European scientific and technological excellence. Each network is intended to advance knowledge in a particular area by assembling a critical mass of skills. Targeted towards long-term objectives, the activities concerned, often multidisciplinary, are not aimed at precise predefined results in terms of products, processes or services but the progressive and lasting integration of research capacities existing or emerging in Europe at both national and regional level. To this end, in order to create a virtual *centre of excellence* the members of the network will implement a joint programme of activities integrating a substantial proportion or even the entirety of their activities in the area concerned.

b) *integrated projects*

The purpose of this instrument is to increase European competitiveness or help to resolve major societal problems by mobilising a critical mass of resources and research and technological development expertise existing in Europe. Accordingly, each integrated project will have the aim of obtaining a certain number of precise results in terms of products, processes or services. The activities carried out in the context of an integrated project will by definition be targeted even in the case of risky research. All the activities carried out in the context of an integrated project will fit into the general framework of an “implementation plan”.

c) *Participation in national programmes carried out jointly* (under Article 169 of the Treaty)

The objective of this instrument is to promote and support the coherent and coordinated mobilisation for the benefit of the entire EU of the organised efforts (programmes) of the Member States in areas of common and priority interest to the Union. The aim is also to increase the impact of national efforts on an EU scale in matters of interest to many Member States. The national programmes in the priority research areas of the Framework Programme in question will be those carried out either by governments, regional authorities or national research organisations. Their joint implementation will entail the drawing up of harmonised work programmes, the coordination of the assignment of budgets; a redirection of certain actions to increase complementarity, and the launching of joint calls for proposals.

This instrument has never been used before as it presupposes a desire for mutual coordination between Member States and will require a more substantial preparation phase compared with more conventional projects. Nevertheless, the time is judged to be right - in particular following the Lisbon summit and the call for the open coordination method - for this type of instrument.

5.1.3 *Measures taken following ex post evaluation*

The recommendations of the five-year assessment of the framework programmes and the specific programmes carried out in 2000 have been taken into account in preparing the specific programme proposals, in particular those concerning:

- the need to make up for Europe's trailing position in the field of RTD compared with its competitors;
- the need for complementarity and coherence between national and Community RTD policies and the essential role of the Commission in achieving this objective;
- the beneficial impact of the framework programme which "fills a gap in Europe by enabling researchers in universities and in industry to carry out applied work together";
- the need to lighten the procedures of the 1998-2002 programme and the need to "rethink the structures and procedures for managing the framework programme";
- placing Community research activities in the broader context of a genuine European research policy;
- reinforcing the concentration of the programmes;
- continuing with the research needed to achieve the objectives of Community 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 fifth 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 pilot projects for the measures envisaged for the next framework programme (networks, clusters, industrial platforms, larger-scale projects, etc.).

5.2. Actions envisaged and means of budget intervention

The actions envisaged for the specific programme on "Integrating and strengthening the European Research Area" are set out below presented by detailed action areas. This presentation makes it possible to highlight the estimated results expected, the contributions to the overall objectives of the framework programme or of the Community or potential performance parameters associated with these. These indications are intended as yardsticks and not definitively adopted goals.

A correspondence between the action areas and the types of instruments used is given further on in the form of a table.

1. INTEGRATING THE EUROPEAN RESEARCH AREA

1.1. Priority thematic areas

1.1.1. Genomics and biotechnology for health

i) fundamental knowledge and basic tools for functional genomics

(Gene expression and proteomics, Structural genomics, Comparative genomics and population genetics, Bioinformatics)

ii) applications 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)

iii) applications in medicine and public health

(Combating cancer, cardiovascular disease and rare diseases, Combating resistance to drugs, Studying the brain and combating degenerative diseases of the nervous system, Studying human development and the ageing process)

iv) confronting the major communicable diseases linked to poverty

Expected results, contributions to overall objectives or potential performance parameters

- To increase the quality and performance of tools needed to exploit genome information (high throughput tools, suitable model organisms, and bioinformatics).
- To acquire more information on genes related to health or disease.
- To contribute to health care costs reduction through more precise diagnosis and better-targeted treatment.
- To target the reduction of cost and time for the development of new drugs (from bench to the market).
- To foster the competitiveness of Europe's biotechnology industry.
- To develop new in vitro tests as alternatives to animal experimentation.
- To increase the number of new effective vaccines and new therapies, in particular against infections acquired in hospital.
- To increase public and private investment in health research for developing countries.
- To increase number of partnerships between Europe and developing countries

1.1.2. Information Society technologies

i) Applied IST research addressing major societal and economic challenges

(Research on technologies for trust and confidence, Research addressing societal challenges, Research addressing work and business challenges, Complex problem solving in science, engineering, business and for society)

ii) Communication and computing infrastructures

(Communication and network technologies, Software technologies, services and distributed systems)

iii) *Components and microsystems*

(Micro, Nano and Opto-electronics, Micro and Nano Technologies, Microsystems, Displays)

iv) *Knowledge and interface technologies*

(Knowledge technologies and digital content, Intelligent surfaces and interfaces)

Expected results, contributions to overall objectives or potential performance parameters

- Strengthened and reinforced European leadership in IST. Reinforcement of Europe's successes in areas such as mobile communications, networks infrastructure, consumer electronics, microelectronics and embedded software. Indicators: Macroeconomic indicators on the supply of IST and IST share in GDP are appropriate evaluation measures.
- Next generation of terrestrial and satellite-based mobile and wireless systems, beyond 3G in Europe and integration of networks infrastructures around the next generation Internet. Indicators: Market share, technology adoption rate surveys.
- Electronic and mobile commerce solutions for anytime-anywhere trading and covering the whole value creation cycle of extended products and services. Indicators: Sectoral output data, including the service sector.
- Improved security of electronic transactions, enhancing privacy of IST applications and services and providing tools combating cyber crimes. Indicators: White-collar crime statistics.
- Broader inclusion of citizens in the Information Society, and more effective health, safety, mobility and environment management and support systems; Conception of assistive systems that will restore functions or compensate for disabilities. Indicators: User survey satisfaction ratings (e.g. on improvement in diagnostics), health and safety statistics.
- Solutions enabling citizens to learn when needed, at any time, wherever they wish and in the most suitable way. Development of solutions for eliciting, sharing, trading and delivery of organisational knowledge. Indicators: User surveys, questionnaires.

1.1.3. Nanotechnologies, intelligent materials, new production processes

i) *nanotechnologies*

(Long-term interdisciplinary research into understanding phenomena, harnessing processes and developing research tools, Nanobiotechnologies, 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)

ii) intelligent materials

(Development of fundamental knowledge, Technologies associated with the production and transformation of new materials, Engineering support for materials development)

iii) new production processes

(Development of flexible and intelligent manufacturing systems, Systems research hazard control, Optimising the life-cycle of industrial systems, products and services)

Expected results, contributions to overall objectives or potential performance parameters

- To increase human and financial resources devoted to research in the private sector by the achievement of critical mass in this industrially oriented field.
- To increase the development and uptake of nanotechnologies, intelligent materials and new products processes in SMEs through their significant (> 20%) participation in these activities.
- To minimise natural resource use emissions and waste within a product life-cycle approach
- To increase and integrate skills and competence across S&T disciplines and actors, including in the Candidate Countries

1.1.4. Aeronautics and space

i) aeronautics

(Increasing competitiveness, improving environmental impact with regard to engine emissions and noise, increasing aircraft safety, increasing the capacity and safety of the air transport system)

ii) space

(Galileo, GMES, Satellite telecommunications)

Expected results, contributions to overall objectives or potential performance parameters

- Maintain European leadership in aeronautics.
- Reduce aircraft direct operating costs by 20% and 50%, in the short and long term, respectively.
- Reduce by a factor of 2 the accident rates in the short term and by a factor of 5 in the long term
- Develop the capability of handling 16 million flights a year in 10 years.

1.1.5. Food safety and health risks

Epidemiology of food-related diseases and genetic susceptibilities

Environmental health risks

Impact of food on health (in particular products containing GMOs)

«Traceability» processes (in particular relating to genetically modified organisms including systems based on recent biotechnology developments)

Methods of analysis and detection of chemical contaminants and pathogenic microorganisms (viruses, bacteria, parasites, and new agents of the prion type)

Safer production methods and healthier foodstuffs (including those based on biotechnologies and on organic farming processes)

Impact of animal feed, and the use of sub-products of different origins for that feed, on human health

Expected results, contributions to overall objectives or potential performance parameters

- To define validated biomarkers of exposure or effects in relation to human health
- To increase the number of control analyses carried out in the food chain
- To increase the number of food crops and food animal strains/breeds
- To increase the number of safer production technologies
- To reduce total bacterial load in commercialised food products

1.1.6 Sustainable development and global change

1.1.6.1. Technologies for sustainable development

i) research activities having an impact in the short and medium term

(Renewable energy sources, more efficient and clean use of energy, especially in urban areas, new concepts of energy efficient and cleaner transport, Intelligent transport, re-balancing and integration of transport modes)

ii) research activities having an impact in the longer term

(Fuel cells, Hydrogen, Solar photovoltaic technologies and biomass)

Expected results, contributions to overall objectives or potential performance parameters

- To contribute to the political objective of reducing greenhouse gas emissions to levels of 8% lower than those of 1990 by 2010, and keeping the effort to sustain this trend beyond 2010 (Kyoto Protocol)

- To contribute to the doubling of the share (from 6% to 12%) of RES by 2010 (White Paper on Renewable Energy); 12% energy savings through rational use and demand reduction by 2010; reversing the trend towards an increase (from 50% to 70%) in the dependence on foreign energy supply.
- To contribute to the reduction in the longer term of new and renewable Energy costs to levels competitive with fossil fuel based sources

1.1.6.2. Global change

Impact and mechanisms of greenhouse gas emissions on climate and carbon sinks (oceans, forests and soil) Water cycle

Biodiversity, protection of genetic resources, functioning of terrestrial and marine ecosystems and interactions between human activities and the latter

Mechanisms of desertification and natural disasters connected with climate change

Global observation systems for climate change

Expected results, contributions to overall objectives or potential performance parameters

- To develop instruments to predict regional climatic change.
- To develop management tools to mitigate the impacts on water availability.
- To enhance european scientific contributions to relevant Conventions and policy making and thereby increase the coherence of Europe's research effort on the international scale.
- To evaluate the indirect effects in climate by non-greenhouse gases.
- To develop a network of biodiversity monitoring and to develop rehabilitation options.
- To elucidate links between climatic change and natural disasters.
- To develop instruments to better predict and mitigate the consequences of natural disasters (floods, storms, fires, avalanches, and landslides).
- To develop common European data bases on global change parameters.

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

i) Knowledge-based European Society

(Improving the generation, distribution and use of knowledge and its impact on economic and social development, Options and choices for the development of a knowledge-based society serving the EU objectives set at the Lisbon summit, The variety of paths towards a knowledge society)

ii) *citizenship, democracy and new forms of governments*

(The implications of European integration and enlargement for governance and the citizen, Articulation of areas of responsibility and new forms of governance, Conflict resolution, security, peace and justice, New forms of citizenship and identities)

Expected results, contributions to overall objectives or potential performance parameters

- To have available comparative studies, including data collection and development of methodologies, on the transition to the European knowledge society in the different areas of the economy and society

1.2. Anticipating the EU's scientific and technological needs

1.2.1. Policy-oriented research and leading edge topics

Research needed for the formulation, implementation and monitoring of the application of Community policies.

Research meeting needs in certain new interdisciplinary and multidisciplinary areas or at the leading edge of knowledge

Expected results, contributions to overall objectives or potential performance parameters

- Strengthened and more effective contribution to Community policies: the objectives and expected results for each policy concerned are to be defined by the respective Directorates General.
- Reduction in response times and increased flexibility of action taken in the face of scientific, technological and socio-economic events.

1.2.2. Specific research activities for SMEs

Collective research

(Research aimed at addressing common problems/challenges; pre-normative research; research aimed at reinforcing the technological basis of particular sectors; development of technological tools)

Cooperative research

Expected results, contributions to overall objectives or potential performance parameters

- Significant participation in the Specific Programme (over 15% of the funding for the part on “Integrating Research”) by SMEs, reflected in terms of an increase and training of R&D personnel, technological development and utilisation of results.
- Participation indicators have been developed and were used to monitor the participation of SMEs in the Framework Programme (participation share in

each thematic programme, participation for each country, newcomers, size, youth, female-owned...)

1.2.3. Specific international cooperation activities

Helping European researchers, businesses and research organisations in the EU and the countries associated with the Framework Programme to have access to knowledge and expertise existing elsewhere in the world.

Helping to ensure Europe's strong and coherent participation in research initiatives carried out at international level

Providing support in the scientific and technological field to the implementation of the Community's foreign policy and development aid policy.

Specific activities concerning three groups of countries : the Mediterranean third countries, Russia and the countries of the CIS, and the developing countries

Expected results, contributions to overall objectives or potential performance parameters

- Enlarged and strengthened participation of third countries in Community research activities
- Intensified and higher-profile contribution to international actions aiming at resolving major global problems
- Greater support in the field of science and technology for the implementation of foreign policy and development aid policy."

2. STRENGTHENING THE FOUNDATIONS OF THE EUROPEAN RESEARCH AREA

2.1. Coordination of research activities

Coordination of national activities

(Support proposals on co-ordination, networking, design and implementation of joint initiatives, Develop an integrated information system)

Coordination at European level

(S&T co-operation activities carried out in other European co-operation frameworks, Collaboration and joint initiatives of specialised European scientific co-operation organisations)

Expected results, contributions to overall objectives or potential performance parameters

- Establish networks of national programmes
- Evaluating the performances of the Member States and the observed differences with regard to innovation

2.2. Coherent development of research and innovation policies

Analyses and studies (work related to foresight, statistics and scientific and technological indicators)

Benchmarking research and innovation policies at national, regional and European level

Mapping scientific and technological excellence in Europe

Improving the regulatory and administrative environment for research and innovation in Europe

Expected results, contributions to overall objectives or potential performance parameters

- Better informed decision-making regarding the prioritisation and implementation of EU S&T and other policies.
- High level of participation of S&T decision makers and policy institutes in foresight-based EU decision support activities.
- Publication of an annual report on European science and technology, including key figures on the European Research Area.
- Studies on developing new and improved indicators in fields of policy interest, and of new statistical databases.
- Making available the results of the first benchmarking cycle
- Realising the first excellence maps.

The means of intervention and financial participation under the framework programme will be as follows, according to the objectives:

Areas	Activities/objectives of the instrument	Types of instruments ⁽¹⁾	Financial participation under the Framework Programme
Integrating European research	In the priority thematic areas <ul style="list-style-type: none"> - Genomics and biotechnology for health ; - Information Society technologies ; - Nanotechnologies, intelligent materials, new production processes; - Aeronautics and space ; - Food safety and health risks ; - Sustainable development and global change ; - Citizens and governance in the European knowledge-based society 	Networks of excellence	Grant for integration
		Integrated projects	Grant to the budget
		Article 169	
	Anticipating the EU's scientific and technological needs : <ul style="list-style-type: none"> - Scientific and technological needs of Community policies ; - New or emerging scientific and technological needs 	- Targeted specific projects	Grant to the budget
		Coordination and specific support actions	Grant to the budget :
		<u>In duly justified cases :</u> - Networks of excellence	Grant for integration
		- Integrated projects	Grant to the budget
		- Article 169	
	- Specific international cooperation activities	- Specific targeted projects	Grant to the budget
		- Coordination and specific support actions	Grant to the budget
- Specific research activities for SMEs		- Specific research projects for small and medium-sized enterprises	Grant to the budget .
Strengthening the foundations of the European Research Area	Across the whole field of science and technology : <ul style="list-style-type: none"> - Support for the coordination of research activities carried out in Europe - Support for the coherent development of research and innovation policies in Europe 	- Coordination and specific support actions	Grant to the budget

(1) Accompanying actions can also be implemented throughout the specific programme.

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

5.3. Means of implementation

The Commission will ensure the implementation of the actions. In certain duly justified cases, it may call upon external bodies for assistance.

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 16 275 million. The total amount for the Framework Programmes 2002-2006 is EUR 17 500 million.

6.1.1 *Financial intervention: Commitments in €million (to the third decimal place)*

Breakdown by objective	Total
1) Integrating research	12 055
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 society	225
Anticipating the EU's scientific and technological needs	1 630
Policy oriented research and leading edge topics	880
Specific research activities for SMEs	450
Specific international co-operation activities	300
2) 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	12 505

An annual schedule for each of these objectives is not significant at this level. It could only be defined as being strictly proportional to that for the entire specific programme, itself in line with that of the framework programme. The annual internal breakdown will be established subsequently within the work programmes

6.1.2 *Technical and administrative assistance, support expenditure and IT expenditure (Commitment appropriations)*

This budget category does not apply in this field.

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

For the indirect actions of the Fifth Framework Programme of the European Community (1998-2002), the annual volume is in the order of 3500 new contracts signed (all categories *confound*), for an annual budget of € 3000 million.

For the indirect actions of the Framework Programme 2002-2006, the annual budget will be in the order of € 3700 million, an increase in real terms by 13 %.

Nevertheless, as set out in point 5.1.2, three new principal instruments have been designed for the implementation of this new Framework Programme, namely networks of excellence, integrated projects and participation to joint execution of national programmes (as provided for in Article 169 of the Treaty).

Compared to previous Framework Programmes, these instruments go beyond merely scientific projects and introduce the concept of integration of research, in particular by achieving critical mass of competences and resources in identified areas.

As concerns the management of the Framework Programme 2002-2006, this concept of critical mass will be reflected in a significant increase of the mean financial contribution to projects and is expected to result in a substantial reduction of the number of contracts concluded annually.

7. IMPACT ON STAFF AND ADMINISTRATIVE EXPENDITURE

Determined to fundamentally modify the implementation of the Framework Programme, the Commission proposes to lower the ceiling for human resources and other administrative expenditure to 5.5 % for the two indirect, non-nuclear research programmes.

Currently in the parts of the 5th Framework Programme related to indirect, non-nuclear research, the overall ceiling for human resources and other administrative expenditure is 7.0%.

On present trends, actual expenditure under the 5th Framework Programme is likely to remain close to this ceiling, perhaps a little below.

Assuming there were to be no change in the methods of implementing the Framework Programme, and given the need to allow for some margin in this category of expenditure, the Commission would have no reason to depart from the overall ceiling of 7%. This is largely because the proposed budget for the next programme increases in line with inflation, allowing for a little more in line with growth in the economy.

Any reduction in the overall ceiling could only be achieved on the assumption of significant gains in productivity, including significant changes in the management of the programme. A relatively restrictive set of assumptions would include :

- A freeze on the total number of statutory staff at its 2002 level of 1654 posts, assuming productivity gains of 2% per annum to compensate for the increase in the real volume of the programme
- An inflation rate of 2% a year, even though staff costs tend to rise at a slightly higher rate
- A freeze in expenditure on external personnel at its 2002 level.

The above scenario would allow the Commission to propose a reduction in the overall ceiling to about 6.3 %.

The Commission is, however, prepared to commit itself to a much more significant reduction in the ceiling from 7.0% to 5.5%. This would allow an important amount of additional resources, roughly € 230 million, to be allocated directly to research projects.

This requires equitable efforts in productivity gains in all research activities. The ceiling of 5.5% proposed for administrative expenditure is a global one, covering the specific programmes “Integrating and Strengthening the European Research Area” and “Structuring the European Research Area” as a whole. In implementing these programmes, the Commission will ensure an appropriate share of administrative expenditure between the services responsible for managing research activities. This share will take account of the overall budget to be managed, the intensity of the use of the three new instruments, the labour-intensiveness and the latest technological developments of the activities at the various stages of their life-cycle, including their length, and the need to ensure effective management of the contracts committed under previous Framework Programmes.

The main factor that would allow this to be achieved is the introduction on a widespread scale of the new instruments proposed in the next Framework Programme, namely integrated projects, networks of excellence and joint execution of national research programmes under Article 169 of the Treaty. These would allow net reductions in the costs of administering the programme.

In other terms, a ceiling of 5.5 % expresses the determination of the Commission to fundamentally modify the implementation of the Framework Programme.

- It is useful to recall that even if the new instruments are used fully in line with the Commission’s proposal, their impact on administrative expenditure will be gradual. During the 2003-2006 period, an important part of the administrative activities undertaken by the Commission will still be to implement and conclude previous Framework Programmes.

The average duration of contracts for indirect research being four years, some 13,000 open contracts with a financial volume of € 6,600 million could be expected, at the start of 2003.

The ceiling of 5.5 % for the human and administrative resources for indirect, non-nuclear programmes will therefore require exploiting all the potential of the new management approach to the Framework Programme:

- Full use would need to be made of the new instruments to reduce the number of individual projects and contracts to be administered by the Commission.
- Their management will need to be largely simplified and decentralised.
- All possibilities will need to be exploited to externalise technical support activities and certain aspects of the management of specific categories of activities, whenever this reduces overall administrative expenditure.

It requires also efficient programme and budget structures, and this reduced 5.5% ceiling should apply for the total of the two indirect, non-nuclear research programmes.

This proposal is critically dependent on the introduction of the new instruments in line with the Commission's proposal. Any revision of this will imply a change in the ceiling for administrative costs.

7.1. Impact on human resources

Types of post		Staff to be assigned to management of the action using existing and/or additional resources		Total	Description of tasks deriving from the action
		Number of permanent posts	Number of temporary posts		
Permanent officials or Temporary staff	A	626			<i>If necessary, a fuller description of the tasks may be annexed.</i>
	B	195			
	C	329			
Other human resources			500 to 650 person/years		See costs
Total		1150			

There is a specific establishment plan for the indirect research actions comprising a total of 954 A posts, 273 B posts and 427 C posts, giving a total of 1654 posts (EC and EURATOM, including SAB 3/2001).

To this establishment plan should be added 166 operating budget posts with no financial impact on the budget for these programmes, under the heading of participation in the formulation and implementation of research policy.

7.2 Overall financial impact of human resource

Type of human resources	Amount €million	Method of calculation*
Officials Temporary research staff	400.000	On the basis of an extrapolation of actual cost in 2000 for this personnel, inflation of 2% per annum et and an average vacancy rate of 8%.
Other human resources (give budget line)	100.000 to 130.000	On the basis of an extrapolation of actual costs in 2000 and the forecast of expenditure in 2001/2002 and taking into account the objective described at the beginning of point 7
Total	500.000 to 530.000	Financed from B6 (research budget)

The amounts correspond to total expenditure for the duration of the programme.

7.3 Other administrative expenditure deriving from the action

Budget line (No and heading)	Amount €million	Method of calculation
(B6) Missions, operation, infrastructure, IT, communication (depending on the types of expenditure authorised in the table of equivalence for indirect RTD actions)	157.000 to 187.000	On the basis of an extrapolation of actual costs in 2000 and the forecast of expenditure in 2001/2002 and taking into account the objective described at the beginning of point 7
Total	157.000 to 187.000	Financed from B6 (research budget)

The amounts correspond to total expenditure for the action for the four years of implementation of this specific programme, i.e. total annual expenditure of €172.000 million.

I.	Total (7.2 + 7.3) (€million)	687.000
II.	Duration of action (years)	4
III.	Indicative annual cost (€million)	172.000

8. FOLLOW-UP AND EVALUATION

8.1 Follow-up arrangements

The specific programmes are designed to help bring about the European Research Area and they will be implemented in parallel with and in close collaboration with other Community and national activities in pursuit of the same objectives. The very nature of research and the different types of actions at different levels make it difficult to determine causes and effects, and monitoring and evaluating the result and impact are complex.

Based on the experience of the earlier programmes and methodological studies in progress, a series of instruments has already been or is being finalised in order to develop the objectives and monitor and evaluate the results and impact of the framework programme and programmes implementing it, as well as the activities relating to bringing about the ERA. The Commission will take stock of the development of these instruments in good time before the programmes are implemented.

By these means, a structured system for collection of information and statistics will be progressively put in place. Within this context general indicators specifically adapted to the framework programme will be developed, to make it possible to evaluate in particular the contributions of the programmes in relation to the challenges facing the EU identified in point 5.1 (Investment in RTD and in knowledge, overall and in the priority fields for the EU, human RTD resources, exploitation of RTD results, coherence of national and Community research policies and with regard to research infrastructures).

In addition, more specific indicators will be identified for the different objectives of the programmes; relating in particular to the production, management and networking, exploitation and impact of the knowledge arising from the activities carried out under the programmes. First thoughts in this connection are already indicated in point 5.2 under the heading of results expected, contributions to overall objectives or potential performance parameters.

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 and the specific programmes 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.

The objective is to step up and improve the systematic collection, coherence and quality of the basic information, in order to allow efficient analysis and monitoring as well as a substantial contribution to the five-year assessment. In order to make

Community research managers more aware of issues relating to the monitoring of the implementation and the results and the impact of the programmes, it is also planned to draw up a joint self-assessment format. In addition, measures will be taken to ensure greater coherence between the monitoring of the framework programme, the specific programmes and progress with the European Research Area.

Annual report: Progress with implementing the Framework Programme and the specific programmes 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, realisation of the European Research Area 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 and the specific programmes, 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, the achievement of the objectives and the impact of the activities 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

By submitting reports which may give rise to the consolidation of revenue in the participants' accounts, the financial coordinator should make all the financial documentation available to the Commission to enable it to carry out its financial audits, indicating the timetable and the consolidation of the participants' accounts.

