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Modified proposal for a

DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

CONCERNING THE SIXTH 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

(2002-2006)

Modified proposal for a

COUNCIL DECISION

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

(2002-2006)

(presented by the Commission pursuant to Article 250(2)
of the EC-Treaty)

EXPLANATORY MEMORANDUM

In accordance with the EC and Euratom Treaties, the Commission adopted, on 21 February 2001, its proposals for Decisions concerning the framework programme (2002-2006) (sixth framework programme) for Research and Technology Development, aimed at contributing towards the creation of the European Research Area.

The proposals have been examined by the Council and the European Parliament, as well as by the Economic and Social Committee. The Parliament delivered its opinion on first reading on [15] November 2001. The Council is aiming to arrive at a Common Position imminently.

To expedite an agreement on the framework programme, and in the interest of transparency, the Commission is now bringing forward its position on the Parliament's amendments, in the form of amended proposals. While maintaining the key principles of the Commission's original proposals, these take up, in spirit and content if not necessarily always in precise wording, a large proportion of Parliament's amendments, where the Commission believes they contribute to the goals of the framework programme and are likely to facilitate the subsequent negotiations.

The main issues raised by the Parliament concern the EC framework programme. As regards the Commission's position, the following items can be highlighted:

- On the **structure** of the seven thematic priority areas, the Commission accepts the changes the Parliament wishes to introduce, namely: (a) the organisation of priority 1 in two sections, one centred on genomics and its applications for health, the other on the major diseases; and (b) the organisation of priority 6 in three sections, covering, respectively, *sustainable energy systems*, *sustainable surface transport* and *global change and ecosystems*.
- As for the **scope** of the priority areas, and their scientific and technical **content**, the Commission accepts many of the clarifications requested, and some additions, where these reflect important needs and are consistent with maintaining the overall focus of each priority. The headings have been adjusted in some cases in order to reflect better their content. On other important topics, where greater synergies can be promoted among the significant research efforts carried out at national level, clearer references are made in the section on "Strengthening the Foundations of the European Research Area" – "co-ordination of research activities".
- On the **instruments**, the Commission accepts the principle of a smooth transition from "traditional" to "new" instruments and the idea of a "fourth instrument" in the spirit of the "escalier d'excellence", which would be in two forms, already allowed for in other parts of the framework programme: "specific targeted projects" and "networking of research activities" which would be applicable to all types of participants. To achieve this, while the FP will be implemented mainly through "integrated projects" and "networks of excellence", part of the research actions within the thematic priorities will be carried out through this "fourth instrument", and a degressive approach will be followed, ensuring a progressive increase in the utilisation of the new instruments.
- As for the information to be given to Parliament on **implementation**, in the interests of full transparency the Commission has accommodated these requests as far as

possible, while maintaining a coherent framework for reporting and avoiding unnecessary duplications.

- As regards the section of the programme entitled “**anticipating the EU’s scientific and technological needs**” Parliament has proposed changes to the budget and scope of activities which, in the Commission’s view, will make it impossible to achieve important Community goals. Two parts of this activity are affected in particular:
 - *Research in support of Community policies and responding to emerging needs* where the considerable budget cut envisaged would make it impossible to carry out necessary research in support of Community policies in areas such as agriculture and forestry, fisheries, public health and protection of cultural heritage, as well as on new and emerging research areas crucial to the Union’s prospects in the knowledge society. In order to clarify both the research content and the operational modalities applying to these actions, the Commission has now modified the presentation of these activities, and included substantial further details, in line with its modified proposal for the specific programme “Integrating and strengthening the European Research Area”¹.
 - *Specific international co-operation activities*, where the proposed transfer to the “human resources and mobility” part of the programme, would make it impossible to fulfil the Community’s political commitments in this highly important area. To preserve the visibility and the distinct, horizontal nature of these activities they have been maintained as in the Commission’s original proposal.
- As far as the **budget** is concerned, the Commission maintains the overall amount originally proposed (as well as the separate amounts for the EC and EURATOM parts within it. As for the breakdown, the Commission has included significant changes, in the directions suggested by Parliament, to accommodate the adjustments made to the research content of various parts of the programme.

¹ COM(2001) 594 final, 17.10.2001

Modified proposal for a

DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

concerning the sixth 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

(2002-2006)

(Act with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

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

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

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

Whereas:

- (1) **In the context of the fulfilment of the objectives presented in Article 2 of the Treaty**, Article 163 of the Treaty gives the Community the objective of strengthening the scientific and technological bases of Community industry and encouraging it to become more competitive at international level, while promoting research activities deemed necessary by virtue of other Community policies.
- (2) Pursuant to Article 165 of the Treaty, the Community and its Member States are required to coordinate their research and technological development activities so as to ensure that national policies and Community policy are mutually consistent.
- (3) Article 166 of the Treaty provides for the adoption of a multiannual framework programme setting out all Community research, technological development and demonstration (RTD) activities.
- (4) In 2000 the Commission submitted two communications, respectively on the prospects for and the objectives of creating a European Research Area², and on making a reality of the European Research Area and guidelines for EU research activities in the period

² COM(2000) 6 final, 18.1.2000.

2002-2006³. In 2000 the Commission also submitted a communication on "Innovation in a knowledge-driven economy"⁴.

- (5) The European Councils in Lisbon in March 2000 and Santa Maria de Feira in June 2000 adopted conclusions aimed at the rapid establishment of a European research and innovation area with a view to job creation and economic growth, **in the context of sustainable development, with the ultimate goal of enabling the Union, within the next ten years, to become the world's most competitive and dynamic knowledge economy.**
- (6) The European Parliament^{5, 6}, the Council^{7, 8}, the Economic and Social Committee⁹ and the Committee of the Regions¹⁰ have also supported the creation of the European Research Area.
- (7) On 19 October 2000 the Commission submitted the conclusions of the external assessment of the implementation and results of the Community activities carried out in the five years preceding that assessment, accompanied by its observations¹¹.
- (8) It is therefore necessary to adopt a framework programme for the period 2002-2006 capable of exercising a structuring effect on research and technological development in Europe **the European Union, candidate countries and other associated countries** and making a significant contribution to bringing about the European Research Area.
- (9) In accordance with Article 166(1) of the Treaty, it is necessary to set the scientific and technological objectives and priorities for the activities envisaged, the maximum overall amount, the detailed rules for the Community's financial participation in the programme for the period 2002-2006, as well as the respective shares for each of the activities envisaged, and to indicate the broad lines of the activities in question, while respecting the objective of protecting the financial interests of the Community.
- (10) The Joint Research Centre is called on to contribute to the implementation of the framework programme, in particular in those areas in which it can offer objective and independent expertise and in which it can play a role in the implementation of other Community policies.
- (11) Research activities carried out within the framework programme ~~should~~ **must** respect fundamental ethical principles, notably those which appear in the Charter of Fundamental Rights of the European Union; **no support will be provided to research aimed at military purposes.**

³ COM(2000) 612 final, 4.10.2000.

⁴ COM(2000) 567 final, 20.9.2000.

⁵ Resolution of 18 May 2000 PE 290.465 p.48.

⁶ Resolution of 15 February 2001

⁷ Resolution of 15 June 2000, OJ C 205, 19.7.2000 p.1

⁸ Resolution of 16 November 2000, OJ C 374, 28.12.2000 p.1

⁹ Opinion of 24 May 2000, OJ C 204, 18.7.2000 p.70

¹⁰ Opinion of 12 April 2000, OJ C 226, 8.8.2000 p.18

¹¹ COM (2000) 659 final, 19.10. 2000

(12) Following the Commission Communication “A Mobility Strategy within the European Research Area”, the mobility of researchers will be promoted, with a view to the successful creation of the European Research Area”.

