

**INFORMATION NOTE**

Subject : Draft Decision of the European Parliament and of the Council concerning the seventh framework programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

– General approach

Delegations will find attached the General Approach as it results from the "Competitiveness" Council meeting on 30 May 2006. The changes to the original Commission proposal (doc. 8087/05) are underlined and changes to the Partial General Approach (doc. 15062/05) are **bold underlined** for ease of reference.

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**Information note**

**Draft**

**DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

concerning the seventh framework programme of the European Community for research,  
technological development and demonstration activities (2007 to 2013)

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<sup>1</sup>,

Having regard to the opinion of the European Economic and Social Committee<sup>2</sup>,

Having regard to the opinion of the Committee of the Regions<sup>3</sup>,

Acting in accordance with the procedure laid down in Article 251 of the Treaty<sup>4</sup>,

Whereas:

[*recitals*]

HAVE DECIDED AS FOLLOWS:

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<sup>1</sup> OJ C , , p. .

<sup>2</sup> OJ C , , p. .

<sup>3</sup> OJ C , , p. .

<sup>4</sup> OJ C , , p. .

## Article 1

### Adoption of the Framework Programme

The Framework Programme for Community activities in the area of research and technological development, including demonstration activities, hereinafter the "seventh Framework Programme" is hereby adopted for the period from 1 January 2007 to 31 December 2013.

## Article 2

### Objectives and activities

- (1) The seventh Framework Programme shall support the activities set out in paragraphs 2 to 5. The objectives and the broad lines of those activities are set out in Annex I.
- (2) Cooperation: supporting the whole range of research actions carried out in trans-national cooperation in the following thematic areas:
  - (a) Health;
  - (b) Food, Agriculture and Biotechnology;
  - (c) Information and Communication Technologies;
  - (d) Nanosciences, Nanotechnologies, Materials and new Production Technologies;
  - (e) Energy;
  - (f) Environment (including Climate Change);
  - (g) Transport (including Aeronautics);
  - (h) Socio-economic Sciences and Humanities;
  - (i) Space;
  - (j) Security.

- (3) Ideas: supporting "investigator-driven" research carried out across all fields by individual national or transnational teams in competition at the European level.
- (4) People: strengthening, quantitatively and qualitatively, the human potential in research and technology in Europe.
- (5) Capacities: supporting key aspects of European research and innovation capacities such as research infrastructures; regional research driven clusters; the development of a full research potential in the Community's convergence and outermost regions; research for the benefit of small and medium sized enterprises (SMEs); "Science in Society" issues; support to coherent development of policies; horizontal activities of international cooperation.
- (6) The seventh Framework Programme shall also support the non-nuclear direct scientific and technical actions carried out by the Joint Research Centre (JRC) as defined in Annex I.

### Article 3

The seventh Framework Programme shall be implemented through specific programmes. These programmes shall establish precise objectives and the detailed rules for implementation.

#### Article 4

Maximum overall amount and shares assigned to each programme<sup>5</sup>

1. The maximum overall amount for Community financial participation in this seventh Framework Programme shall be EUR **50521** million. That amount shall be distributed among the activities and actions referred to in paragraphs 2 to 6 of Article 2 as follows (in EUR million):

Cooperation	<b><u>32315</u></b>
Ideas	<b><u>7460</u></b>
People	<b><u>4728</u></b>
Capacities	<b><u>4267</u></b>
Non-nuclear actions of the Joint Research Centre	<b><u>1751</u></b>

2. The indicative breakdown among the thematic areas of each activity referred to in paragraph 1 is set out in Annex II.
3. The detailed rules for Community financial participation in this Framework Programme are set out in Annex III.

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<sup>5</sup> *P.m: all figures are in current prices reflecting the Interinstitutional Agreement (IIA) on the Financial Perspectives (2007-2013). Accordingly, IIA figure for FP7 for 2007-2013 of EUR 48081 million in 2004 prices corresponds to EUR 54582 million for 2007-2013 in current prices, of which 50521 million for FP7 (EC) for 2007-2013, 2751 million for FP7 (Euratom) for 2007-2011 and indicatively 1310 million for Euratom programme for 2012-2013.*

## Article 5

### Protection of the Communities' financial interests

For the Community actions financed under this Decision, Regulation (EC, Euratom) No. 2988/95 and Regulation (EC, Euratom) No. 2185/96 shall apply to any infringement of a provision of Community law, including infringements of a contractual obligation stipulated on the basis of the programme, resulting from an act or omission by an economic operator, which has, or would have, the effect of prejudicing the general budget of the European Communities or budgets managed by them, by an unjustified item of expenditure.

## Article 6

All the research activities carried out under the seventh Framework Programme shall be carried out in compliance with fundamental ethical principles.

## Article 7

### Monitoring, assessment and review

1. The Commission shall continually and systematically monitor the implementation of the Framework Programme and its Specific Programmes and regularly report and disseminate the results of this monitoring.
2. Not later than 2010, the Commission shall carry out, with the assistance of external experts, an evidence-based interim evaluation of this Framework Programme and its specific programmes building upon the ex-post evaluation of the Sixth Framework Programme. This evaluation shall cover the quality of the research activities under way, as well as the quality of implementation and management, and progress towards the objectives set.

The Commission shall communicate the conclusions thereof, accompanied by its observations and, where appropriate, proposals for the adaptation of this Framework Programme, to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions.

The interim evaluation will be preceded by a progress report as soon as enough data becomes available, giving initial findings on the effectiveness of the new actions initiated under FP7 and of the efforts made on simplification.

3. Two years following the completion of this Framework Programme, the Commission shall carry out an external evaluation by independent experts of its rationale, implementation and achievements.

The Commission shall communicate the conclusions thereof, accompanied by its observations, to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions.

Done at Brussels,

*For the European Parliament*  
*The President*

*For the Council*  
*The President*

**SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES,  
BROAD LINES OF THE THEMES AND ACTIVITIES**

The seventh Framework Programme will be carried out to pursue the general objectives described in Article 163<sup>6</sup> of the Treaty to strengthen industrial competitiveness and meet the research needs of other Community policies and thereby contributing towards the creation of a knowledge-based society, building on a European Research Area. It shall promote excellence in scientific and technological research through the following four programmes: cooperation, ideas, people and capacities.

**I. COOPERATION**

In this part of the 7<sup>th</sup> Framework Programme, support will be provided to trans-national co-operation in different forms across the European Union and beyond, in a number of thematic areas corresponding to major fields of the progress of knowledge and technology, where research must be supported and strengthened to address European social, economic, environmental and industrial challenges. The bulk of this effort will be directed towards improving industrial competitiveness, with a research agenda that reflects the needs of users throughout Europe.

The overarching aim is to contribute to sustainable development.

The ten themes determined for Community action are the following:

- (1) Health;
- (2) Food, Agriculture and Biotechnology;
- (3) Information and Communication Technologies;

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<sup>6</sup> "The Community shall have the objective of strengthening the scientific and technological bases of Community industry and encouraging it to become more competitive at international level, while promoting all the research activities deemed necessary by virtue of other chapters of this Treaty."

- (4) Nanosciences, Nanotechnologies, Materials and new Production Technologies;
- (5) Energy;
- (6) Environment (including Climate Change);
- (7) Transport (including Aeronautics);
- (8) Socio-economic Sciences and the Humanities;
- (9) Space;
- (10) Security

These themes are broadly defined at relatively high level, such that they can adapt to evolving needs and opportunities that may arise during the lifetime of the 7<sup>th</sup> Framework Programme. For each of them, a series of activities have been identified which indicate the broad lines envisaged for Community support. These have been identified on the basis of their contribution to Community objectives, including the transition to a knowledge society, the relevant European research potential and the added value of Community level intervention for these subjects.

Special attention will be paid to ensuring there is effective coordination between the thematic areas and to priority scientific areas which cut across themes, such as forestry research, cultural heritage, marine sciences and technologies.

Multidisciplinarity will be encouraged by joint cross-thematic approaches to research and technology subjects relevant to more than one theme, with joint calls being an important inter-thematic form of cooperation.

In the case of subjects of industrial relevance in particular, the topics have been identified relying, among other sources, on the work of different "European Technology Platforms" set up in fields where Europe's competitiveness, economic growth and welfare depend on important research and technological progress in the medium to long term. European Technology Platforms bring together stakeholders, under industrial leadership, to define and implement a Strategic Research Agenda. This Framework Programme will contribute to the realisation of these Strategic Research Agendas where these present true European added value.

The ten themes also include research needed to underpin the formulation, implementation and assessment of Community policies, such as in the areas of health, safety, consumer protection, energy, the environment, development aid, fisheries, maritime affairs, agriculture, animal welfare, transport, education and training, employment, social affairs, cohesion, and the creation of an Area of Freedom, Security and Justice, along with pre-normative and co-normative research relevant to improving the quality of standards and their implementation.

Under each theme, beside these activities, two types of opportunities will be addressed in an open and flexible way:

- **Future and Emerging Technologies:** to support research aiming at identifying or further exploring new scientific and technological opportunities in a given field and/or in their combination with other relevant areas and disciplines through specific support for spontaneous research proposals, including by joint calls; to nurture novel ideas and radically new uses and to explore new options in research roadmaps in particular linked with a potential for significant breakthroughs; adequate coordination with the activities carried out under the Ideas programme will be guaranteed in order to avoid overlap and ensure an optimum use of funding
- **Unforeseen policy needs:** to respond in a flexible way to new policy needs that arise during the course of the Framework Programme, such as unforeseen developments or events requiring a quick reaction like, the new epidemics, emerging concerns in food safety or natural disaster response.

The dissemination and transfer of knowledge is a key added value of European research actions, and measures will be taken to increase the use of results by industry, policy makers and society. Dissemination will be considered an integral task under all thematic areas with appropriate restrictions for the security theme due to the confidentiality aspects of the activities, including through the funding of networking initiatives, seminars and events, assistance by external experts and information and electronic services in particular CORDIS.

Complementarity and synergy with this programme and other Community programmes will be ensured. Actions to support innovation will be taken under the Competitiveness and Innovation Programme.