Where appropriate, the Commission will carry out such financial audits, in particular if it has reasons to doubt the realistic nature of the account vis-à-vis the progress of work described in the activity reports.

The Community's financial audits will be carried out either by its own staff or by accounting experts approved according to the law of the participant audited. The Community will chose the latter freely, while avoiding any risks of conflicts of interest which might be indicated to it by the participant subject to the audit.

In addition, the Commission will make sure in carrying out the research activities, that the financial interests of the European Communities are protected by effective checks and, in case of detected irregularities, measures as well as deterrent and proportionate sanctions.

In order to achieve this aim, rules on checks, measures and sanctions, with references to the Regulations No 2988/95, 02185/96, 1073/99 and 1074/99 will be taken up in all legal *instruments* used in the implementation of the programmes, including the specific *contracts* and the model contracts.

In particular, the following points will have to be provided for in the *contracts* :

- the introduction of specific contractual clauses to protect the financial interests of the EC in carrying out checks and controls in relation to the awards ;

- the participation of administrative checks in the field of fraud-fighting, in accordance with Regulations No 2185/96, 1073/99 and 1074/99 ;
- the application of administrative sanctions for all intentional or negligent irregularities in the implementation of the contracts, in accordance with the framework Regulation No 2988/95, including a black listing mechanism ;
- the fact that possible recovery orders in case of irregularities and fraud be enforceable according to Article 256 of the EC Treaty.

Proposal for a

COUNCIL DECISION

**adopting a specific programme 2002-2006 for research,
technological development and demonstration aimed at
structuring the European Research Area**

Proposal for a

COUNCIL DECISION

**adopting a specific programme 2002-2006 for research,
technological development and demonstration aimed at
structuring the European Research Area**

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission²⁵

Having regard to the opinion of the European Parliament²⁶

Having regard to the opinion of the Economic and Social Committee²⁷

Whereas:

- (1) In accordance with Article 166 (3) of the Treaty Decision No. .../..EC28 of [...] of the European Parliament and the Council concerning the multi-annual 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") is to be implemented through specific programmes that define detailed rules for their implementation, fix their duration and provide for the means deemed necessary.
- (2) The framework-programme 2002-2006 is organised in three main blocks of activities, "integrating research", "structuring the European Research Area" and "strengthening the foundations of the European Research Area", the second of which should be implemented by this specific programme.
- (3) The rules for the participation of undertakings, research centres and universities and for the dissemination of research results, for the framework programme, adopted by

25 OJ No.
26 OJ No.
27 OJ No.
28 OJ No.

the European Parliament and Council in Decision No. .../..EC29 (hereinafter referred to as "the rules for participation and dissemination") should apply to this programme.

- (4) New instruments, involving simplified and decentralised management, and the exploitation of external technical support should, if fully exploited in this programme, enable personnel and administrative expenses to be reduced to a maximum of 5.5% of the overall amount deemed necessary for its implementation.
- (5) In implementing this programme, emphasis should be given to the participation of SMEs, and it may be appropriate to engage in international co-operation activities with third countries and international organisations. Special attention should be paid to the Accession countries.
- (6) Research activities carried out within this programme should respect fundamental ethical principles, notably those which appear in the Charter of Fundamental Rights of the European Union.
- (7) Following the Commission Communication "Women and Science"³⁰ and the Resolutions of the Council³¹ and the European Parliament³² 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.
- (8) This programme should be implemented in a flexible, efficient and transparent manner, taking account of relevant interests, in particular of the scientific, industrial, user and policy communities; the research activities carried out under it should be adapted where appropriate to the needs of Community policies and to scientific and technological developments.
- (9) Since the measures for the implementation of this Decision are management measures within the meaning of Article 2 of Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission³³. They should be adopted by the use of the management procedure provided for in Article 4 of that Decision.
- (10) The Commission should in due course arrange for an independent assessment to be conducted concerning the activities carried out in the fields covered by this programme.

29 OJ No

30 COM(1999) 76

31 Resolution of 20 May 1999, OJ C 201, 16.7.1999

32 Resolution of 3 February 2000, PE 284.656

33 OJ L 184, 17.7.1999, p. 23

HAS ADOPTED THIS DECISION

Article 1

1. In accordance with the framework programme, a specific programme on structuring the research area (hereinafter referred to as "the specific programme") is hereby adopted for the period from [.....] to 31 December 2006.
2. The objectives and scientific and technological priorities for the specific programme are set out in Annex I.

Article 2

In accordance with Annex II to the framework programme, the amount deemed necessary for the execution of the specific programme is EUR 3 050 million, including a maximum of 5.5% for the Commission's administrative expenditure. An indicative breakdown of this amount is given in Annex II.

Article 3

1. The detailed rules for financial participation by the Community in the specific programme shall be those referred to in Article 2(2) of the framework programme.
2. Instruments for implementing the specific programme are defined in Annexes I and III to the framework programme and described in Annex III.
3. The rules for participation and dissemination shall apply to the specific programme.

Article 4

1. The Commission shall draw up a work programme for the implementation of the specific programme, setting out in greater detail the objectives and scientific and technological priorities set out in Annex I, and the timetable for implementation.
2. The work programme shall take account of relevant research activities carried out by the Member States, Associated States and European and international organisations. It shall be updated where appropriate.

Article 5

1. The Commission shall be responsible for the implementation of the specific programme.
2. The procedure laid down in Article 6 shall apply for the adoption of the following measures:
 - the drawing up and updating of the work programme referred to in Article 4(1),

- any adjustment to the indicative breakdown of the amount as set out in Annex II.

Article 6

1. The Commission shall be assisted by a committee, composed of representatives of the Member States and chaired by the representative of the Commission.
2. Where reference is made to this paragraph, the management procedure laid down in Article 4 of Decision 1999/468/EC³⁴ shall apply, in compliance with Article 7 (3) thereof.
3. The period provided for in Article 4(3) of Decision 1999/468/EC shall be two months.

Article 7

1. The Commission shall regularly report on the overall progress of the implementation of the specific programme, in accordance with Article 4 of the framework programme.
2. The Commission shall arrange for the independent assessment provided for in Article 5 of the framework programme to be conducted concerning the activities carried out in the fields covered by the specific programme.

Article 8

This decision is addressed to the Member States.

Done at Brussels, [...]

For the Council
The President
[...]

34 OJ L 184, 17.7.1999, p. 23

ANNEX I
Scientific and technological objectives and broad lines of the activities

Introduction

This programme will attack a number of key structural weaknesses that are manifested across all fields of European research and which are likely to have progressively more important effects on the EU's capacity to meet the aspirations of its citizens as its economies and societies become more knowledge-based. It will:

- enhance the propensity, at all levels, to turn research into useful and commercially valuable innovations;
- promote the development of human resources which constitute the underlying raw material on which research capabilities must be built, as well as the mobility of researchers – and of their knowledge and expertise - between European countries and to Europe from outside;
- stimulate the development and upgrading of research infrastructures of the highest quality on a more rational and cost-effective basis, and make facilities and associated resources more universally available to researchers throughout Europe who are able to benefit from them;
- develop the means for more constructive and effective communication and dialogue between research and citizens in general, so as to enable society at large to have a better-informed and more constructive influence on the future development and governance of science, technology and innovation.

By their nature and means of implementation, the activities carried out within this programme are applicable to all fields of research and technology. They have specific vocations, distinct from, and complementary to, the activities implemented within other parts of the framework programme, notably those within the “Integrating and strengthening the European Research Area” programme in the priority thematic areas defined for EU research in that programme, and attention will be given to ensure coherence with them.

This complementary relationship will be reflected in:

- improved provisions for human resource development and knowledge transfer arising from the implementation of the activities covered by this programme, which would apply, inter alia, to the thematic priority areas of research, as well as research infrastructures of broad application, including those crossing the boundaries between priority areas;
- the use, as appropriate, of consistent methods and tools to promote innovation through research and to reconcile better research with the concerns of society, as well as consistent frameworks for the implementation of actions on human resources, infrastructure support and ensuring the ethical conduct of research, which may be implemented, inter alia, within the context of integrated projects and networks of excellence.

Participation of the candidate countries in this programme will be encouraged.

1. RESEARCH AND INNOVATION

Objectives

The overall aim is to make a tangible improvement in Europe's innovation performance, in the short, medium and long term, by stimulating a better integration between research and innovation, and by working towards a more coherent and innovation-friendly policy and regulatory environment across the European Union.

To this end, and in accordance with the objectives of the communication³⁵ « Innovation in a knowledge-driven economy », activities will be implemented in a number of specific areas that are complementary and mutually supportive, within themselves and with the actions carried out under the heading « Integrating and strengthening the European Research Area ». They will focus on improving the knowledge, understanding and capabilities of the actors involved – researchers, industrialists, investors, public authorities at European, national and regional levels, and others – by encouraging more intensive and fruitful interactions between them, and by providing strategic information and services, as well developing new methodologies and tools, to assist them in their particular endeavours. A general principle underlying all these actions is that innovation cannot be separated from research ; the actions serve to reinforce the links between research and innovation, from the point of the conception of research activities, right through the period of their realisation.

To strengthen their structuring effect in Europe, these activities will, where appropriate, be carried out in cooperation with other forums or organisations at regional, national or European level, such as the Structural Funds or the EIB and the EIF in the context of the "*Innovation 2000 Initiative*".

Activities envisaged

i) Networking the players and encouraging interaction between them

The effectiveness of innovation systems depends on the intensity of interactions and exchanges between the players concerned. The European networks involved in this activity will, among other things, have the aim of encouraging interfaces between research and industry and between business and funding. The activities will concern the encouragement and validation of local and regional initiatives to promote the creation and development of innovative businesses; exchanges of good practice and the implementation of transnational cooperation involving universities, incubators, risk capital funds, etc.; and the optimisation of practices with regard to communication, training, transfer and sharing of knowledge between universities, businesses and the financial world.

ii) Encouraging transregional cooperation

The regional level is the most appropriate for putting in place innovation strategies and programmes involving the main local players. The purpose of this activity, to be carried out in close cooperation with activities in the context of regional policy and the Structural Funds, will be to promote exchanges of information on specific innovation-related themes; facilitate transfers of good practice and put in place innovation strategies in the regions in countries due to join the EU; and encourage the carrying out at regional level of schemes or measures that have proved successful at European level.

35 COM(2000)567, of 20.9.2000

iii) Experimenting with new tools and approaches

The purpose of these activities is to experiment with new innovation concepts and methods. These activities will concern experimenting on a European scale with new concepts applied in a national or regional environment to promote innovation and the setting-up of innovative businesses; analysis of the potential, for reproducing and/or exploiting proven methods, tools or results in new contexts; and putting into place integrated platforms making it possible to input and disseminate knowledge and know-how concerning the socio-technical processes of innovation.

iv) Putting services in place and consolidating them

The establishment of the European Research Area and the gradual integration of innovation systems in Europe will require a supply of information and services transcending the existing national fragmentation. The activities to be carried out will concern the CORDIS research and innovation information service, which will be supplemented by other media in order to reach the various target populations; the network of innovation relay centres, the geographical coverage of which will continue to be extended, and which will be supplemented by instruments to encourage the transnational transfer of knowledge and technologies; and information and support services in fields such as intellectual or industrial property and access to innovation funding.

v) Stepping up economic and technological intelligence

In the knowledge-based economy, economic and technological intelligence is a vital component of competitive research and innovation strategies. The activities to be carried out will centre on the innovation players: SMEs, researcher-entrepreneurs and investors. They will mainly involve intermediaries working with/for these players as well as organisations with economic and technological intelligence expertise. They will concentrate on specific S&T themes or industrial sectors and may concern: innovation promotion in SMEs, in particular by means of activities aimed at facilitating their participation in the Community research programmes; support for activities concerning the gathering, analysis and dissemination of information on S&T developments, applications and markets which may be of assistance to the stakeholders; and identification and dissemination of best practice with regard to economic and technological intelligence.

vi) Analysing and evaluating innovation in Community research projects

The research and innovation activities carried out in the context of Community projects, in particular within the networks of excellence and the integrated projects, represent a plentiful source of information about obstacles to innovation and the practices to be deployed in order to overcome them. The ex-post analysis of these practices will concern the gathering and analysis of information about measures taken to promote innovation in Community projects, as well as the obstacles encountered and the actions needed to remove them; the comparison of experience derived from Community projects with the lessons learnt from other national or intergovernmental programmes and the validation of the information obtained; and the active dissemination of this information among businesses and other participants in the generation and exploitation of knowledge.

2. HUMAN RESOURCES AND MOBILITY

Today's knowledge-based societies are heavily dependent on their capacity to produce, transfer and utilise knowledge. This requires mobilising cognitive resources, beginning with the research community. The overall strategic objective of the Human Resources and Mobility activity is to provide broad support for the development of abundant and dynamic world-class human resources in the European research system, taking into account the inherent international dimension of research.

This will involve a coherent set of actions, largely based on the financing of structured mobility schemes for researchers. These will essentially be geared at the development and transfer of research competencies, the consolidation and widening of researchers' career prospects, and the promotion of excellence in European research. The widely-recognised Marie Curie name will apply to all the actions concerned.

The activity will be open to all fields of scientific and technological research that contribute to the Community's RTD objectives. However, the possibility of refining priorities, as regards for example, scientific disciplines, participating regions, types of research organisations, and the level of experience of the targeted researcher populations, will be retained, in order to respond to the evolution of Europe's requirements in the area.

Attention will be paid to:

- the participation of women within all actions, and appropriate measures to promote a more equitable balance between men and women in research.
- the personal circumstances relating to mobility, particularly with respect to the family, career development and languages.
- the development of research activity in the less-favoured regions of the EU and Associated Countries, and to the need for increased and more effective co-operation between research disciplines and between academia and industry, including SMEs.

With a view to further reinforcing the human potential for European research, this activity will also aim to attract the best and most promising researchers from third countries³⁶, promote the training of European researchers abroad and stimulate the return of European scientists established outside Europe.

Actions to be pursued

Three main strands of actions will be implemented.

i) Host-driven actions

This first strand is aimed at supporting research networks, research organisations and enterprises in the provision of structured global schemes for the training and mobility of researchers, and the development and transfer of competencies in research. The actions concerned are intended to have a strong structuring effect on the European research system, in

³⁶ Participation of researchers from third countries is foreseen in all of the host-driven mobility schemes (section -i), as well as in one of the individual-driven schemes (section -ii). In such cases, account will be taken of any relevant arrangements between the EU and those countries - or groups of countries, as well as of the relevant Framework Programme participation and financing rules.

particularly by encouraging junior researchers to pursue a research career. Training elements in this strand will be directed at researchers at the early stages (typically the first 4 years) of their research careers, such as those who are undertaking a doctoral degree, while the transfer of competencies and knowledge will involve more experienced researchers.

- ***Marie Curie Research Training Networks*** – These provide the means for research teams of recognised international stature to link up, in the context of a well-defined collaborative research project, in order to formulate and implement a structured training programme for researchers in a particular field of research. Networks will provide a cohesive, but flexible framework for the training and professional development of researchers, especially in the early stages of their research career. Networks also aim to achieve a critical mass of qualified researchers, especially in areas that are highly-specialised and/or fragmented; and to contribute to overcoming institutional and disciplinary boundaries, notably through the promotion of multidisciplinary research. They will also provide a straightforward and effective means to involve the less-favoured regions of the EU and Associated Countries in internationally-recognised European research co-operation. Partners will be given significant autonomy and flexibility in the detailed operation of the networks. The duration of a network will typically be 4 years, with associated fellowships of up to 3 years, including short-term stays.
- ***Marie Curie Host Fellowships for Early Stage Research Training*** - These will be targeted at higher education and research institutions, training centres and enterprises, with a view to reinforcing their training capability. The scheme will be directed at researchers in the early stages of their professional career. It will focus on the acquisition of specific scientific and technological competencies in research, as well as of complementary skills such as those relating to research management and ethics. Hosts will be selected on the basis of their area of specialisation in research training. The associated fellowships will allow for fellows' stays for up to a maximum duration of 3 years. The scheme will also work towards more co-ordinated approaches to training among the organisations concerned, particularly between those involved in international doctoral studies.
- ***Marie Curie Host Fellowships for the Transfer of Knowledge*** - These will be directed at European organisations (universities, research centres, enterprises, etc.) in need of developing new areas of competence, as well as at furthering the development of research capabilities in the less-favoured regions of the EU and Associated countries. Knowledge transfer fellowships will allow experienced researchers to be hosted at such organisations for the transfer of knowledge, research competencies and technology. Fellowships will have a maximum duration of 2 years.
- ***Marie Curie Conferences and Training Courses*** - These will enable junior researchers to benefit from the experience of leading researchers. Support will be given to specific training activities (including virtual ones) that highlight particular European achievements and interests. Two categories of measures are foreseen: the first concerns support for a coherent series of high-level conferences and/or training courses (summer schools, laboratory courses etc.) proposed by a single organiser, and covering a specific theme or several linked themes; the second involves support for the participation of junior researchers in large conferences selected for their specific training interest. Such activities would typically be for a few days, but could extend to a few weeks, for example in the case of summer schools.

ii) Individual-driven actions

This second strand of actions concerns the support to individual researchers, in response to Europe's particular needs in terms of acquisition and transfer of competencies in research. It also addresses the professional re-integration of European researchers who have benefited from the Marie Curie scheme, as well as the return to Europe of European researchers who have been abroad for longer periods. It involves a number of schemes organised according to the geographical origin and destination of the researcher. Participation in these schemes will be open to researchers with at least 4 years of research experience, including those in possession of a doctorate degree.

- **Marie Curie Intra-European Fellowships** - these will allow the most promising researchers from EU and Associated countries to undertake training through research in the European organisations most appropriate to their individual needs. The application will be made by the fellow in conjunction with the host organisation. The topic will be freely chosen by the researcher in collaboration with the host, with a view to completing or diversifying his/her expertise. These fellowships will have a duration of 1 to 2 years.
- **Marie Curie Outgoing International Fellowships** - These will be awarded to researchers from EU and Associated countries to work in established third country research centres, thereby widening their international experience in research. This scheme will require the submission of a coherent individual training programme, involving a first phase abroad, followed by a mandatory second phase in Europe.
- **Marie Curie Incoming International Fellowships** - These will aim at attracting high-level researchers and promising young researchers from third countries to work and undertake research training in Europe, with the view to developing mutually-beneficial research co-operation between Europe and third countries. In the case of emerging economies and developing countries, the scheme may include provision to assist fellows to return to their country of origin.
- **Marie Curie Re-integration Grants** - These will be directed at researchers from the EU and Associated countries who have just completed a Marie Curie fellowship of at least two years. It will consist of a lump sum in the form of a personal grant to be used within one year. It will be allocated to the fellow on the basis of the submission of a defined project, which will be evaluated on its own merits. The re-integration would not be restricted to the researcher's country of origin. A similar mechanism (but covering a period of re-integration of up to two years) will apply to European researchers who have carried out research outside Europe for at least 5 years.

iii) Excellence Promotion and Recognition

This third strand of actions will focus on the promotion and recognition of excellence in European research, thereby increasing its visibility and attractiveness. It will aim at promoting European research teams, especially in new and/or emerging areas of research, and at highlighting personal achievements of European researchers, with a view to supporting their further development and international recognition, while also promoting the diffusion of their work for the benefit of the scientific community.

- **Marie Curie Excellence Grants** - These aim at providing support to individual researchers or research teams of the highest level of excellence for the establishment

or expansion of their teams, more particularly for leading edge or interdisciplinary research activities. The grant will cover a period of up to 4 years and will be awarded on the basis of a well-defined research programme.

- ***Marie Curie Excellence Awards*** - These aim at the public recognition of the excellence achieved by researchers who have in the past benefited from training and mobility support by the Community. Prize money will be awarded as a grant to be used for professional advancement, with the obligation to report within two years about the use made of the grant. Beneficiaries may propose themselves or be proposed by others.
- ***Marie Curie Chairs*** - These will be awarded for the purpose of making top-level appointments, in particular to attract world-class researchers and encourage them to resume their careers in Europe. Awards will normally have a duration of three years. This scheme may be developed in synergy with the host-driven actions.

Co-operation with Member States and Associated Countries

The Human Resources and Mobility activity will seek to co-finance initiatives which foster co-operation and create synergies with national and regional programmes where these coincide with the specific objectives of the schemes outlined above. Such co-operation will be established on the basis of relevant Community criteria, with a view to creating genuine access to these initiatives for all EU and Associated Country researchers, as well as promoting the adoption of mutually-recognised research training standards.

In terms of management of the activity, beyond the increased importance of host-driven actions, initiatives will be undertaken to reinforce co-operation with Member States and Associated Countries in the provision of 'proximity support' to researchers, which is a key element of any mobility scheme for researchers moving within or returning to Europe. This could be undertaken through the co-financing of existing and new structures, at national or regional level, with the aim of providing practical assistance to foreign researchers in matters (legal, administrative, familial or cultural) relating to their mobility.

A further aspect of this co-operation might concern a number of tasks associated with the management and follow up of individual fellowship contracts. This would require prior establishment of a clear demarcation of tasks and responsibilities in accordance with Community financial regulations and rules, and the undertaking of relevant cost/benefit analyses.

Internal, Framework Programme Co-operation

The role of the Human Resources and Mobility activity is to support research training and the development of research competencies. This does not preclude other activities within the new Framework Programme from incorporating similar elements. The Human Resources and Mobility activity will provide assistance with regard to the adoption of consistent criteria in relation to the evaluation, selection and monitoring of such actions, as well as the promotion of common approaches among the activities, with a view to ensuring coherence and developing possible synergies, and an equitable balance in the participation of men and women.

3. RESEARCH INFRASTRUCTURES

The ability of Europe's research teams to remain at the forefront of all fields of science and technology depends on their being supported by state-of-the-art infrastructures. The term "research infrastructures" refers to facilities and resources that provide essential services to the research community in both academic and industrial domains. Research infrastructures may be "single-sited" (single resource at a single location), "distributed" (a network of distributed resources, including infrastructures based on Grid-type architectures), or "virtual" (the service being provided electronically).

The overall objective of this activity is to promote the development of a fabric of research infrastructures of the highest quality and performance in Europe and their optimum use on a European scale based on the needs expressed by the research community. Specifically this will aim at:

- ensuring that European researchers may have access to the infrastructures they require to conduct their research, irrespective of the location of the infrastructure;
- providing support for a co-ordinated approach for the development of new research infrastructures and for the operation and enhancement of existing infrastructures, including where appropriate facilities of world-wide relevance not existing in Europe.

Where relevant, support for research infrastructures in this programme will be implemented in association with the thematic priorities of the Framework Programme and with the other available forms of support.

Five schemes for support will be implemented:

- ***Integrated Initiatives.*** The objective is to support the provision of essential services to the research community at European level. For this purpose the initiatives combine cooperation networks with one or more other specific activities, including for example transnational access and research activities to improve the performance of the infrastructure. The scheme will also encourage the bridging of gaps that may limit the potential for exploitation of research results by industry, including SME's. Integrated initiatives will be selected on the basis of a wide-scale but flexible scientific and technological programme of European dimension aiming, where appropriate, at the long-term sustainability of the programme.
- ***Communication Network Development.*** The objective of this scheme in support existing research infrastructures is to create a denser network between related initiatives, in particular by establishing a broadband communications network for all researchers in Europe and specific high performance Grids and test-beds.
- ***Transnational Access.*** The objective is to sponsor new opportunities for research teams (including individual researchers) to obtain access to individual major research infrastructures most appropriate for their work. Community financing will cover the necessary operating costs of providing access to such infrastructures for research teams working in Member States and Associated States other than the state where the operator of a given infrastructure is located.

- *Design studies.* The objective is to contribute, on a case-by-case basis, to feasibility studies and technical preparatory work for those new infrastructures to be undertaken by one or a number of Member States, which have a clear European dimension and interest.
- *Development of new infrastructures.* In appropriate circumstances, this scheme could contribute towards the development of a new infrastructure alongside with other funding agencies.

In general, funding provided for new or enhanced infrastructures will be limited to the minimum necessary to catalyse the activity; the major part of construction and operation, and the long-term sustainability of the infrastructures in question being assured by national and/or other sources of finance. Such funding would only be provided on the basis of a detailed justification, based on European added value, addressing the scientific, legal and financial dimensions of the proposed development. Feasibility studies and technical preparatory work should investigate the possibilities of combining funding with other sources of finance from the European Union (e.g. the European Investment Bank and the Structural Funds).

Broadband communication networks, which are highly relevant to the political goals set out by the European Research Area and the e-Europe initiative, should also be used as a means to enhance scientific co-operation with third countries.

Support for research infrastructures in this programme should, where relevant, take into account existing or future mechanisms for a co-ordinated approach to research infrastructures in Europe, as well as the scientific advice of existing European and international organisations (e.g. ESF). Accompanying measures under this programme may be implemented, where appropriate, to sustain these mechanisms.

4. SCIENCE AND SOCIETY

Today, and even more in the knowledge-based society of tomorrow, science and technology have a ubiquitous presence throughout the economy and in everyday life. If they are to realise their full potential in securing a continually-increasing quality of life – in the broadest sense - to Europe’s citizens, new relations and a more productive dialogue between the scientific community, industrialists, policy-makers and society at large will be needed.