~~(12)~~**(13)** Following the Commission Communication "Women and Science"¹² and the Resolutions of the Council¹³ and the European Parliament¹⁴ 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, **and further enhanced action is needed**

(14) Participation in the activities of the sixth framework programme will be encouraged through publication of the necessary information on content, conditions and procedures, to be made available in a timely and thorough manner to potential participants, including those from the candidate and other associated countries.

~~(13)~~**(15)** The Commission should **will** submit regular progress reports **to the European Parliament and the Council** on the implementation of the **sixth** framework programme for 2002-2006 and, in good time and before submitting its proposal for the next framework programme, have an independent assessment carried out of the implementation of the activities undertaken, **which will be done in a spirit of openness with respect to all the relevant actors.**

(16) The financial implications of the multiannual sixth framework programme are compatible with the current ceiling under heading 3 of the financial perspective.

(17) Each thematic priority area should have its own budget line in the General Budget of the European Communities.

HAVE DECIDED AS FOLLOWS:

Article 1

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

Article 2

1. The maximum overall amount for Community financial participation in the entire **sixth** framework programme 2002-2006 shall be EUR 16.270 billion: the proportion assigned to each of the activities is fixed in Annex II.

¹² COM(1999) 76.

¹³ Resolution of 20 May 1999, OJ C 201, 16.7.1999.

¹⁴ Resolution of 3 February 2000, PE 284.656.

2. The detailed rules for financial participation by the Community shall be governed by the Financial Regulation applicable to the General Budget of the European Communities, supplemented by Annex III.

Article 3

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

Article 4

Implementation of the sixth framework programme may give rise, where necessary, to supplementary programmes within the meaning of Article 168 of the Treaty, to Community participation in research and development programmes undertaken by several Member States within the meaning of Article 169 or to the setting-up of joint undertakings or any other structure within the meaning of Article 171. It may also give rise to cooperation with third countries or international organisations within the meaning of Article 170.

Article 5

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

Article 56

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

Article 67

The sixth framework programme 2002-2006 is open to the participation of: **in accordance with the relevant agreements, decisions or protocols, to the participation of the EEA countries, the candidate countries, and other countries including Switzerland and Israel.**

- ~~the EEA countries, in accordance with the conditions established in the EEA agreements;~~
- ~~the central and eastern European candidate countries (CEEC), in accordance with the conditions established in the Europe Agreements, in the additional protocols thereto and in the decisions of the respective Association Councils;~~

~~— Cyprus, Malta and Turkey, on the basis of bilateral agreements to be concluded with these countries;~~

~~— Switzerland and Israel, on the basis of bilateral agreements to be concluded with these countries.~~

Done at Brussels, [...]

For the European Parliament

For the Council

The President

[...]

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

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

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

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

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

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

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

- in a limited number of priority thematic areas ~~exclusively~~ **mainly** by means of strongly integrating and powerful instruments: networks of excellence, integrated projects and EU participation in national research programmes implemented jointly pursuant to Article 169 of the Treaty **as well as, in the form of a stairway of excellence and integration, specific targeted projects and co-ordination actions**;
- in areas **covering a wider field of research** ~~related to the anticipation of EU science and technology needs~~ in the form of certain specific needs of EU policies or new emerging needs;
- in the field of science and technology as a whole in the case of complementary research **and innovation** activities for SMEs, **including very small firms**.

Research activities will be based on an integrated and, where relevant, transdisciplinary approach, incorporating as appropriate innovation and socio-economic dimensions.

Exploratory research at the leading edge of knowledge will be carried out as appropriate within each thematic priority area on subjects closely related to one or more topics included within it.

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

- in the priority thematic areas:
 - of initiatives aimed at securing for Europe a leading role in international research efforts on global issues, and ensuring a coherent contribution by Europe to these;
 - of integrated bilateral cooperation activities with third countries¹⁵ or groups of third countries;
 - of participation of third country researchers and organisations in projects and networks in areas of particular interest to those countries.
- as regards ~~anticipating EU science and technology needs~~ **activities covering a wider field of research**, of specific cooperation activities with certain third countries or groups of third countries.

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

During the implementation of this framework programme and in the research activities arising from it, fundamental ethical principles are to be respected. These include the principles set out in the Charter of fundamental rights of the EU, protection of human dignity and human life, protection of personal data and privacy as well as the environment in accordance with Community law¹⁶ and the relevant international conventions such as the Declaration of Helsinki in its latest version, the Council of Europe Convention on Human Rights and Biomedicine signed in Oviedo on 4 April 1997 and the Additional Protocol on the Prohibition of Cloning Human Beings signed in Paris on 12 January 1998, the UN Convention on the Rights of the Child, the Universal Declaration on the Human Genome and Human Rights adopted by UNESCO, and the relevant World Health Organisation (WHO) resolutions, current legislation and regulations in countries where the research will be carried out¹⁷.

¹⁵ Third countries: countries that are not members of the EU and are not associated with the framework programme. The countries associated with the framework programme, whose organisations and researchers can, by virtue of this, participate in framework programme activities under the same conditions as those of the Member States of the EU are: the European Economic Area countries, the candidate countries, Switzerland and Israel.

¹⁶ **The European Group on Ethics in Science and New Technologies advises the European Commission on ethical aspects in the connection with the preparation and implementation of Community legislation and policies.**

¹⁷ **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 at EC level 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.**

The following fields of research shall not be financed under this framework programme:

- **research activity aiming at human cloning for reproductive purposes;**
- **research activity intended to modify the genetic heritage of human beings which could make such changes heritable¹⁸;**
- **research activities intended to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.**

In accordance with the Amsterdam protocol on animal protection and welfare, animal experiments must be replaced with alternatives wherever possible. Suffering by animals must be avoided or kept to a minimum¹⁹.

¹⁸ **Research relating to cancer treatment of the gonads can be financed.**

¹⁹ **This particularly applies (pursuant to Directive 86/609/EEC) to animal experiments involving species which are particularly closely related to human beings. Altering the genetic heritage of animals and cloning of animals may be considered only if the aims are ethically justified and the conditions are such that the animals' welfare is guaranteed and the principles of biodiversity are respected.**

1. INTEGRATING EUROPEAN RESEARCH

This part of the framework programme is structured as follows:

1.1. Priority thematic areas of research

1.1.1. Genomics and biotechnology for health

- i) Advanced genomics and its applications for health.**
- ii) Combating major diseases.**

1.1.2. Information Society technologies

1.1.3. Nanotechnologies, intelligent materials, and new production processes

1.1.4. Aeronautics and space

1.1.5. Food safety and health risks

1.1.6. Sustainable development

- i) Sustainable Energy Systems**
- ii) Sustainable surface transport**
- iii) Global change and ecosystems**

1.1.7. Citizens and governance in an open European knowledge-based society

1.2. Specific activities covering a wider field of research

1.2.1 Anticipating the EU's scientific and technological needs

1.2.2 Specific research activities for SMEs

1.2.3. Specific international cooperation activities:

1.2.4. Joint Research Centre activities

These activities will be implemented in an integrated fashion to assure coherence and synergy between their various elements and, as appropriate, with other parts of the framework programme.

1.1. Priority thematic areas of research

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

Seven priority thematic areas have been selected.

1.1.1. *Genomics and biotechnology for health*

Objective

The activities carried out in this area are intended to help Europe exploit, by means of an integrated research effort, breakthroughs achieved in decoding the genomes of living organisms, more particularly for the benefit of public health and citizens and to increase the competitiveness of the ~~European~~ biotechnology industry in the Member States, the candidate countries and other associated countries. The emphasis will be put on translational research to enable real and consistent progress in medicine and improve quality of life.