Particular attention should be paid to assure an adequate participation of SMEs<sup>7</sup>, in particular knowledge-intensive SME in transnational cooperation. Concrete measures, including support actions to facilitate SME participation, will be taken throughout the "Cooperation" part of the programme in the framework of a strategy to be developed under each theme. These strategies will be accompanied by quantitative and qualitative monitoring against the objectives set. The aim will be to enable at least 15% of the funding available under the "Cooperation" part of the programme to go to SMEs. Support will also be provided to initiatives aimed at engaging the dialogue on scientific issues and research results with the broadest possible public beyond the research community, and in the field of scientific communication and education. The integration of the gender dimension and gender equality will be addressed in all areas of research.

Across all these themes, support to trans-national cooperation will be implemented through:

- Collaborative research;
- Joint Technology Initiatives;
- Co-ordination of research programmes;
- International Co-operation.

### **Collaborative research**

Collaborative research will constitute the bulk and the core of Community research funding. The objective is to establish, in the major fields of advancement of knowledge, excellent research projects and networks able to attract researchers and investments from Europe and the entire world.

This will be achieved by supporting collaborative research through a range of funding schemes: Collaborative projects, Networks of Excellence, Co-ordination/support actions (see Annex III).

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<sup>7</sup> Throughout the Seventh Framework Programme, "SMEs" are understood to include microenterprises.

## Joint Technology Initiatives

In a very limited number of cases, the scope of a RTD objective and the scale of the resources involved **could** justify setting up long term public private partnerships in the form of Joint Technology Initiatives. These initiatives, mainly resulting from the work of European Technology Platforms and covering one or a small number of selected aspects of research in their field, will combine private sector investment and national and European public funding, including grant funding from the Research Framework Programme and loan **and guarantee** finance from the European Investment Bank. Each Joint Technology Initiative will be decided individually, either on the basis of Article 171 of the Treaty (this may include the creation of a joint undertaking) or on the basis of Specific Programme Decisions in accordance with Article 166(3) of the Treaty.

Potential Joint Technology Initiatives will be identified in an open and transparent way on the basis of an evaluation using a series of criteria:

- Inability of existing instruments to achieve the objective.
- Scale of the impact on industrial competitiveness and growth.
- Added value of European-level intervention.
- The degree and clarity of definition of the objective and deliverables to be pursued.
- Strength of the financial and resource commitment from industry.
- Importance of the contribution to broader policy objectives.
- Capacity to attract additional national support and leverage current and future industry funding.

Considering the particular scope and complexity of the Joint Technology Initiatives, strong efforts will be made to ensure their transparent operation and that any allocation of Community funding by the Joint Technology Initiatives will take place on the basis of the Framework Programme principles of excellence and competition.

Particular attention will be paid to the overall coherence and coordination between Joint Technology Initiatives and programmes and projects in the same fields<sup>8</sup>, while respecting their existing implementation procedures, as well as to ensuring that the participation in their projects is open to a wide range of participants throughout Europe, and in particular SMEs.

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<sup>8</sup> In particular with the activities carried out by the intergovernmental structure EUREKA

## Co-ordination of non-Community research programmes

The action undertaken in this field will make use of two main tools: the ERA-NET scheme and the participation of the Community in jointly implemented national research programmes (Treaty Article 169). The action may cover subjects not directly linked to the ten themes in as far as they have a sufficient European added value. The action will also be used to enhance the complementarity and synergy between the Framework Programme and activities carried out in the framework of intergovernmental structures such as EUREKA and COST<sup>9</sup>.

The ERA-NET scheme will develop and strengthen the coordination of national and regional research activities by:

- Providing a framework for actors implementing public research programmes to step up the coordination of their activities. This will include support for new ERA-NETs as well as for the broadening and deepening of the scope of existing ERA-NETs, e.g. by extending their partnership, as well as mutually opening their programmes;
- In a limited number of cases providing additional Community financial support to those participants that pool resources for the purpose of joint calls for proposals between their respective national and regional programmes ("ERA-NET PLUS").

The participation of the Community in research programmes jointly implemented on the basis of Article 169 is especially relevant to European co-operation on a large scale in "variable geometry" between Member States sharing common needs and/or interests. In well identified cases such Article 169 initiatives **could** be launched in areas to be identified in close association with the Member States, including the possible cooperation with intergovernmental programmes, on the basis of a series of criteria:

- Relevance to Community objectives.
- The clear definition of the objective to be pursued and its relevance to the objectives of this Framework Programme.
- Presence of a pre-existing basis (research programmes existing or envisaged).

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<sup>9</sup> This will include financial support for the administration and coordination activities of COST.

- European added value.
- Critical mass, with regard to the size and the number of programmes involved, the similarity of activities they cover.
- Efficiency of Article 169 as the most appropriate means for achieving the objectives.

### **International co-operation**

International cooperation actions under this part of the Framework Programme will be:

- An enhanced participation of researchers and research institutions from third countries, with appropriate restrictions for the security theme due to the confidentiality aspects, in the thematic areas, with a strong effort to encourage them to seize this opportunity.
- Specific co-operation actions in each thematic area dedicated to third countries in the case of mutual interest in co-operating on particular topics to be selected on the basis of their scientific and technological level and needs. Closely associated with the bilateral co-operation agreements or multilateral dialogues between the EU and these countries or groups of countries, these actions will serve as privileged tools for implementing the co-operation between the EU and these countries. Such actions are, in particular: actions aiming at reinforcing the research capacities of candidate countries as well as neighbourhood countries; cooperative activities targeted at developing and emerging countries, focusing on their particular needs in fields such as health, agriculture, fisheries and environment, and implemented in financial conditions adapted to their capacities.

This part of the Framework Programme covers the international co-operation actions in each thematic area and across themes. They will be implemented in coordination with those under the "People" and the "Capacities" part of the Framework Programme. An overall strategy for International Cooperation within the Framework Programme will underpin this activity.

## THEMES

### 1. Health

#### **Objective**

Improving the health of European citizens and increasing the competitiveness of European health-related industries and businesses, while addressing global health issues including emerging epidemics. Emphasis will be put on translational research (translation of basic discoveries in clinical applications including scientific validation of experimental results), the development and validation of new therapies, methods for health promotion and prevention including promotion of healthy ageing, diagnostic tools and medical technologies, as well as sustainable and efficient healthcare systems.

#### **Rationale**

The sequencing of the human genome and the recent advances in post-genomics have revolutionised research into human health and diseases. Integrating the vast amounts of data and understanding underlying biological processes requires bringing together critical masses of various expertises and resources that are not available at a national level, with a view to developing knowledge and capacity for intervention.

Significant advances in translational health research, which is essential to ensure that biomedical research provides practical benefits and improves life quality, also requires multidisciplinary and pan-European approaches involving different stakeholders. Such approaches allow Europe to contribute more effectively to international efforts to combat diseases of global importance.

Clinical research on many diseases (e.g. cancer, cardiovascular and infectious diseases, mental and neurological diseases, in particular those linked with ageing, such as Alzheimer and Parkinson diseases) relies on international multi-centre trials to achieve the required number of patients in a short time-frame.

Epidemiological research requires a large diversity of populations and international networks to achieve significant conclusions. Developing new diagnostics and treatments for rare disorders as well as performing epidemiological research on those disorders also require multi-country approaches to increase the number of patients for each study. And performing health policy-driven research at the European level enables comparisons of the models, systems, data, and patient material held in national databases and biobanks.

A strong EU-based biomedical research will help strengthen the competitiveness of the European healthcare biotechnology, medical technology and pharmaceutical industries. The EU also has to play an active role in creating an environment conducive to innovation in the pharmaceutical sector, in particular to maximise the success of clinical research. Research-based SMEs are the main economic drivers of the healthcare biotechnology and medical technology industries. Although Europe now has more Biotechnology companies than US, most of them are small and less mature than their competitors. Public-private research efforts at the EU level will facilitate their development. EU research will also contribute to the development of new norms and standards to set up an appropriate legislative framework for new medical technologies (e.g. regenerative medicine).

The activities that will be addressed, which include research essential to policy requirements, are set out below. The strategic issues, child health, health of the ageing population will receive specific attention across the activities. Long-term research agendas such as those established by European Technology Platforms, such as the one on innovative medicines, will be supported where relevant. To respond to new policy needs, additional actions may be supported for example in the areas of health policy issues and occupational health and safety.

Ethical, legal and socio-economic issues will be taken into account within each of the following activities.

## **Activities**

- **Biotechnology, generic tools and medical technologies for human health.**
  - *High-throughput research.* To catalyse progress in fundamental genomics and biomedical research by enhancing data generation, standardisation, acquisition and analysis.
  - *Detection, diagnosis and monitoring.* With emphasis on non-invasive or minimally invasive approaches and technologies such as new preventive tools for regenerative medicine (e.g. through molecular imaging and diagnostics).
  - *Predicting suitability, safety and efficacy of therapies.* To develop and validate biological markers, in vivo and in vitro methods and models, including simulation, pharmacogenomics, targeting and delivery approaches and alternatives to animal testing.
  - *Innovative therapeutic approaches and intervention.* To consolidate and ensure further developments in advanced therapies and technologies with potential application in many diseases and disorders such as new therapeutic tools for regenerative medicine.
  
- **Translating research for human health**
  - *Integrating biological data and processes: large-scale data gathering, systems biology.* To generate and analyse the vast amount of data needed to understand better the complex regulatory networks of thousands of genes and gene-products controlling important biological processes in all relevant organisms and at all levels of organisation.
  
  - *Research on the brain and related diseases, human development and ageing.* To explore the process of healthy ageing and the way genes and environment interact with brain activity, under normal conditions as well as in brain diseases and relevant age related illness (e.g. dementia).
  
  - *Translational research in infectious diseases.* To address drug resistance, the global threats of HIV/AIDS, malaria and tuberculosis as well as Hepatitis C and potentially new and re-emerging epidemics (e.g. SARS and highly pathogenic influenza).