Such a dialogue cannot be confined to the EU alone. It must be international in scope, taking full account of the enlargement perspective and the global context. Given the very broad range of issues and interactions that are implied in the relations between science and technology, on one hand, and the broader community, on the other, these considerations must be integrated within all areas of activity of the framework programme. The role of this specific activity is to develop the structural links between the institutions and activities concerned and provide a central focus, through common reference frameworks and the development of appropriate tools and approaches, to guide activities in this domain covered by the different parts of the framework programme.

It will be implemented by means of networks, benchmarking, exchange of best practices, developing and promoting awareness of methodologies, studies and the bringing together of national efforts. In specific cases, where appropriate, dedicated research will be supported.

i) Bringing research closer to society

The aim is to examine systematically the various components of “science and governance” in order to create conditions under which policy decisions are more effective in meeting society’s needs, more soundly based in science and at the same time take account of the concerns of civil society. This requires consideration of effective processes of dialogue on emerging scientific and technological issues ultimately having consequences for prospective policy development; developing appropriate means for creating scientific references and channelling scientific advice to policy makers; and equipping the latter with tools to assess and manage scientific uncertainty, risk and precaution.

- **Science and governance:** *analysing and support to best practice; developing new consultation mechanisms to promote more productive involvement of civil society and relevant stakeholders in policy formulation and implementation, including the communication of scientific outputs necessary to decision taking in terms readily understandable to civil society and other stakeholders; monitoring activities concerning the functioning of policy-making processes to assess the interaction between experts, industry, civil society and policy-makers.*
- **Scientific advice and reference systems:** *exchange of experience and good practice; monitoring the production of scientific advice world-wide and how this advice is provided as input to decision; developing new and better methodologies for reliable and recognised reference systems; ensuring the smooth operation and effective use of the European Research Advisory Body and its sub-committees in order to provide scientific advice for the development of the European research area.*

ii) Responsible research and application of science and technology

The aim is to ensure that rapidly advancing progress in science is in harmony with the ethical values of all Europeans. Activities will promote "responsible research" in Europe, in which the requirements for investigative freedom are better reconciled with social and environmental responsibilities in the development and application of science and technology, as well as the public dialogue, monitoring, and early warning, of ethical and social issues, and risks arising from new technological developments, for the benefit of national and international policy makers and other interested groups.

- **Ethics:** *networking between existing ethics bodies and activities in Europe, and promotion of dialogue on ethics in research with other regions in the global context; awareness raising and training activities in ethics; co-ordination and development of codes of conduct for research activities and technological developments; research on ethics in relation to science, technology developments and their applications, for example, in relation to information society, nanotechnologies, human genetics and biomedical research and in food technologies.*
- **Uncertainty, risk, and implementing the precautionary principle:** *analysis and support to best practice in the application of the precautionary principle in different areas of policy making and in the assessment, management and communication of uncertainty and risk.*

iii) Stepping up the science/society dialogue and women in science

Support for the responsible development of science and technology requires not only a continued dialogue between the relevant stakeholder, but also better public awareness of scientific and technological advances and their possible implications, and a wider understanding of scientific and innovation culture. There are also particular needs to stimulate young peoples' interest in science, to increase the attractiveness of scientific careers, and to make progress towards gender equality in research, which will also enhance human resources and improve levels of excellence in European research

- **Public understanding:** *supporting awareness-raising events and the recognition of achievements in European research; analysis of the factors influencing public opinion, including the role of the media and science communicators; developing new ways of raising public awareness and knowledge; encourage comprehensive “stakeholder” debates and stimulate awareness for innovation in society.*
- **Young peoples' interest in scientific careers:** *initiatives to attract the younger generation to participate in the discussion on science and technology and their societal impact and to raise the S&T awareness among youth; support for the development of better approaches to science for girls and boys within and outside the formal education system, and for actions concerning a better understanding of the relative attractiveness and social aspects of taking science as a career.*
- **Women and Science:** *actions to stimulate the policy debate at national and regional level to mobilise woman scientists and boost the participation of the private sector; promoting the enhancement of the Gender Watch System and associated activities to promote gender equality throughout the framework programme; specific actions to develop a better understanding of the gender issue in science.*

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Types of activities	Amount (EUR million)
Research and Innovation	300
Human Resources	1800
Research infrastructures	900
Science / society	50
Total	3050

ANNEX III – MEANS FOR IMPLEMENTING THE PROGRAMME

In order to implement the specific programme, and in accordance with the Decisions 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 (2002/.../EC) and with the rules for the participation of undertakings, research centres and universities and for the dissemination of research results (2002/.../EC), the Commission may use, across the whole field of science and technology:

- **experimental projects relating to innovation** aimed at experimenting with, validating and disseminating on a European scale new innovation concepts and methods in the area of "*Research and innovation*".
- **specific targeted projects** in order to carry out research or demonstration activities in the area of "*Science and society*".
- **integrated initiatives relating to infrastructure**, combining activities that are essential for strengthening and developing research infrastructures for the provision of services on a European scale, in the area of "*Research infrastructures*".
- **mobility and training actions** implementing certain Marie Curie activities such as research training networks, conferences and training courses and individual training fellowships in the area of "*Human resources and mobility*".
- **specific coordination and support actions** in order to achieve the objectives identified in all the areas of the programme.
- **accompanying actions** by way of additional measures to achieve the objectives of the programme or to prepare future activities in the context of the Community's research and technological development policy.

The Commission will evaluate the proposals in accordance with the evaluation criteria set out in the above mentioned Decisions in order to verify their relevance with regard to the objectives of the programme, their scientific and technological excellence, their Community added value and the participants' management capacity.

The Community contribution will be granted in accordance with the above mentioned decisions. In the case of participation of bodies from regions lagging in development, it may be possible to obtain complementary funding from the Structural Funds within the limits specified by the Community framework for state aid for research.

LEGISLATIVE FINANCIAL STATEMENT

Policy area(s): Research

Activity(ies): Research actions under the EC Treaty.

TITLE OF ACTION

Proposal for a Council Decision adopting a specific programme for research, technological development and demonstration activities aimed at "Structuring the European Research Area"

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

Subsection B6 6 Indirect Actions: these lines will be specified at the beginning of the 2003 budget procedure, taking into account the ABB nomenclature, which is being drawn up.

2. OVERALL FIGURES

2.1. Total allocation for action (Part B): €3 050 million for commitments

2.2. Period of application:

2002-2006

2.3. Overall multiannual estimate of expenditure:

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

€ million (*to 3rd decimal place*)

	2003	2004	2005	2006	2007 +	Total
Commitments	660.500	708.000	744.300	769.400	-	2882.200
Payments	81.500	372.000	523.300	618.400	1 287.000	2882.200

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

This budget category does not apply in this field.

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

Commitments	42.500	42.000	41.700	41.600	-	167.800
/Payments						

TOTAL a+b+c	2003	2004	2005	2006	2007 +	Total
Commitments	703.000	750.000	786.000	811.000	-	3 050.000
Payments	124.000	414.000	565.000	660.000	1 287.000	3 050.000

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 Specific Programme.

These association agreements are linked to a Framework Programme. Their renewal will be renegotiated following adoption of the new Framework Programme and it is therefore impossible to forecast the amount of revenue in question.

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

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 3

4. LEGAL BASIS

Article 166 of the EC Treaty.

Proposal for a Decision of the European Parliament and of the Council adopting the 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.

5. DESCRIPTION AND GROUNDS

5.1. Need for Community intervention

5.1.1 Objectives pursued

As recognised at the highest political level by the European Council in Lisbon, Feira, Nice and again recently in Stockholm, research is a central component of the knowledge-based economy and society developing worldwide. The objective set for the EU in Lisbon was "to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth, more and better jobs and greater social cohesion" over the next decade. More than ever, research is proving to be one of the main 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 at both EU and national level.

However, Europe still has structural weaknesses where research is concerned. These can be summed up in four main points:

- I. *Insufficient and dispersed investment in research and technological development and more generally in knowledge* (RTD, education and software), with the result that we are lagging behind our competitors. In 1999, the EU invested EUR 76 billion less than the US in research and development. It is now lagging behind its competitors in terms of research spending as a proportion of GDP (in 1999, the figure was 1.9% for the EU compared with 2.6% for the US and 2.9% for Japan³⁷). In 1999, the US invested some 9% in knowledge, ahead of the EU (7.6%) and Japan (6.9%). And the gap is continuing to widen.
- II. *Insufficient human resources in research.* Researchers represent 5.3/1000 of the workforce in the EU (1998), 7.4/1000 in the US (1993) and 8.9/1000 in Japan (1998) where there are twice as many researchers in industry. Direct public spending on higher education corresponds to 0.9% of GDP in the EU, 1.4% in the US and 0.5% in Japan (1997).
- III. *A limited capacity to translate scientific breakthroughs into innovative and competitive products and services,* despite high-quality scientific production. The figures for the number of patents granted by the European, American and Japanese patents offices per million inhabitants are 32 in the EU, 49 in the US and 88 in Japan. In 1998, the trade balance for high-tech products was a €28 billion deficit for the EU (a trend confirmed throughout the decade), compared with a €8 billion deficits for the US and an EUR 39 billion surplus for Japan. Risk capital investment in the advanced sectors corresponds to 80% in the US and, while it is on the increase, only 26 % in the EU and 23% in Japan.
- IV. *A fragmentation of research policies in Europe.* The EU has not yet adopted a fully-fledged research policy. The 15 national policies co-exist side by side and alongside the Community framework programme without adequate coordination between them to achieve efficient organisation and exploitation. This lack of coordination also affects the establishment and efficient exploitation of research infrastructures.

37 1998 figure.

To alleviate this situation, the Commission has proposed and Council and Parliament have endorsed the creation of a "*European Research Area*". Bringing it about will necessarily be the product of a joint effort by the Community, the Member States and research stakeholders. The Community research framework programmes (2002-2006) and the specific programmes will make a contribution to this in particular through the significant leverage effect that they can have for integrating, coordinating and structuring research in the EU and strengthening the foundations of the European Research Area.

A structural change in the EU's S&T fabric to remedy the above mentioned weaknesses will need resources commensurate with the objective. The Commission has proposed funding for the framework programme totalling EUR 17.5 billion, corresponding to the previous level of funding plus inflation and growth (but still representing only 5 to 6% of public spending on RTD). The Commission takes the view that this sort of amount could have a significant effect on the research system as such, improve at least some of the overall research indicators, and have a significant effect in the priority areas of the framework programme which will generate growth in the EU. In overall terms, this level of funding will make it possible to maintain the Community's RTD effort expressed as percentage of GDP at its present level during the period 2003-2006.

The plan is to implement the framework programmes by five specific programmes, three of which come under the European Community Treaty and two under the European Atomic Energy (Euratom) Treaty. Each specific programme is identified according to the nature of the instruments deployed, reflecting the objectives and organisation of the framework programme:

- A programme on "Integrating and strengthening the European Research Area" comprising the indirect actions proposed under the heading "Integrating research" and under the heading "Strengthening the foundations of the European Research Area", thus bring together research and coordination activities.
- A programme on "Structuring the European Research Area", comprising horizontal, support and structuring activities.
- Two "Joint Research Centre (JRC)" programmes comprising the direct actions carried out by the JRC in the non-nuclear and nuclear fields respectively.
- A "Nuclear energy" programme comprising the indirect actions carried out in the field of nuclear energy.

The objectives of the specific programme "Structuring the European Research Area" are set out below by action areas, together with their justification and the European added value that they can provide.

1. Research and innovation

The objective of these actions is to promote technological innovation, the exploitation of research results, the transfer of knowledge and technologies and the setting-up of technology businesses within the Community and all its regions.

Justification and European added value

- Need to reduce performance gaps between European regions

- Need to promote policies and development strategies for innovation
- Need for participants in Community research actions to have information and specialised services on a European scale
- At present, information about economic and technological trends is lacking or does not have a sufficiently high profile
- Need to promote cooperation between players with additional know-how in order to innovate.

2. Human resources and mobility

The objective of the activities carried out under this heading is to provide support for the development of abundant and world-class human resources in all the regions of the Community, by promoting trans-national mobility for training purposes, the development of expertise or the transfer of knowledge in particular between different sectors; support for the development of scientific excellence; and helping to make Europe more attractive to third-country researchers. This should be achieved by attempting to make the most of the potential of all components of the population, and more particularly women, by taking appropriate measures to this end.

Justification and European added value

- Low proportion of European workforce in R&D (5.3 in every thousand in 1998) compared to US (7.4 in 1993) and Japan (8.9 in 1998).
- Brain drain to the US of European scientists, with stay rates of up to 50 % (in 1998) after completion of a doctoral degree in the US.
- Low take up in 1998 of scientific studies and academic research assignments, with 23% of people aged 20 to 29 years in the EU in higher education, compared to 39% in the USA and 21% in Japan.
- Rigidity of academic careers and more attractive career prospects in industry.
- Differing national and regional laws and practices affecting the mobility of researchers.

3. Research infrastructures

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

Justification and European added value

- Obstacles remain to transnational access to facilities.
- The potential of electronic communications networks is not yet fully exploited.
- Multinational funding agreements are difficult to establish.

- Technological development related to infrastructures is handicapped by a lack of critical mass.

4. Science and society

The objective of the actions carried out under this heading is to encourage the development in Europe of harmonious relations between science and society and openness to innovation as a result of establishing new relationships and an informed dialogue between researchers, industrialists, policy makers and citizens.

Justification and European added value

- Recent events in Europe, such as BSE, GMOs, have resulted in a loss of public confidence in science and technology
- Policy-makers have required rapid and precise answers to complex scientific issues, usually transcending geographical boundaries
- Traditional methods of education appear to be failing
- Women are widely underrepresented in scientific research (for instance, women represent 50% of the graduates in Europe, but account for only 10% of the full professors).

5.1.2 Measures taken in connection with ex ante evaluation

An ex-ante evaluation was carried out by the Commission services when preparing the specific programme proposals. Its results reflect in particular:

- 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;
- wide-ranging consultations among the protagonists relating to the two communications on the European Research Area in the course of the year 2000³⁸ and the framework programme proposal at the beginning of 2001;
- a series of internal and external Commission studies relating to economic, political and foresight areas and the impact of RTD activities.

The results of the ex-ante evaluation carried out are reflected in particular in the choices made with regard to the structure of the programmes, the objectives and priorities and the implementing instruments.

The objectives and priorities were selected in accordance with the rigorous application of the criterion of European added value.

38 COM (2000) 612 of 4 October 2000
COM (2000) 6 of 18 January 2000

This covers the following aspects applied to the priority themes and activities selected, the justification and European added value of which are described in greater detail in point 5.1. and the expected results in point 5.2.

- Importance of collaboration in economic terms (economies of scale) and as a result of its beneficial effects on the private research effort and industrial competitiveness
- Maintenance or development of the position of the EU in RTD areas strategic for the EU
- Need to combine the complementary expertise present in the different countries, more particularly in the face of interdisciplinary problems and the need to have recourse to comparative studies on a European scale
- Links with the priority interests of the EU as well as with Community legislation and policies
- The necessarily transnational nature of the research as the result of the scale on which the problems arise or for scientific reasons.

With regard to the implementing instruments, new instruments, which by their nature can only be implemented at Community level, have been designed to contribute at EU level to:

- promoting the interaction between research and innovation
- developing human resources and reinforcing mobility
- supporting research infrastructures
- developing harmonious relations between science and society.

These instruments and the corresponding objectives are described in point 5.2.

5.1.3 Measures taken following ex post evaluation

The recommendations of the five-year assessment of the framework programmes and the specific programmes carried out in 2000 have been taken into account in preparing the specific programme proposals, in particular those concerning:

- the need to make up for Europe's trailing position in the field of RTD compared with its competitors;
- the need for complementarity and coherence between national and Community RTD policies and the essential role of the Commission in achieving this objective;
- the beneficial impact of the framework programme which "fills a gap in Europe by enabling researchers in universities and in industry to carry out applied work together";
- the need to lighten the procedures of the 1998-2002 programme and the need to "rethink the structures and procedures for managing the framework programme";
- placing Community research activities in the broader context of a genuine European research policy;

- reinforcing the concentration of the programmes;
- continuing with the research needed to achieve the objectives of Community 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 fifth 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 pilot projects for the measures envisaged for the next framework programme (networks, clusters, industrial platforms, larger-scale projects, etc.).

5.2. Actions envisaged and means of budget intervention

The actions envisaged for the specific programme on "Structuring the European Research Area" are set out below presented by detailed action areas. This presentation makes it possible to highlight the estimated results expected, the contributions to the overall objectives of the framework programme or of the Community or potential performance parameters associated with these. These indications are intended as yardsticks and not definitively adopted goals.

A correspondence between the action areas and the types of instruments used is given further on in the form of a table.

1. Research and innovation

- i) Networking the players and encouraging interaction between them
- ii) Encouraging transregional cooperation
- iii) Experimenting with new tools and approaches
- iv) Putting services in place and consolidating them
- v) Stepping up economic and technological intelligence
- vi) Analysing and evaluating innovation in the Community research projects

Expected results, contributions to overall objectives or potential performance parameters

- Increasing the number of business "start-ups"
- Increasing the amount of risk capital invested in innovative businesses
- Increasing the number of collaborations established between regions and with the associated countries
- Increasing the number of users and the number of transactions involving specifically European information services
- Doubling the number of members of networks working with SMEs.

2. Human resources and mobility

i) *Host-driven actions*

(Marie Curie Research Training Networks, Marie Curie Host Fellowships for Early Stage Research Training, Marie Curie Host Fellowships for the Transfer of Knowledge, Marie Curie Conferences and Training Courses)

ii) *Individual-driven actions*

(Marie Curie Intra-European Fellowships, Marie Curie Outgoing International Fellowships, Marie Curie Incoming International Fellowships, Marie Curie Re-integration Grants)

iii) *Excellence Promotion and Recognition*

(Marie Curie Excellence Grants, Marie Curie Excellence Awards, Marie Curie Chairs)

(Cooperation with Member States and Associated Countries, Internal Framework Programme Co-operation)

Expected results, contributions to overall objectives or potential performance parameters

- Evaluation of the number of international collaborative projects and individual moves, countries involved, length of stays, age of the researchers.
- Evaluation of the number of researchers/researcher-months, age profile, disciplines and types of training.
- Increase in the number of permanent positions following mobility
- Promotion of the return to Europe of European scientists
- Increase in the number of researchers/teams awarded.

3. Research infrastructures

Integrated Initiatives,

Communication network development,

Transnational Access,

Design studies,

Development of new infrastructures.

Expected results, contributions to overall objectives or potential performance parameters

- Provision of access to, or services from, around 100 infrastructures for on average about 8,000 researchers per € 100 million of financing
- Promotion of co-operation among on average about 100 participants in 10 networks or research projects per € 100 million of financing.

- Increase of the number of new techniques, technologies or electronic networks, which will significantly enhance the provision of services by relevant infrastructures in their fields.

4. Science and society

i) Bringing research closer to society

(Science and governance, Scientific advice and reference systems)

ii) Responsible development and application of science and technology

(Ethics, Uncertainty, risk and implementing the precautionary principle)

iii) Stepping up the science/society dialogue and women in science

(Public understanding, Young peoples' interest in scientific careers, Women and Science)

Expected results, contributions to overall objectives or potential performance parameters

- Guidelines for science and governance, and scientific reference systems, aimed at better connection between the scientific community, policy-makers and civil society.
- Mapping of the scientific advice structures in the EU and world-wide
- Carrying out ethical reviews in order to ensure the adherence to ethical principals in Community research activities, and developing codes of conduct
- To reach the objective of 40% for women's participation in assemblies and panels.

The means of intervention and financial participation under the framework programme will be as follows, according to the objectives:

Areas	Themes/activities	Types of instruments ⁽¹⁾	Financial participation under the framework programme
Promoting interaction between research and innovation	Networking the players and encouraging interaction between them	<ul style="list-style-type: none"> - Experimental projects relating to innovation - Coordination and specific support actions: - coordination actions - specific support actions 	Grant to the budget: Grant to the budget
	Encouraging transregional cooperation		
	Experimenting with new tools and approaches		
	Putting services in place and consolidating them		
	Stepping up economic and technological intelligence		
	Analysing and evaluating innovation in the Community research projects		
Developing human resources and stepping up mobility	Marie Curie research training networks	Mobility and training actions	Grant to the budget
	Marie Curie Host Fellowships for Early Stage Research Training		
	Marie Curie host fellowships for the transfer of knowledge		
	Marie Curie conferences and training courses		
	Marie Curie intra-European fellowships		
	Marie Curie outgoing international fellowships		
	Marie Curie incoming international fellowships		
	Marie Curie reintegration grants		
	Excellence promotion and recognition	<ul style="list-style-type: none"> - Coordination and specific support actions: - coordination actions - specific support actions 	Grant to the budget
	Cooperation with Member States and associated countries		

Areas	Themes/activities	Types of instruments ⁽¹⁾	Financial participation under the framework programme
Support for research infrastructures	Transnational access to research infrastructures	Specific support actions	
	Services of a European scale	Integrated initiatives	Grant to the budget
	Communication network development	Integrated initiatives Coordination and specific support actions: - coordination actions - specific support actions	Grant to the budget
	Technical preparatory work, feasibility studies	Coordination and specific support actions: - coordination actions - specific support actions	
	Development of new infrastructures		
Development of harmonious relations between science and society	Science and governance	- Targeted specific projects	Grant to the budget
	Scientific advice and expertise	- Coordination and specific support actions - coordination actions	
	Ethics	- specific support actions specific	
	Risks		
	Public understanding of science		
	Young peoples' interest in scientific careers		
	Women and science		

(1) Accompanying actions can also be implemented throughout the specific programme.

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

5.3. Means of implementation

The Commission will ensure the implementation of the actions. In certain duly justified cases, it may call upon external bodies for assistance.

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 16 275 million. The total amount for the Framework Programmes 2002-2006 is EUR 17 500 million.

6.1.1 *Financial intervention: Commitments in €million (to the third decimal place)*

Breakdown by objective	Total
Structuring the European research area	3 050
1) Research and innovation	300
2) Human resources	1 800
3) Research infrastructure	900
4) Science and society	50
TOTAL	3 050

An annual schedule for each of these objectives is not significant at this level. It could only be defined as being strictly proportional to that for the entire specific programme, itself in line with that of the framework programme. The annual internal breakdown will be established subsequently within the work programmes.

6.1.2 *Technical and administrative assistance, support expenditure and IT expenditure (Commitment appropriations)*

This budget category does not apply in this field.

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

For the indirect actions of the Fifth RTD Framework Programme of the European Community (1998-2002), the annual volume is in the order of 3500 new contracts signed (all categories included), for an annual budget of € 3000 million.

For the indirect actions of the Framework Programme 2002-2006, the annual budget will be in the order of € 3700 million, an increase in real terms by 13 %.

Nevertheless, as set out in point 5.1.2, new instruments have been designed for the implementation of this new Framework Programme

Compared to previous Framework Programmes, these instruments go beyond merely scientific projects and introduce the concept of integration and structuring of research, in particular by critical mass and networking of competences and resources in identified areas.

As concerns the management of the Framework Programme 2002-2006, this concept of critical mass will be reflected in a significant increase of the mean financial contribution to projects and is expected to result in a substantial reduction of the number of contracts concluded annually.

7. IMPACT ON STAFF AND ADMINISTRATIVE EXPENDITURE

Determined to fundamentally modify the implementation of the Framework Programme, the Commission proposes to lower the ceiling for human resources and other administrative expenditure to 5.5 % for the two indirect, non-nuclear research programmes.

Currently in the parts of the 5th Framework Programme related to indirect, non-nuclear research, the overall ceiling for human resources and other administrative expenditure is 7.0%.

On present current trends, actual expenditure under the 5th Framework Programme is likely to remain close to this ceiling, perhaps a little below.

Assuming there were to be no change in the methods of implementing the Framework Programme, and given the need to allow for some margin in this category of expenditure, the Commission would have no reason to depart from the overall ceiling of 7%. This is largely because the proposed budget for the next programme increases in line with inflation, allowing for a little more in line with growth in the economy.

Any reduction in the overall ceiling could only be achieved on the assumption of significant gains in productivity, including significant changes in the management of the programme. A relatively restrictive set of assumptions would include :

- A freeze on the total number of statutory staff at its 2002 level of 1654 posts, assuming productivity gains of 2% per annum to compensate for the increase in the real volume of the programme
- An inflation rate of 2% a year, even though staff costs tend to rise at a slightly higher rate
- A freeze in expenditure on external personnel at its 2002 level

The above scenario would allow the Commission to propose a reduction in the overall ceiling to about 6.3 %.

The Commission is, however, prepared to commit itself to a much more significant reduction in the ceiling from 7.0% to 5.5%. This would allow an important amount of additional resources, roughly € 230 million, to be allocated directly to research projects.

This requires equitable efforts in productivity gains in all research activities. The ceiling of 5.5% proposed for administrative expenditure is a global one, covering the specific programmes 'Integrating and Strengthening the European Research Area' and 'Structuring the European Research Area' as a whole. In implementing these programmes, the Commission will ensure an appropriate share of administrative expenditure between the services responsible for managing research activities. This share will take account of the overall budget to be managed, the intensity of the use of the three new instruments, the labour-intensiveness and the latest technological developments of the activities at the various stages of their life-cycle, including their length, and the need to ensure effective management of the contracts committed under previous Framework Programmes.