Justification of the effort and European added value

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

However, this work requires considerable and sustained financial outlay. In the United States, public and private spending on post-genomic research is rising steadily and significantly: nearly 2 billion dollars of public-sector funding per annum, essentially managed by the NIH²⁰ (the total budget for which will increase by 14.4% in 2001) and twice as much industrial funding.

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

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

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

²⁰

National Institutes of Health

Actions envisaged

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

i) *Advanced genomics and its applications for health.*

- Fundamental knowledge and basic tools for functional genomics: **research will involve studies in model organisms animals, plants and microbes, especially with small genomes, that will contribute to the understanding of the function of genes and gene products relevant to human health.**
 - gene expression and proteomics;
 - structural genomics;
 - comparative genomics and population genetics;
 - bioinformatics;
 - **multidisciplinary functional genomics approaches to basic biological processes.**
- Application of knowledge and technologies in the field of genomics and biotechnology for health:
 - technological platforms for the development **developments in the fields of new diagnostic, prevention and therapeutic tools (including pharmacogenomic approaches, alternative methods to animal testing and stem cell research);**
 - support for innovative research in genomics **and proteomics** start-up companies.

ii) *Combating major diseases.*

- Application of medical genomics knowledge and technologies **involving a translational approach** in the following fields:
 - combating ~~cancer, degenerative~~ diseases of the nervous system, cardiovascular diseases and rare diseases;
 - combating resistance to **antibiotics and other** drugs;
 - studying human development, the brain and the ageing process.

A broader approach will be pursued with regard to combating:

- **cancer, with a focus on the development of patient-oriented strategies from prevention to diagnosis and treatment. Effort will be concentrated on supporting translational research aimed at bringing basic knowledge through to clinical application.**
- the three poverty-linked infectious diseases (Aids, malaria and tuberculosis) which have priority in terms of disease control at EU and international level.

1.1.2. *Information Society technologies*

Objective

The activities carried out in this area, pursuant to the conclusions of the Lisbon European Council and the objectives of the e-Europe initiative, are intended to stimulate the development in Europe of technologies and applications at the heart of the creation of the Information Society in order to increase the competitiveness of European industry and allow ~~European citizens~~ **people in all EU regions of the Member States, candidate countries and other associated countries** the possibility of benefiting fully from the development of the knowledge-based society. **Concentration on the future generation of IST will bring IST applications and services to everyone and enable the development of the next generation of technologies to be more user-centred.**

Justification of the effort and European added value

At the dawn of the 21st century, information and communication technologies are revolutionising the functioning of the economy and society, and are generating new ways of producing, trading and communicating. The effort devoted to these technologies in Europe is still insufficient, particularly when compared with the United States. In that country, public and private sector funding combined is three times as much for this sector as the corresponding spending in Europe.

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

Europe is well positioned to lead and shape the future development not only of technologies but also of their impact on our life and work. The future competitiveness of all European industry and the living standards of Europe's citizens depend largely on future efforts in IST research in order to prepare the upcoming generation of products, processes and services.

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

The objective of ambient intelligence

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

Community actions will concentrate on the technological priorities that will make it possible to realise this vision. They will aim at mobilising the community of researchers around targeted initiatives, such as the development of the next generations of mobile communication systems, so as to achieve medium and long-

term objectives while being able to react to the new needs and demands of markets as well as public policy.

Actions envisaged

The actions undertaken will therefore address the following technological priorities:

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

Completing and building on progress expected in the development of basic technologies, research aimed at finding solutions for major societal and economic challenges **faced by an emerging knowledge-based society** and, accordingly, focusing on:

- **Research on technologies for trust and confidence addressing the key security challenges posed by the “all-digital” world and the need to secure the rights and privacy of citizens.**
- ambient intelligence systems offering access to the information society for all, ~~whatever their~~ **regardless of** age and situation, as well as interactive and intelligent systems for health, mobility, security, leisure, **tourism** preservation of, **and access to,** the cultural heritage and environmental ~~monitoring,~~ **including humanitarian mine clearance;**
- electronic and mobile commerce, as well as technologies for secure transactions and infrastructures, new tools and new methods of work, **including the consequences of IST on work and working environments** technologies for learning and systems for corporate knowledge management, for integrated business management, and for e-government **taking account of consumer needs;**
- large-scale distributed systems and platforms, including GRID-based systems that provide effective solutions to complex problems in areas such as the environment, energy, health, transport and industrial design.

Communication -and computing infrastructures

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

Mobile, wireless, optical and broadband communication infrastructures and computing and software technologies that are reliable, pervasive and can be adapted to meet the growing needs of applications and services. Work will focus on:

- the new generations of wireless and mobile communications systems and networks; satellite communications systems; all-optical technologies; integration and management of communication networks; capacity-enhancing technologies necessary for the development of systems, infrastructures and

services, in particular for audiovisual applications. **Work will also lead to the next generation Internet including the roll out of version six (IPv6);**

- software technologies, ~~and architectures assuring~~ **and distributed systems supporting the development of** multifunctional **and complex** services ~~and distributed systems~~ **that involve multiple actors;** engineering and control of complex and large-scale systems to ensure reliability and robustness.

Components and microsystems

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

- the design and production of micro- and opto-electronic and photonic components, **including for information storage, pushing the limits of miniaturisation and minimising the costs and power consumption of micro-electronic and micro-system components, and taking account of the environmental impact of IST systems.**
- nanoelectronics, microtechnologies, **displays** and microsystems, and multidisciplinary research into new materials and quantum devices; new computing models and concepts.

Information management and interfaces

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

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

1.1.3. Nanotechnologies, intelligent materials, and new production processes

Objective

The activities carried out in this area are intended to help **the Member States, candidate countries and other associated countries** Europe achieve a critical mass of capacities needed to develop and exploit, especially for greater eco-efficiency **and reduction of discharges of hazardous substances into the environment,** leading-edge technologies for the knowledge- and intelligence-based products, services and manufacturing processes of the years to come.

Justification of the effort and European added value

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

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

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

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

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

Actions envisaged

Nanotechnologies:

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

Intelligent materials:

- development of fundamental knowledge;
- technologies associated with the production and transformation of new materials, **including bio-materials**;
- support engineering.

New production processes :

- the development of **new processes and** flexible and intelligent manufacturing systems incorporating advances in virtual manufacturing technologies, interactive decision-aid systems, ~~and~~ high-precision engineering **and innovative robotics**;
- systems research needed for **non-polluting** waste management and hazard control **in production and manufacturing, including bio-processes and reduction in consumption of primary resources**;
- development of new concepts optimising the life-cycle of industrial systems, products and services.

1.1.4. Aeronautics and space

Objective

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

Justification of the effort and European added value

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

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

With this aim in view, the "*Vision for 2020*"²¹ report of eminent European personalities in this sector of industry recommends optimising European, national and private sector research efforts around a common vision and a strategic research agenda.

On space, following on from the Commission's communication "*Europe and space: Turning to a new chapter*"²², the EU will support research designed to make use of space for the benefit of markets and society.

²¹ "European Aeronautics: A Vision for 2020" (Report of the Group of Personalities)
²² COM(2000) 597.