- *Translational research in major diseases: cancer, cardiovascular disease, diabetes/obesity; rare diseases; other chronic diseases including rheumatic diseases, arthritis and musco-skeletal diseases. To develop patient-oriented strategies from prevention to diagnosis with particular emphasis in treatment including clinical research.*
- **Optimising the delivery of health care to European citizens**
  - *Translating clinical outcome into clinical practice. To create the knowledge base for clinical decision-making and how to translate outcomes of clinical research into clinical practice and especially addressing the specificities of children, women and the elderly population.*
  - *Quality, efficiency and solidarity of health care systems including transitional health care systems and home care strategies. To translate effective interventions into management decisions, to assess the cost, efficiency and benefits of different interventions including as regards patient safety, to define the needs and conditions for an adequate supply of human resources, to analyse factors influencing equity of access to high quality health care, including analyses of changes in population (e.g. ageing, mobility and migration, and the changing workplace).*
  - *Enhanced disease prevention and better use of medicines. To develop efficient public health interventions addressing wider determinants of health (such as stress, diet, lifestyle or environmental factors and their interaction with medication). To identify successful interventions in different health care settings for improving the prescription of medicines and improving their use by patients (including pharmacovigilance aspects and interactions of medicines).*
  - *Appropriate use of new health therapies and technologies. Long term safety and effectiveness assessment and monitoring of large scale use of new medical technologies (including devices) and advanced therapies ensuring a high level of protection and benefit for public health.*

## 2. Food, Agriculture and Biotechnology

### Objective

Building a European *Knowledge Based Bio-Economy*<sup>10</sup> by bringing together science, industry and other stakeholders, to exploit new and emerging research opportunities that address social, environmental and economic challenges: the growing demand for safer, healthier, higher quality food and for sustainable use and production of renewable bio-resources; the increasing risk of epizootic and zoonotic diseases and food related disorders; threats to the sustainability and security of agricultural, aquaculture and fisheries production; and the increasing demand for high quality food, taking into account animal welfare and rural contexts and response to specific dietary needs of consumers.

### Rationale

Innovations and advancement of knowledge in the sustainable management, production and use of biological resources (micro-organism, plants, animals), will provide the basis for new, sustainable, safe, eco-efficient and competitive products for agriculture, fisheries, feed, food, health, forest based and related industries. In line with the European strategy on life sciences and biotechnology<sup>11</sup>, this will help increase the competitiveness of European biotechnology and food companies, in particular high tech SMEs, while improving social welfare and well-being. Research into the safety of food and feed chains, diet related diseases, food choices and the impact of food and nutrition on health will help to fight food related disorders (e.g. obesity, allergies) and infectious diseases (e.g. transmissible spongiform encephalopathies, avian-flu), while making important contributions to the implementation of existing and the formulation of future policies and regulations in the area of public, animal and plant health and consumer protection.

The diversity and mainly small size of the European industries in these areas, while being one of its strengths and an opportunity, leads to fragmented approaches to similar problems. These are better addressed by increased collaboration and sharing of expertise, for example on new methodologies, technologies, processes and standards that result from changing Community legislation.

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<sup>10</sup> The term "bio-economy" includes all industries and economic sectors that produce, manage and otherwise exploit biological resources and related services, supply or consumer industries, such as agriculture, food, fisheries, forestry, etc.

<sup>11</sup> "Life sciences and biotechnology – A strategy for Europe" - COM(2002) 27.

Several European Technology Platforms contribute in setting common research priorities, in fields such as plant genomics and biotechnology, forestry and forest based industries, global animal health, farm animal breeding, food and industrial biotechnology. The research will also provide the knowledge base needed to support<sup>12</sup>: the Common Agricultural Policy and European Forest Strategy; agriculture and trade issues; safety aspects of GMOs; food safety regulations; Community animal health, disease control and welfare standards; and the Common Fisheries Policy reform aiming to provide sustainable development of fishing and aquaculture. In view of social relevance, a flexible response to new policy needs is also foreseen, in particular with respect to new risks and social or economic trends and needs.

### **Activities**

- **Sustainable production and management of biological resources from land, forest, and aquatic environments:** Enabling research, including 'omics' technologies, such as genomics, proteomics, metabolomics, systems biology and converging technologies for micro-organisms, plants and animals, including exploitation of their biodiversity; improved crops and production systems, including organic farming, quality production schemes and monitoring and assessment of GMO impacts on environment and humans; sustainable, competitive and multifunctional agriculture, and forestry; rural development; animal health and welfare, breeding and production; plant health; sustainable and competitive fisheries and aquaculture; infectious diseases in animals, including zoonoses and their pathogenic mechanisms; other threats to the sustainability and security of food production, including climate change; safe disposal of animal waste; conservation, management and exploitation of living aquatic resources, development of tools (including ICT tools) needed by policy makers and other actors in areas such as agriculture, fisheries and aquaculture and rural development (landscape, land management practices etc.); socioeconomic and ethical contexts of production.

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<sup>12</sup> Complementary research relating to the sustainable management and conservation of natural resources is addressed under the "Environment (including Climate Change)" theme.

- **"Fork to farm": Food, health and well being:** Consumer, societal, industrial and health as well as traditional aspects of food and feed, including behavioural and cognitive sciences; nutrition, diet related diseases and disorders, including childhood and adult obesity and allergies; nutrition in relation to the prevention of diseases (including increased knowledge about the health bringing compounds and properties of food); innovative food and feed processing technologies (including packaging and technologies from non-food fields); improved quality and safety, both chemical and microbiological, of food, beverage and feed; enhanced food safety assurance methodologies; integrity (and control) of the food chain; physical and biological environmental impacts on and of food/feed chains; total food chain concept (including seafood and other food raw materials and components); traceability and its further development; authenticity of food; development of new ingredients and products.
- **Life sciences and biotechnology for sustainable non-food products and processes:** Improved crops and forest resources, feed-stocks, marine products and biomass (including marine resources) for energy, environment, and high added value products such as materials and chemicals (including biological resources utilisable in pharmaceutical industry and medicine), including novel farming systems, bio-processes and bio-refinery concepts; bio-catalysis; forestry and forest based products and processes; environmental bioremediation and cleaner processing, the utilisation of agro industrial wastes and by-products.

### 3. Information and Communication Technologies

#### Objective

Improve the competitiveness of European industry and enable Europe to master and shape the future developments of Information and Communication Technologies (ICT) so that the demands of its society and economy are met. Activities will strengthen Europe's scientific and technology base and ensure its global leadership in ICT, help drive and stimulate innovation through ICT use and ensure that ICT progress is rapidly transformed into benefits for Europe's citizens, businesses, industry and governments.

## **Rationale**

Information and Communication Technologies are critical to Europe's future and underpin the realisation of the Lisbon agenda. They have a catalytic impact in three key areas: productivity and innovation, modernisation of public services and advances in science and technology. Half of the productivity gains in our economies are explained by the impact of ICT on products, services and business processes. ICT is the leading factor in boosting innovation and creativity and in mastering change in value chains across industry and service sectors. ICT is essential to meet the rise in demand for health and social care and to modernise services in domains of public interest such as education, cultural heritage, security, energy, transport and the environment. And ICT is catalytic in the advance of other fields of science and technology as it transforms the way researchers conduct their research, co-operate and innovate.

The escalating economic and societal demands, together with the continued mainstreaming of ICT and the need to push further the technology limits set a growing agenda for research. To bring technology closer to people and organisational needs means: hiding technology complexity and revealing functionality on demand; making technology very simple to use, available and affordable; providing new ICT-based applications, solutions and services that are trusted, reliable, and adaptable to the users' context and preferences. Driven by the demand of more-for-less, ICT researchers are involved in a global race to achieve further miniaturisation, to master the convergence of computing, communications and media technologies, including further interoperability between systems and the convergence with other relevant sciences and disciplines, and to build systems that are able to learn and evolve.

From these diverse efforts a new wave of technologies is emerging. ICT research activities will also draw on a broader range of scientific and technological disciplines including bio- and life sciences, psychology, pedagogy, cognitive and social sciences and the humanities.

ICT is one the most research intensive sectors. The ICT research effort, public and private, represents a third of the total research effort in all major economies. Although Europe already enjoys industrial and technological leadership in key ICT fields it lags in investing in ICT research behind its major competitors. Only through a renewed and more intensive pooling of the effort at European level will we be able to make the most of the opportunities that progress in ICT can offer.

The ICT research activities will be closely articulated with policy actions for ICT deployment and with regulatory measures within a comprehensive and holistic strategy. Priorities have been set following extensive consultations including input from a series of European Technology Platforms and industrial initiatives in areas such as nano-electronics, microsystems, embedded systems, mobile and wireless communications, electronic media, robotics and software, services and Grids.

## **Activities**

The role of research into Future and Emerging Technologies is particularly relevant under this theme to support research at the frontier of knowledge in core ICTs and in their combination with other relevant areas and disciplines; to nurture novel ideas and radically new uses and to explore new options in ICT research roadmaps, including the exploitation of quantum effects, system integration and smart systems.

- **ICT Technology Pillars:**

- *Nano-electronics, photonics and integrated micro/nano-systems*: pushing the limits of miniaturisation, integration, variety, storage and density; increasing performance and manufacturability at lower cost; facilitating incorporation of ICT in range of applications; interfaces; upstream research requiring exploration of new concepts.
- *Ubiquitous and unlimited capacity communication networks*: ubiquitous access over heterogeneous networks - fixed, mobile, wireless and broadcasting networks spanning from the personal area to the regional and global area - allowing the seamless delivery of ever higher volumes of data and services anywhere, anytime.
- *Embedded systems, computing and control*: powerful, secure and distributed, reliable and efficient computing, storage and communication systems and products that are embedded in objects and physical infrastructures and that can sense, control and adapt to their environment; interoperability of discrete and continuous systems.
- *Software, Grids, security and dependability*: dynamic, adaptive, dependable and trusted software and services, platforms for software and services, complex systems and new processing architectures, including their provision as a utility.