The main factor that would allow this to be achieved is the introduction on a widespread scale of the new instruments and means of implementation proposed in the next Framework Programme. These would allow net reductions in the costs of administering the programme.

In other terms, a ceiling of 5.5 % expresses the determination of the Commission to fundamentally modify the implementation of the Framework Programme.

- It is useful to recall that even if the new instruments are used fully in line with the Commission's proposal, their impact on administrative expenditure will be gradual. During the 2003-2006 period, an important part of the administrative activities undertaken by the Commission will still be to implement and conclude previous Framework Programmes.

The average duration of contracts for indirect research being four years, , some 13000 open contracts with a financial volume of € 6600 million could be expected at the end of the 5th FP.

The ceiling of 5.5 % for the human and administrative resources for indirect, non-nuclear programmes will therefore require exploiting all the potential of the new management approach to the Framework Programme:

- Full use would need to be made of the new instruments to reduce the number of individual projects and contracts to be administered by the Commission.
- Their management will need to be largely simplified and decentralised.
- All possibilities will need to be exploited to externalise technical support activities and certain aspects of the management of specific categories of activities, whenever this reduces overall administrative expenditure.

It requires also efficient programme and budget structures and this reduced 5.5% ceiling should apply for the total of the two indirect, non-nuclear research programmes.

This proposal is critically dependent on the introduction of the new instruments in line with the Commission's proposal. Any revision of this will imply a change in the ceiling for administrative costs.

7.1. Impact on human resources

Types of post		Staff to be assigned to management of the action using existing and/or additional resources		Total	Description of tasks deriving from the action
		Number of permanent posts	Number of temporary posts		
Permanent officials or Temporary staff	A	153			<i>If necessary, a fuller description of the tasks may be annexed.</i>
	B	47			
	C	80			
Other human resources			125 to 160 person/years		See costs
Total		280			

There is a specific establishment plan for the indirect research actions comprising a total of 954 A posts, 273 B posts and 427 C posts, giving a total of 1654 posts (EC and EURATOM, including SAB 3/2001).

To this establishment plan should be added 166 operating budget posts with no financial impact on the budget for these programmes, under the heading of participation in the formulation and implementation of research policy.

7.2 Overall financial impact of human resources

Type of human resources	Amount €million	Method of calculation *
Officials Temporary research staff	98.000	On the basis of an extrapolation of actual costs in 2000 for this personnel, inflation of 2% per annum et and an average vacancy rate of 8%.

Other human resources (give budget line)	25.000 to 32.000	On the basis of an extrapolation of actual costs in 2000 and the forecast of expenditure in 2001/2002 and taking into account the objective described at the beginning of point 7
Total	123.000 to 130.000	Financed from B6 (research budget)

The amounts correspond to total expenditure for the duration of the programme.

7.3 Other administrative expenditure deriving from the action

Budget line (No and heading)	Amount €million	Method of calculation
(B6) Missions, operation, infrastructure, IT, communication (depending on the types of expenditure authorised in the table of equivalence for indirect RTD actions)	37.800 to 44.800	On the basis of an extrapolation of actual costs in 2000 and the forecast of expenditure in 2001/2002 and taking into account the objective described at the beginning of point 7
Total	37.800 to 44.800	Financed from B6 (research budget)

The amounts correspond to total expenditure for the action for the four years of implementation of this specific programme, i.e. total annual expenditure of €42.000 million.

I.	Total (7.2 + 7.3) (€million)	167.800
II.	Duration of action (years)	4
III.	Indicative annual cost (€million)	42.000

8. FOLLOW-UP AND EVALUATION

8.1 Follow-up arrangements

The specific programmes are designed to help bring about the European Research Area and they will be implemented in parallel with and in close collaboration with other Community and national activities in pursuit of the same objectives. The very nature of research and the different types of actions at different levels make it difficult to determine causes and effects, and monitoring and evaluating the result and impact are complex.

Based on the experience of the earlier programmes and methodological studies in progress, a series of instruments has already been or is being finalised in order to develop the objectives and monitor and evaluate the results and impact of the framework programme and programmes implementing it, as well as the activities relating to bringing about the ERA. The Commission will take stock of the development of these instruments in good time before the programmes are implemented.

By these means, a structured system for collection of information and statistics will be progressively put in place.

Within this context general indicators specifically adapted to the framework programme will be developed, to make it possible to evaluate in particular the contributions of the programmes in relation to the challenges facing the EU identified in point 5.1 (Investment in RTD and in knowledge, overall and in the priority fields for the EU, human RTD resources, exploitation of RTD results, coherence of national and Community research policies and with regard to research infrastructures).

In addition, more specific indicators will be identified for the different objectives of the programmes; relating in particular to the production, management and networking, exploitation and impact of the knowledge arising from the activities carried out under the programmes. First thoughts in this connection are already indicated in point 5.2 under the heading of results expected, contributions to overall objectives or potential performance parameters.

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 and the specific programmes 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.

The objective is to step up and improve the systematic collection, coherence and quality of the basic information, in order to allow efficient analysis and monitoring as well as a substantial contribution to the five-year assessment. In order to make Community research managers more aware of issues relating to the monitoring of the implementation and the results and the impact of the programmes, it is also planned to draw up a joint self-assessment format. In addition, measures will be taken to ensure greater coherence between the monitoring of the framework programme, the specific programmes and progress with the European Research Area.

Annual report: Progress with implementing the Framework Programme and the specific programmes 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, realisation of the European Research Area 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 and the specific programmes, 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, the achievement of the objectives and the impact of the activities 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

By submitting reports which may give rise to the consolidation of revenue in the participants' accounts, the financial coordinator should make all the financial documentation available to

the Commission to enable it to carry out its financial audits, indicating the timetable and the consolidation of the participants' accounts.

Where appropriate, the Commission will carry out such financial audits, in particular if it has reasons to doubt the realistic nature of the accounts vis-à-vis the progress of work described in the activity reports.

The Community's financial audits will be carried out either by its own staff or by accounting experts approved according to the law of the participant audited. The Community will chose the latter freely, while avoiding any risks of conflicts of interest which might be indicated to it by the participant subject to the audit.

In addition, the Commission will make sure in carrying out the research activities, that the financial interests of the European Communities are protected by effective checks and, in case of detected irregularities, measures as well as deterrent and proportionate sanctions.

In order to achieve this aim, rules on checks, measures and sanctions, with references to the Regulations No 2988/95, 02185/96, 1073/99 and 1074/99 will be taken up in all legal *instruments* used in the implementation of the programmes, including the specific *contracts* and the model contracts.

In particular, the following points will have to be provided for in the *contracts* :

- the introduction of specific contractual clauses to protect the financial interests of the EC in carrying out checks and controls in relation to the awards ;
- the participation of administrative checks in the field of fraud-fighting, in accordance with Regulations Nos 2185/96, 1073/99 and 1074/99 ;
- the application of administrative sanctions for all intentional or negligent irregularities in the implementation of the *contracts*, in accordance with the framework Regulation No 2988/95, including a black listing mechanism ;
- the fact that possible recovery orders in case of irregularities and fraud be enforceable according to Article 256 of the EC Treaty.

Proposal for a
COUNCIL DECISION

adopting a specific programme 2002-2006 for research, technological development and demonstration to be carried out by means of direct actions by the Joint Research Centre

Proposal for a

COUNCIL DECISION

adopting a specific programme 2002-2006 for research, technological development and demonstration to be carried out by means of direct actions by the Joint Research Centre

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 166(4) thereof,

Having regard to the proposal from the Commission³⁹

Having regard to the opinion of the European Parliament⁴⁰

Having regard to the opinion of the Economic and Social Committee⁴¹

Having regard to the opinion of the Committee of the Regions⁴²

Whereas:

- (1) In accordance with Article 166 (3) of the Treaty,] Decision No.../..EC of [...] of the European Parliament and 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 Area⁴³ (hereinafter referred to as the "framework programme is to be implemented through specific programmes that define detailed rules for their implementation, fix their duration and provide for the means deemed necessary.
- (2) The framework programme is structured in three main blocks of activities, "integrating research", "structuring the European Research Area", and "strengthening the foundations of the European Research Area", within the first of which the direct actions conducted by the Joint Research Centre should be implemented by this specific programme, while contributing in part to the aims of the other two.
- (3) The rules for the participation of undertakings, research centres and universities and for the dissemination of research results, for the framework programme, adopted by the European Parliament and Council in Decision No.../..EC⁴⁴ (hereafter referred to

39 OJ ...
 40 OJ ...
 41 OJ ...
 42 OJ ...
 43 OJ...
 44 OJ ...

as "the rules for participation and dissemination") should apply to this programme as regards dissemination of research results.

- (4) In implementing this programme, emphasis should be given to promoting mobility and training of researchers, and innovation, in the Community.
- (5) For the purpose of implementing this programme, in addition to co-operation covered by the Agreement on the European Economic Area or by an Association Agreement, it may be appropriate to engage in international co-operation activities, in particular on the basis of Article 170 of the Treaty, with third countries and international organisations. Special attention should be paid to Accession Countries.
- (6) Research activities carried out within this programme should respect the fundamental ethical principles, notably those which appear in the Charter of Fundamental Rights of the European Union.
- (7) Following the Commission Communication "Women and Science"⁴⁵ and the Resolutions of the Council⁴⁶ and the European Parliament⁴⁷ on this scheme, an action plan is being implemented in order to reinforce and increase the place of women in science and research.
- (8) This programme should be implemented in a flexible, efficient and transparent manner, taking account of relevant needs of JRC's user and Community policies, as well as respecting the objective and protecting the communities financial interests. The research activities carried out under it should be adapted where appropriate to these needs and to scientific and technological developments.
- (9) The JRC should actively pursue activities in innovation and technology transfer.
- (10) In the implementation of this programme, the Board of Governors of the JRC should be consulted by the Commission in accordance with the relevant provisions of Commission Decision 96/282/Euratom of 10 April 1996 on the reorganisation of the Joint Research Centre. ⁴⁸
- (11) The Commission should in due course arrange for an independent assessment to be conducted concerning the activities carried out in the fields covered by this programme.
- (12) The Board of Governors of the JRC has been consulted on the scientific and technological content of this specific programme,

45 COM(1999)76.

46 Resolution of 20 May 1999, OJ C201, 16.7.1999

47 Resolution of 3 February 2000, PE 284.656.

48 OJ L 107, 30.4.1996, p. 12.

HAS ADOPTED THIS DECISION:

Article 1

1. In accordance with Decision [...] on the framework programme 2002-2006 (hereinafter referred to as “the framework programme”), a specific programme related to direct actions of research, technological development and demonstration to be carried out by the Joint Research Centre (hereinafter referred to as “the specific programme”) is hereby adopted for the period from [.....] to 31 December 2006.
2. The objectives and scientific and technological priorities for the specific programme are set out in Annex I.

Article 2

In accordance with Annex II to [Decision [.../...]/ the framework programme], the amount deemed necessary for the execution of the specific programme is EUR 715 million. An indicative breakdown of this amount is given in Annex II to this Decision.

Article 3

1. The Commission shall be responsible for the implementation of the specific programme.
2. The specific programme shall be implemented by means of the instruments defined in Annexes I and III to the framework programme and in Annex III to this Decision.
3. The rules for the participation of undertakings, research centres and universities and for the dissemination of research results (hereinafter referred to as “the rules for participation and dissemination”) set out in Decision [.../...] shall apply to the specific programme, as regards dissemination of research results.

Article 4

1. The Commission shall draw up a work programme for the implementation of the specific programme, which shall be made available to all interested parties, setting out in greater detail the objectives and scientific and technological priorities, set out in Annex I, and the timetable for implementation, and the implementation arrangements.
2. The work programme shall take account of relevant research activities carried out by the Member States, Associated States, European and international organisations. It shall be updated where appropriate.

Article 5

For the purposes of implementing the specific programme, the Board of Governors of the JRC shall be consulted by the Commission in accordance with Commission Decision 96/282/Euratom.

The Commission shall regularly inform the Board of Governors of the implementation of this specific programme.

Article 6

1. The Commission shall regularly report on the overall progress of the implementation of the specific programme, in accordance with Article 4 of the framework programme.
2. The Commission shall arrange for the independent assessment provided for in Article 5 of the framework programme to be conducted concerning the activities carried out in the fields covered by the specific programme.

Article 6

This decision is addressed to the Member States.

Done at Brussels, [...]

For the Council
The President
[...]

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND BROAD OUTLINES OF THE ACTIVITIES

1. INTRODUCTION

The Joint Research Centre carries out its work programme with the mission to provide customer-driven scientific and technical support for the conception, implementation and monitoring of European Union policies. The JRC serves the common interest of the Member States while being independent of special interests, private or national, and as such provides support when there is a need for European intervention.

The JRC's contribution to the Framework Programme incorporates recommendations of recent evaluations of the JRC⁴⁹ and requirements necessitated by the Reform of the Commission. In particular, it includes:

- A strengthened user-orientation
- Networking activities to create a broad knowledge base and, in the spirit of the European Research Area (ERA), more closely associate Member and Accession State laboratories, industry and regulators in the S&T support provided to the EU policies.
- The concentration of activities on selected themes, including training of researchers.

It responds to clearly expressed needs and requirements, notably from the Commission services, which have been identified and are updated through systematic and regular contacts⁵⁰.

In its domains of competence, the JRC's contribution will aim at establishing synergies with the relevant thematic priorities in the other specific programmes, notably through participation in the indirect action, with a view to add value, when appropriate, to the work carried out therein (e.g. through the comparison and validation of tests and methods or the integration of results for policy-making purposes).

The political and institutional context in which the JRC operates has evolved significantly in recent years. Rapid technological developments especially in biotechnology and the information society are changing our society with new demands on policy makers to simultaneously protect the citizen and ensure competitiveness in a global economy. Crises in consumer confidence and the growing impact of technology on day to day life have placed the onus on policy-makers throughout Europe and the world to secure reliable scientific input throughout the whole policy process. This encompasses the ability to respond rapidly in the event of unforeseen circumstances and to taking a more responsible view of potential longer-term impact of science and technology developments. The development of common European systems of scientific and technical reference, as foreseen in the ERA, is an important step in this direction.

49 Davignon Report (2000), 5-year assessment of JRC (2000), 1999 JRC Scientific Audit, 2001 Prioritisation Audit

50 Annual users workshops, interservice group of users DGs, bilateral agreements, etc.

With the implementation of the JRC's refocused mission to support EU policies⁵¹, the Framework Programme 2002-2006 represents a new chapter in how the JRC will perform its activities. On its own the JRC cannot be expected to cover the whole spectrum of scientific and technical support needed in such context. Three characteristics permeate its proposed work programme: i) concentration, (ii) openness and networking and (iii) customer-orientation. Appropriate instruments will be set up to meet those objectives with particular attention to the clustering of projects contributing to specific policy areas (see Annex III).

The JRC, as the in-house RTD service of the Commission, will

- Provide demand-led S&T support to European policy formulation, development, implementation and monitoring in its areas of competence,
- Contribute to the establishment of common scientific and technical reference systems within the European Research Area.

The thrust of JRC's support to EU policies lies in the provision of technical support on issues related to environmental protection, safety and security of the citizens and sustainable development. This includes risk assessment, testing, validation and refinement of methods, materials and technologies to support a range of policies - safety of food products, chemicals, air quality, water quality, nuclear safety, to protection against fraud. Almost all this support will be carried out in close collaboration with laboratories and research centres in Member States and elsewhere. To achieve this, the JRC has refocused its non-nuclear activities into two core areas, supported by horizontal competencies:

- Food, chemical products and health
- Environment and sustainability

The core areas will be complemented by horizontal activities:

- Technology foresight
- Reference materials and measurements
- Public security and anti-fraud.

2. PROGRAMME CONTENT

2.1 Food, chemical products and health

The health protection of consumers particularly from the potentially harmful effects of contaminants in food and of chemical products is a key European policy. This is evidenced by the creation of a European Food Authority and the development of a new Community policy on chemicals.

In the framework programme 2002-2006 the JRC will respond to a series of specific requirements associated with the rapidly evolving food and chemical Community policies. It will develop further as a scientific reference and validation centre in selected areas linked to

⁵¹ Fulfilling the JRC's mission in the European Research Area. Communication from the Commission to the Council and European Parliament C215 of 22.4.2001.

the quality and safety of food, the safety of chemical products, the Community dimension of chemical measurement/metrology infrastructure and health-related information. JRC's strategy relies heavily on extensive networking with laboratories in the Member States, on the maintenance of advanced analytical facilities and reference measurement and material production and on expanded competencies in life sciences including proteomics and bioinformatics. Services like information systems, data banks (e.g. molecular register) will be provided in support to relevant EU policies. Given the novelty of many issues and the complexity of the regulatory environment, training will also be a priority. Work will be focused on the following priorities:

- Food safety and quality
- Genetically Modified Organisms (GMOs)
- Chemical products
- Biomedical applications

Food safety and quality

Emphasis will be on the development and validation of reliable methods and reference materials for the detection of contaminants (natural such as mycotoxins and man-made such as PCBs), residues (e.g. pesticides, growth hormones and veterinary drugs) and ingredients and additives in food as well as in animal feed. JRC's prime role will be the co-ordination of testing of methods and materials and the submission of approved results to support risk assessment and management (in close support to the European Community Reference Laboratories for Veterinary Residues). As most food-borne diseases derive from microbiological including virus contamination, emphasis will be placed on evaluation of new approaches for rapid identification and monitoring. Research on genomics and proteomics will identify the cause of many food-related problems such as allergenicity, and the nature of TSE diseases. The JRC will maintain flexibility to deal with new public health issues as they arise and will establish additional efforts in the area of microbiology.

Standardisation of tests and evaluation of new methods for sensitive detection of BSE and TSE will involve the implementation of quality control of large scale post-mortem testing in abattoirs in collaboration with relevant DGs, TSE Ad-hoc Scientific Committee and leading TSE research laboratories. The JRC will investigate the fate of specific risk material (monitoring of food products for presence of central nervous tissue, recycling and safe handling of animal meal). Special emphasis will be put on safety aspects of animal feed being the prime route to the food chain.

Food quality will grow in importance due to the relationship between health and food. Apart from assessment of compliance with labelling (detection of frauds and adulteration) there is a strong need to judge the efficacy and/or side effects of food supplements and functional food. The growing popularity of organic food requires the availability of suitable methods to assess authenticity. The JRC will focus its expertise in the area of food authenticity towards the emergence of "nutraceuticals" and their effectiveness.

Technological prospective research will be conducted on the development of food products and processes, and on the impact of food safety policies on the agri-food sector.

Genetically modified organisms (GMOs)

Concerning the presence of GMOs in food and environment the JRC will provide considerable scientific and technical support in this field. This support will be carried out in the context of the European network of GMO laboratories, co-ordinated by JRC at the request of EU Member States. Tasks will include development and validation methods for GMO detection, identification and quantification, increasing the range of certified reference materials (new species, processed food), development of biomolecular databases, and training. Research activities (e.g. on sampling and traceability) focusing on novel varieties of food and feeds or on tackling the problem of species unauthorised for use in EU will be performed to underpin regulatory needs and to achieve pan European harmonisation.

The study of GMOs in the environment will require the building of new competencies to deal with the genetic, biodiversity and agronomic aspects of introducing new organisms in the environment.

Chemical products

The new Community policy on chemicals will impact strongly on the support required of JRC52 throughout this Framework Programme. The role for JRC will encompass operating an expanded scheme to regulate chemicals; this will reinforce the already close links with relevant Member State authorities, industry and with international bodies e.g. OECD. The risk assessment experience and expertise of the ECB will also provide a solid foundation for significant research effort in this area.

The validation of alternative methods will increase in importance in support of the new testing programme of the new chemicals policy. Research will also take place on the safety of vaccines and on the challenging area of the long-term effects of repeated low doses of potentially hazardous substances.

Exchange of validated information through telematic means on health and medicines between regulatory bodies in EU Candidate Countries and diffusion to all user-groups including consumers and patients are pursued.

The JRC will contribute to risk assessment on existing dangerous substances with attention paid to the migration of harmful compounds from materials in contact with human and food, e.g. plasticisers in toys and the harmful effects of cosmetics. Prospective analyses of the relations between Community policies and innovation and competitiveness of the European chemical industry will also be undertaken.

Biomedical applications

An ageing population will inevitably change the profile of demand on EU health systems. The JRC plans to apply its expertise in materials and life sciences on the biocompatibility and long-term reliability of implants and on the use of optical techniques in minimally invasive medical systems. This work necessitates networking with research laboratories, hospitals, industry and regulatory authorities. It will also work towards a globally accepted system for clinical diagnostic measurement in collaboration with the International Federation of Clinical Chemistry (Directives on In-Vitro-diagnostics and Medical Devices).

52 includes work of the European Chemicals Bureau (ECB) of the JRC.

JRC's nuclear and isotopic facilities and competencies in the production and use of radioactive and stable isotopes will also be used for medical purposes as in new types of cancer therapies [α -immunotherapy, Boron Neutron Capture Therapy (BNCT)] as well as in clinical reference materials.

2.2 Environment and sustainability

The quality and use of water, air and soils, the sustainable use of energy and the threat of global warming are concerns of growing political attention. Community policy developments in those fields call for adequate knowledge of causes, processes, impacts and trends. The JRC defines its programme in a manner which takes direct account of those requirements. It will thereby consolidate its role as a centre of knowledge and reference in environmental matters of significant European dimension. It will do so by becoming increasingly involved in reference networks with member states and internationally, particularly in the accession states. Service to the policy making process will be strengthened by developing a closer partnership with the relevant Commission Services and by pursuing cross-policy, techno-economic prospective research. Attention will also be given to reinforcing the synergy with the European Environment Agency with particular attention to the diffusion of scientific results. The programme will cover the following areas:

- assessing and preventing global change;
- protection of the European environment (air, water and terrestrial resources);
- contributions to sustainable development (new and renewable energies, environmental assessment) ;
- support to GMES (Global Monitoring for Environment and Security).

Assessing and preventing adverse global change

The JRC will provide support to the development of EU's strategy to combat global warming, making use of its combined technical, socio-economic, modelling and research skills. The implementation of the Kyoto Protocol necessitates the understanding of the causes and processes controlling greenhouse gas cycles. A priority for JRC will be the direct support of the EU Monitoring Mechanism of green house gases (Council decision 92/296). Closing gaps of knowledge by specific research contribution will be a critical part of the role of the JRC in this context. Work will focus on the establishment of a reference system which will enhance data quality and reduce uncertainty.. A critical part of this is the monitoring of changes in land cover, land use and forestry at various scales (see also GMES). Energy scenarios for the future as well as carbon emission forecasts are also key to the implementation of relevant measures. Policy options to reduce emissions in a cost-effective way will also be investigated. To maximise its efforts, the JRC will conduct its global change activities in a dedicated cluster. Issues associated with climate policy implementation, carbon sequestration, atmospheric quality measurements, the dynamics of ozone and UV radiation over Europe could also be examined.

Protection of the European environment

- Preserving air quality

Air pollution is a key concern for the European citizen and is also the focus of a large body of regulatory instruments (e.g. CAFE). The cornerstones of JRC's efforts will be a) the

assessment of emissions by vehicles and stationary sources (new emission directives, standards for diesel/gasoline, new fuels, particulate matter and dioxin emissions; harmonisation/standardisation of world-wide reference test cycles and of measuring methods for industrial emissions) and b) the provision of reference for the implementation and the development of air quality directives (analysis quantification of air pollution, monitoring, techniques, pre-normative work, methods for evaluating the impact of air quality policies on human exposure and modelling tools for data analysis and comparisons of abatement scenarios.

Cross sectoral integrated analysis of the transport, energy, health and enterprise policies will be conducted to determine their effect on emissions and ambient pollution levels. The work will be conducted in the context of large networks of experts including representatives from the automotive and energy industries.

- Water quality

Water is a key resource issue of the future; maintaining natural water sources and securing good quality drinking water are of particular relevance. The Framework Directive on Water will oblige co-ordination and harmonisation of monitoring and reporting processes of all Community regulatory existing instruments during the next six years. Research leading to the harmonisation of a common database on reports by Member States on implementation of various water related directives (e.g. Residual urban water, Nitrates, Surface water, etc.) will be pursued. JRC will focus on the determination of ecological water quality parameters (also in the context of supporting existing generic European metrological infrastructure), identification of significant pollutants, indicators of quality in inland and coastal waters and on the identification of microbiological hazards, especially in waste waters as well as on socio-economic implications of the new regulatory framework. Impacts on health are addressed under the "Food Safety and Quality" chapter of this programme. Integrated coastal zone management research will be pursued to provide community reference approaches.

- Terrestrial resources

The soils and the landscapes are the site of most human activities and their characteristics are determined by management practices. The environmental component of the agricultural policy as well as several pieces of EU legislation (e.g. Water Directive, Spatial Development Perspective, Urban Agenda, Climate Change and others) deal with a range of those issues. The JRC will provide support to the development of a common platform for integrated spatial analysis as a basis for policy making and evaluation. Catchment areas will be used as units of study for evaluating various processes and impacts. The extensive database managed by the European Soils Bureau will be expanded through networking; the ongoing collaboration with Eurostat will also be reinforced. Attention will be paid to the development of tools and to provide information on natural landscapes in the context of forestry, land use and biodiversity conservation. Support to the environmental component of the Common agricultural policy will be provided in terms of landscape analysis and use of indicators. Information on the state and changes in urban and regional environment will be produced. Work will rely upon the use of advanced remote sensing techniques, geographical information systems and modelling of spatial processes.