Actions envisaged

Aeronautics

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

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

Space

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

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

1.1.5. Food safety and health risks

Objective

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

Justification of the effort and European added value

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

Citizens and consumers expect that research will help to guarantee that the food and products marketed are safe and healthy and can be consumed in total safety. **To this end, emphasis should be placed on the whole food production chain, ‘from fork to farm’, including where appropriate plant sciences and biotechnology relevant for health.**

This requires the availability of the most complete, precise and up to date scientific knowledge. Apart from the public health aspect, the prosperity of a sector representing some EUR 600 billion in terms of annual turnover and 2.6 million jobs is at stake. **Given that small and very small enterprises constitute a major part of the food sector, the success of activities undertaken will rely on the adaptation of knowledge and processes to the specific characteristics of these enterprises.**

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

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

Actions envisaged

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

- methods of analysis, and detection **and control** of chemical contaminants **and existing or emerging** and pathogenic microorganisms **such as** viruses, bacteria, **yeasts, fungi,** parasites, and new agents of the prion type **(with emphasis on development of ante-mortem diagnostic tests for BSE and scrapie)**;
- impact of animal feed **including products containing genetically modified organisms,** and the use of sub-products of different origins for that feed, on human health;
- “traceability” processes, in particular relating to **amongst other food components,** genetically modified organisms, ~~including those based on recent biotechnology developments;~~
- safer **and environmentally friendly** production **and processing** methods and healthier, **nutritious, and functional** foodstuffs, ~~including those based on biotechnologies and on organic farming processes~~ **relying on a range of approaches from the use of plant and animal sciences and biotechnologies to organic farming;**
- epidemiology of food-related diseases and **allergies,** ~~genetic susceptibilities~~ **including impact of diet on the health of children;**

- impact of food, ~~and in particular~~ **including amongst others** products **resulting from organic farming or** containing genetically modified organisms, **and those arising from recent biotechnology developments** on health;
- environmental health risks, **(chemical, biological and physical)** with emphasis being placed on cumulative risks, **including combined exposures of authorised substances**, transmission routes to human beings, long-term effects and exposure to small doses, as well as the impact on particularly sensitive groups, and especially children.

1.1.6. *Sustainable development and global change*²³

Objective

The activities carried out in this area are intended to strengthen the scientific and technological capacities needed for Europe to be able to implement sustainable development, **recognised as a Community objective by the Gothenburg European Council, integrating its environmental, economic and social dimensions, with particular regard to secure sustainable energy and transport. They should enable Member States, the candidate and other associated countries to** ~~and~~ **make a significant contribution to the international efforts to understand and control global change and preserve the equilibrium of ecosystems.**

Justification of the effort and European added value

The global implementation of sustainable development requires more particularly:

- the design, development and dissemination of technologies making it possible to ensure **the conservation and** more rational **and sustainable** use of natural resources, **with** less waste ~~production~~ and a reduction in the impact of economic activity on the environment, **in favour of an “energy intelligent” and “transport intelligent” Europe;**
- a better understanding of the mechanisms **and impacts** of global change, and in particular climate change and our related forecasting capacities, **and of ecosystems.**

Where technology is concerned, as highlighted in the Commission Green Paper "Towards a European strategy for the security of energy supply"²⁴, two areas concerned as a matter of priority are energy and transport, which are responsible for over 80% of total emissions of greenhouse gases and more than 90% of CO₂ emissions.

Under the Kyoto Protocol, the EU is required to reduce its greenhouse gas emissions by 8% compared with the 1990 levels in the period 2008-2012. **This will require the development of innovative sustainable energy and transport solutions.**

²³ The priority objectives for nuclear research are set out in the Annex “Scientific and technological objectives” of the proposal for the Euratom framework programme.

²⁴ COM(2000) 769.

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

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

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

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

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

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

Actions envisaged

~~Technologies for sustainable development~~

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

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

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

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

i) Sustainable Energy Systems

- in the short and medium term, especially in the urban environment:
 - the main new and renewable energy sources and their integration,
 - alternative motor fuels,
 - energy saving and energy efficiency, in particular in buildings;
- for the medium and longer term:
 - fuel cells including applications for transport and for stationary use,
 - technologies for hydrogen as an energy carrier and storage system,
 - new and advanced concepts for photovoltaic energy and advanced uses of biomass (including of agricultural origin),
 - disposal of CO₂ associated with cleaner fossil fuel plants;

ii) Sustainable surface transport

- with a view to developing environmentally friendly transport systems and vehicles and clean urban transport, with rational use of the car in the city:
 - new vehicle concepts in particular for road and urban transport, including novel propulsion systems and integration of fuel cells for transport purposes,
 - advanced design and production techniques leading to improved quality, safety, recyclability, comfort and cost-effectiveness ;
- with a view to making rail and maritime transport more effective, and addressing the interoperability needs of a single European Railway System and assuring intelligent and safe transport of passengers and freight in particular for road and maritime transport:
 - rebalancing and integrating different modes, in favour of those that are more sustainable and safer (for example by means of developing intermodality for freight and passengers, and innovations in the management of the logistic chain),
 - optimising infrastructure use and increasing safety, through interoperable intelligent transport systems and vehicles, and avoiding traffic congestion, in particular in urban areas.

iii) Global change and ecosystems

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

- impact and mechanisms of greenhouse gas emissions and other atmospheric constituents on climate and carbon sinks (oceans, forests and soil) in particular to improve prediction and to evaluate mitigation options;
- water cycle, including soil – related aspects;

- **understanding marine and terrestrial** biodiversity, **marine ecosystem functions**, protection of genetic resources, **sustainable management** operation of terrestrial and marine ecosystems and interactions between human activities and the latter;
- mechanisms of desertification and natural disasters connected with climate change;
- global climate change observation systems.

1.1.7. ~~Citizens and governance in the European knowledge-based society~~ **Citizens and governance in an open European knowledge-based society**

Objective

The activities carried out in this area are intended to mobilise in a coherent effort, in all their wealth and diversity, ~~European~~ **research capacities in the Member States, candidate countries and other associated countries in economic, political, social and human sciences with a view that are necessary to develop an understanding of, and to addressing issues related to, the emergence of the knowledge-based society and new forms of relationships between its people, on one hand citizens and between its people institutions on the other.**

Justification of the effort and European added value

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

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

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

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

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

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

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

Actions envisaged

Action by the Community will focus on the following themes:

*Knowledge-based **European society and social cohesion***

- **Research with reference to the objectives set by the Lisbon European Council and subsequent Councils, in particular:** improving the production, transmission and utilisation of knowledge in Europe;
- options and choices for the development of a knowledge-based society serving the EU objectives set at the Lisbon and Nice European Councils, in particular as regards improving the quality of life, **social** employment and labour market policies, life-long education and training, and strengthening social cohesion and sustainable development;
- variety of transition dynamics **and paths** towards the knowledge-based society at local, national and regional level.

Citizenship, democracy and new forms of governance

- consequences of European integration and enlargement of the EU for democracy, the concept of legitimacy, and the functioning of the institutions, **through a better understanding of political and social institutions in Europe, and their historical evolution;**
- ~~redefinition~~ **articulation** of areas of competence and responsibility, and new forms of governance;
- security issues connected with the resolution of conflicts and restoration of peace and justice;
- emergence of new forms of citizenship and identities, forms and impact of cultural diversity in Europe; **social and cultural dialogue between Europe and the rest of the world.**

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

- transnational research and comparative studies and the coordinated development of statistics and qualitative and quantitative indicators;
- interdisciplinary research in support of public policies;

- the establishment and exploitation on a European scale of research infrastructures and data and knowledge bases.