- *Knowledge, cognitive and learning systems*: semantic systems; capturing and exploiting knowledge embedded in web and multimedia content; bio-inspired artificial systems that perceive, understand, learn and evolve, and act autonomously; learning by convivial machines and humans based on a better understanding of human cognition.
  - *Simulation, visualisation, interaction and mixed realities*: tools for innovative design and creativity in products, services and digital media, and for natural, language-enabled and context-rich interaction and communication.
  - *New perspectives in ICT drawing on other science and technology disciplines*, including insights from physics, biotechnologies, materials- and life-sciences, for miniaturisation of ICT devices to sizes compatible and interacting with living organisms, to increase performance and user-friendliness of systems engineering and information processing, and for modelling and simulation of the living world.
- **Integration of Technologies:**
    - *Personal environments*: personal communication and computing devices, accessories, wearables, implants; their interfaces and interconnections to services and resources.
    - *Home environments*: communication, monitoring, control, assistance; seamless interoperability and use of all devices; interactive digital content and services.
    - *Robotic systems*: advanced autonomous systems; cognition, control, action skills, natural interaction; miniaturisation, humanoid technologies.
    - *Intelligent infrastructures*: tools making infrastructures that are critical to everyday life more efficient and user-friendly, easier to adapt and maintain, more robust to usage and resistant to failures.

- **Applications Research:**

- *ICT meeting societal challenges:* New systems, novel materials, structures, technologies and services in areas of public interest improving quality, efficiency, access and inclusiveness; user friendly applications, integration of new technologies and initiatives such as ambient assisted living.
  - for *health*, improving disease prevention and health care provisions, early diagnosis, treatment and personalisation; autonomy, safety, monitoring and mobility of patients; health information space for knowledge discovery.
  - to improve *inclusion* and equal participation and prevent digital divides; assistive technology for elderly and for disabled people; design-for-all.
  - for *mobility*; intelligent ICT-based transportation systems, vehicles and intelligent service solutions for tourism enabling people and goods to move safely, ecologically, comfortably and efficiently.
  - in support of the environment, risk management and sustainable development, to prevent or reduce vulnerability and to mitigate the consequences of natural disasters, industrial accidents and human activities related to economic development.
  - for *governments*; efficiency, openness and accountability, for a world-class public administration and links to citizens and businesses, supporting democracy, allowing access to information to all.
- *ICT for content, creativity and personal development:*
  - new *media* paradigms and new forms of content, including entertainment; creation of interactive digital content; enriched user experiences; cost-effective content delivery; digital rights management; hybrid media.
  - technology-enhanced *learning*; adaptive and contextualised learning solutions; active learning.
  - ICT-based systems to support accessibility and use over time of digital *cultural* and scientific resources and assets, in a multilingual environment.

- *ICT supporting businesses and industry:*
  - new forms of dynamic networked co-operative *business* processes, digital eco-systems; optimised *work* organisation and collaborative work environments such as knowledge sharing and interactive services (e.g. for tourism).
  - *Manufacturing, including traditional industries:* rapid and adaptive design, production and delivery of highly customised goods; digital and virtual production; modelling, simulation and presentation tools; miniature and integrated ICT products;
- *ICT for trust and confidence:* identity management; authentication and authorization; privacy enhancing technologies; rights and asset management; protection against cyber threats.

#### **4. Nanosciences, Nanotechnologies, Materials and new Production Technologies**

##### **Objective**

Improve the competitiveness of European industry and generate knowledge to ensure its transformation from a resource-intensive to a knowledge-intensive industry, by generating step changes in knowledge and implementing decisive knowledge for new applications at the crossroads between different technologies and disciplines. This will benefit both new, high-tech industries and higher-value, knowledge-based traditional industries, with a special focus to the appropriate dissemination of RTD results to SMEs. These activities are concerned with enabling technologies which impact all industrial sectors and many other FP7 Themes.

## **Rationale**

The increasing difficulties affecting many industrial activities appears no longer to be limited to traditional sectors with a high labour intensity, but is beginning to be observed in intermediate sectors – which constitute the established strengths of European industry – and even in some high-technology sectors. A strong industrial base must be maintained by strengthening the knowledge content in the existing industry as well as building, in Europe, a strong knowledge-based, knowledge intensive industry, stressing the exploitation of basic research for industrial applications. This will include the modernisation of the existing SME base and the creation and subsequent growth of new knowledge-driven SMEs, from the dissemination of knowledge and expertise through collaborative programmes.

The competitiveness of the industry of the future will largely depend on nanotechnologies and their applications. RTD in nano-sciences and nanotechnologies taken up by several areas can accelerate European industry's transformation. The EU has recognised leadership in fields such as in nanosciences, nanotechnologies, materials and production technologies which must be strengthened in order to secure and increase the EU position in a highly competitive global context.

Industry relevant priorities and their integration for sectoral applications can be established through activities like the European Technology Platforms in fields such as nanoelectronics, manufacturing, steel, chemistry, the transport industry, construction, industrial safety, textiles, forest-based industry and nano-medicine. This will help establish common research priorities and targets. In addition by responding flexibly to new policy needs that arise during the lifetime of FP7, the relevant policy, regulatory and standardisation, and impact issues will be addressed.

## Activities

- **Nano-sciences, Nano-technologies**

- Generating new knowledge on interface and size dependent phenomena; nano-scale control of material properties for new applications; integration of technologies at the nano-scale including monitoring and sensing; self-assembling properties; nano-motors; nano-machines and nano-systems; methods and tools for characterisation and manipulation at nano dimensions; nano and high-precision technologies in chemistry; study and production of nanometre precise components; impact on human safety, health and the environment; metrology, monitoring, nomenclature and standards; exploration of new concepts and approaches for sectoral applications, including the integration and convergence of emerging technologies. Activities will also investigate the impact of nanotechnology on society and the relevance of nanoscience and technology for the solution of societal problems.

- **Materials**

- Generating new knowledge on high-performance surfaces and materials for new products and processes as well as for their repair; knowledge-based materials with tailored properties and predictable performance; more reliable design and simulation; computational modelling; higher complexity; environmental compatibility; integration of nano-micro-macro functionality in the chemical technology and materials processing industries; new nano-materials including nano-composites, bio-materials and hybrid materials, including design and control of their processing, properties and performance.

- **New Production**

- Creating conditions and assets for sustainable knowledge-intensive production, including construction, development and validation of new paradigms responding to emerging industrial needs and fostering the modernisation of the European industry base; development of generic production assets for adaptive, networked and knowledge-based production; development of new engineering concepts exploiting the convergence of technologies (eg, nano, micro, bio, info, cognitive and their engineering requirements) for the next generation of high value-added new or renewed products and services, and adaptation to the changing needs; engage high-throughput production technologies.

- **Integration of technologies for industrial applications**

- Integrating new knowledge, nano- and microtechnologies, materials and production in sectoral and cross sectoral applications such as: health, food, construction and buildings, transport, energy, information and communication, chemistry, environment, textiles and clothing, footwear, forest-based industry, steel, mechanical engineering.

## 5. Energy

### Objective

Adapting the current energy system into a more sustainable one, less dependent of imported fuels based on a diverse mix of energy sources, in particular renewables, energy carriers and non-polluting sources; enhancing energy efficiency, including by rationalising use and storage of energy; addressing the pressing challenges of security of supply and climate change, whilst increasing the competitiveness of Europe's industries.

## **Rationale**

Energy systems are confronted with major challenges. The urgency to develop adequate and timely solutions is justified by the alarming trends in global energy demand (predicted to rise by 60% in the next 30 years), the need to curb dramatically emissions of greenhouse gases to mitigate the devastating consequences of climate change, the damaging volatility of oil prices (in particular for the transport sector which is heavily oil dependent) and geopolitical instability in supplier regions. Research and demonstration are needed to provide the most environmentally and cost-effective technologies and measures enabling the EU to meet its targets under the Kyoto Protocol and beyond and to implement its energy policy commitments, as described in the 2000 Green Paper on the security of energy supply<sup>13</sup> **and the 2006 Green Paper on a European strategy for sustainable competitive and secure energy**<sup>14</sup>.

Europe has developed world leadership in a number of energy technologies. It is the pioneer in modern renewable energy technologies, such as solar energy, bio- and wind energy. The EU is also a global competitor in power generation and distribution technologies and has a strong research capability in the area of carbon capture and sequestration. These positions, however, are under severe threat from competition (in particular from the US and Japan). Therefore Europe must maintain and develop its leading position which requires large efforts and international collaboration.

Radically transforming the energy system requires new technologies with risks that are too high and the benefits too uncertain for private firms to provide all the investment needed for research, development, demonstration and deployment. Public support should therefore play a key role in mobilising private investment and European efforts and resources should be combined in a coherent and more effective manner, to compete with economies that are investing heavily and consistently in similar technologies. European technology platforms play an important role in this regard, by mobilising the necessary research effort in a coordinated manner. The activities to meet the objective are set out below. A specific activity on knowledge for energy policy making is included which may also provide support to new policy needs that emerge, for example relating to the role of European energy policy in the developments of international climate change actions, and instabilities or disruptions in energy supply and price.

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<sup>13</sup> COM(2000) 769.

<sup>14</sup> **COM(2006) 105.**

## **Activities**

- **Hydrogen and fuel cells**

Integrated action to provide a strong technological foundation for competitive EU fuel cell and hydrogen industries, for stationary, portable and transport applications. The Hydrogen and Fuel Cells European Technology Platform helps this activity by proposing an integrated research and deployment strategy.

- **Renewable electricity generation**

Technologies to increase overall conversion efficiency, cost efficiency and reliability, driving down the cost of electricity production from indigenous renewable energy sources, including wastes, and the development and the demonstration of technologies suited to different regional conditions.

- **Renewable fuel production**

Integrated fuel production systems and conversion technologies: to develop and drive down the unit cost of solid, liquid and gaseous (including hydrogen) fuels produced from renewable energy sources including wastes, aiming at the cost-effective production and use of carbon-neutral fuels, in particular biofuels for transport and electricity generation.

- **Renewables for heating and cooling**

Research, development and demonstration of technologies and devices including storage technologies to increase efficiencies and drive down the costs of active and passive heating and cooling from renewable energy sources, ensuring their use in different regional conditions where sufficient potential can be identified.

- **CO2 capture and storage technologies for zero emission power generation**

Research, development and demonstration of technologies to drastically reduce the environmental impact of fossil fuel use aiming at highly efficient and cost effective power generation plants with near zero emissions, based on CO2 capture and storage technologies.