Contributions to sustainable development

Work on sustainable development pervades the whole JRC programme and attention is paid to the integration of economic, social and environmental dimensions.

- Energy

The Kyoto protocol has given a critical dimension to the energy debate since energy use and transport, two cornerstones of economic life, have major impacts on the emission of greenhouse gases. The importance of new and renewable energies as well as of energy efficiency and technology for the security of supply has been underlined in a recent Green Paper and in a Communication on “Renewables”.

The JRC experience in the field of renewables, energy policy and energy technology will be exploited to provide support to emerging Community issues in a deregulated market; a concentration on the following areas of work is foreseen:

- development of reference systems – through accredited laboratory and certification schemes - in renewable energy production (with priority on solar electricity), storage and energy use in buildings.
- technology assessment, validation and modelling activities of new and conventional energy technologies with particular reference to safety, efficiency, waste and biomass generated power technologies and waste incineration performances.
- energy scenarios and forecasting in the context of greenhouse gases emissions and market assessment for new and renewable energy technologies in a competitive energy economy.

- Environmental assessment

The need for an “integrated” assessment of environment quality is increasingly recognised. The JRC will support the EU Sustainable Development strategy through the development of appropriate integrated policy assessment tools and through activities leading to the integration of environmental concerns in EU policies. The European Integrated Pollution Prevention and Control Bureau (IPPC) will continue its directive-linked work on assessing best available technologies in view of reducing pollution in selected industrial sectors. Complex emission scenarios are needed to link air pollution and global change. Waste management is an important area where an integrated analysis from waste generation to treatment and disposal is necessary. Environmental integrity and human health is another area of integrated studies to which the JRC will contribute. New assessment tools and approaches to eco-toxicology will be developed to address topics such as air pollution and contaminants in waters (endocrine disruptors, biocides and pharmaceuticals). The JRC will also provide methodological support to the integration of the environmental dimension in development assistance.

The JRC will contribute to the fulfilment of the EC legislation for exchanging environmental monitoring data (incl. radioactivity) and information (through model intercomparison) under routine and emergency conditions.

A focus on inter-policy linkages and impacts will be retained by JRC as a specific contribution to the implementation of sustainable development practices at Community level.

Support to GMES

The need for independent information on key issues affecting the world’s environment and the security of the citizen is increasingly recognised. GMES is a European initiative towards the implementation of operational services for collecting, analysing and disseminating a range of information items related to changes in environmental quality, resource availability and

management, natural risks and hazards. The GMES is being implemented under the dual concern of preserving the global environment and reducing or anticipating threats to the security of the citizen. It focuses primarily on the use of earth observation techniques for maintaining an adequate long-term watch on key landscape parameters (such as land cover, use, resource degradation or depletion etc.) at various geographical levels. It will also call for techniques to support the assessment of natural risks and the management of catastrophic events. The JRC will focus on the development of EU-policy relevant applications which feed into the GMES concept in three areas of work: support to international environmental agreements, assessing risks and hazards, and evaluating environmental stress.

2.3 Technology foresight

Increasingly, the definition of EU policies is dependent on the timely anticipation and understanding of developments in science and technology and the social and economic environment. JRC's expertise in analysing inter-relationships between technology and society, and its experience in co-ordinating cross-sectoral and multidisciplinary foresight research on an international scale will contribute to the implementation of the objectives of the European Research Area (ERA). Throughout the framework programme 2002-2006, the JRC's activities in this research area will be based on a close collaboration with DG RTD and other customer DGs. The activity will focus on:

- Techno-economic foresight
- International Foresight Co-operation forum

Techno-economic foresight

JRC will undertake medium to long-term prospective studies on crucial technological developments affecting the EU and the relevant impact on growth, sustainable development, employment, social cohesion and competitiveness. This activity will also provide background analysis and information that will be valuable in the implementation by the JRC of its work in its specific competence areas. It will include prospective analysis to identify technological bottlenecks and opportunities, including quantitative estimations; identification of promising technologies and the conditions required for their uptake.

International foresight co-operation forum

The JRC will strengthen its working relationships with international think-tanks and top level advisors, by following up existing successful experiences (e.g. the European science and technology observatory (ESTO) network, the High-Level Economists Group) and by pursuing the establishment of an International foresight co-operation framework. The availability of a mechanism to share analysis on the main emerging challenges will in particular prove useful in promoting Europe's role in the international debate on science and governance. A common reference system in policy-oriented foresight analysis will be established in the context of regional exercises with particular attention to Candidate Countries.

2.4 Reference materials and measurements

Recognition of standards and measurements in products is an important component for the implementation of Community policies related to consumer safety, free trade, competitiveness of European industry and external relations. JRC will further support the existing or developing European metrological infrastructure to produce results of demonstrated quality, develop specific reference measurements, produce certified reference materials (CRMs) to

improve their global acceptance, organise international measurement evaluation programmes and will establish trans-national databases in support to EU policies. Throughout JRC's work programme agreed reference methods and materials are required, whether in environment, food safety, public health or the nuclear industry. In addition to work described in the previous sections, JRC plans to support the creation of a European Certified Reference Material system. This will put the Centre in position to provide sound advice to Commission services where applicable to EU legislation and practice.

- BCR53 and industrial certified reference materials
- Metrology in chemistry

BCR and certified reference materials

This activity concerns developing concepts and techniques for the production and certification of reference materials to improve their global acceptance under the EU-US Mutual Recognition Agreement, where JRC advises DG TRADE. JRC will concentrate on production of BCRs and new CRMs for control of industrial processes and products. As support to DG RTD, JRC will, where feasible, extend its responsibility for storage and distribution of BCR to the management of the production and certification of new CRMs from indirect actions. Nuclear reference materials used for safeguards and nuclear materials accountancy will be expanded to the environment.

Metrology in chemistry

The JRC will continue to represent the Commission in international bodies responsible for the development of a world-wide chemical measurement system. Strategic tasks will include the development of primary measurement techniques, the production and certification of isotopic reference materials and organisation of International Measurement Evaluation Programmes. Topics depend on EU policy requirements and evaluations rely heavily on the participation of numerous laboratories, especially those which have a reference role to play in their sector or region. Through the establishment of networks (PECOMet-Network and MetMED) support will be provided to EU-Candidate countries and Mediterranean countries to build up a structured measurement system in chemistry.

2.5 Public security and anti-fraud

Public security issues - proliferation of weapons of mass destruction, the globalisation of the economy, infringements to privacy and Internet vulnerabilities, risks from natural or technological disasters - require a coordinated international approach. The EU is providing a framework through a number of mechanisms and at the same time it has declared zero tolerance to fraud. These political initiatives and commitments need scientific and technical support and the JRC is shaping its programme to directly answer some of those specific requirements. JRC has, over the years, developed a broad-based and well-recognised expertise in the general domain of security and anti-fraud, in the handling of large information infrastructures and in dealing with complex systems. In the framework programme 2002-2006, such expertise will be provided to user European institutions according to their priorities and needs. Increased emphasis will be given to exploiting networks with other research institutions and stakeholders in order to deepen and widen the support. JRC will concentrate on the following issues:

- International humanitarian security
- Natural and technological hazards, risks and emergencies
- Cyber-security
- Monitoring compliance with EU regulations and fraud control

International humanitarian security

The JRC will maintain a focus on technical aspects of EU efforts in humanitarian demining, firstly to improve knowledge of existing technology for minefield survey and detection through testing and benchmarking, secondly to assess new technologies, and thirdly to increase the visibility, transparency and efficiency of EU mine action operations.

The JRC, through the GMES initiative, will also contribute to developing a European capability that allows integrated space-based data, environmental data and socio-economic data to be made available for European security policies on a timely basis. Based on its expertise in safeguarding nuclear materials, the JRC is prepared, if required, to deal with the technical issues raised in non-proliferation and disarmament of weapons of mass destruction.

Natural and technological hazards, risks and emergencies

JRC will continue to support efforts to develop a European framework for forecasting, assessing, managing and reducing risks in the Community. In the Framework Programme 2002-2006 the JRC will further develop a system approach to the management of natural and technological hazards. For technological risks - from aircraft incidents and industrial hazards - JRC's efforts will be centred round its operation and improvement of harmonised European monitoring systems (ECCAIRS⁵⁴ MAHB⁵⁵, EPERC⁵⁶ which will be further extended to the enlargement countries. For natural hazards, JRC will endeavour to provide Europe with a similar capability. At the same time, efforts to develop a common European approach towards floods and forest fires will continue through a focus on integration of advanced modelling, conventional and space-based data. A link to the GMES initiative will be developed. Various networks, such as the European network of earthquake engineering laboratories will be extended to international level. Similarly, JRC in collaboration with European partners will set up a network of experimental facilities to develop a common integrated initiative for structural safety.

Cybersecurity

The JRC will build on experience gained in supporting the EU's dependability initiative, out-of-court dispute settlement systems as well as the observatory on electronic payment systems. Working closely with the responsible Commission Services and Member State organisations, it will support the development of an appropriate EU response to risks of cybercrime, privacy and Internet vulnerabilities. Efforts will concentrate on methods for better characterising these risks, on criteria for evaluating technical countermeasures and on testing them in JRC facilities and on developing appropriate and harmonised measures, indications and statistics in consultation with other interested parties, including Europol. The JRC will also maintain an

54 European Coordination Centre for Aircraft mandatory accident Reporting Systems
 55 Major Accidents Hazard Bureau
 56 European Pressure Equipment Research Council

Internet website on the issue of cybercrime and report its progress to the EU Forum established in the framework of the Commission Communication on 'Creating a safer information society by improving the security of information infrastructures and combating computer-related crime' [COM (2000)890 final].

Monitoring compliance with EU regulations and fraud control

The JRC supports the Commission's efforts to increase the effectiveness of anti-fraud measures, both by providing advanced technologies to bodies that operate at the EU level and by supporting Member States in the use of the latest technologies. The JRC, working closely with the concerned Commission services, will maintain appropriate support to the Common Agricultural Policy, the Common Fisheries Policy and the European Anti-Fraud Office, OLAF. As well as exploring the application of new technologies - DNA analysis for livestock identification, satellite image interpretation for crop acreage monitoring or fishing vessel identification, cross-correlation of isotopic analysis of beverages and foodstuffs to determine contents and origin, intelligence gathering from open sources, language technology to analyse multilingual documents – the JRC will continue to provide customers with the integrated knowledge that includes the entire cycle from data capture, data fusion, data mining through to visualisation and estimation.

The JRC will also build on its methodological experience to provide timely, reliable and more socially-robust information to the policy process. This will be achieved for official statistics through the coordination, with Eurostat, of thematic research networks with emphasis on short-term indicators, business cycle and financial analysis and through the development of a quality assurance methodology for scientific input to governance.

Increased importance will be devoted to early warnings and trend detection, dissemination, awareness raising and knowledge-sharing with partner laboratories in the Member States. The fraud problem will not be tackled on an individual case basis but at a system level - developing procedures and regulations that involve less bureaucracy and that are intrinsically less prone to fraud.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Activity	Amount (EUR million)
Food, Chemical products and Health	207 M€
Environment and Sustainability	286 M€
Horizontal Activities (Technology Foresight; Reference Materials and Measurements; Public Security and Antifraud)	222 M€
Total	715 M€ 57 58

57 Of which approximately 6% may be allocated to exploratory research and up to 2% for exploitation of own JRC results and technology transfer.

58 This total includes the JRC's budget contribution necessary for its participation in indirect actions.

ANNEX III

SPECIFIC RULES FOR IMPLEMENTING THE PROGRAMME

1. The Commission, after consulting the Board of Governors of the JRC, shall implement the direct action on the basis of the scientific objectives and contents described in Annex I. The activities relating to this action shall be performed in the relevant institutes of the Joint Research Centre (JRC).
2. In the implementation of its activities, the JRC will, whenever appropriate and feasible, participate in or organise networks of public and private laboratories in the Member States or European research consortia supporting the European policy making process. Particular attention shall be paid to co-operation with industry, especially with small and medium-sized enterprises. Research bodies established in third countries may also co-operate on projects, in accordance with the relevant provisions of Article 6 of the Framework Programme and, where applicable, of agreements for scientific and technological co-operation between the Community and the third countries concerned. Particular attention will be paid to co-operation with research laboratories and institutes in the Candidate Countries and countries of Central and Eastern Europe and the former Soviet Union.

It will also use appropriate mechanisms to continuously identify the requirements and needs of its customers and users and to involve them in the related activities.

The knowledge gained through implementation of the projects will be disseminated by the JRC itself (taking into account possible limitations due to confidentiality issues).

3. The accompanying measures shall include:
 - organisation of the visits of JRC staff to national laboratories, industrial laboratories and universities,
 - the promotion of mobility of young scientists, particularly from the Candidate countries, with particular attention to encourage participation of women,
 - specialised training in support of the elaboration and/or implementation of the European policies with the emphasis on multidisciplinary,
 - the organisation of visits to JRC institutes of visiting scientists and seconded national experts, particularly from Candidate countries, with particular attention to encourage participation of women
 - systematic exchange of information, through, *inter alia*, the organisation of scientific seminars, workshops and colloquiums and scientific publications,
 - the independent scientific and strategic evaluation of the performance of the projects and programmes.

FINANCIAL STATEMENT

Policy area(s): RESEARCH

Activity(ies): Direct Action

TITLE OF ACTION:

PROPOSAL FOR A COUNCIL DECISION ADOPTING A SPECIFIC PROGRAMME 2002-2006 FOR RESEARCH, TECHNOLOGICAL DEVELOPMENT AND DEMONSTRATION AIMED AT CONTRIBUTING TO THE EUROPEAN RESEARCH AREA TO BE CARRIED OUT BY MEANS OF DIRECT ACTIONS BY THE JOINT RESEARCH CENTRE

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

B6-111: Persons associated with the institution

B6-121: Resources

B6-2: Direct Operating Appropriations – Scientific and Technical support to Community policies – EC framework programme (2002 TO 2006)

2. OVERALL FIGURES

2.1 Total allocation for action (Part B): 715 € million for commitment

2.2 Period of application:

2002 to 2006

2.3 Overall multiannual estimate on expenditure:

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

€ million (to 3rd decimal place)

	Years 2002	2003	2004	2005	2006	2007 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		175.7	177.6	179.6	182.1		715
Payments		146.2	167.9	178.2	222.6		715

TOTAL a+b+c							
Commitments		175.7	177.6	179.6	182.1		715
Payments		146.2	167.9	178.2	222.6		715

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 revenue⁵⁹:

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

OR

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

€ million (to 1 decimal place)

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

3. BUDGET CHARACTERISTICS

Type of expenditure		New	EFTA participation	Participation applicant countries	Heading Financial Perspective
Non-comp	Diff	YES	YES	YES	N° 3

4. LEGAL BASIS

Article 166 of the EC Treaty.

Decision ..././EC of the European Parliament and the Council adopting the framework programme 2002-2006 of the European Community for research, technology development and demonstration activities aimed at contributing towards the creation of the European Research Area (OJ n° ...).

⁵⁹ For further information see a separate guidance paper

5. DESCRIPTION AND GROUNDS

5.1 Need for Community intervention 60

5.1.1 *Objectives pursued*

The Joint Research Centre's mission is to provide customer-driven scientific and technical support for the conception, implementation and monitoring of European Union policies. The JRC serves the common interest of the Member States while being independent of special interests, private or national, and as such provides support when there is a need for European intervention.

The JRC programme addresses key areas of policy concern where it has specific competence to offer. Its non-nuclear activities are concentrated into two main themes "Food, Chemical Products and Health" and "Environment and Sustainability" which are reinforced by horizontal areas of expertise ("Technology foresight", "Reference materials and measurements" and "Public Security and Antifraud"). A recurrent thread in the programme is the attention to safety and security issues. This includes risk assessment, testing, validation and refinement of methods, materials and technologies to support a range of policies.

For a more efficient response to policy needs, the JRC will extend its networking activities in a more strategic manner to create a broad knowledge. In the spirit of ERA, it will closely link with a wide range of partners from within the EU (European agencies or organisations, national authorities) and beyond to contribute significantly to the establishment of a common scientific reference system in its areas of competence. These networks will be dedicated to the provision of scientific services (early alert, anticipation, quick response, validation and integration of knowledge, interfacing with stakeholders and policy makers) and products (databases, common standards, validation methods, etc).

A strengthened user-orientation to deliver scientific and technical support throughout the policy cycle will be ensured throughout the programme life; an inter-service users group with high-level representation from the Commission Services will be set-up to ensure priority setting and the allocation of resources according to policy needs.

5.1.2 *Measures taken in connection with evaluation*

The JRC programme is being regularly reviewed through scientific audits and the 5-year-assessments. Annual programme presentations to the other services of the Commission are organised. A high level user group composed by representative of customer Commission's DGs has been set up in view of establishing and reviewing priorities in close connection with policy needs.

The Scientific Audit of the JRC Institutes, launched in 1999, was designed to provide an early advice and feedback to the JRC management on the scientific standing of the institutes, and an assessment of their scientific strengths and weaknesses, both in terms of staff and other resources, for the implementation of the new programme. The chief objective was to ensure that the FP5 execution could be performed with the requisite scientific quality. The Scientific Audit's overall conclusions confirmed the soundness of JRC's scientific strategies and the validity of its new mission.

60 For further information see a separate guidance paper

The 5-Year-Assessment (5YA) exercise, input required by legislation before the tabling by the Commission of proposals for the Sixth RTD Framework Programme, was carried out in 2000. Given that scientific issues had already been addressed in the Scientific Audit, the main focus of the 5YA was the management aspects of the JRC activities, the impact of the JRC support to the EU policies, and the delivered results in relation to the adopted programmes. The resulting recommendations were dominated by the overriding statement that the new mission of the JRC must be maintained and its implementation assured in all aspects and consequences.

In January 2000 Research Commissioner Philippe Busquin established a High Level Panel chaired by Viscount Etienne Davignon, with the task to review and to make recommendations on the workings of the JRC. The Davignon Report was issued in July 2000. The High Level Panel endorses the mission assigned to the JRC by the 5th RTD Framework Programme and finds that it has a clear long-term role. It proposes opening it up to the other Community institutions and contains a number of organisational suggestions. It recommends that the JRC should not dissipate its efforts but should do more to focus its activities, promote intense networking with other European centres of excellence and finally, it attaches particular importance to nuclear activities.

Finally, in July 2000 the Commission's Peer Group, appointed earlier in the year to make a political overview of the Institution's activities and bring them in line with the human resources it had available, published a report in which a series of actions were identified.

In response to the various evaluations, the JRC has undertaken a strategy for concentrating its activities into some core competence areas and has identified possible reduction of activities across its structure with the launch of an Activity Prioritisation Audit, the results of which have been published internally on April 2, 2001. An interservice consultation has taken place in view of a Communication to the Commission that should disseminate the results of this evaluation to the rest of the Commission services.

5.2 Actions envisaged

- Food, chemical products and health

In FP 2002-2006, the JRC will become a scientific reference and validation centre in selected areas linked to the quality and safety of food, the safety of chemical products including the operation of appropriate data bases. JRC's strategy relies heavily on extensive networking with laboratories in the Member States, on the maintenance of advanced analytical facilities and reference material production and on expanded competencies in life sciences including proteomics and bioinformatics. Services like information systems, data banks (e.g. molecular register) will be provided in support to relevant EU policies. Given the novelty of many issues and the complexity of the regulatory environment, training will also be a priority.

Work will focus on the following priorities: food safety & quality, genetically modified organisms (GMOs), chemical products and biomedical applications.

- Environment and sustainability

The quality and use of water, air and soils, the sustainable use of energy and the threat of global warming are concerns of growing political attention. The JRC will consolidate its role as a centre of knowledge and reference in environmental matters of European dimension. It will establish reference networks with member states and internationally,

particularly in the accession states. It will work in synergy with the European Environment Agency in view of a better exploitation and diffusion of research results. The JRC also functions as a reference laboratory in environmental measurements as in emissions from motor vehicles, air and water quality; it produces the assessment needed for identifying best available technologies in integrated pollution prevention and control.

The programme will cover the following areas: assessing and preventing global change, protection of the European environment (air, water and terrestrial resources), technologies for sustainable development (renewable energy, integrated environmental assessment), technical support to GMES (Global monitoring for environment and security).

These two core activities will be supported by a set of horizontal competencies:

- Reference materials and measurements

Recognition of standards is a key component for the implementation of Community policies related to consumer safety, free trade, competitiveness of European industry and external relations. JRC will further develop specific reference measurements, produce certified reference materials (CRMs) to improve their global acceptance, organise international measurement evaluation programmes and will establish transnational databases in support to EU policies related to environment, food safety and public health and for the nuclear industry. **The focus will be on: Bureau Communautaire de References and the production of industrial certified reference materials, metrology in chemistry.**

- Public security and anti-fraud

Public security issues require a co-ordinated international approach; questions related proliferation of weapons of mass destruction, the globalisation of the economy, infringements to privacy and Internet vulnerabilities, risks from natural or technological disasters are often transboundary issues. The EU is setting a high priority on the fight against fraud and has declared a “zero tolerance” policy. The JRC has a well-recognised expertise in the general domain of security and anti-fraud, in the handling of large information infrastructures and in dealing with complex systems. This expertise will be provided to European institutions with increased emphasis on the development of networks with other research institutions and stakeholders.

JRC will concentrate on the following crosscutting issues: international security, natural and technological hazards, risks and emergencies, cyber-security, accounting and control.

- Technology foresight

JRC’s expertise in analysing inter-relationships between technology and society, and its experience in co-ordinating cross-sectoral and multidisciplinary foresight research on an international scale will contribute to the development of EU policies and to the implementation of the objectives of the European Research Area (ERA). Throughout the next Framework programme, the JRC’s activities in this research area will be linked with national foresight programmes and in close collaboration with the DG RTD and other customer DGs.

The activity will focus on techno-economic foresight, socio-economic studies in support to EU policies, quality of socio-economic information, international foresight co-operation forum.

5.3 Methods of implementation

Direct action of the framework programme 2002-2006 managed and conducted by Commission staff.

6. FINANCIAL IMPACT

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

(The method of calculating the total amounts set out in the table below must be explained by the breakdown in Table 6.2.)

6.1.1 Financial intervention

Commitments in € million (to the 3rd decimal place)

Breakdown	2002	2003	2004	2005	2006	2007 and subs. years	Total
Food, Chemical Products and Health		50.867	51.,417	51.996	52.720		207.000
Environment and sustainable development		70.280	71.040	71.840	72.840		286.000
Horizontal Activities		54.553	55.143	55.764	56.540		222.000
TOTAL		175.700	177.600	179.600	182.100		715.000

6.1.2 Technical and administrative assistance, support expenditure and IT expenditure (Commitment appropriations)

	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)⁶¹

(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 the 3rd decimal place)

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>Food, Chemical products and Health</u> <u>Environment and Sustainable Development</u> <u>Horizontal Activities</u> - <i>Scientific and Technological Perspective</i> - <i>Reference Materials and Measures</i> - <i>Public Security and Anti-fraud.</i>				
TOTAL COST				715.000

If necessary explain the method of calculation

61 For further information see a separate guidance paper

7. IMPACT ON STAFF AND ADMINISTRATIVE EXPENDITURE

7.1 Impact on human resources

Types of post		Staff to be assigned to management of the action using existing and/or additional resources		Total	Description of tasks deriving from the action
		Number of permanent posts	Number of temporary posts		
Permanent officials or Temporary staff	A	733			<i>If necessary, a fuller description of the tasks may be annexed.</i>
	B	595			
	C	537			
	D	37			
Other human resources			NDE, Grantholders, Visiting Scientists, ...		
Total		1,902			

In 2002, the JRC will have a single staff table of 1,902 posts distributed as follows: 733 A-posts, 595 B-posts, 537 C-posts and 37 D-posts⁶². The staff is managed as a single group: staff can be put allocated to both nuclear and non-nuclear activities. The ratio of non-nuclear to total staff is variable during the period of execution of the framework programme. This ratio is of the order of 2/3. A relatively large number of short-term scientific posts are also financed as non-statutory staff (about 200). Their status can be grantholders, scientific visitors, national experts on secondment...

7.2 Overall financial impact of human resources

Type of human resources	Amount €	Method of calculation *
Officials		
Temporary staff		
Other human resources (give budget line)		
Total	116.3	

The amounts are total expenditure for twelve months.

The different resources: staff, material, specific credits are distributed to remain within the given envelope. The staff credits have been allocated after taking the minimum needs for infrastructure into account and deciding on a minimum level of specific credits for the execution of projects and for networking. The staff budget is reduced compared to that of the fifth framework programme 1998-2002 and a significant staff reduction (150 posts) is necessary. This reduction will depend on the evolution of salaries during the period 2003-2006 and of the evolution of the required competencies: ratio between A/B/C/D staff.

⁶² This compares with the current (2001) staff table of 2080 posts. As in the past this envelope of statutory posts constitutes a separate staff table and represents the maximum statutory staff which may be engaged. However the number of staff employed in practice depends on the availability of financial resources (institutional credits, competitive income and other possible sources of revenue).