~~1.2. Anticipating the EU's scientific and technological needs~~

~~The activities carried out under this heading are intended to:~~

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

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

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

~~These will cover two non-exclusive categories of research:~~

- ~~— research necessary for the formulation, implementation and enforcement of Community and EU policies:~~
 - ~~— research in support of the implementation of common policies such as the common agricultural policy and the common fisheries policy;~~
 - ~~— research in support of EU policy objectives such as, for example, those set out in the 6th Environment Programme²⁵ and the Green Paper "Towards a European Strategy for the Security of Energy Supply²⁶;~~
 - ~~— research in support of the objectives set for the EU by the European Council, for example the objectives set by the Lisbon and Feira European Councils with regard to economic policy, Information Society and e-Europe, enterprise, social policy and employment, education and training, including the requisite statistical methods and tools;~~
 - ~~— research necessary for other Community or EU policies in areas such as, for example, health, in particular public health, regional development, trade, external relations and development aid or justice and home affairs;~~
- ~~— research that responds to needs in new, interdisciplinary and multidisciplinary areas or areas at the leading edge of knowledge, especially in order to help European research cope with unexpected major developments, including in areas linked to the priority fields.~~

²⁵ COM(2001) 31

²⁶ COM(2000) 769.

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

- The activities concerned will essentially take the form of:
 - specific targeted projects generally of a limited scale carried out in partnerships of a size commensurate with the needs to be met;
 - the networking of research activities carried out at national level, where the existing capacities in the Member States need to be mobilised in order to achieve the objectives.
- In certain duly justified cases, where the objectives in question can be better achieved by these means, limited use may be made of the instruments used in the priority thematic areas such as the networks of excellence or, where appropriate, the integrated projects.
- The choice of research topics, areas and subjects will be made by the Commission on the basis of assessment by an internal group of users, taking account of the opinion of an independent consultative body made up of high-level scientific and industrial experts.
- For the implementation of these activities, recourse may be had to a two-step mechanism: calls for expressions of interest open to any entity or organisation in the EU to identify needs precisely and then evaluate them; calls for proposals on themes selected on this basis.
- Of the projects judged to be of sufficient scientific and technical quality by peer review, the Commission will select those most likely to help support the policies it is responsible for implementing.
- In accordance with their spirit and objective, the activities carried out under this heading will be implemented on the basis of annual decisions.

These activities will also comprise in particular:

1.2. Specific activities covering a wider field of research

Activities under this heading will complement research within the thematic priority areas and comprise the following:

- **Anticipating the EU's scientific and technological needs**
- **Specific research activities for SMEs**
- **Specific international co-operation activities**
- **Joint Research Centre activities**

1.2.1 Anticipating the EU's scientific and technological needs

These activities have a distinct role within the overall architecture of the sixth framework programme. They involve common implementation arrangements, and the

necessary critical mass, to assure efficient and flexible conduct of research which is essential to the fundamental objectives of Community research and which covers a wide range of needs that cannot be satisfied within the thematic priorities. They will have the following specific objectives:

- To underpin the formulation and implementation of Community policies, bearing on the interests of possible future members of the Union as well as the existing member states, and monitor their effects;
- 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 feature common to 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 (as appropriate: policymakers, industrial user groups, leading edge research groups, etc.) They will be implemented in conjunction with an annual programming mechanism, by which specific priorities, corresponding to identified needs and falling within the objectives indicated above, will be determined.

Priorities thus determined will then be inscribed in the workprogramme for the corresponding specific programme, alongside the priorities deriving from objectives in other parts of the programme, and updated regularly. This will result in a progressive allocation of the budget relating to these activities to the specific priorities identified, throughout the period of execution.

The programming will be carried out by the Commission, and will be based on suggestions received in response to a wide-ranging consultation of interested circles in the EU and the countries associated with the framework programme, regarding the topics to be included.

A budget of Euro 440 million will be allocated to the research activities specified below, which have been determined on the basis of needs which can be identified now. This represents 50% of the amount destined for all activities under this heading; the remaining 50% will be allocated to research activities to be defined during the course of implementation of the specific programme.

i) Policy-orientated research

The activities under this heading will provide, in particular, support for:

- the implementation of common policies, in particular the common agricultural policy, and the common fisheries policy;
- the achievement of Community policy objectives, including in particular those set out in the 6th Environment Action Programme²⁷ the Green Paper “Towards a European strategy for the security of energy supply”;²⁸

²⁷
²⁸

COM(2001)31.
COM(2000)769.

and the White Paper on European transport policy²⁹; as well as those in such fields as public health and consumer protection, gender equality, regional development, trade, enlargement, external relations and development aid, and justice and internal affairs.

- the achievement of other 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, including the Lisbon strategy, with regard to economic policy, in the fields of the Information Society and e-Europe, enterprise, internal market and competitiveness, social policy and employment, and education and culture, including the requisite statistical methods and tools.

Multi-annual programming

The multi-annual programming of these activities will take into account the opinions of the relevant Scientific Committees associated with the policies concerned. The programming will be conducted with the help of a User Group composed of different Commission Services, who will also have recourse, where appropriate, to an independent consultation structure composed of high-level scientific and industrial experts. The User Group will assess suggestions put forward regarding the topics to be included on the basis of the following criteria:

- their contribution to policy formulation and development (e.g. links with legislative proposals in preparation or with major deadlines in the area);
- their potential contribution to the EU's competitiveness, the strengthening of its scientific and technological bases and the achievement of the European Research Area, including the effective integration of the candidate countries.
- European added value, taking account in particular of research carried out in the Member States in the relevant fields;
- the scientific relevance and feasibility of the research themes and approaches proposed;
- assurance of an appropriate division of tasks, and synergy, between these activities and the Direct Actions of the Joint Research Centre in support of Community policies.

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.

Initial research priorities

The programming method described above has been applied to define policy-orientated research priorities responding to needs that can already be

²⁹

COM(2001)370.

anticipated. In this first application, it has been based on suggestions for topics made by the Commission's policy services, drawing on the advice, as appropriate, of the relevant Scientific Committees, as well as the broader objectives of the Union as set out in successive conclusions of the meetings of the European Council. The priorities so defined will be incorporated in the workprogramme at the start of the programme.

They have been grouped within the following lines of action, in a structure which optimises synergies between different policy requirements and scientific inputs, and which cuts across and complements the thematic priorities:

- *Sustainable management of Europe's natural resources.* Research under this heading responds to policy requirements relating, in particular, to the modernisation and sustainability of the common agriculture and fisheries policies and the promotion of rural development, including forestry. It will focus in particular on:

promotion of sustainable, quality-based agriculture and forestry; multifunctional models of sustainable agriculture and forestry management, and related tools and assessment methods; promotion of rural development; alternative approaches to fisheries management, through better understanding of key biological and selectivity parameters within an ecosystem based approach; development of bases for policies to promote sustainable aquaculture through disease prevention, production systems diversification and improved husbandry; environmental implications of agriculture, fisheries and aquaculture-based production systems; aquaculture and animal health and welfare; environmental assessment (soil, water, air, noise).

- *Providing health, security and opportunity to the people of Europe.* Research in this category responds to policy requirements relating, in particular, to the implementation of the European Social Agenda, public health and consumer protection and the creation of an Area of Freedom, Security and Justice. It will focus in particular on:

social, consumer and public health policy issues including health determinants and provision of high quality and sustainable health services and pensions (in particular in the context of ageing and demographic change); handicaps/disabilities, epidemiology contributing to disease prevention and responses to emerging rare and communicable diseases, secure blood and organ donations, non-animal test methods for risk assessment of chemical substances and emerging threats to security, consumer and worker health and safety, as well as understanding migration and refugee flows, and crime trends.

- *Underpinning the economic potential and cohesion of a larger and more integrated European Union.* Research in this category responds, in particular, to the needs of a series of policies concerned with the competitiveness, dynamism and integration of the European economy, in the context of enlargement, globalisation and Europe's commercial relations with the rest of the world. It will focus in particular on:

impacts of integration, sustainable development, competitiveness and trade policies (including improved means to assess economic development and cohesion); transport security; development of tools, indicators and operational parameters for assessing sustainable transport and energy system performance (economic, environmental, social), forecasting and developing innovative policies for sustainability in the medium and long term; information society issues (such as management and protection of digital assets, inclusive access to information society); protection of cultural heritage; improved quality, accessibility and dissemination of European statistics.