- **Clean coal technologies**

Research, development and demonstration of technologies to substantially improve plant efficiency, reliability and cost through development and demonstration of clean coal conversion technologies, which will be linked to CO2 capture and storage technologies or co-utilisation of biomass.

- **Smart energy networks**

Research, develop and demonstrate how to increase the efficiency, safety, reliability and quality of the European electricity and gas systems and networks notably within the context of a more integrated European energy market e.g. by transforming the current electricity grids into an interactive (customers/operators) service network and to remove obstacles to the large-scale deployment and effective integration of distributed and renewable energy sources.

- **Energy efficiency and savings**

Research, development and demonstration of new concepts, optimisation of proved concepts and technologies to improve energy efficiency and savings for buildings, services and industry. This includes the integration of strategies and technologies for energy efficiency (including co- and polygeneration), the use of new and renewable energy technologies and energy demand management and the realization of climate neutral energy supply of buildings.

- **Knowledge for energy policy making**

Development of tools, methods and models to assess the main economic and social issues related to energy technologies and to provide quantifiable targets and scenarios for medium and long term horizons.

## **6. Environment (including Climate Change)**

### **Objective**

Sustainable management of the environment and its resources through advancing our knowledge on the interactions between the biosphere, ecosystems and human activities, and developing new technologies, tools and services, in order to address in an integrated way global environmental issues. Emphasis will be put on prediction of climate, ecological, earth and ocean systems changes; on tools and technologies for monitoring, prevention, mitigation and adaptation of environmental pressures and risks including on health, as well as for the sustainability of the natural and man-made environment.

### **Rationale**

Environmental problems go beyond national frontiers and require a coordinated approach at a pan-European and often global level. Earth's natural resources and the man-made environment are under intense pressures from growing population, urbanisation, construction, continuous expansion of the agriculture, aquaculture, fisheries, transport and energy sectors, as well as climate variability and warming at local, regional and global scales. Europe needs to engage in a new sustainable relationship with the environment while improving competitiveness and strengthening European industry. EU-wide cooperation is needed to attain critical mass given the scale, scope and high level of complexity of environmental research. It facilitates common planning, the use of connected and inter-operable databases, and the development of coherent and large scale observation and forecasting systems. Research should address the need for data management and information services and problems about data transfer, integration, mapping.

Research is needed at EU level for the implementation of international commitments such as the UN Framework Convention on Climate Change (UNFCCC) and its Kyoto protocol, the UN Convention on Biological Diversity, the objectives of the World Summit on Sustainable Development 2002, including the EU Water Initiative, and contributions to the Intergovernmental Panel on Climate Change and the Earth Observation initiative. In addition there are significant research needs arising from existing and emerging EU level policies, the implementation of the 6<sup>th</sup> Environmental Action Plan and associated thematic strategies (e.g. the EU marine strategy), the action plans, programmes and directives on Environmental Technologies and Environment and Health, the Water Framework and NATURA 2000.

The EU needs to strengthen its position in world markets for environmental technologies. Such technologies contribute to sustainable consumption and production helping to deliver sustainable growth providing eco-efficient solutions to environmental problems at different scales and protecting our cultural heritage. Environmental requirements act as a stimulus for innovation and can provide business opportunities. European Technology Platforms on water supply and sanitation and on sustainable chemistry confirm the need for EU level action and their research agendas are taken into consideration in the activities below. Other Platforms (e.g. on Construction and on Forestry) partially deal with environmental technology issues and are taken into consideration as well. Socio-economic aspects particularly strongly influence the development and introduction of environmental technologies to the market and their subsequent application as for example in water resources management. Activities shall consider the socio-economic aspects of policies and technological developments, whenever relevant to the topic.

A series of activities are listed below<sup>15</sup> many of which are directly relevant to policy needs. However, additional support may be provided to new policy needs that emerge, for example relating to sustainability impact assessments of EU policies; the follow up of the post-Kyoto action on Climate Change; and new environmental policies such as in the European Soil Strategy and in maritime policy, standards and regulations.

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<sup>15</sup> Complementary research relating to the production and use of biological resources is addressed under the "Food, Agriculture and Biotechnology" theme.

## **Activities**

- **Climate change, pollution and risks**

- *Pressures on environment and climate:* Functioning of climate and the earth system including the polar regions; adaptation and mitigation measures; pollution in air, soil and water; changes in atmospheric composition and water cycle; interactions between climate, land surface, ice and the ocean; and impacts on biodiversity and ecosystems.
- *Environment and health:* Interaction of environmental stressors with human health including identification of sources, biomonitoring research for environment related health, indoor air quality and links to indoor environment, urban environment, car emissions and impact and emerging risk factors; integrated risk assessment methods for hazardous substances including alternatives to animal testing; quantification and cost-benefit analysis of environmental health risks and indicators for prevention strategies.
- *Natural hazards:* Improve prediction and integrated hazards- vulnerability - and risk assessments for disasters related to geological hazards (such as earthquakes, volcanoes, tsunamis) and climate (such as storms, forest fires, droughts, floods and other extreme events); develop early warning systems and improve prevention and mitigation strategies.

- **Sustainable Management of Resources**

- *Conservation and sustainable management of natural and man-made resources and biodiversity* : ecosystems; water resources management; waste management and prevention; protection and management of biodiversity, soil, seabed and coastal areas protection, approaches against desertification and land degradation; sustainable use and management of forests; sustainable management and planning of urban environment, including post-industrialized zones; data management and information services; assessment and foresight relating to natural processes.
- *Management of marine environments:* Impacts of human activities on the marine environment and its resources; pollution and eutrophication in regional seas and coastal areas; deep sea ecosystems; assessment of marine biodiversity trends, of ecosystem processes and of ocean circulation; seabed geology. Development of strategies, concepts and tools for a sustainable use of the ocean and its resources.

- **Environmental Technologies**

- *Environmental technologies for observation, simulation, prevention, mitigation, adaptation, remediation and restoration of the natural and man-made environment*: related to water, climate, air, marine, urban and rural environment, soil, waste treatment, recycling, clean production processes, chemicals safety.
- *Protection, conservation and enhancement of cultural heritage, including human habitat: improved damage assessment on cultural heritage, development of innovative conservation strategies, foster integration of cultural heritage in the urban setting.*
- *Technology assessment, verification and testing*: Methods and tools for environmental risk and lifecycle assessment of processes, technologies and products; support for sustainable chemistry, forest-based sector technology, water supply and sanitation Platforms<sup>16</sup>; scientific and technological aspects of a future European environmental technologies verification and testing programme.

- **Earth observation and assessment tools**

- *Earth and ocean observation systems and monitoring methods for the environment and sustainable development*: Contribute to the development and integration of observation systems for environmental and sustainability issues in the framework of GEOSS (to which GMES is complementary); interoperability between systems and optimisation of information for understanding, modelling and predicating environmental phenomena.
- *Forecasting methods and assessment tools for sustainable development*: modelling links between economy/environment/society including market based instruments, externalities, thresholds and developing the knowledge base and methodologies for sustainability impact assessment on key issues such as land use and marine issues; urban development, social and economic tensions related to climate change.

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<sup>16</sup> The research agendas of relevant European Technology Platforms will be taken into account in the different activities.

## 7. Transport (including Aeronautics)

### Objective

Based on technological and operational advances and on the European transport policy, develop integrated, safer, "greener" and "smarter" pan-European transport systems for the benefit of the citizen, society and climate policy, respecting the environment and natural resources; and securing and further developing the competitiveness attained by the European industries in the global market.

### Rationale

Transport is one of Europe's strengths - the air transport sector contributes to 2.6% of the EU GDP (with 3.1 million jobs) and the surface transport field generates 11% of the EU GDP (employing some 16 million persons). However, transport is responsible for 25% of all the EU emissions of CO<sub>2</sub>, hence the absolute need for a "greening" of the system to ensure more sustainable transport patterns and compatibility with growth rates, as developed in the White Paper on "European Transport Policy for 2010: time to decide".<sup>17</sup>

The enlargement (increasing land surface by 25% and population by 20%) and economic development of the EU present new challenges for transporting people and goods efficiently, cost-effectively and in a sustainable manner. Transport also has direct relevance on other major policies such as trade, competition, employment, environment, cohesion, energy, security and the internal market. Investment in RTD in EU transport industries is a prerequisite to ensure technological competitive advantage in global markets.<sup>18</sup> Activities at European level will also stimulate the restructuring of the industry, including the integration of the supply chain and in particular SMEs.

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<sup>17</sup> COM(2001) 370.

<sup>18</sup> The European aeronautics industry invests 14% of its turnover in research, the European car industry almost 5% of its turnover; and the EU shipbuilding industry competitive advantage relies exclusively on RTD.

The research agendas developed by European Technology Platforms<sup>19</sup> support the need to take a new "transport systems" perspective that considers the interactions of vehicles, transport networks and the use of transport services, which can only be developed at European level. RTD costs in all these fields are rising substantially, and collaborative activity at EU-level is essential to enable a "critical mass" of diverse RTD providers to address the scale and multi-disciplinary challenges in a cost-effective way, as well as meeting the political, technological and socio-economic challenges on issues such as the "clean and safe vehicle" of the future, interoperability and intermodality with particular reference to waterborne and rail transport, affordability, safety, capacity, security and environmental impacts in an enlarged Union. Also, developing technologies in support of the Galileo system and its applications will be essential in implementing European policies.

As well as the strong industry relevance of the themes and activities set out below, the needs of policy makers will be addressed in an integrated way covering economic, social and environmental aspects of transport policy. In addition, support will be provided to respond to existing as well as new policy needs, for example relating to developments in maritime policy or implementation of the European Single Sky.

## **Activities**

- **Aeronautics and air transport**

- *The greening of air transport:* reduction of emissions, including green house gases and noise disturbance, incorporating work on engines and alternative fuels, structures and new aircraft designs, airport operations and traffic management.
- *Increasing time efficiency:* improvement of the efficiency of operating schedules focusing on innovative air traffic management systems in line with the effective implementation of Single Sky policy which integrate air, ground and space components, including traffic flow and more aircraft autonomy.
- *Ensuring customer satisfaction and safety:* improvement of passenger comfort, innovative in-flight services and more efficient passenger handling; improvement of all safety aspects of air transport; wider choice of aircraft ranging from wide body to small size vehicles.