7.3 Other administrative expenditure deriving from the action

Budget line (number and heading)	Amount €	Method of calculation
Overall allocation (Title A7)		
A0701 – Missions		
A07030 – Meetings		
A07031 – Compulsory committees ⁽¹⁾		
A07032 – Non-compulsory committees ⁽¹⁾		
A07040 – Conferences		
A0705 – Studies and consultations		
... Other expenditure (state which)		
Information systems (A-5001/A-4300)		
Other expenditure - Part A (state which)		
Total		

The amounts are total expenditure for twelve months.

⁽¹⁾ Specify the type of committee and the group to which it belongs.

I.	Annual total (7.2 + 7.3)	€
II.	Duration of action	Years
III.	Total cost of action (I x II)	€

(In the estimate of human and administrative resources required for the action, DGs/Services must take into account the decisions taken by the Commission in its orientation debate and when adopting the preliminary draft budget (PDB). This means that DGs must show that human resources can be covered by the indicative pre-allocation made when the PDB was adopted.

Exceptional cases, where the action concerned could not be foreseen when the PDB was being prepared, will have to be referred to the Commission for a decision on whether and how (by means of an amendment of the indicative pre-allocation, an ad hoc redeployment exercise, a supplementary/amending budget or a letter of amendment to the draft budget) implementation of the proposed action can be accepted.)

8. FOLLOW-UP AND EVALUATION

Each year, with the help of appropriately qualified independent experts, the Commission will examine the implementation of specific programme 2002-2006. It will, in particular, assess whether the objectives, priorities and financial resources are still appropriate to the changing situation. Where appropriate, it will submit proposals to adapt or supplement the specific programme 2002-2006.

The Commission produces an annual report on the activities of the Joint Research Centre. These reports are sent to the European Parliament, the Council and the Economic and Social Committee.

9. ANTI-FRAUD MEASURES

When the implementation of the programme calls for the use of external contractors or implies granting financial contributions to third parties, the Commission will carry out, where appropriate, financial audits, in particular if it has reasons to doubt the realistic nature of work performed or described in the activity reports.

The Community's financial audits will be carried out either by its own staff or by accounting experts approved according to the law of the audited party. The Community will choose the latter freely, while avoiding any risks of conflicts of interest which might be indicated to it by the party subject to the audit.

In addition, the Commission will make sure in carrying out the research activities, that the financial interests of the European Communities are protected by effective checks and, in case of detected irregularities, measures as well as deterrent and proportionate sanctions.

In order to achieve this aim, rules on checks, measures and sanctions, with references to the Regulations No 2988/95, 2185/96, 1073/99 and 1074/99 will be taken up in all contracts used in the implementation of the programme.

In particular, the following points will have to be provided for in the *contracts* :

- the introduction of specific contractual clauses to protect the financial interests of the EC in carrying out checks and controls in relation to the work performed;
- the participation of administrative checks in the field of fraud-fighting, in accordance with Regulations No 2185/96, 1073/99 and 1074/99 ;
- the application of administrative sanctions for all intentional or negligent irregularities in the implementation of the *contracts*, in accordance with the framework Regulation No 2988/95, including a black listing mechanism ;
- the fact that possible recovery orders in case of irregularities and fraud be enforceable according to Article 256 of the EC Treaty.

In addition and as routine measures, an internal audit and control programme in respect of scientific and budgetary aspects, will be carried out by the JRC staff responsible; internal audit carried out by the JRC Internal audit Unit; and local inspections by this Unit and the Court of Auditors.

Proposal for a

COUNCIL DECISION

**adopting a specific programme 2002-2006 (Euratom)
for research and training on**

nuclear energy

Proposal for a

COUNCIL DECISION

**adopting a specific programme 2002-2006 (Euratom)
for research and training on
nuclear energy**

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular the first paragraph of Article 7 thereof,

Having regard to the proposal from the Commission⁶³

Having regard to the opinion of the European Parliament⁶⁴

Having regard to the opinion of the Economic and Social Committee⁶⁵

Whereas:

- (1) By Decision No. ..././Euratom⁶⁶ the Council adopted the multiannual framework programme 2002-2006 of the European Atomic Energy Community for research and training activities aimed at contributing towards the creation of the European Research Area (hereinafter referred to as "the framework programme") to be implemented by means of research and training programme(s) drawn up in accordance with Article 7 of the Treaty, which define the detailed rules for their implementation, fix their duration and provide for the means deemed necessary.
- (2) The rules for the participation of undertakings, research centres and universities for the implementation of the framework programme, adopted by the Council in Decision No. ..././Euratom⁶⁷ (hereinafter referred to as "the rules for participation") should apply to this programme.
- (3) The Commission's administrative expenditure for the implementation of this programme reflects the high number of staff seconded to laboratories in the members States and to the ITER project.
- (4) In implementing this programme, emphasis should be given to promoting mobility of researchers, and innovation, in the Community as well as international co-operation activities with third countries and international organisations. Special attention should be paid to the Accession countries.

63 OJ
64 OJ
65 OJ
66 OJ
67 OJ

- (5) Research activities carried out within this programme should respect fundamental ethical principles, notably those which appear in the Charter of Fundamental Rights of the European Union.
- (6) Following the Commission Communication “Women and Science”⁶⁸ and the Resolution of the Council⁶⁹ and the European Parliament⁷⁰ 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.
- (7) This programme should be implemented in a flexible, efficient and transparent manner, taking account of relevant interests, in particular of the scientific, industrial, user and policy communities. The research activities carried out under it should be adapted where appropriate to the needs of Community policies and to scientific and technological developments.
- (8) The Commission should in due course arrange for an independent assessment to be conducted concerning the activities carried out in the fields covered by this programme.
- (9) The Scientific and Technical Committee has been consulted.

68 COM (1999) 76

69 Resolution of 20 May 1999, OJ C 201, 16.7.1999

70 Resolution of 3 February 2000, PE 284.656

HAS ADOPTED THIS DECISION

Article 1

1. In accordance with the framework programme, a specific programme for research and training on nuclear energy (hereinafter referred to as "the specific programme") is hereby adopted for the period from [.....] to 31 December 2006.
2. The objectives and scientific and technological priorities for the specific programme are set out in Annex I.

Article 2

In accordance with Annex II to the framework programme], the amount deemed necessary for the execution of the specific programme is EUR 900 million, including a maximum of 16.5% for the Commission's administrative expenditure. An indicative breakdown of this amount is given in Annex II to this decision.

Article 3

1. The detailed rules for financial participation by the Community in the specific programme shall be those referred to in Article 2, (2) of the framework programme.
2. The specific programme shall be implemented by means of instruments defined in Annex III.
3. The rules for participation shall apply to the specific programme.

Article 4

1. The Commission shall draw up a work programme for the implementation of the specific programme, setting out in greater detail the objectives and scientific and technological priorities set out in Annex I, and the timetable for implementation.
2. The work programme shall take account of relevant research activities carried out by the Member States, Associated States, European and international organisations. It shall be updated where appropriate.

Article 5

1. The Commission shall be responsible for the implementation of the specific programme.
2. For the purposes of implementing the specific programme the Commission shall be assisted by a consultative committee. The members of this committee can vary according to the different subjects on the committee's agenda. For fission-related aspects, the composition of this committee and the detailed operational rules and procedures applicable to it shall be as laid down in Council Decision

84/338/Euratom, ECSC, EEC71 dealing with management and co-ordination advisory committees. For the fusion-related aspects they shall be as laid down in the Council Decision of 16 December 1980 dealing with the consultative committee for the fusion programme.

Article 6

1. The Commission shall regularly report on the overall progress of the implementation of the specific programme, in accordance with Article 4 of the framework programme.
2. The Commission shall arrange for the independent assessment provided for in Article 5 of the framework programme to be conducted concerning the activities carried out in the fields covered by the specific programme.

Article 7

This decision is addressed to the Member States.

Done at Brussels, [...]

For the Council
The President
[...]

ANNEX I

Scientific and technological objectives and broad lines of the activities

1. INTRODUCTION

As the source of 35% of the electricity produced in the European Union, nuclear energy is an element of the debate on how to combat climate change and reduce the energy dependency of the EU. But significant challenges need to be faced. Controlled thermonuclear fusion is one of the long term options for energy supply, in particular for the centralised supply of base-load electricity. The priority is to make progress towards demonstrating the scientific and technological feasibility of fusion energy and assessing its sustainable qualities. In the short term, ways of dealing with nuclear waste that are acceptable to society need to be found, and more particularly the implementation of technical solutions for the management of long-lived waste. Innovative concepts for the safer exploitation of nuclear fission should also be studied as possible contributions to meeting European energy needs in the decades ahead.

Co-operation at European level, including the exchange of scientists and common research programmes, is already well established in this field. In respect of nuclear waste and other activities, this will be intensified and deepened at programme and project level with the aim of better use of resources (both human resources and experimental facilities) and promoting a common European view on key problems and approaches, in accordance with the needs of the European research area. Links will be established with national programmes and networking will be promoted with third countries, in particular, USA, Canada and Japan. In the case of fusion, the Community and Member States will continue to work within the framework of an integrated programme of activities.

Co-ordination will be assured with the JRC programme on “nuclear safety and safeguards”.

2. PRIORITY THEMATIC AREAS

2.1 Fusion energy research

Objectives

Fusion energy could contribute in the second half of the century to the emission-free large-scale production of base-load electricity. The advances made in fusion energy research justify to further pursue a vigorous effort towards the long-term objective of a fusion power plant. Theoretical work and experimental studies on the existing devices world-wide, in particular on JET, have established the scientific and technical readiness for the construction of a project of the next generation after JET with the objective of demonstrating the scientific and technological feasibility of fusion energy. World wide collaboration on fusion energy research has progressed to the detailed engineering design of such a Next Step device, ITER, with the objectives of extended burn in inductive operation with power amplification $Q > 10$, demonstrating generation of 400 MW of fusion power over about 400 seconds, that could allow burning plasmas to be studied in conditions relevant to energy production.

The successful completion of the ITER Engineering Design Activities makes it possible, in line with the reactor orientation of the Community activities on fusion energy research, to

take a decision about the realisation of the Next Step. Subject to a positive outcome of the international negotiations on the juridical and institutional conditions of the establishment of an ITER Legal Entity and negotiations for its joint implementation (construction, operation, exploitation and decommissioning), a specific decision could be sought in the period 2003-2004, so that construction could effectively start during the period 2005-2006. The period 2003-2006 has therefore to be seen as a transition period marked by the need to rationalise European activities due to the strong orientation of the programme towards the Next Step. The budgetary proposition for research in the field of fusion energy over the period 2003-2006 provides that out of a total appropriation of 700 Mio€, 200 Mio€ are foreseen for the realisation of ITER.

If and when decided, the realisation of the Next Step will mobilise significant human and financial resources. Once a decision is taken to go ahead with the project, adaptations to the current efforts of the European partners of Euratom in the field of fusion and organisational changes will be required, in particular to jointly steer the European contribution to ITER. The amount of 500 Mio€ is proposed to allow the continuation of a meaningful R&D programme, including the transition between the activities currently carried out in the framework of the Associations⁷² and JET, and what would become the "accompanying programme" in physics and technology for fusion once construction of the Next Step/ITER device has reached its steady state after 2006.

Priorities

i) Associations' programme in physics and technology

The Associations' programme will include:

- ***R&D in fusion physics and plasma engineering***, focusing on the study and evaluation of 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.
- ***Structured R&D activities in fusion technology*** in particular research on fusion materials and participation in the R&D activities for the decommissioning of JET, which is foreseen at the end of its operations.
- ***Investigations of socio-economic aspects***, focusing on evaluation of economic costs and social acceptability of fusion energy, in complement to the further studies on safety and environmental aspects; co-ordination, in the context of a keep-in-touch activity, of the Member States' civil research activities on inertial confinement and possible alternative concepts; dissemination of results and the diffusion of information to the public; mobility and training.

In contributing to the Associations' programme, priority will be given to multilateral actions to focalise activities on common projects such as those directly related to operation on JET and to the Next Step / ITER and/or staff training. Depending on a decision on the realisation of ITER and its timing, the current Community support to the Associations activities will be adjusted, and the phasing out of the exploitation of a number of facilities will be considered. Adequate means shall be ensured to maintain a strong European co-ordination of the fusion activities, which has demonstrated its usefulness over the years.

⁷² Established under contracts of associations between the Community and entities in the Members States.

The extent of the accompanying domestic programme in fusion physics and technology which is required in the Associations and European industry to take full benefit from ITER, will depend (a) on the level of the European share in ITER and (b) on where would be sited. This could entail investments aiming at maintaining experimentation on fusion devices at world-class level in Europe beyond the start of operation of ITER and an adequate programme of technological development.

ii) Exploitation of the JET facilities

The JET facilities will continue to be exploited in the framework of the European Fusion Development Agreement (EFDA), in view of completing the exploitation of the performance enhancements currently under way. The use of the JET facilities will have to be suspended at an appropriate time to enable the corresponding resources to be redirected to the Next Step / ITER.

iii) Next Step / ITER

The Proposal for the Euratom framework programme (2002-2006) includes the continuation of Next Step activities with a view to participate in its construction in the second half of the period. However, since decisions on ITER do not depend only upon EU Institutions but also on the EU international partners, the proposed programme of activities must be open regarding the eventual siting and framework of the Next Step / ITER and the precise content of the accompanying domestic programme.

The EU participation in ITER would include contributions to the construction of equipment and installations, which are within the perimeter of the ITER site and necessary for its exploitation, as well as to the costs associated with the staffing and management of, and the support to be given to, the project during construction. The level and nature of this participation will depend on the outcome of the negotiations with the EU international partners, and in turn on the location of the ITER site. If ITER was located in Europe, the EU participation would also include contribution to the costs to be borne by Europe as a Host Party.

2.2 Treatment and disposal of radioactive waste

Objectives

The absence of a broadly agreed approach to waste management and disposal is one of the main impediments to the continued and future use of nuclear energy. In particular, this applies to the disposal of long-lived waste components in geological repositories, which will be required no matter what treatment method is chosen for the spent fuel and high level waste. Research alone cannot ensure societal acceptance; however, it is needed in order to develop and test the repository technologies, investigate suitable sites, promote basic scientific understanding relating to safety and safety assessment methods, and to develop decision processes that are perceived as fair and equitable by the stakeholders involved.

Research is also needed to explore the potential offered by new reactor types and/or fuel cycles to make better use of fissile material and generate less waste, while meeting appropriate cost expectations, and to clarify the prospects for conducting partitioning and transmutation, which have a theoretical potential to reduce the hazard of the waste, on an industrial scale with adequate safety and at reasonable cost.

Research Priorities

i) Research on geological disposal

The aims are to establish a sound technical basis for demonstrating the safety of disposing high level radioactive wastes in geological formations and underpin the development of a common European view on the main issues related to the disposal of waste.

- **Improvement of fundamental knowledge, developing and testing technologies:** research will focus on key physical, chemical and biological processes; interaction between the different natural and engineered barriers, their long-term stability and means of implementing disposal technologies in underground research laboratories.
- **New and improved tools:** research will focus on models for performance, safety assessment and methodologies to demonstrate long term safety, including sensitivity and uncertainty analyses, evaluation of alternative measures of performance and processes relating to the public concerns on waste disposal.

ii) Partitioning and transmutation; new reactor concepts

The aims are to determine practical ways of reducing the amount and/or hazard of the waste to be disposed of by partitioning and transmutation and to explore the potential of new reactor concepts.

- **Partitioning and transmutation:** research will focus on fundamental assessments of the overall concept; demonstration at pilot scale of the most promising partitioning technologies; further development of technologies for transmutation; and evaluation of their industrial practicability.
- **New reactor concepts:** research will focus primarily on the High Temperature Reactor (HTR), in particular with regard to power conversion system for direct cycle, material properties in a high temperature helium environment, innovative fuel coatings, process heat applications and safety and licensing issues.

3. OTHER ACTIVITIES IN THE FIELD OF NUCLEAR SAFETY

Objectives

The objectives are to support EU policies in the fields of health, safety and the environment and better integrate European research on nuclear fission and the other uses of ionising radiation.

Research priorities

i) Radiation protection

The aims are to underpin Community standards on radiation protection and how they are applied, to respond flexibly and rapidly to emerging needs and to enhance European capability through better integration of the research effort. Research will focus on:

- quantification of risks at low and protracted doses typical of those encountered in the environment and the workplace, through epidemiological studies of suitable exposed populations complemented by cellular and molecular biology research. Collaboration

with Russia and other CIS countries will be essential for gaining access to data on exposed populations of interest.

- better integration of European research, in particular in the areas of health and environmental protection, radioecology, emergency and environmental management, medical uses of radiation and exposure to natural sources of radiation.

ii) *Innovative ways of producing nuclear energy*

The aim is to investigate possible innovative concepts for nuclear energy. Research will focus on:

- *further development of innovative concepts for nuclear energy that have been identified as offering longer term benefits such as in terms of safety, waste management, costs and sustainability.*

iii) *Education and training*

The aim is to better integrate European education and training in the nuclear sciences to combat the decline in both student numbers and teaching establishments, thus providing the necessary competence and expertise for the continued safe use of nuclear energy and other uses of radiation in industry and medicine. Support will focus on:

- *development of a more common approach for education in the nuclear sciences and engineering in Europe and its implementation, including the better integration of national resources and capabilities.*

This will be complemented by support for individual fellowships, special training courses, training networks and grants for young research workers from the former Soviet Union.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Types of activities	Amount (EUR million)
Controlled thermonuclear fusion	70073
Treatment and storage of waste	150
Other activities	50
Total	900

73 Of which EUR 200 million is foreseen for participation in the ITER project

ANNEX III – MEANS FOR IMPLEMENTING THE PROGRAMME

In order to implement the specific programme, and in accordance with the Decisions of the European Parliament and of the Council concerning the multiannual Framework Programme 2002-2006 of the European Atomic Energy Community for research and training activities aimed at contributing towards the creation of the European Research Area (2002/.../Euratom) and with the rules for the participation of undertakings, research centres and universities for the implementation of the framework programme (2002/.../Euratom), the Commission will use various instruments.

The Commission will evaluate the proposals in accordance with the evaluation criteria set out in the above mentioned Decisions in order to verify their relevance with regard to the objectives of the programme, their scientific and technological excellence, their Community added value and the participants' management capacity.

A. NEW INSTRUMENTS

A.1 Networks of excellence

In general, the network will be organised around a core group of participants to which others may be added. In order to create a *virtual centre of excellence*, they will integrate a considerable part or even the totality of their research activities in the area concerned. These activities will often be multidisciplinary, and oriented towards long-term objectives and not precise predefined results in terms of products, processes or services.

In addition to these integrated research activities, the network's joint programme of activities will also comprise integration activities as well as activities related to spreading of excellence outside the network.

In pursuing its objectives, the network will therefore carry out:

- Research activities integrated by its participants
- Integration activities which will comprise in particular:
 - adaptation of the participants' research activities in order to strengthen their complementarity;
 - development and utilisation of electronic information and communication means, and development of virtual and interactive working methods;
 - short-, medium- and long-term exchanges of personnel, the opening of positions to researchers from other members of the network, or their training;
 - development and use of joint research infrastructures, and adaptation of the existing facilities with a view to a shared use;
 - joint management and exploitation of the knowledge generated, and actions to promote innovation.
- Activities of spreading of excellence which will comprise, as appropriate:

- training of researchers;
- communication concerning the achievements of the network and the dissemination of knowledge;
- services in support of technological innovation, aimed in particular at the take-up of new technologies;
- analyses of science/society issues related to the research carried out by the network.

In carrying out some of its activities (such as training of researchers), the network will endeavour to ensure publicity by publishing calls for applications.

The size of the network may vary according to the areas and subjects involved. As an indication, the number of participants should not be less than half a dozen. On average, in financial terms, the Community contribution to a network of excellence may represent several million euros per year.

The network proposals should comprise the following elements:

- a general outline of the joint programme of activities, and its content for the first year, broken down into research activities, integration activities, and activities for spreading excellence;
- the role of the participants, identifying the activities and resources that they will integrate;
- the operation of the network (co-ordination and management of activities);
- the plan for the dissemination of knowledge and the perspectives as regards exploitation of the results.

The partnership may evolve when necessary, within the limit of the initial Community contribution, by replacing participants or adding new ones. In most cases, this will be done through publication of a call for applications.

The programme of activities would be updated yearly and would entail a reorientation of certain activities or launching of new ones not initially foreseen, which could involve new participants. The Commission may launch calls for proposals with a view to the allocation of additional contribution in order to cover, for example, an extension of the integrated activities of the existing network or the integration of new participants.

The Community's financial contribution will be a fixed amount linked to the implementation of a set of work, initially calculated on the basis of the resources dedicated to carrying out the joint programme of activity and paid on an annual basis. As a complement to the resources of the participants, it should be sufficient to act as an incentive for integration, but without creating a financial dependence that might jeopardise the lasting association of the network.

A.2 Integrated projects

The objective of this instrument is to strengthen European competitiveness or contribute to resolve major societal problems by mobilising a critical mass of research and technological development resources and skills existing in Europe.

Accordingly, each integrated project will have the aim of obtaining identifiable scientific and technological results applicable to products, processes or services. The activities carried out in the context of an integrated project will have by definition clearly defined objectives even in the case of risky research.

In general, the participants in the projects will be organised around a core group made up of the main participants. All the activities carried out in the context of an integrated project will be defined in the general framework of an "execution plan" comprising activities relating to:

- research, technological development and/or demonstration;
- management, dissemination and transfer of knowledge with a view to promoting innovation;
- analysis and assessment of the technologies concerned, as well as the factors relating to their exploitation.

In pursuit of its objectives, it may also comprise activities relating to:

- training researchers, students, engineers and industrial executives;
- support for the take-up of new technologies;
- information and communication, and dialogue with the public concerning the science/society aspects of the research carried out within the project.

The size of an integrated project may vary according to the themes and subjects, depending on the critical mass necessary in order to obtain the expected results under the best possible conditions.

The combined activities of an integrated project may represent a financial size ranging from several million euros to several tens of millions of euros.

In most cases an integrated project will comprise a set of specific actions, relating to certain aspects of the research needed to achieve the objectives pursued, of variable sizes and structures according to the tasks to be achieved, executed in a closely co-ordinated manner. In some cases, however, an integrated project may take the form of a single large project with a single component.

Integrated project proposals should contain the following elements:

- the scientific and technological objectives of the project;
- the main lines and timetable of the execution plan, highlighting the articulation of the various components;
- the stages of implementation and the results expected in each one of them;

- the role of the participants within the consortium and the specific skills of each of them;
- the organisation and management of the project;
- the plan for the dissemination of knowledge and the exploitation of results;
- the global budget estimate and the budget for the different activities, including a financial plan identifying the various contributions and their origin.

The partnership may evolve when necessary, within the limit of the initial Community contribution, by replacing participants or adding new ones. In most cases, this will be done through publication of a call for applications.

The execution plan will be updated yearly. This updating may entail the reorientation of certain activities and the launching of new ones. In the latter case, and where an additional Community contribution is needed, the Commission will identify these activities and the participants who will carry them out, by means of a call for proposals.

The Community contribution will be part of a financing plan which may involve recourse to other financing schemes, in particular Eureka or the instruments of the EIB or the EIF. It may amount to up to 50% of the total project budget, broken down into budgets per activity. It will be paid annually on the basis of the proposed execution plan.

B OTHER INSTRUMENTS

In order to implement the programme, the Commission can have recourse to:

- **specific targeted projects** in order to carry out research or demonstration activities
- **integrated initiatives relating to infrastructure**, combining activities that are essential to strengthening and developing research infrastructures for the provision of services on a European scale
- **mobility and training actions**
- **specific co-ordination and support actions** in order to achieve the objectives identified in all the areas of the programme.
- **accompanying actions** by way of additional measures to achieve the objectives of the programme or prepare future activities in the context of the Community's research and technological development policy.

C - SPECIFIC IMPLEMENTATION RULES IN THE AREA OF RESEARCH INTO THERMONUCLEAR FUSION

In the implementation of activities in the research area on controlled thermonuclear fusion, the following rules will be applied.

I. PROCEDURES

The projects undertaken in the context of shared-cost of research and technological development actions will be carried out on the basis of procedures set out in:

- the contracts of association with the Member States and the Associated States or organisations in those States,
- the *European Fusion Development Agreement (EFDA)*,
- any other multilateral agreement concluded between the Community and associated organisations (such as the agreement on the promotion of mobility) 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 organisations in the Member States or the associated states without an association,
- international agreements covering projects carried out in the framework of co-operation with third countries, such as ITER, and by legal entities which may be set up in the framework of such agreements.

II. FINANCIAL CONTRIBUTION

The Framework programme financial contribution to the current expenditure of the Associations and to contracts of limited duration will be progressively and substantially reduced from its current annual rate, over the duration of the framework programme.

The modalities of participation of the Community in the activities related to the joint implementation of projects carried out within the framework of international co-operations such as ITER are defined in the relevant international co-operations and by the legal entities which can be established in the frame of these agreements. Appropriate legal entities, or any other appropriate forms, may be created by Euratom and the associated organisations in order to manage this Community participation.

FINANCIAL STATEMENT

Policy area(s): Research

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

TITLE OF ACTION

Proposal for a Council Decision adopting a specific programme for research and training actions on "Nuclear Energy".

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

Subsection B6 6 Indirect Actions: these lines will be specified at the beginning of the 2003 budget procedure, taking into account the ABB nomenclature, which is being drawn up.