A co-ordinated approach will be ensured when addressing research questions that are common to different policy areas, in particular with respect to the measurement and impact assessment of demographic changes and more broadly in the development of policy-relevant statistics and indicators.

ii) *Research to explore new and emerging scientific and technological problems and opportunities*

Research under this heading will respond to needs in new interdisciplinary and multidisciplinary areas or areas at the leading edge of knowledge, and which fall within the legitimate scope of Community research, as well as to unexpected major developments. By bringing together resources from across the EU, it will aim to put European research in a leading position, opening the way or creating new scientific and technological developments. It will stimulate the flow of ideas between academia and industry, and allow Europe better to exploit its research assets in the drive towards a dynamic knowledge-based society.

The following areas of activity will be supported initially:

- Research to assess rapidly new discoveries, or newly-observed phenomena, which may indicate emerging risks or problems of high importance to European society, and identify appropriate responses to them.
- Research in emerging areas of knowledge and on future technologies, in particular in transdisciplinary fields, which is highly innovative and involves correspondingly high (technical) risks. It will be open to any new idea that has significant potential for major industrial and/or social impact, or for the development of Europe's research capabilities in the longer term.

Proposals will be evaluated on the basis of research excellence, potential for future impact, and, in the first of these areas particularly, innovativeness.

Multi-annual programming

Specific topics within the above categories on which research will be focused during the implementation of the programme will be selected by means of the multi-annual programming on the basis of their urgency or potential for future societal, industrial, or economic relevance, taking account of the ongoing research activities under this heading. The assessment of topics will be carried out with the support of an independent consultation structure composed of

high-level scientific and industrial experts and will also incorporate the following criteria:

- **the potential contribution of the research topics proposed for innovation and the EU's competitiveness, the strengthening of its scientific and technological bases and the achievement of the European Research Area, including the effective integration of the candidate countries;**
- **the scientific relevance and timeliness 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.

iii) Implementation

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 the objectives can be achieved by mobilising capacities existing in the Member States, candidate countries and other associated 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 following evaluation by independent experts.

1.2.2 Specific research activities for SMEs

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

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

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

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

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

1.2.3. Specific international cooperation activities:

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

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

1.2.4. Joint Research Centre activities³⁰

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

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

The JRC will carry out these activities in close cooperation and by networking with scientific circles, national research organisations and businesses in Europe. **It may participate in all research activities of the framework programme, including networks of excellence and integrated projects.**

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

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

- Food, chemical products and health:

Food safety and quality, in particular to combat BSE; genetically modified organisms; chemical products, **including validation of non-animal testing procedures**; biomedical applications (more particularly establishment of references in this area).

³⁰ The JRC's activities in the field of nuclear research are described in the Annex "Scientific and technological objectives" to the proposal for a Euratom framework programme. The JRC will also carry out activities in connection with the structuring of the European Research Area, and ~~will be able to participate in all the research activities under the Framework Programme carried out on the basis of calls for proposals in the priority areas and under the heading "Anticipating the EU's scientific and technological needs". It will carry out~~ a limited amount of exploratory research in connection with those activities.

- Environment and sustainability:

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

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

- Technology foresight:

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

- Reference materials and measurements³¹:

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

- Public security and combating fraud:

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

2. STRUCTURING THE EUROPEAN RESEARCH AREA

2.1. Research and innovation

Objective

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

Justification of the effort and European added value

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

Actions envisaged

³¹ Metrology activities in the nuclear field are described in the Annex "Scientific and technological objectives" to the proposal for a Euratom Framework Programme.

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

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

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

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

Some of these activities will be carried out in liaison with those of the EIB (in particular by means of the EIF) under its "Innovation 2000 Initiative" as well as ~~the~~ **in co-ordination with Structural Funds measures in this field**.

2.2. Human resources and mobility

Objective

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

Justification of the effort and European added value

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

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.**

In co-operation with the most appropriate national and Community actions, support will be given to the provision of practical assistance to foreign researchers in matters (legal, administrative, familial or cultural) relating to their mobility.

Actions envisaged

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

- global support measures for universities, research centres, businesses and networks, for the hosting of European and third country researchers;
- individual support measures for European researchers for the purposes of mobility to another European or a third country, and for top-class third-country researchers wishing to come to Europe. **Such support will provide for a sufficiently long training period and focus on researchers with at least four years of research experience;**
- mechanisms for return to the countries and regions of origin, as well as professional (re-)integration mechanisms, in particular linked to the granting of global and individual support;
- financial contribution to national or regional programmes in support of researcher mobility open to researchers from other European countries;
- support for **the establishment of new** European research teams ~~of the highest~~ **which are considered to have a potential to reach a high** level of **scientific** excellence, more particularly for leading edge or interdisciplinary research activities;
- scientific prizes for work of excellence carried out by a researcher having received EU financial support for mobility .

2.3. Research infrastructures

Objective

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

Justification of the effort and European added value

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

Actions envisaged

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

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

2.4. Science/society

Objective

The activities carried out under this heading are intended to encourage the development of harmonious relations between science and society and the opening-up of innovation in

Europe, as well as contributing to critical thinking by scientists in response to concern in society, as a result of the establishment of new relations and an informed dialogue between researchers, industrialists, political decision-makers and citizens.

Justification of the effort and European added value

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

Actions envisaged

In line with the Commission Staff Working Paper "Science, Society and Citizens in Europe"³², the activities carried out in this area in the whole field of science and technology will particularly address the following themes:

- *Bringing research closer to society* : Science and governance; scientific advice; involvement of society in research; foresight;
- *Ensuring that use of scientific and technological progress takes place in a responsible fashion, **in harmony with the ethical values of most Europeans: assessment, management and communication of uncertainty and risk; expertise; implementing analysis and support to best practice in the application of the precautionary principle in different areas of policy making; European reference system; research on ethics in relation to science, technology developments and their applications;***
- *Stepping up the science/society dialogue*: new forms of dialogue **with the participation of relevant stakeholders;** knowledge of science by citizens; **stimulation of awareness through prizes and “citizens fora”;** **promoting young people's interest in scientific careers; initiatives aimed at promoting the role and place of women in science and research at all levels.**

They will take the form of activities in support of:

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

³² SEC (2000) 1973.

3. STRENGTHENING THE FOUNDATIONS OF THE EUROPEAN RESEARCH AREA

Objective

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

Justification of the effort and European added value

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

Actions envisaged

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

- To step up the coordination of research activities carried out in Europe, at both national and European level, financial support for:
 - the mutual opening-up of national programmes;
 - networking of research activities conducted at national level;
 - scientific and technological cooperation activities carried out in other European cooperation frameworks, in particular the cooperation activities of COST and the European Science Foundation;
 - collaboration and joint initiatives of specialised European scientific cooperation organisations such as CERN, EMBL, ESO and the ESA.³³

Efforts will be made to encourage European co-ordination of research activities across the range of research priorities, including:

- **health: health issues in specific population groups (in particular children and older people); major diseases and disorders (for example, diabetes and hepatitis).**
- **environment: sustainable local and urban development; seismic risks;**
- **energy (fossil fuels): new generation power plants ("near-zero-emission"), energy storage, transport and distribution.**

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

³³ CERN: European Organisation for Nuclear Research; EMBL: European Molecular Biology Laboratory; ESO: European Southern Observatory; ESA: European Space Agency.