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<sup>19</sup> ACARE: Advisory Council for Aeronautics Research in Europe. Launched in 2001, it is the first operational example of a Technology Platform; ERRAC: European Rail Research Advisory Council; ERTRAC: European Road Transport Research Advisory Council; WATERBORNE Technology Platform.

- *Improving cost efficiency*: reduction of costs associated with product development, manufacturing and operating costs focusing on zero maintenance aircraft, increased use of automation and simulation.
  - *Protection of aircraft and passengers*: enhancement of protection measures for the traveller, crew, aircraft and air transport system such as improved data and identification methods, protecting the aircraft against attack, improved security design of aircraft.
  - *Pioneering the air transport of the future*: addressing the longer term challenges of aviation with more radical, environmentally efficient and innovative combinations of technologies which would lead to significant steps forward in air transport.
- **Surface transport (rail, road and waterborne)**
    - *The greening of surface transport*: reduction of environmental and noise pollution, including green house gases; reducing the impact of transport on climate change by reducing emissions through technological and socio-economic means as well as user training; development of clean and efficient engines and power-trains, including hybrid technology and the use of alternative fuels for transport applications; end of life strategies for vehicles and vessels.
    - *Encouraging and increasing modal shift and decongesting transport corridors*: development of sustainable innovative, intermodal and interoperable regional and national transport networks, infrastructures and systems in Europe; cost internalisation; information exchange between vehicle/vessel and transport infrastructure; optimisation of infrastructure capacity; modal shift strategies to encourage energy efficient means of transport.
    - *Ensuring sustainable urban mobility for all citizens including the disadvantaged*: innovative organisation schemes, including clean and safe vehicles and non-polluting means of transport, new high quality public transportation modes and rationalisation of private transport, communication infrastructure, integrated town planning and transport including their relationship with growth and employment.
    - *Improving safety and security*: as inherent to the transport system, in transport operations for drivers, passengers, crew, cyclists and pedestrians, as well as for freight, in the design and operation of vehicles, vessels, and within the total transport system.
    - *Strengthening competitiveness*: improvement of design processes; development of advanced power-train and vehicle and vessel technologies; innovative and cost-effective production systems and infrastructure construction and maintenance; integrative architectures.

- **Support to the European global satellite navigation system (Galileo):** precise navigation and timing services for use in a range of sectors; efficient use of satellite navigation and support to the definition of second generation technologies and applications.

## 8. **Socio-Economic Sciences and the Humanities**

### **Objective**

Generating an in-depth, shared understanding of complex and interrelated socio-economic challenges Europe is confronted with, such as growth, employment and competitiveness, social cohesion, social, cultural and educational challenges in an enlarged EU and sustainability, migration and integration, quality of life and global interdependence, in particular with the view of providing an improved knowledge base for policies in the fields concerned.

### **Rationale**

Europe has a strong and high quality research base in socio-economic sciences and the humanities fields. The diversity of approaches within the EU in the economic, social, political and cultural domains provides a highly fertile ground for research in these fields at EU-level. There is a high European added value in collaborative research addressing European socio-economic and socio-cultural issues in the areas mentioned. First, the issues and challenges concerned are of high priority at the European level and are addressed by Community policies. Second, comparative research across EU or other countries offers a particularly effective tool as well as important learning opportunities across countries and regions.

Third, EU-level research has particular advantages in being able to develop Europe-wide data collection and to employ the multiple perspectives needed to understand complex issues. Finally, the development of a genuinely European socio-economic knowledge base on these key challenges will make an essential contribution to promoting their shared understanding across the European Union and, most significantly, on the part of the European citizens.

The activities to be supported are listed below and are expected to contribute significantly to improve the formulation, implementation, impacts and assessments of policy and the definition of regulatory measures in a wide range of areas such as economic, social, cultural, education and training, enterprise, international trade, consumer, external relations, official statistics policies and the creation of the area of freedom, security and justice. In addition, opportunities will be provided to address emerging socio-economic challenges as well as to undertake research on new or unforeseen policy needs. Use may also be made of social platforms to discuss future research agendas.

### **Activities**

- **Growth, employment and competitiveness in a knowledge society:** developing and integrating research on the issues affecting growth, socio-economic stability, employment and competitiveness, covering topics such as innovation, education including life-long learning and the role of scientific and other knowledge on a global scale, youth and youth policy, adaptation of labour market policies, and national institutional contexts.
- **Combining economic, social and environmental objectives in a European perspective:** by addressing the two key and highly interrelated issues of continuing evolution of European socio-economic models and economic and social cohesion in an enlarged EU, taking into account sustainability and the protection of the environment, sustainable urban planning, the interaction between environment, energy and society and the role of cities and metropolitan regions.
- **Major trends in society and their implications:** such as demographic change including ageing and its effects on pension systems, migration and integration, analysing the implications of the demographic change for urban development; lifestyles, work, families, gender issues, health and quality of life; economic consumer protection; criminality; the role of business in society and population diversity, cultural interactions multicultural issues and issues related to protection of fundamental rights and the fight against discrimination of any kind.
- **Europe in the world: understanding changing** interactions, cross cultural relations and interdependencies between world regions and their implications; and addressing emerging threats and risks without undermining human rights, freedom and well-being.

- **The citizen in the European Union:** in the context of the future development of the EU, addressing the issues of achieving a sense of democratic "ownership" and active participation by the peoples of Europe; effective and democratic governance at all levels including economic and legal governance; research for building a shared understanding and respect for Europe's diversities and commonalities in terms of culture, religions, cultural heritage, institutions and legal systems, history, languages and values as building elements of our European multi-cultural identity and heritage.
- **Socio-economic and scientific indicators:** their use in policy and its implementation and monitoring, the improvement of existing indicators, techniques to analyse them and the development of new ones for this purpose and for the evaluation of research programmes, including indicators based on official statistics.
- **Foresight activities** on major science, technology and related socio-economic issues such as the future demographic trends and the globalization of knowledge and evolution of research systems, as well as of the future developments in and across major research domains and scientific disciplines.

## 9. Space

### Objective

Supporting a European Space Programme focusing on applications such as GMES with benefits for citizens and for the competitiveness of the European space industry. This will contribute to the development of a European Space Policy, complementing efforts by Member States and by other key players, including the European Space Agency.

## **Rationale**

The Community can contribute in this field to the better definition of common objectives based on user requirements and policy objectives; to the coordination of activities, to avoid duplications and maximise interoperability; to improving cost-effectiveness and to the definition of standards. Public authorities and decision-makers represent important potential users and the European industry will also benefit from a well defined European Space policy implemented through a European Space Programme, supported in part by the proposed research and technological development actions. European level actions are also needed to support Community policy objectives, for example in the fields of agriculture, forestry, fisheries, environment, telecommunications, security, transport as well as ensuring that Europe is a respected partner in regional and international cooperation.

In the last 40 years, Europe, nationally and through ESA, has built up excellent technological competence. Sustaining a competitive industry (including manufacturers, service providers and operators) requires new research and technologies. Space applications bring important benefits to the citizens.

The activities set out below aim at: the efficient exploitation of space assets for the implementation of applications, namely GMES (Global Monitoring for Environment and Security) and their contribution to law enforcement in Community policies; as well as space exploration, allowing international cooperation opportunities and dramatic technological breakthroughs;. exploitation and exploration of space supported through enabling activities guaranteeing the strategic role of the European Union. These activities will be complemented by other actions included in the Competitiveness and Innovation Framework Programme and in the Education and Training Programme. The public policy benefits of the below activities will also be maximised, included additional support for new policy needs that may arise, for example: space based solutions in support of developing countries; and use of space-observation tools and methods to support developments in Community policies.

## **Activities**

- **Space-based applications at the service of the European Society**

- GMES: development of satellite-based monitoring and early-warning systems, including for the safety of citizens, and techniques relating to the management of the environment and security (including the management of natural disasters) and their integration with ground-based, ship-borne and airborne components; support to the use and delivery of GMES data and services.
- Innovative satellite communication services, seamlessly integrated in the global electronic communication networks, for citizens and enterprises in application sectors encompassing civil protection, e-government, telemedicine, tele-education, search and rescue, tourism and leisure time, personal navigation, fleet management, agriculture and forestry, meteorology and generic users.
- Development of monitoring technologies and systems for reducing the vulnerability of space-based services and for contributing to the surveillance of space.

- **Exploration of space**

- Providing R&D support and maximising scientific added value through synergies with initiatives of ESA or national space agencies in the field of space exploration; facilitating the access to scientific data.

- **RTD for strengthening space foundations**

- Space research and development for long term needs including space transportation; research activities to increase the competitiveness and cost-effectiveness of the European space technology sector.
- Space sciences including life and physical sciences in space.

## 10. Security

### Objective

To develop the technologies and knowledge for building capabilities needed to ensure the security of citizens from threats such as terrorism, natural disasters, and crime, while respecting fundamental human rights; to ensure optimal and concerted use of available technologies to the benefit of civil European security, to stimulate the co-operation of providers and users for civil security solutions, improving the competitiveness of the European security industry and delivering mission-oriented research results to reduce security gaps.

### Rationale

Security in Europe is a precondition of prosperity and freedom. The EU Security Strategy: 'A Secure Europe in better World', adopted by the European Council, addresses the need for a comprehensive security strategy encompassing both civil and defence-related security measures.

Security related research is an important building block for realising a high level of security within the area of freedom, security and justice. It will also contribute to developing technologies and capabilities in support of other Community policies in areas such as transport, civil protection, energy and environment. Security research needs specific implementation rules to take into account its special nature.