2. OVERALL FIGURES

2.1. Total allocation for action (Part B): €900 million for commitments

2.2. Period of application:

2002-2006

2.3. Overall multiannual estimate of expenditure:

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

€ million (*to 3rd decimal place*)

	2003	2004	2005	2006	2007 +	Total
Commitments	177.800	186.800	189.800	197.100	-	751.500
Payments	123.700	123.200	157.600	147.000	200.000	751.500

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

This budget category does not apply in this field.

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

Commitments /Payments	36.300	36.800	37.400	38.000	-	148.500
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TOTAL a+b+c	2003	2004	2005	2006	2007 +	Total
Commitments	214.100	223.600	227.200	235.100	-	900.000
Payments	160.000	160.000	195.000	185.000	200.000	900.000

2.4. Compatibility with the financial programming and the financial perspective

- x Proposal compatible with 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

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

Certain Associated States will contribute to the funding of the Specific Programme.

The association agreements are linked to a Framework Programme. Their renewal will be renegotiated following adoption of the new Framework Programme and it is therefore impossible to forecast the amount of revenue in question.

In accordance with the association agreements for the current Framework Programme and in the context of their renewal, revenue not used by the end of the current Framework Programme (31/12/2002), will be transferred to the new Framework Programme.

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

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 3

4. LEGAL BASIS

Article 7 of the Euratom Treaty.

Proposal for a Council Decision relating to the multiannual framework programme 2002-2006 of the European Atomic Energy Community for research and training activities aimed at contributing to the creation of the European Research Area.

5. DESCRIPTION AND GROUNDS

5.1. Need for Community intervention

5.1.1 Objectives pursued

As recognised at the highest political level by the European Council in Lisbon, Feira, Nice and again recently in Stockholm, research is a central component of the knowledge-based economy and society developing worldwide. The objective set for the EU in Lisbon was "to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth, more and better jobs and greater social cohesion" over the next decade. More than ever, research is proving to be one of the main 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 at both EU and national level.

However, Europe still has structural weaknesses where research is concerned. These can be summed up in four main points:

- I. Insufficient and dispersed investment in research and technological development and more generally in knowledge (RTD, education and software), with the result that we are lagging behind our competitors. In 1999, the EU invested EUR 76 billion less than the US in research and development. It is now lagging behind its competitors in terms of research spending as a proportion of GDP (in 1999, the figure was 1.9% for the EU compared with 2.6% for the US and 2.9% for Japan).⁷⁴ In 1999, the US invested some 9% in knowledge, ahead of the EU (7.6%) and Japan (6.9%). And the gap is continuing to widen.
- II. Insufficient human resources in research. Researchers represent 5.3/1000 of the workforce in the EU (1998), 7.4/1000 in the US (1993) and 8.9/1000 in Japan (1998) where there are twice as many researchers in industry. Direct public spending on

74 1998 figure.

higher education corresponds to 0.9% of GDP in the EU, 1.4% in the US and 0.5% in Japan (1997).

- III. *A limited capacity to translate scientific breakthroughs into innovative and competitive products and services*, despite high-quality scientific production. The figures for the number of patents granted by the European, American and Japanese patents offices per million inhabitants are 32 in the EU, 49 in the US and 88 in Japan. In 1998, the trade balance for high-tech products was a €28 billion deficit for the EU (a trend confirmed throughout the decade), compared with a €8 billion deficits for the US and a EUR 39 billion surplus for Japan. Venture-capital investment in the advanced sectors corresponds to 80% in the US and, while it is on the increase, only 26 % in the EU and 23% in Japan.
- IV. *A fragmentation of research policies in Europe*. The EU has not yet adopted a fully-fledged research policy. The 15 national policies co-exist side by side and alongside the Community framework programme without adequate coordination between them to achieve efficient organisation and exploitation. This lack of coordination also affects the establishment and efficient exploitation of research infrastructures.

To alleviate this situation, the Commission has proposed and Council and Parliament have endorsed the creation of a "*European Research Area*". Bringing it about will necessarily be the product of a joint effort by the EU, the Member States and research stakeholders. The EU research framework programmes (2002-2006) and the specific programmes will make a contribution to this in particular through the significant leverage effect that they can have for integrating, coordinating and structuring research in the EU and strengthening the foundations of the European Research Area.

A structural change in the EU's science and technology fabric to remedy the above mentioned weaknesses will need resources commensurate with the objective. The Commission has proposed funding for the framework programme totalling EUR 17.5 billion, corresponding to the previous level of funding plus inflation and growth (but still representing only 5 to 6% of public spending on RTD). The Commission takes the view that this sort of amount could have a significant effect on the research system as such, improve at least some of the overall research indicators, and have a significant effect in the priority areas of the framework programme which will generate growth in the EU. In overall terms, this level of funding will make it possible to maintain the Community's RTD effort expressed as percentage of GDP at its present level during the period 2003-2006.

The plan is to implement the framework programmes by five specific programmes, three of which come under the European Community Treaty and two under the European Atomic Energy (Euratom) Treaty. Each specific programme is identified according to the nature of the instruments deployed, reflecting the objectives and organisation of the framework programme:

- A programme on "*Integrating and strengthening the European Research Area*" comprising the indirect actions proposed under the heading "*Integrating research*" and under the heading "*Strengthening the foundations of the European Research Area*", thus bring together research and coordination activities.
- A programme on "*Structuring the European Research Area*", comprising horizontal, support and structuring activities.

- Two "Joint Research Centre (JRC)" programmes comprising the direct actions carried out by the JRC in the non-nuclear and nuclear fields respectively.
- A "Nuclear energy" programme comprising the indirect actions carried out in the field of nuclear energy.

The objectives of the specific programme on "Nuclear energy" are set out below by action areas, together with their justification and the European added value that they can provide.

1. Treatment and disposal of radioactive waste

The objective is to develop and test repository technologies, investigate suitable sites, promote basic scientific understanding relating to safety and safety assessment methods, and to develop decision processes that are perceived as fair and equitable by the stakeholders involved.

Justification and European added value

- The absence of a broadly agreed approach for the management and disposal of high level wastes is a major impediment to the winding up of past installations, as well as the continued and further use of nuclear energy
- An agreed approach would have positive implications for cost, safety and security of energy supplies

Existing radioactive wastes need to be managed.

2. Fusion Energy Research

Fusion energy could contribute to the emission-free large-scale production of base-load electricity. The advances made in fusion energy research justify further pursuit of a vigorous effort towards the long-term objective of a fusion power plant.

Justification and European added value

- Need to progress further towards the understanding of fusion plasmas in conditions relevant to a future reactor.
- The exploitation of the facilities, notably JET, which have been constructed with preferential support, would not be adequately possible on a national scale. Until ITER is in operation, JET is the most powerful tool existing in the world to advance in the study of fusion plasmas.
- The EU by presenting itself as a single partner is in a stronger position for participating in an international project like ITER than Member States individually.
- Need for more fundamental studies and training of young scientists in the area fusion.

Role in ensuring dissemination of the results in the Member States.

3. Other activities in the field of nuclear safety

The objectives are to support EU policies in the fields of health, safety and the environment and better integrate European research on nuclear fission and the other uses of ionising radiation.

Justification and European added value

- Improved knowledge of risks at low doses will enable the more cost effective allocation of resources to radiation protection
- A deeper integration is critical to maintaining capabilities in the general context of a mature and/or declining nuclear industry
- Necessity to face important competitors.
- The number of students and institutions offering nuclear education is declining

5.1.2 Measures taken in connection with ex ante evaluation

When preparing the specific programme proposals the Commission services carried out an ex ante evaluation. Its results reflect in particular:

- 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;
- wide-ranging consultations among the protagonists relating to the two communications on the European Research Area in the course of the year 2000/75 and the framework programme proposal at the beginning of 2001;
- a series of internal and external Commission studies relating to economic, political and foresight areas and the impact of RTD activities.

The results of the ex-ante evaluation carried out are reflected in particular in the choices made with regard to the structure of the programmes, the objectives and priorities and the implementing instruments.

The objectives and priorities were selected in accordance with the rigorous application of the criterion of European added value.

This covers the following aspects applied to the priority themes and activities selected, the justification and European added value of which are described in greater detail in point 5.1. and the expected results in point 5.2.:

- Cost and scale of research beyond the possibilities of a single country, and need to assemble a “critical mass” of financial and human resources;
- Importance of collaboration in economic terms (economies of scale) and as a result of its beneficial effects on the private research effort and industrial competitiveness

75 COM (2000) 6, 18 January 2000
COM (2000) 612, 4 October 2000.

- Maintenance or development of the position of the EU in RTD areas strategic for the EU
- Need to combine the complementary expertise present in the different countries, more particularly in the face of interdisciplinary problems and the need to have recourse to comparative studies on a European scale
- Links with the priority interests of the EU as well as with Community legislation and policies
- The necessarily transnational nature of the research as the result of the scale on which the problems arise or for scientific reasons.

With regard to the implementing instruments, two main new instruments will be applied in the context of the Euratom programme. By their nature they can only be implemented at Community level. They have been designed to contribute to the establishment of:

- a critical mass needed and the integration of research;
- closer links between the programmes and Member States' activities and coordination of national programmes;
- cooperation in areas strategic for the EU and solutions to major challenges facing the EU;
- the excellence and attractiveness of S&T in Europe;
- dissemination and exploitation of S&T results throughout the EU.

These instruments are:

a) *networks of excellence*

The purpose of this instrument is to strengthen European scientific and technological excellence. Each network is intended to advance knowledge in a particular area by assembling a critical mass of expertise. Targeted towards long-term objectives, the activities concerned, often multidisciplinary, are not aimed at precise predefined results in terms of products, processes or services but the progressive and lasting integration of research capacities existing in Europe at both national and regional level. To this end, in order to create a virtual *centre of excellence* the members of the network will implement a joint programme of activities integrating a substantial proportion or even the entirety of their activities in the area concerned.

b) *Integrated projects*

The purpose of this instrument is to increase European competitiveness or help to resolve major societal problems by mobilising a critical mass of resources and research and technological development expertise existing in Europe. Accordingly, each integrated project will have the aim of obtaining a certain number of precise results in terms of products, processes or services. The activities carried out in the context of an integrated project will by definition be targeted even in the case of risky research. All the activities carried out in the context of an integrated project will fit into the general framework of an “implementation plan”.

5.1.3 *Measures taken following ex post evaluation*

The recommendations of the five-year assessment of the framework programmes and the specific programmes carried out in 2000 have been taken into account in preparing the specific programme proposals, in particular those concerning:

- the need to make up for Europe's trailing position in the field of RTD compared with its competitors;
- the need for complementarity and coherence between national and Community RTD policies and the essential role of the Commission in achieving this objective;
- the beneficial impact of the framework programme which "fills a gap in Europe by enabling researchers in universities and in industry to carry out applied work together";
- the need to lighten the management procedures of the 1998-2002 programme and the need to "rethink the structures and procedures for managing the framework programme";
- placing EU research activities in the broader context of a genuine European research policy;
- more concentrated programmes;
- continuing with the research needed to achieve the objectives of Community 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 fifth 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 pilot projects for the measures envisaged for the next framework programme (networks, clusters, industrial platforms, larger-scale projects, etc.).

5.2. Actions envisaged and means of budget intervention

The actions envisaged for the specific programme on "Nuclear energy" are set out below, presented by detailed action areas. This presentation makes it possible to highlight the estimated results expected, the contributions to the overall objectives of the framework programme or of the Community or potential performance parameters associated with these. These indications are intended as yardsticks and not definitively adopted goals.

A correspondence between the action areas and the types of instruments used is given further on in the form of a table.

1. Treatment and disposal of radioactive waste

i) Research on geological disposal

(Improvement of fundamental knowledge, developing and testing technologies, New and improved tools)

ii) Partitioning and transmutation; new reactor concepts

(Partitioning and transmutation; new reactor concepts)

Expected results, contributions to overall objectives or potential performance parameters

- Sound technical basis for demonstrating the safety of disposing of high level radioactive waste in geological formations
- Evaluation of the practicability, on an industrial scale, of partitioning and transmutation
- Conception of new reactors or fuel cycles with potential for commercial exploitation

2. Fusion Energy Research

i) Association's programme in physics and technology

(R&D in fusion physics and plasma engineering, Structured R&D activities in fusion technology, Investigations of socio-economic aspects)

ii) Exploitation of the JET facilities

iii) Next Step/ITER

Expected results, contributions to overall objectives or potential performance parameters

- Establishment of a framework for ITER construction and operation,
- Starting up of the Next Step / ITER construction,
- Full exploitation of the JET facilities
- Commissioning of the Stellarator W-7-X.
- a deeper assessment of fusion configurations akin to the Tokamak,
- A deeper understanding of the socio-economic background concerning fusion as an energy source.
- Further developing the physics and technology (in particular materials) basis for fusion energy.

3. Other activities in the field of nuclear safety

- i) radiation protection*
- ii) innovative ways of producing nuclear energy*
- iii) education and training*

Expected results, contributions to overall objectives or potential performance parameters

- Improved quantification of low-dose radiation risks
- Development of innovative ways of producing nuclear energy and assessment of their potentials
- Development of a co-operative European programme on education and training in the field of nuclear energy
- Improvement of Community standards providing enhanced health and environmental protection

The means of intervention and financial participation under the framework programme will be as follows, according to the objectives:

Areas	Activities/ Objectives of instrument	Type of instrument⁽¹⁾	Financial contribution of Framework Programme
Priority thematic area	Treatment and disposal of radioactive waste	- Networks of excellence - Integrated projects	Grant to the budget
	Fusion	(2)	
Other activities in the field of nuclear safety	Radiation protection	- Targeted specific projects	Grant to the budget
	Innovative ways of producing nuclear energy	- Coordination and specific support action - training and mobility activities	Grant to the budget
		- <u>in duly justified cases-</u> networks of excellence	
Education and training	- integrated projects	Grant to the budget	

(1) Accompanying actions can also be implemented throughout the specific programme.

(2) Fusion energy research

Projects undertaken in the context of shared-cost research and technological development activities are implemented on the basis of procedures set out in:

- contracts of association with Member States and Associated States or organisations in those States,
- the European Fusion Development Agreement (EFDA),
- any other multilateral agreement between the Community and the associated organisations (such as the agreement on the promotion of mobility) or the legal entities which may be set up after consulting the competent advisory committee,
- other contracts of limited duration, notably with organisations in the Member States or Associated States having no association,
- international agreements covering projects carried out in the context of cooperation with third countries such as ITER and by legal entities which may be set up under those agreements.

The setting-up of consortia for integrated projects having a common objective will be encouraged.

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. The latter may also serve as intermediaries for Community budget 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.

5.3. Means of implementation

The Commission will ensure the implementation of the actions. In certain duly justified cases, it may call upon external bodies for assistance.

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 16 275 million. The total amount for the Framework Programmes 2002-2006 is EUR 17 500 million.

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

Breakdown by objective	Total
1) Waste processing and storage	150
2) Fusion Energy Research	700
3) Other activities in the field of nuclear safety	50
TOTAL	900

An annual schedule for each of these objectives is not significant at this level. It could only be defined as being strictly proportional to that for the entire specific programme, itself in line with that of the framework programme.

The annual internal breakdown will be established subsequently within the work programmes.

6.1.2 Technical and administrative assistance, support expenditure and IT expenditure (Commitment appropriations)

This budget category does not apply in this field.

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

Here too, a breakdown by objective and type of measure cannot be established at this stage, since the outputs from the indirect research actions are research projects resulting from calls for proposals after evaluation, hence the difficulty of quantifying these actions in advance.

7. IMPACT ON STAFF AND ADMINISTRATIVE EXPENDITURE

The ceiling for administrative expenditure on this programme is 16.5% of the €900 million planned for this action as a whole.

This particular situation is due to the fact that this programme has 224 research posts at its disposal, costing - for the whole period - 85% of the requested ceiling.

This high number of posts arises out of the mode of operation of the programme, for which 50% of these posts are seconded, either to laboratories in Member States under association agreements or to the ITER project.

Moreover, there were successive redeployments throughout the fifth Framework Programme in order to reduce the staff on the programme and better to balance the staff and the budget for the period 1999-2002.

The programmes other expenditure is quite low owing mainly to the small number of contracts managed. Note that about a third of this other expenditure also relates to the ITER project.

7.1. Impact on human resources

Type of post		Staff to be assigned to management of the action using existing and/or additional resources		Total	Description of tasks deriving from the action
		Number of permanent posts	Number of temporary posts		
Research officials or temporary staff	A	175			<i>If necessary, a fuller description of the tasks may be annexed.</i>
	B	31			
	C	18			
Other human resources			27 to 32 person-years		See costs
Total		224			

There is a specific establishment plan for the indirect research actions comprising a total of 954 A posts, 273 B posts and 427 C posts, giving a total of 1654 posts (EC and EURATOM, including SAB 3/2001).

To this establishment plan should be added 166 operating budget posts with no financial impact on the budget for these programmes, under the heading of participation in the formulation and implementation of research policy.

7.2 Overall financial impact of human resources

Type of human resources	Amount €million	Method of calculation *
Officials Temporary research staff	126.000	On the basis of an extrapolation of actual costs in 2000 for this personnel, inflation of 2% per annum et and an average vacancy rate of 8%.
Other human resources (give budget line)	5.500 to 6.500	Based on an extrapolation of real costs in 2000 and forecast expenditure for 2001/2002.
Total	131.500 to 132.500	Financed from B6 (research budget)

The amounts correspond to total expenditure for the duration of the programme.

7.3 Other administrative expenditure deriving from the action

Budget line (No and heading)	Amount €million	Method of calculation
(B6) Missions, operation, infrastructure, IT, communication (depending on the types of expenditure authorised in the table of equivalence for indirect RTD actions)	16.000 to 17.000	Based on an extrapolation of real costs in 2000 and forecast expenditure for 2001/2002
Total	16.000 to 17.000	Financed from B6 (research budget)

The amounts correspond to total expenditure for the action for the four years of implementation of this specific programme, i.e. total annual expenditure of €37.000 million.

I.	I. Total (7.2 + 7.3) (€million)	148.500
II.	Duration of action (years)	4
III.	Indicative annual cost (€million)	37.000

8. MONITORING AND EVALUATION

8.1 Monitoring system

The specific programmes are designed to help bring about the European Research Area and they will be implemented in parallel with and in close collaboration with other Community and national activities in pursuit of the same objectives. The very nature of research and the different types of actions at different levels make it difficult to determine causes and effects, and monitoring and evaluating the result and impact are complex.

Based on the experience of the earlier programmes and methodological studies in progress, a series of instruments has already been or is being finalised in order to develop the objectives and monitor and evaluate the results and impact of the framework programme and programmes implementing it, as well as the activities relating to bringing about the ERA. The Commission will take stock of the development of these instruments in good time before the programmes are implemented.

By these means, a structured system for collection of information and statistics will be progressively put in place.

Within this context general indicators specifically adapted to the framework programme will be developed, to make it possible to evaluate in particular the contributions of the programmes in relation to the challenges facing the EU identified in point 5.1 (Investment in RTD and in knowledge, overall and in the priority fields for the EU, human RTD resources, exploitation of RTD results, coherence of national and Community research policies and with regard to research infrastructures).

In addition, more specific indicators will be identified for the different objectives of the programmes; relating in particular to the production, management and networking, exploitation and impact of the knowledge arising from the activities carried out under the programmes. First thoughts in this connection are already indicated in point 5.2 under the heading of results expected, contributions to overall objectives or potential performance parameters.

8.2 Arrangements and schedule for the planned evaluation

- **Annual monitoring:** The Commission will, by calling upon suitable expertise where appropriate, continuously monitor the implementation of the Framework Programme and the specific programmes 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.

The objective is to step up and improve the systematic collection, coherence and quality of the basic information, in order to allow efficient analysis and monitoring as well as a substantial contribution to the five-year assessment. In order to make Community research managers more aware of issues relating to the monitoring of the implementation and the results and the impact of the programmes, it is also planned to draw up a joint self-assessment format. In addition, measures will be taken to ensure greater coherence between the monitoring of the framework programme, the specific programmes and progress with the European Research Area.

Annual report: Progress with implementing the Framework Programme and the specific programmes 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, realisation of the European Research Area 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 and the specific programmes, 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, the achievement of the objectives and the impact of the activities 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

By submitting reports which may give rise to the consolidation of revenue in the *participants'* accounts, the financial coordinator should make all the financial documentation available to the Commission to enable it to carry out its financial audits, indicating the timetable and the consolidation of the *participants'* accounts.

Where appropriate, the Commission will carry out such financial audits, in particular if it has reasons to doubt the realistic nature of the accounts vis-à-vis the progress of work described in the *activity reports*.

The Community's financial audits will be carried out either by its own staff or by accounting experts approved according to the law of the *participant* audited. The Community will chose the latter freely, while avoiding any risks of conflicts of interest, which might be indicated to it by the *participant* subject to the audit.

In addition, the Commission will make sure in carrying out the research activities, that the financial interests of the European Communities are protected by effective checks and, in case of detected irregularities, measures as well as deterrent and proportionate sanctions.

In order to achieve this aim, rules on checks, measures and sanctions, with references to the Regulations Nos 2988/95, 2185/96, 1073/99 and 1074/99 will be taken up in all legal *instruments* used in the implementation of the programmes, including the specific *contracts* and model contracts.

In particular, the following points will have to be provided for in the *contracts* :

- the introduction of specific contractual clauses to protect the financial interests of the EC in carrying out checks and controls in relation to the awards;
- the participation of administrative checks in the field of fraud-fighting, in accordance with Regulations Nos 2185/96, 1073/99 and 1074/99;
- the application of administrative sanctions for all intentional or negligent irregularities in the implementation of the contracts, in accordance with the framework Regulation No 2988/95, including a black-listing mechanism;
- the fact that possible recovery orders in case of irregularities and fraud be enforceable pursuant to Article 164 of the EAEC Treaty.

**Proposal for a
COUNCIL DECISION**

adopting a specific programme 2002-2006 for research and training to be carried out by the Joint Research Centre by means of direct actions for the European Atomic Energy Community

Proposal for a

COUNCIL DECISION

adopting a specific programme 2002-2006 for research and training to be carried out by the Joint Research Centre by means of direct actions for the European Atomic Energy Community

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular the first paragraph of Article 7 thereof,

Having regard to the proposal from the Commission⁷⁶,

Having regard to the opinion of the European Parliament⁷⁷,

Having regard to the opinion of the Economic and Social Committee⁷⁸,

Whereas:

- (1) By Decision No .../.../Euratom, the Council adopted the multiannual framework programme 2002-2006 of the European Atomic Energy Community for research and training activities aimed at contributing towards the creation of the European Research Area⁷⁹ (hereinafter referred to as "the framework programme ") to be implemented by means of research and training programme(s) drawn up in accordance with Article 7 of the Treaty, which define the detailed rules for their implementation, fix their duration and provide for the means deemed necessary.
- (2) The rules for the participation of undertakings, research centres and universities and for the dissemination of research results, for the framework programme, adopted by the Council in Decision No..../.../Euratom⁸⁰ should apply to this programme.
- (3) In implementing this programme, emphasis should be given to promoting the mobility and training of researchers, and innovation, in the Community.
- (4) For the purpose of implementing the framework programme, it may be appropriate to engage in international co-operation activities, in particular on the basis of Chapter X

76 OJ C ...
77 OJ ...
78 OJ ...
79 OJ....
80 OJ....

of the Treaty, with third countries and international organisations. Special attention should be paid to Accession Countries.

- (5) Research activities carried out within this programme should respect the fundamental ethical principles, notably those which appear in the Charter of Fundamental Rights of the European Union.
- (6) Following the Commission Communication “Women and Science”⁸¹ and the Resolution of the Council⁸² and the European Parliament⁸³ 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.
- (7) This programme should be implemented in a flexible, efficient and transparent manner, taking account of relevant needs of JRC’s users and Community policies, as well as respecting the objective of protecting the communities financial interests. The research activities carried out under it should be adapted where appropriate to these needs and to scientific and technological developments.
- (8) The JRC should implement the research and training activities carried out by means of direct action, in particular the tasks entrusted to the Commission by the Treaty. The Commission should undertake the tasks incumbent upon it in the area of nuclear fission, making use of the technical expertise of the JRC.
- (9) The JRC should actively pursue activities in innovation and technology transfer.
- (10) In the implementation of this programme, the Board of Governors of the JRC should be consulted by the Commission in accordance with the relevant provisions of Commission Decision 96/282/Euratom of 10 April 1996 on the reorganisation of the JRC⁸⁴.
- (11) The Commission should in due course arrange for an independent assessment to be conducted concerning the activities carried out in the fields covered by this programme.
- (12) The Scientific and Technical Committee has been consulted on the scientific and technological content of this specific programme.
- (13) The Board of Governors of the JRC has been consulted on the scientific and technological content of this specific programme,

81 COM (1999) 76

82 Resolution of 20 May 1999, OJ C 201, 16.7.1999

83 Resolution of 3 February 2000, PE 284.656

84 OJ L 107, 30.4.1996, p. 12.

HAS ADOPTED THIS DECISION:

Article 1

1. In accordance with Decision [...] on the framework programme 2002-2006 (hereinafter referred to as “the framework programme”), a specific programme related to direct action of research and training activities to be carried out by the Joint Research Centre (hereinafter referred to as "the specific programme") is hereby adopted for the period from [...] to 31 December 2006.
2. The objectives and scientific and technological priorities for the specific programme are set out in Annex I.