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

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

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

	EUR million
First activity ³⁴ :	13 570 <u>13 715</u>
Second activity ³⁵ :	600
Third activity ³⁶ :	300 <u>275</u>
Fourth activity ³⁷ :	1800 <u>1 680</u>
Maximum overall amount*	16 270

***Indicative breakdown :**

1) Integrating research^{38 39}	12 770 <u>13 020</u>
• Genomics and biotechnology for health	2 000 <u>2 150</u>
• <u>Advanced genomics and its applications for health</u>	<u>1 100</u>
• <u>Combating major diseases</u>	<u>1050</u>
• Information Society technologies	3 600
• Nanotechnologies, intelligent materials, <u>and</u> new production processes	1 300
• Aeronautics and space	1 000
• Food safety and health risks	600 <u>625</u>

³⁴ Covering the activities carried out under the heading "Integrating research", with the exception of international cooperation activities; research infrastructures, and the theme "Science/Society" carried out under the heading "Structuring the European Research Area; and activities carried out under the heading "Strengthening the foundations of European Research Area".

³⁵ Covering the international cooperation activities carried out under the heading "Integrating research", in the priority areas and under the heading of anticipating the EU's scientific and technological needs.

³⁶ Covering the specific activities on the theme "Research and innovation" carried out under the heading "Structuring the European Research Area" in addition to innovation activities carried out under the heading "Integrating research".

³⁷ Covering the activities concerning human resources and support for mobility carried out under the heading "Structuring the European Research Area".

³⁸ ~~The aim is to allocate~~ **Of which** at least 15% of the financial resources assigned to this heading ~~to~~ **for** SMEs.

³⁹ Including EUR 600 million in total for international cooperation activities.

• Sustainable development and global change	1 700 <u>1 850</u>
• <u>Sustainable Energy Systems</u>	<u>630</u>
• <u>Sustainable surface transport</u>	<u>600</u>
• <u>Global change and ecosystems</u>	<u>620</u>
• Citizens and governance in the European <u>in an open European</u> knowledge-based society	225
• <u>Specific activities covering a wider field of research</u>	2 345 <u>2 270</u>
• <u>Anticipating the EU's scientific and technological needs</u> ⁴⁰	<u>800</u>
• <u>Specific research activities for SMEs</u>	<u>450</u>
• <u>Specific international co-operation activities</u>	<u>300</u>
• <u>Joint Research Centre activities</u>	<u>720</u>
2) Structuring the European Research Area	3 050 <u>2 830</u>
• Research and innovation	300 <u>275</u>
• Human resources and mobility	1 800 <u>1 680</u>
• Research infrastructures	900 <u>800</u> ⁴¹
• Science/society	50 <u>75</u>
3) Strengthening the foundations of the European Research Area	450 <u>420</u>
• Support for the coordination of activities	400 <u>370</u>
• Support for the coherent development of policies	50
TOTAL	16 270 ⁴²

⁴⁰ Including EUR 715 Million for JRC activities.

⁴¹ **Including up to EUR 150 million for further development of Géant.**

⁴² To which should be added the sum of EUR 1,230 million under the Euratom framework programme, broken down indicatively as follows: Treatment and storage of nuclear waste EUR 150 million; Controlled thermonuclear fusion EUR 700 million [of which EUR 200 million is foreseen for participation in the ITER project]; other activities EUR 50 million; JRC activities EUR 330 million [of which EUR 110 million for the treatment and storage of waste].

ANNEX III: INSTRUMENTS AND DETAILED RULES FOR COMMUNITY FINANCIAL PARTICIPATION

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

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

1. INSTRUMENTS

1.1. Instruments to integrate research

Four types of instrument will be used for the implementation of activities in the thematic priority areas: networks of excellence; integrated projects; participation in jointly-executed national programmes; as well as, in the form of a stairway of excellence and integration, specific targeted research projects and co-ordination activities.

During the implementation of the research activities, the types of instruments, from within these categories, to be applied for a particular subject of research will be specified, as well as the nature of proposals that are expected.

The networks of excellence and integrated projects will be the main instruments for implementing research activities; specific targeted research projects and co-ordination actions may be employed for research projects with objectives within particular fields of research with limited scope.

1.1.1. *Networks of excellence*

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

The overall objective of Networks of Excellence (NoE) is to reinforce scientific and technological excellence in Europe by progressively integrating research capacities at a high level of excellence across European countries. NoE foster co-operation between capacities of excellence existing in universities, research centres, enterprises (SME's as well as big enterprises), and technology organisations. Each NoE will act as a "Virtual centre of excellence" dedicated at enhancing the progress of knowledge on a particular theme, in the perspective of long term objectives.

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

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

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

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

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

The networks of excellence will prepare and implement a strategy for disseminating the results of their work; resources will be reserved for this purpose by each network of excellence.

1.1.2. Integrated projects.

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

These projects, representing an order of magnitude of up to several tens of millions of euros, **but which may also include projects of more limited size, provided that the necessary critical mass and integration can be achieved,** will be carried out by consortia often involving intense university/industry collaboration. **The partners may be enterprises (including SMEs), universities and research centres, and other legal entities.**

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

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

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

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

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

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

The implementation of the programmes of activities carried out by the networks of excellence and in the context of the integrated projects will be regularly evaluated, **and reported on by the Commission in its annual report on RTD activities.**

1.1.3. Participation in national programmes carried out jointly

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

The programmes concerned will be clearly identified programmes implemented by governments or national research organisations, **without discrimination between Member States.** Their joint implementation will entail recourse to a specific implementation structure. This may be achieved by means of harmonised work programmes and common, joint or coordinated calls for proposals. In appropriate cases, the development or operation of common infrastructures may be involved.

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

1.1.4. Specific targeted research projects

Specific targeted research projects may take either of the following two forms, or a combination of the two:

- (a) a research and technological development project designed to gain new knowledge either to considerably improve or to develop new products, processes or services or to meet other needs of society and Community policies;**

- (b) a demonstration project designed to prove the viability of new technologies offering potential economic advantage but which cannot be commercialised directly.**

1.1.5. Coordination actions

Coordination actions are intended to promote and support the coordinated initiatives of a range of research and innovation operators. They cover a range of activities such as the organisation of conferences, meetings, the performance of studies, exchanges of personnel, the exchange and propagation of good practices, setting up information systems and expert groups, and may, if necessary, include support for the definition, organisation and management of joint or common initiatives.

1.1.46. Anticipating the EU's scientific and technological needsSpecific activities covering a wider field of research****

*The instruments for implementing the activities carried out under the heading “Anticipating the EU’s scientific and technological needs”**Specific activities covering a wider field of research** are described in Annex 1.*

1.2. Instruments to structure the European Research Area

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

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

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

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

2. DETAILED RULES FOR FINANCIAL PARTICIPATION BY THE COMMUNITY

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

In the case of participation of bodies from regions lagging in development, when a project receives the maximum intensity of co-financing authorised under the *framework programme*

or an overall grant, an additional contribution from the Structural Funds, pursuant to Council Regulation (EC) No 1260/99,⁴³ could be granted.

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

In the case of participation of organisations from Mediterranean or developing countries, a contribution of the MEDA programme and of the financial instruments of the Union's aid to development could be envisaged.

Financial participation by the Community will be granted in compliance with the principle of co-financing, with exception of financing for studies, conferences and public tenders. Depending on the nature of the different instruments, financial participation by the Community may be of an overall nature or take the form of a grant to the budgets for each of the steps in the implementation of the instruments.