Existing security related research activities in Europe suffer from the fragmentation of efforts, the lack of critical mass of scale and scope and the lack of connections and interoperability. Europe needs to improve the coherence of its efforts by developing efficient institutional arrangements and by instigating the various national and international actors to co-operate and co-ordinate in order to avoid duplication and to explore synergies wherever possible. Security research at Community level will maintain an exclusively civil orientation and focus on activities of clear added value to the national level. As a consequence, civil security research within the Seventh Framework Programme will reinforce the competitiveness of the European security industry. Recognising that there are areas of 'dual-use' technology, close coordination with the activities of European Defence Agency (EDA) will be needed in order to ensure complementarity.

The non defence activities set out below will complement and integrate the technology- and systems-oriented research relevant to civil security which is carried out in other themes. They will be mission-oriented, developing the technologies and capabilities as required by the specific security missions. They are by design flexible so as to accommodate as yet unknown future security threats and related policy needs that may arise, stimulating cross-fertilisation and the take-up of existing technologies for the civil security sector, European security research will also encourage the development of multi-purpose technologies in order to maximise the scope for their application.

### **Activities**

- **Security of citizens**: delivering technology solutions for civil protection, including bio-security and protection against risks arising from crime and terrorist attacks.
- **Security of infrastructures and utilities**: analysing and securing existing and future public and private critical/networked infrastructure (e.g. in transport, energy, ICT), systems and services (including financial and administrative services).
- **Intelligent surveillance and border security**: focusing on technologies and capabilities to enhance the effectiveness and efficiency of all systems, equipment, tools and processes required for improving the security of Europe's land and coastal borders, including border control and surveillance issues.
- **Restoring security and safety in case of crisis**: focusing on technologies in support of diverse emergency management operations (such as civil protection, humanitarian and rescue tasks), and on issues such as inter-organisational preparation, co-ordination and communication, distributed architectures and human factors.

The above four areas will be supported by the following themes of a more cross-cutting nature:

- **Security systems integration, interconnectivity and interoperability**: focusing on technologies to enhance the interoperability of systems, equipment, services and processes, including law enforcement, firefighting, civil defence and medical information infrastructures, as well as on the reliability, organisational aspects, protection of confidentiality and integrity of information and traceability of all transactions and processing.

- **Security and society:** mission orientated research which will focus on socio-economic and cultural analyses, scenario building and activities related to: cultural, social and economic dimensions of security, the communication with the society, the citizen's perception of security, ethics, protection of privacy, societal foresight and systemic risk analysis. Research will also address technologies that better safeguard privacy and liberties, and will address vulnerabilities and new threats, as well as the management and impact assessment of possible consequences.
- **Security research co-ordination and structuring:** co-ordination of European and international security research efforts and development of synergies between civil, security and defence research, improvement of legal conditions, and encouragement to the optimal use of existing infrastructures.

## II IDEAS

### Objective

**This programme will enhance the dynamism, creativity and excellence of European research at the frontier of knowledge. This will be done by supporting "investigator-driven" research projects carried out across all fields by individual teams in competition at the European level. Projects will be funded on the basis of proposals presented by researchers on subjects of their choice and evaluated on the sole criterion of excellence as judged by peer review.**

### Rationale

Investigator-driven "frontier" research, within the framework of activities commonly understood as "basic research", is a key driver of wealth and social progress, as it opens new opportunities for scientific and technological advance, and is instrumental in producing new knowledge leading to future applications and markets.

Despite many achievements and a high level of performance in a large number of fields, Europe is not making the most of its research potential and resources, and urgently needs a greater capacity to generate knowledge.

A Europe-wide competitive funding mechanism (in addition to and not replacing national funding) for frontier research executed by individual teams, which may be of national or transnational character, is a key component of the European Research Area, complementing other Community and national activities. It will help reinforce the dynamism and attractiveness of Europe for the best researchers from both European and third countries, and for industrial investment.

### Activities

This action will respond to the most promising and productive areas of research and the best opportunities for scientific and technological progress, within and across disciplines, including engineering and social sciences and the humanities. It will be implemented independently of the thematic orientations of the other parts of the Framework Programme, and will pay attention to young researchers and new groups as well as established teams.

The Community activities in frontier research will be implemented by a European Research Council (ERC), consisting of an independent scientific council, supported by a lean and cost-effective dedicated implementation structure.

The scientific council will consist of representatives of the European scientific community at the highest level, acting in their personal capacity, independently of political or other interests. Its members will be appointed by the Commission following an independent procedure for their identification. The scientific council will, inter alia, oversee decisions on the type of research to be funded and act as guarantor of the quality of the activity from the scientific perspective. Its tasks will cover, in particular, the development of the annual work programme, the establishment of the peer review process, as well as the monitoring and quality control of the programme's implementation from the scientific perspective.

The dedicated implementation structure will be responsible for all aspects of implementation and programme execution as provided for in the annual work programme. It will, in particular, implement the peer review and selection process according to the principles established by the scientific council and will ensure the financial and scientific management of the grants.

The implementation and management of the activity will be reviewed and evaluated on an ongoing basis to assess its achievements and to adjust and improve procedures on the basis of experience. In the context of the interim evaluation referred to in Article 7.2, an independent review will also be carried out of the ERC's structures and mechanisms, against the criteria of scientific excellence, autonomy, efficiency and transparency and with the full involvement of the scientific council. The review will explicitly look at the advantages and disadvantages of a structure based on an Executive Agency and a structure based on Article 171 of the Treaty. On the basis of this review, these structures and mechanisms should be modified as appropriate. The Commission will ensure that all the necessary preparatory work is undertaken and presented with a view to a transition to any modified structure required, as soon as possible.

The Commission will act as the guarantor of the ERC's full autonomy and integrity.

### III PEOPLE

#### **Objective**

Strengthening, quantitatively and qualitatively, the human potential in research and technology in Europe, by stimulating people to enter into the researcher's profession, encouraging European researchers to stay in Europe, and attracting to Europe researchers from the entire world, making Europe more attractive to the best researchers. This will be done by putting into place a coherent set of "Marie Curie" actions, addressing researchers at all stages of their careers, from initial research training to life-long learning and career development.

#### **Rationale**

Abundant and highly trained qualified researchers are a necessary condition to advance science and to underpin innovation, but also an important factor to attract and sustain investments in research by public and private entities. Against the background of growing competition at world level, the development of an open European labour market for researchers and the diversification of skills and career paths of researchers are crucial to support a beneficial circulation of researchers and their knowledge, both within Europe and in a global setting.

Mobility, both trans-national and intersectoral, including stimulating industrial participation and the opening of research careers and academic positions at European scale, is a key component of the European Research Area and indispensable to increase European capacities and performances in research. International competition between researchers will remain central in order to ensure highest quality of research under this activity. To ensure training and mobility within new research and technology areas, appropriate coordination with other parts of the Framework Programme will be ensured.

## Activities

- **Initial training of researchers** to improve their career perspectives, in both public and private sectors, including through the broadening of their scientific and generic skills, and attracting more young researchers to scientific careers. This will be implemented through Marie Curie Networks with the main objective to overcome fragmentation of and to strengthen at European level the initial training and career development of researchers. Members of the trans-national networks shall exploit their complementary competencies through integrated training programmes. Support will comprise recruitment of early stage researchers, organisation of training events also open to researchers outside the network and senior chairs and/or industry positions for knowledge transfer and supervision.
- **Life-long training and career development** to support the career development of experienced researchers. With a view to complementing or acquiring new skills and competencies or to enhance inter/multidisciplinarity and/or inter-sectoral mobility, support is foreseen for researchers with particular needs for additional/complementary competences and skills, for researchers to resume a research career after a break and for (re)integrating researchers into a longer term research position in Europe, including in their country of origin, after a trans-national/international mobility experience. This action line will be implemented through both individual fellowships awarded directly at Community level and through the co-financing of regional, national or international programmes where this fulfils the criteria of European added value, transparency and openness.
- **Industry-academia pathways and partnerships:** Support to longer term co-operation programmes between organisations from academia and industry, in particular SMEs, aims at increasing knowledge sharing through joint research partnerships, supported by the recruitment of experienced researchers to the partnership, by staff secondments between both sectors, and by the organisation of events.

- **The international dimension**, to increase the quality of European research by attracting research talent from outside Europe and fostering mutually beneficial research collaboration with researchers from outside Europe. This will be addressed through international outgoing fellowships (with an in-built mandatory return phase); international incoming fellowships; partnerships to support the exchange of researchers. Common initiatives between European organisations and organisations from countries neighbouring the EU and countries with which the Community has a Science and Technology agreement will also be supported. The activity will include measures to counter the risk of "brain drain" from developing countries and emerging economies and measures to create networks of European researchers working abroad. These actions will be implemented in line with the international activities under the "Co-operation" and "Capacities" Programmes.
- **Specific actions** to support the creation of a genuine European labour market for researchers, by removing obstacles to mobility and enhancing the career perspectives of researchers in Europe. Furthermore, awards to improve the public awareness of Marie Curie actions and their objectives will be provided.

## IV CAPACITIES

This part of the Framework Programme will enhance research and innovation capacities throughout Europe and ensure their optimal use. This aim will be achieved through:

- Optimising the use and development of research infrastructures.
- Strengthening innovative capacities of SMEs and their ability to benefit from research.
- Supporting the development of regional research-driven clusters.
- Unlocking the research potential in the EU's convergence and outermost regions.
- Bringing science and society closer together for the harmonious integration of science and technology in European society.
- Support to the coherent development of research policies.
- Horizontal actions and measures in support of international co-operation.

### RESEARCH INFRASTRUCTURES

#### **Objective**

Optimising the use and development of the best research infrastructures existing in Europe, and helping to create in all fields of science and technology new research infrastructures of pan-European interest needed by the European scientific community to remain at the forefront of the advancement of research, and able to help industry to strengthen its base of knowledge and its technological know how.

#### **Rationale**

Research infrastructures play an increasing role in the advancement of knowledge and technology and their exploitation. The importance of such infrastructures is already well established in areas such as energy, space and particle physics and is increasing in other areas. For example, radiation sources, data banks in genomics and data banks in social science, observatories for environmental and space sciences, systems of imaging or clean rooms for the study and development of new materials or nano-electronics, are at the core of research. They are expensive, need a broad range of expertise to be developed, and should be used and exploited by a large community of scientist and customer industries on a European scale.