Article 2

In accordance with Annex II to [Decision [.../...]/ the framework programme], the amount deemed necessary for the execution of the specific programme is EUR 330 million. An indicative breakdown of this amount is given in Annex II to this Decision.

Article 3

1. The Commission shall be responsible for the implementation of the specific programme.
2. The specific programme shall be implemented in accordance with the specific rules set out in Annex III.

Article 4

1. The Commission shall draw up a work programme for the implementation of the specific programme, which shall be made available to all interested parties, setting out in greater detail the objectives and priorities, the timetable for implementation and the implementation arrangements.
2. The work programme shall take account of relevant research activities carried out by the Member States, Associated States, European and international organisations. It shall be updated where appropriate.

Article 5

1. For the purposes of implementing the specific programme, the Board of Governors of the JRC shall be consulted by the Commission in accordance with Commission Decision 96/282/Euratom. .
2. The Commission shall regularly inform the Board of Governors of the implementation of this specific programme.

Article 6

1. The Commission shall regularly report on the overall progress of the implementation of the specific programme, in accordance with Article 4 of the framework programme.
2. The Commission shall arrange for the independent assessment provided for in Article 5 of the framework programme to be conducted concerning the activities carried out in the fields covered by the specific programme.

Article 7

The Commission may request the JRC to execute, on the basis of the criterion of mutual benefit, projects with legal entities established in third countries when this contributes effectively to the execution of direct actions.

Article 8

This decision is addressed to the Member States.

Done at Brussels, [...]

For the Council
The President
[...]

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND BROAD OUTLINES OF THE ACTIVITIES

1. INTRODUCTION

The Joint Research Centre carries out its mission to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of European Union policies. It serves the common interest of the Member States while being independent of special interests, private or national.

The JRC's contribution to the framework programme 2002-2006 incorporates recommendations of recent evaluations of the JRC85 and requirements necessitated by the Reform of the Commission. In particular, it includes

- As strengthened user-orientation.
- Networking activities to create a broad knowledge base and, in the spirit of the European Research Area (ERA), more closely associate Member State laboratories, industry and regulators in the S&T support provided to the EU policies.
- The concentration of activities on selected themes, including training of researchers to maintain nuclear expertise in the EU and its associated member states.

Co-ordination will be assured with the indirect actions under the Euratom specific programme.

It responds to clearly expressed needs and requirements, notably from the Commission services, which have been identified, are updated through systematic and regular contacts⁸⁶.

In its domains of competence, the JRC's contribution will aim at establishing synergies with the relevant thematic priorities in the other specific programmes, notably through participation in the indirect action, with a view to add value, when appropriate, to the work carried out therein (e.g. through the comparison and validation of tests and methods or the integration of results for policy-making purpose).

2. PROGRAMME CONTENT

2.1 Motivation

JRC's activities in the nuclear area aim to support related Community policies and specific Treaty obligations entrusted to the Commission. Nuclear energy supplies about a third of the Community's electricity and vigilance is still required to ensure a continuation of the Community's outstanding safety record, to maintain efforts to avoid proliferation and to efficiently manage the processing and long-term storage of waste. The Enlargement of the

85 Davignon Report (2000), 5-year assessment of JRC (2000), 1999 JRC Scientific Audit, Prioritisation Audit 2001.

86 Annual user workshops, interservice group of user DGs, bilateral agreement, etc.

Union together with the needs of safeguarding material arising from the disarmament process or the emergence of new technological developments introduce new challenges.

Focusing its activities in areas where Community involvement is appropriate, the JRC operates where its pan-European identity provides an added-value and where its action is justified by the cross-border aspects of nuclear safety and security or by public concern about the issues: safeguards, non-proliferation, radio-active waste management, reactor safety and radiation monitoring will be the key areas.

The principal objective will be to further develop collaboration through networking, leading to broad consensus on a range of these issues at European and world-level. The application of Safeguards by the Euratom Safeguards Office (ESO) and the IAEA requires R&D support and direct assistance. Special attention will be given to co-operation with future EU Member States. Training activities will be an important component for JRC to help equip the EU with a future generation of scientists with necessary nuclear skills and expertise. Main areas of research activity will therefore be as follows:

- Radio-active waste management and safeguarding nuclear materials.
- Safety of present and innovative reactors, radiation monitoring and medical applications from nuclear research.

2.2. Radio-active waste management and safeguarding nuclear materials

Spent fuel and high level waste treatment and storage

To address the issues of spent nuclear fuels and radio-active waste treatment and management, the JRC will further develop its understanding of fundamental physical, chemical and materials science data on actinides and actinide-containing products. The JRC will continue to provide basic nuclear data (such as elements cross sections, behaviour in extreme conditions) of importance for waste management studies as well as for material and medical sciences.

The basic processes governing the behaviour of irradiated fuel under conditions of interim storage or long term geological disposal will be further investigated.

The JRC will continue to test and evaluate processes to improve the efficient separation (partitioning) of radio-toxic elements from spent fuel and the subsequent reprocessing of the resulting products. This will be carried out with European partners under the transmutation and partitioning programme. Besides this experimental and theoretical approach JRC will pursue and extend its participation in networks with a possible co-ordinating role like in the international working group on fuel design for the accelerator driven systems.

Nuclear Safeguards

The safeguards work will provide direct support to the inspectorates (ESO and IAEA) and to operators and will undertake related underpinning research to prepare for future demands including continuous improvements of safeguards activities to adapt to political context, in particular changes in verification regimes, and technological evolution. The activity includes the development and assessment of instrumentation in the areas of destructive and non-destructive assays; provision of certified reference materials, containment and surveillance, training of inspectors and

the upgrading and operation of on-site laboratories. JRC will continue to be the focus point of the European Safeguards Research and Development Association (ESARDA) network.

The strengthening of the safeguard regime is increasingly reliant on information technologies to improve efficiency and to carry out new measures. JRC will pursue its efforts in developing environmental monitoring, satellite monitoring, and innovative data and information management systems as well as improved communications and remote surveillance techniques that enable certain safeguards activities to be performed remotely from headquarters. Synergy with the work performed by JRC in the area of anti-fraud will be further developed.

The JRC will continue to support the transfer of the technological “acquis communautaire” in the safeguards area to the Applicant Countries.

The JRC is closely involved in the international efforts to detect clandestine activities and to combat the illicit trafficking of nuclear materials. Nuclear forensic science will be further developed.

From nuclear safeguards to non-proliferation of weapons of mass destruction

The JRC will support the non-proliferation by adapting specialised know-how and techniques used for nuclear safeguards that may also potentially support verification regimes of nuclear and other weapons for mass destruction.

2.3 Safety of present and innovative reactors, radiation monitoring and medical applications from nuclear research

Safety of present and innovative reactors

The high safety level of plants within the EU must be maintained, in particular for reactors to be operated for a further 10-50 years. The JRC will continue supporting safety authorities and nuclear plant operators by networking on ageing, damage detection, in-service inspection, structural integrity assessment and production of fundamental neutron data. Accident analysis and management, validation of codes, systems’ analysis, and risk-informed methods development are traditional JRC competencies, which are important both for EU harmonisation and in view of enlargement. Support to the PHEBUS programme will continue. Retrieval of experimental data and their archiving for easy availability will be supported.

Development of a common safety culture in Central & Eastern European Countries is a further area for JRC support; this includes operational safety measures and plant upgrading, structural integrity, accident prevention and management.

On the safety of nuclear fuel, JRC will concentrate on mechanical and chemical interactions at the fuel/cladding interface and on fuel behaviour at high burn-up. The TRANSURANUS fuel performance codes will continue to be extended with new data and training of users, including scientists from Eastern European countries.

Together with industry and R&D institutions, the JRC will contribute to the analysis and evaluation of several safety features of new energy production systems, currently under investigation in several countries.

Radiation monitoring

Research into understanding how to protect the citizen and the environment against the effects of ionising radiation requires reliable dosimetry as a basis. The JRC's long-standing expertise in radio-protection and its reference laboratory for radionuclide metrology will be used to develop further skills and various nuclear measurements.

The radionuclide metrology activity includes new networks, which will provide support to nuclear safety together with food, chemical and environmental safety (with the detection of radioactivity traces and speciation). Efforts will focus on reference radionuclide metrology and on monitoring of low radiation levels.

Medical applications from nuclear research

A number of nuclear technologies of importance for medical applications have resulted from JRC's nuclear facilities and expertise. These emerge from research on new isotope production, development of clinical reference materials and support to diagnostic and therapeutic tools. The JRC will improve the co-ordination of such activities throughout Europe through networking with universities, nuclear research facilities, research centres, European medical associations and the pharmaceutical industry.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Activity	Amount (€ million)
Radio-active waste management and safeguarding nuclear materials	213M€
Safety of present and innovative reactors, radiation monitoring and medical applications from nuclear research	102M€
Staff necessary for the monitoring of the decommissioning of JRC obsolete installations	15M€
Total	330 M€^{87 88}

87 Of which approximately 6% may be allocated to exploratory research and up to 2% for exploitation of own JRC results and technology transfer.

88 This total includes the JRC's budget contribution necessary for its participation in indirect actions.

ANNEX III

SPECIFIC RULES FOR IMPLEMENTING THE PROGRAMME

1. The Commission, after consulting the Board of Governors of the JRC, shall implement the direct action on the basis of the scientific objectives and contents described in Annex I. The activities relating to this action shall be performed in the relevant institutes of the Joint Research Centre (JRC).
2. In the implementation of its activities, the JRC will, whenever appropriate and feasible, participate in or organise networks of public and private laboratories in the Member States or European research consortia in the support of the European policy making process. Particular attention shall be paid to co-operation with industry, especially with small and medium-sized enterprises. Research bodies established in third countries may also co-operate on projects, in accordance with the relevant provisions of Article 6 and, where applicable, of agreements for scientific and technological co-operation between the Community and the third countries concerned. Particular attention will be paid to co-operation with research laboratories and institutes in the Candidate countries and countries of Central and Eastern Europe and the former Soviet Union.

It will also use appropriate mechanisms to continuously identify the requirements and needs of its customers and users and to involve them in the related activities.

3. The knowledge gained through implementation of the projects will be disseminated by the JRC itself (taking into account possible limitations due to confidentiality issues).
4. The accompanying measures shall include:
 - the organisation of the visits of JRC staff to national laboratories, industrial laboratories and universities,
 - the promotion of mobility of young scientists, particularly from the Candidate countries,
 - specialised training with the emphasis on the nuclear expertise and the nuclear safety culture in the European Union,
 - the organisation of visits to JRC institutes of visiting scientists and seconded national experts, particularly from the Candidate countries,
 - systematic exchange of information, through, *inter alia*, the organisation of scientific seminars, workshops and colloquiums and scientific publications,
 - the independent scientific and strategic evaluation of the performance of the projects and programmes.

FINANCIAL STATEMENT

Policy area(s): RESEARCH

Activity(ies): Direct Action

TITLE OF ACTION:

PROPOSAL FOR A COUNCIL DECISION ADOPTING A SPECIFIC PROGRAMME FOR RESEARCH AND TRAINING TO BE CARRIED OUT BY THE JOINT RESEARCH CENTRE BY MEANS OF DIRECT ACTIONS FOR THE EUROPEAN ATOMIC ENERGY COMMUNITY (2002 TO 2006)

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

B6-111: Persons associated with the institution

B6-121: Resources

B6-3: Joint Research Centre - Direct Operating Appropriations - EAEC framework programme (2002 TO 2006)

2. OVERALL FIGURES

2.1 Total allocation for action (Part B): 330 € million for commitment

2.2 Period of application:

2002 to 2006

2.3 Overall multiannual estimate on expenditure:

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

€ million (*to 3rd decimal place*)

	Years 2002	2003	2004	2005	2006	2007 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		81.9	82.4	82.8	82.9		330
Payments		66.7	77.6	82.6	103.1		330

TOTAL a+b+c							
Commitments		81.9	82.4	82.8	82.9		330
Payments		66.7	77.6	82.6	103.1		330

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 revenue⁸⁹:

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

OR

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

€ million (to 1 decimal place)

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

⁸⁹ For further information see a separate guidance paper

3. BUDGET CHARACTERISTICS

Type of expenditure		New	EFTA participation	Participation applicant countries	Heading Financial Perspective
Non-comp	Diff	YES	NO	YES	N° 3

4. LEGAL BASIS

Articles 7 and 8 of the Treaty establishing the European Atomic Energy Community (Euratom).

Council Decision .../..Euratom adopting the framework programme 2002-2006 of the European Atomic Energy Community for research and training activities aimed at contributing towards the creation of the European Research Area (OJ L ...).

5. DESCRIPTION AND GROUNDS

5.1 Need for Community intervention 90

5.1.1 Objectives pursued

The JRC's mission is to provide scientific and technical support for the formulation, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States while remaining independent of commercial or national interests.

Nuclear energy continues to supply about a third of Europe's electricity, and vigilance is still required to ensure a continuation of Europe's outstanding safety record, to maintain efforts to avoid proliferation and to efficiently manage the processing and long-term storage of waste. New challenges include a reactor population whose average age is increasing, an enlargement of the Union to include countries with a different safety culture, and the coming into safeguards of material arising from the disarmament process.

The principal objective will be to further develop collaboration through networking leading to broad consensus on a range of these issues at European and world-level. The application of Safeguards by the Euratom Safeguards Office (ESO) and the IAEA requires R&D support and direct assistance. Special attention will be given to co-operation with future EU Member States. Training activities will be an important component for JRC to help equip the EU with a future generation of scientists with necessary nuclear skills and expertise.

5.1.2 Measures taken in connection with evaluation

The JRC programme is regularly reviewed through scientific audits and the 5-year-assessments. Annual programme presentations to the other services of the Commission are organised. A high level user group composed by representative of customer

Commission's DGs has been set up with a view to establishing and reviewing priorities in close connection with policy needs.

The Scientific Audit of the JRC Institutes, launched in 1999, was designed to provide early advice and feedback to the JRC management on the scientific standing of the institutes, and an assessment of their scientific strengths and weaknesses, both in terms of staff and other resources, for the implementation of the new programme. The chief objective was to ensure that the execution of the framework programme 1998-2002 could be performed with the requisite scientific quality. The Scientific Audit's overall conclusions confirmed the soundness of JRC's scientific strategies and the validity of its new mission:

"The Audit Team considers the development of the JRC nuclear a true success story and sees in its excellent networking practices a clear and leading example of subsidiarity and leadership to be expected of a European research institution."

The 5-Year-Assessment (5YA) exercise, input required by legislation before the tabling by the Commission of proposal for the framework programme 2002-2006, was carried out in 2000. Given that scientific issues had already been addressed in the Scientific Audit, the main focus of the 5YA was the *management aspects* of the JRC activities, the *impact* of the JRC support to the EU policies, and the *delivered results* in relation to the adopted programmes. The resulting recommendations were dominated by the overriding statement that the new mission of the JRC must be maintained and its implementation assured in all aspects and consequences:

"The important work of the JRC in the nuclear domain on safeguarding, plant safety and on the safe and acceptable management of waste must not be allowed to decline in view of the European Union's 30% nuclear energy production."

In January 2000, Research Commissioner Philippe Busquin established a High Level Panel chaired by Viscount Etienne Davignon, with the task to review and to make recommendations on the workings of the JRC. The Davignon Report was issued in July 2000. The High Level Panel endorses the mission assigned to the JRC by the 5th RTD Framework Programme and finds that it has a clear long-term role. It proposes opening it up to the other Community institutions and contains a number of organisational suggestions. It recommends that the JRC should not dissipate its efforts, but should do more to focus its activities, promote intense networking with other European centres of excellence and attaches particular importance to nuclear activities.

Finally, in July 2000 the Commission's Peer Group, appointed earlier in the year to make a political overview of the Institution's activities and bring them in line with the human resources it had available, published a report in which a series of actions were identified.

In response to the various evaluations, the JRC has undertaken a strategy for concentrating its activities into some core competence areas and has identified possible reduction of activities across its structure with the launch of an Activity Prioritisation Audit, the results of which have been published internally on April 2, 2001. An interservice consultation is being prepared in view of a Communication to the Commission that should disseminate the results of this evaluation to the rest of the Commission services.

5.2 Actions envisaged

The JRC programme forms part of the framework programme, which meets the objectives set out in Articles 7 and 8 of the Euratom Treaty.

The JRC's participation in the field of action covered by this proposal is commensurate with its capabilities and attributes and complies with the principle of subsidiarity.

The target population is Europe's scientific and industrial community and that concerned with the various sectoral policies of the Commission in which the JRC is required to provide its support.

This research and training programme is structured around two major areas:

(a) Radio-active waste management and safeguarding nuclear materials

Spent fuel and high level waste treatment and storage

To address the issues of spent nuclear fuels and radio-active waste, the JRC will further develop the characterisation of actinides and actinide-containing products, and will continue to provide basic nuclear data.

The basic processes governing the behaviour of irradiated fuel under conditions of direct long-term disposal will be investigated with priority.

The JRC will continue to test and evaluate processes of efficient separation and burning (partitioning and transmutation) of radio-toxic elements from spent fuel.

Euratom and IAEA Safeguards

The safeguards of nuclear materials include services to the Safeguards Inspectorates (ESO and IAEA) and related underpinning research.

The JRC will continue to support the transfer of technology for Euratom Safeguards applications in the Applicant Countries.

Nuclear forensic science will be further developed to detect clandestine activities and to combat the illicit trafficking of nuclear materials.

Support to non-proliferation of weapons of mass destruction will benefit from the JRC experience, in the nuclear and other fields, to support the fundamental objectives of the Union's security policy.

(b) Safety of present and innovative reactors, radiation monitoring and medical applications from nuclear research

Safety of present and innovative reactors

The high safety level of existing nuclear plants within the EU must be maintained. The JRC will continue, through well-established networks, to work on fuel safety, ageing, damage detection, in-service inspection, structural integrity and assessment, accident analysis and management (support to PHEBUS), validation of codes, systems' analysis and risk-informed methods. Development of a common safety culture in Central & Eastern European Countries is a further area for JRC support.

Together with industry and R&D institutions, the JRC will contribute to the analysis and evaluation of safety and security features of new energy production systems, currently under investigation in several countries.

Radiation monitoring

The JRC's long-standing expertise in radio-protection and its advanced laboratory for radioactivity measurements will be used to develop traces detection and analysis methods, dosimetric skills and various nuclear reference measurements.

Medical applications from nuclear research

A number of nuclear technologies of importance for medical applications have resulted from JRC's nuclear facilities and expertise. These emerge from research on new isotope production, development of clinical reference materials and support to new cancer therapies. The JRC will improve the co-ordination of such activities throughout Europe through networking with universities, research centres, European medical associations and the pharmaceutical industry.

5.3 Methods of implementation

Direct Action of the JRC institutes:

- Institute for Advanced Materials (IAM)
- Institute for Transuranium Elements (ITU)
- Institute for Reference Materials and Measurements (IRMM)
- Institute for Systems, Informatics and Safety (ISIS)

6. FINANCIAL IMPACT

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

(The method of calculating the total amounts set out in the table below must be explained by the breakdown in Table 6.2.)

6.1.1 Financial intervention

Commitments in € million (to the 3rd decimal place)

Breakdown	2002	2003	2004	2005	2006	2007 and subs. years	Total
Radio-active Waste Management and Safeguards		52.900	53.200	53.400	53.500		213.000
Safety of present and innovative reactors, radiation monitoring and medical applications from nuclear research		25.300	25.500	25.600	25.600		102.000
Staff necessary for the monitoring of the decommissioning of JRC obsolete installations		3.700	3.700	3.800	3.800		15.000
TOTAL		81.900	82.400	82.800	82.900		330.000

6.1.2 Technical and administrative assistance, support expenditure and IT expenditure (Commitment appropriations)

	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)⁹¹

(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 the 3rd decimal place)

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>Radio-active Waste Management and Safeguards</u> <u>Safety of present and innovative reactors, radiation monitoring and medical applications from nuclear research</u> <u>Staff necessary for the monitoring of the decommissioning of JRC obsolete installations</u>				
TOTAL COST				330.000

If necessary explain the method of calculation

7. IMPACT ON STAFF AND ADMINISTRATIVE EXPENDITURE

7.1 Impact on human resources

Types of post	Staff to be assigned to management of the action using existing and/or additional resources		Total	Description of tasks deriving from the action
	Number of permanent posts	Number of temporary posts		
Permanent officials or Temporary staff	A 733 B 595 C 537 D 37			<i>If necessary, a fuller description of the tasks may be annexed.</i>
Other human resources		NDE, Grantholders, Visiting Scientists, ...		
Total	1,902			

⁹¹ For further information see a separate guidance paper

In 2002, the JRC will have a single staff table of 1,902 posts distributed as follows: 733 A-posts, 595 B-posts, 537 C-posts and 37 D-posts⁹². The staff is managed as a single group: staff can be put allocated to both nuclear and non-nuclear activities. The ratio of nuclear to total staff is variable during the period of execution of the framework programme. This ratio is of the order of 1/3. A relatively large number of short-term scientific posts are also financed as non-statutory staff (about 200). Their status can be grantholders, scientific visitors, national experts on secondment...

7.2 Overall financial impact of human resources

Type of human resources	Amount €	Method of calculation *
Officials		
Temporary staff		
Other human resources (give budget line)		
Total	50.3	

The amounts are total expenditure for twelve months.

The different resources: staff, material, specific credits are distributed to remain within the given envelope. The staff credits have been allocated after taking the minimum needs for infrastructure into account and deciding on a minimum level of specific credits for the execution of projects and for networking. The staff budget is reduced compared to that of the fifth framework programme 1998-2002 and a significant staff reduction (150 posts) is necessary. This reduction will depend on the evolution of salaries during the period 2003-2006 and of the evolution of the required competencies: ratio between A/B/C/D staff.

92 This compares with the current (2001) staff table of 2080 posts. As in the past this envelope of statutory posts constitutes a separate staff table and represents the maximum statutory staff, which may be engaged. However the number of staff employed in practice depends on the availability of financial resources (institutional credits, competitive income and other possible sources of revenue).

7.3 Other administrative expenditure deriving from the action

Budget line (number and heading)	Amount €	Method of calculation
Overall allocation (Title A7)		
A0701 – Missions		
A07030 – Meetings		
A07031 – Compulsory committees ⁽¹⁾		
A07032 – Non-compulsory committees ⁽¹⁾		
A07040 – Conferences		
A0705 – Studies and consultations		
... Other expenditure (state which)		
Information systems (A-5001/A-4300)		
Other expenditure - Part A (state which)		
Total		

The amounts are total expenditure for twelve months.

⁽¹⁾ Specify the type of committee and the group to which it belongs.

I.	Annual total (7.2 + 7.3)	€
II.	Duration of action	Years
III.	Total cost of action (I x II)	€

(In the estimate of human and administrative resources required for the action, DGs/Services must take into account the decisions taken by the Commission in its orientation debate and when adopting the preliminary draft budget (PDB). This means that DGs must show that human resources can be covered by the indicative pre-allocation made when the PDB was adopted.)

Exceptional cases, where the action concerned could not be foreseen when the PDB was being prepared, will have to be referred to the Commission for a decision on whether and how (by means of an amendment of the indicative pre-allocation, an ad hoc redeployment exercise, a supplementary/amending budget or a letter of amendment to the draft budget) implementation of the proposed action can be accepted.)

8. FOLLOW-UP AND EVALUATION

Each year, with the help of appropriately qualified independent experts, the Commission will examine the implementation of specific programme 2002-2006. It will, in particular, assess whether the objectives, priorities and financial resources are still appropriate to the changing situation. Where appropriate, it will submit proposals to adapt or supplement the specific programme 2002-2006.

The Commission produces an annual report on the activities of the Joint Research Centre. These reports are sent to the European Parliament, the Council and the Economic and Social Committee.

9. ANTI-FRAUD MEASURES

When the implementation of the programme calls for the use of external contractors or implies granting financial contributions to third parties, the Commission will carry out, where appropriate, financial audits, in particular if it has reasons to doubt the realistic nature of work performed or described in the activity reports.

The Community's financial audits will be carried out either by its own staff or by accounting experts approved according to the law of the audited party. The Community will choose the latter freely, while avoiding any risks of conflicts of interest which might be indicated to it by the party subject to the audit.

In addition, the Commission will make sure in carrying out the research activities, that the financial interests of the European Communities are protected by effective checks and, in case of detected irregularities, measures as well as deterrent and proportionate sanctions.

In order to achieve this aim, rules on checks, measures and sanctions, with references to the Regulations No 2988/95, 02185/96, 1073/99 and 1074/99 will be taken up in all contracts used in the implementation of the programme.

In particular, the following points will have to be provided for in the *contracts* :

- the introduction of specific contractual clauses to protect the financial interests of the EC in carrying out checks and controls in relation to the work performed;
- the participation of administrative checks in the field of fraud-fighting, in accordance with Regulations No 2185/96, 1073/99 and 1074/99 ;
- the application of administrative sanctions for all intentional or negligent irregularities in the implementation of the *contracts*, in accordance with the framework Regulation No 2988/95, including a black listing mechanism ;
- the fact that possible recovery orders in case of irregularities and fraud be enforceable according to Article 164 of the EAEC Treaty.

In addition and as routine measures, an internal audit and control programme in respect of scientific and budgetary aspects, will be carried out by the JRC staff responsible; internal audit carried out by the JRC Internal audit Unit; and local inspections by this Unit and the Court of Auditors.