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

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

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

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

Instruments	Financial participation by the Community under the framework programme
Integrating research	44
1. Financial contribution to networks of excellence.	The Community may award an overall grant on the basis of the results from implementation of a common programme of activities.
2. Financial contribution to integrated projects.	The Community may award a grant to the budget of these projects corresponding to a maximum of 50% of their total cost.
3. Financial contribution to national programmes carried out jointly.	The Community may award a grant to the budget of jointly-executed activities corresponding to a maximum of 50% of their total cost; <u>where these activities are open to other European countries</u> it may cover on an overall basis the

⁴³ OJ L 161, 26.6.99

⁴⁴ In the three categories of activities undertaken under "Integrating research" Community funding can cover the participation of bodies and researchers from third countries.

	participation of third country researchers and organisations <u>from these countries</u> in the activities.
4. Financial contribution to activities carried out in order to anticipate the EU's scientific and technological needs <u>specific targeted research projects and coordination actions and specific activities covering a wider field of research</u> , including specific research activities for SMEs and specific international cooperation activities	The Community may award a grant to the budget of these activities corresponding to a maximum of 50% of of their total cost and assume responsibility for the entire budget of the JRC.
Structuring the European Research Area.	
1. Financial contribution to activities to promote interaction between research and innovation.	The Community may award a grant for the budget for these activities.
2. Financial contribution to the development of human resources and increased mobility.	The fellowships and support for excellence will be of a global nature.
3. Financial contribution in support of research infrastructures.	The Community may award a grant to the budgets for the preparatory technical work, including feasibility studies, to a maximum of 50% of their total cost; it may award an overall grant for transnational access and network development activities and, on the basis of the results, for the implementation of integrated initiatives; it may award a grant to the budgets for the development of new infrastructures corresponding to a maximum of 10% of their total cost.
4. Financial contribution towards the development of harmonious relations between science and society.	The Community may award a grant for the budgets for these initiatives.
Strengthening the foundations of the European Research Area.	
1. Financial contribution to coordination activities.	The Community may award a grant for the budgets for these activities.
2. Financial contribution to measures in support of the coherent development of research policies.	The Community may award a grant for the budgets for these measures.

Modified proposal for a

COUNCIL DECISION

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

(2002-2006)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular Article 7 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

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

Whereas:

- (1) A multiannual framework programme covering all research activities, including demonstration and training activities in the field of nuclear energy, to be implemented by means of research and training programmes, may be adopted pursuant to Article 7 of the Treaty.
- (2) In 2000 the Commission submitted two communications, respectively on the prospects for and the objectives of creating a European Research Area⁴⁵, and on making a reality of the European Research Area and guidelines for EU research activities in the period 2002-2006⁴⁶. In 2000 the Commission also submitted a communication on "Innovation in a knowledge-driven economy"⁴⁷.
- (3) The European Councils in Lisbon in March 2000 and Santa Maria de Feira in June 2000 adopted conclusions aimed at the rapid establishment of a European Research and Innovation Area with a view to job creation and economic growth.
- (4) The European Parliament^{48, 49}, the Council^{50, 51}, the Economic and Social Committee⁵² and the Committee of the Regions⁵³ have also supported the creation of the European Research Area.

⁴⁵ COM(2000) 6 final, 18.1.2000.

⁴⁶ COM(2000) 612 final, 4.10.2000.

⁴⁷ COM(2000) 567 final, 20.9.2000.

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

⁴⁹ Resolution of 15 February 2001

- (5) On 19 October 2000⁵⁴ the Commission submitted the conclusions of an external assessment of the implementation and results of the Community activities carried out in the five years preceding that assessment, accompanied by its observations.
- (6) It is therefore necessary to adopt a new framework programme for the period 2002-2006 aimed at making a contribution to bringing about the European Research Area.
- (7) The sixth framework programme ~~2002-2006~~ sets out the scientific and technological objectives and priorities of the activities envisaged and indicates the broad lines of those activities which will be implemented in compliance with the objective of protecting the Community's financial interests.
- (8) A financial reference amount within the meaning of point 34 of the Interinstitutional Agreement between the European Parliament, the Council and the Commission on budgetary discipline and improving the budgetary procedure⁵⁵ is included in this Decision for the entire duration of the framework programme without thereby affecting the powers of the budgetary authority as defined in the Treaty.
- (9) The Joint Research Centre (JRC) is called on help implement the framework programme, in particular in those areas in which it can offer objective and independent expertise and in which it can play a role in the implementation of other Community policies.
- (10) Research activities carried out within the sixth framework programme should respect fundamental ethical principles, notably those which appear in the Charter of Fundamental Rights of the European Union. **Institutions involved in nuclear research should take account of public acceptability of their activities.**
- (11) Following the Commission Communication "Women and Science"⁵⁶ and the Resolutions of the Council⁵⁷ and the European Parliament⁵⁸ on this theme, an Action Plan is being implemented in order to boost and increase the place and role of women in science and research in Europe.
- (12) Participation in the activities of the sixth framework programme will be encouraged through publication of the necessary information on content, conditions and procedures, to be made available in a timely and thorough manner to potential participants, including those from the candidate and other associated countries.**
- (13) It is appropriate that the Commission should submit regular progress reports **to the European Parliament and the Council** on the implementation of the sixth framework programme ~~2002-2006~~ and that it should have an independent assessment carried out concerning the implementation of the activities in good time and before

⁵⁰ Resolution of 15 June 2000, OJ C 205, 19.7.2000 p.1

⁵¹ Resolution of 16 November 2000, OJ C 374, 28.12.2000 p.1

⁵² Opinion of 24 May 2000, OJ C 204, 18.7.2000 p.70

⁵³ Opinion of 12 April 2000, OJ C 226, 8.8.2000 p.18

⁵⁴ COM(2000)659 final, 19.10.2000.

⁵⁵ OJ C 172, 18.6.1999, p.1.

⁵⁶ COM(1999) 76.

⁵⁷ Resolution of 20 May 1999, OJ C 201, 16.7.1999.

⁵⁸ Resolution of 3 February 2000, PE 284.656.

submitting its proposal for the next framework programme, **which will be done in a spirit of openness with respect to all the relevant actors.**

(14) The Scientific and Technical Committee has been consulted by the Commission and has delivered its opinion.

(15) The financial implications of the multi-annual sixth framework programme are compatible with the current ceiling under heading 3 of the financial perspective.

HAS DECIDED AS FOLLOWS:

Article 1

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

Article 2

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

Article 3

All the research activities carried out under the **sixth** framework programme ~~2002-2006~~ shall be carried out in compliance with fundamental ethical principles. **Equality of opportunity, irrespective of gender, will be fully respected.**

Article 4

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

Article 5

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

Article 6

The sixth framework programme ~~2002-2006~~ is open ~~to the participation of:~~ **in accordance with the relevant agreements, decisions or protocols, to the participation of the EEA countries, the candidate countries, and other countries including Switzerland.**

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

Done at Brussels,

For the Council

ANNEX : SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES

1. PRIORITY THEMATIC AREAS OF RESEARCH

1.1 Waste treatment and storage

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

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

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

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

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

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

1.2 Controlled thermonuclear fusion

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

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

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

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

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

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

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

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

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

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

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

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

3. NUCLEAR ACTIVITIES OF THE JOINT RESEARCH CENTRE

In accordance with its task of providing scientific and technical support for EU policies, the JRC's activities will **have the following** focus. ~~its activities on the following fields:~~ **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. Special attention will be given to co-operation with Candidate countries. Training activities will be an important component for JRC to help equip the Community with a future generation of scientists with the necessary competencies and expertise. The main areas of research activity will be as follows⁵⁹.

3.1 Nuclear safety and security:

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

3.2 Measurements and reference materials:

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

⁵⁹ **In addition, the JRC is entitled to participate in all research activities on the same basis as national research organisations [e.g. on the basis of calls for proposals].**