The development of a European approach with regard to research infrastructures, including computing and communication based *e*-infrastructures and virtual infrastructures, and the carrying out of activities in this area at Union level, can make a significant contribution to boosting European research potential and its exploitation.

While Member States' role will remain central in the development and financing of infrastructures, the Community can and should play a catalysing and leveraging role by helping to ensure wider and more efficient access to, and use of, the infrastructures existing in the different Member States, by stimulating the development of these infrastructures, and their networking, in a coordinated way and by fostering the emergence of new research infrastructures of pan-European interest in the medium to long term. In this respect, the European Strategy Forum on Research Infrastructures (ESFRI) plays a key role in identifying needs and a roadmap for European research infrastructures.

### **Activities**

Activities carried out in this field will be executed in the whole field of science and technology. They will be implemented in close cooperation with the activities taking place in the thematic areas to ensure that all the actions undertaken at European level in the Community framework respond to the needs for research infrastructures in their respective area including international cooperation.

The activities will be the following:

- **Support to existing research infrastructures**
  - *trans-national access* to ensure that European researchers may have access to the high performing research infrastructures to conduct their research, irrespective of the location of the infrastructure;
  - *integrating activities* to structure better, on a European scale, the way research infrastructures operate in a given field and promote their coherent use and development;
  - *research e-infrastructure* by fostering the further development and evolution of high-capacity and high-performance communication and grid infrastructures and reinforcing European computing capabilities, as well as encouraging the adoption by user communities where appropriate, enhancing their global relevance and increasing the level of trust and confidence, building on the achievements of GEANT and Grid infrastructures.

- **Support to new research infrastructures**
- *Construction of new infrastructures and major upgrades of existing ones focussing mainly on preparatory phases*, to promote the **emergence** of new research **facilities**, in accordance with the principle of "variable geometry", building primarily upon the work conducted by ESFRI<sup>20</sup>.
- *design studies*, through a bottom-up approach of calls for proposals, to promote the creation of new research infrastructures by funding exploratory awards and feasibility studies for new infrastructures.

Infrastructures projects proposed for funding in this respect will be identified on the basis of a series of criteria including in particular:

- Inability of existing mechanisms to achieve the objective.
- Added value of Community financial support.
- Capacity to offer a service in response to the needs of users from the scientific (academic and industrial) community throughout Europe, including added value to the European Research Area.
- Scientific excellence.
- Relevance at international level.
- Technological and organisational feasibility.
- Possibilities for European partnership and strong financial and other commitment of **Member States and other** major stakeholders.
- Construction and operating costs evaluated.

As far as the construction of new infrastructures is concerned, an efficient coordination of the Community financial instruments, Framework Programme and Structural Funds in particular, will be ensured.

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<sup>20</sup> The European Strategy Forum on Research Infrastructures (ESFRI) was launched in April 2002. ESFRI brings together representatives from the 25 EU Member States, appointed by Ministers in charge of Research, and a representative of the European Commission. The countries associated with the Framework Programme for Research were invited to join in 2004.

## RESEARCH FOR THE BENEFIT OF SMEs

### Objectives

Strengthening the innovation capacity of European SMEs and their contribution to the development of new technology based products and markets by helping them outsource research, increase their research efforts, extend their networks, better exploit research results and acquire technological know how.

### Rationale

SMEs are at the core of European industry. They should be a key component of the innovation system and in the chain of transformation of knowledge into new products, processes and services. Faced with an increasing competition in the internal market and globally, European SMEs need to increase their knowledge and research intensity, expand their business activities on larger markets and internationalize their knowledge networks. Most Member states actions relevant to SMEs do not encourage and support trans-national research cooperation and technology transfer. Actions at EU level are necessary to complement and enhance the impact of actions undertaken at national and regional level. In addition to the actions listed below, the participation of SMEs will be encouraged and facilitated, and their needs taken into account, across the Framework Programme.

### Activities

Specific actions in support to SMEs are conceived to support SMEs or SME associations in need of outsourcing research: mainly low to medium tech SMEs with little or no research capability.

Research intensive SMEs may participate as providers of research services or outsource research to complement their core research capability. Actions will be carried out in the entire field of science and technology with a bottom-up approach. Financial means will be allocated through two schemes:

- **Research for SMEs:** To support small groups of innovative SMEs to solve common or complementary technological problems
- **Research for SME associations:** To support SME associations and SME groupings to develop technical solutions to problems common to large numbers of SMEs in specific industrial sectors or segments of the value chain.

**The clear focus will be to support research projects.** In addition, support will be granted to national schemes providing financial means to SMEs or SME associations to prepare proposals for actions under "Research for the benefit of SMEs". **During the implementation of the Community RTD Framework Programme, complementarity and synergy will be ensured with the actions of the Competitiveness and Innovation Framework Programme.**

The Competitiveness and Innovation Programme will encourage and facilitate the participation of SMEs in the Framework Programme through its horizontal services in support of business and innovation.

## **REGIONS OF KNOWLEDGE**

### **Objectives**

**Strengthening the research potential of European regions, in particular by encouraging and supporting the development, across Europe, of regional "research-driven clusters" associating universities, research centres, enterprises and regional authorities.**

### **Rationale**

Regions are increasingly recognised as important players in the EU's research and development landscape. Research policy and activities at regional level often rely on the development of "clusters" associating public and private actors. The *Pilot Action on "Regions of Knowledge"* demonstrated the dynamic of this evolution and the necessity to support and encourage the development of such structures.

The actions undertaken in this area will enable European regions to strengthen their capacity for investing in RDT and carry out research activities, while maximising their potential for a successful involvement of their operators in European research projects.

## **Activities**

The new *Regions of Knowledge* initiative will involve and bring together regional actors involved in research such as universities, research centres, industry, public authorities (regional councils or regional development agencies). Projects will cover joint analysis of research agendas of regional clusters (in coordination with other activities on the broader issue of regional innovation clusters) and the elaboration of a set of instruments to address them in specific research activities, including through "mentoring" of regions with a less developed research profiles by highly developed ones.

This will comprise measures aiming at improving research networking and access to sources of research funding as well as better integration and linking of research actors and institutions in regional economies. These activities will be implemented in close relationship with Community regional policy and the Competitiveness and Innovation Programme and the Education and Training Programmes.

In the context of the specific activity of "Regions of Knowledge" synergies will be sought with the Community regional policy as well as with relevant national and regional programmes, in particular with regard to convergence and outermost regions.

## **RESEARCH POTENTIAL**

### **Objective**

**Stimulating the realisation of the full research potential of the enlarged Union by unlocking and developing existing or emerging excellence in the EU's convergence regions and outermost regions<sup>21</sup>, and helping to strengthen the capacities of their researchers to successfully participate in research activities at Community level.**

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<sup>21</sup> Convergence regions are those set out in Article 5 of the proposal for a Council Regulation laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund - COM(2004) 492. This includes "convergence" objective regions, regions eligible for funding from the Cohesion fund, and outermost regions.

## **Rationale**

Europe does not fully exploit its research potential, in particular in less advanced regions remote from the European core of research and industrial development. In order to help researchers and institutions, whether in the public or private sector, of these regions to contribute to the overall European research effort, while taking advantage of the knowledge and experience existing in other regions of Europe, this action aims at establishing the conditions that will allow them to exploit their potential and will help to fully realise the European Research Area in the enlarged Union. The actions will build on past and existing measures such as the European Centres of Excellence in the then Accessing and Candidate Countries in the Fifth Framework Programme and Marie Curie Host Fellowships for the Transfer of Knowledge.

## **Activities**

The action in this domain will comprise support to:

- Trans-national two-way secondments of research staff between selected organisations in the convergence regions, and one or more partner organisations; support to selected centres of existing or emerging excellence for the recruitment of incoming experienced researchers from other EU Member States and associated countries;
- The acquisition and development of research equipment and the development of a material environment enabling a full exploitation of the intellectual potential present in the selected centres of existing or emerging excellence in the convergence regions;
- The organisation of workshops and conferences to facilitate knowledge transfer; promotion activities as well as initiatives aiming at disseminating and transferring research results in other countries and on international markets.
- "Evaluation facilities" through which any research centre in the convergence regions can obtain an international independent expert evaluation of the level of their overall research quality and infrastructures.

Strong synergies will be sought with the Community regional policy. Actions supported under this heading will identify needs and opportunities for reinforcing the research capacities of emerging and existing centres of excellence in convergence regions which may be met by Structural and Cohesion funds.

## **SCIENCE IN SOCIETY**

### **Objective**

With a view to building an open, effective and democratic European Knowledge society, the aim is to stimulate the harmonious integration of scientific and technological endeavour, and associated research policies in the European social web, by encouraging at European scale reflection and debate on science and technology, and their relation with the whole spectrum of society and culture.

### **Rationale**

The influence of science and technology on our daily lives becomes increasingly profound. Products of the social activity and shaped by social and cultural factors, science and technology nevertheless remain a remote domain far from the daily concerns of a large part of the public and of policy decision makers, and continues to be the subject of misunderstandings. Contentious issues relating to emerging technologies should be addressed by society on the basis of well informed debate leading to sound choices and decisions.

### **Activities**

The substantial and integrated initiative undertaken in this field will comprise support to:

- Strengthening and improvement of the European science system, including the following questions: improving the use and monitoring the impact of scientific advice and expertise; access to scientific results and the future of scientific publications; promoting trust and "self regulation".

- Broader engagement of researchers and the public at large, including organised civil society, on science-related questions, to anticipate and clarify political and societal issues, including ethical issues.
- Reflection and debate on science and technology and their place in society, drawing on disciplines such as history, sociology and philosophy of science and technology.
- Gender research, including the integration of the gender dimension in all areas of research and the role of women in research.
- Creation of an environment which triggers curiosity for science in young people, by reinforcing science education at all levels including schools and promoting interest and participation in science among young people from all backgrounds.
- Strengthening the role of research based in universities and other higher education institutes and their engagement in the challenges of globalisation.
- Improved communication between the scientific world and the wider audience of policy-makers, the media and the general public, by helping scientists better communicate their work and by supporting scientific information and media.

These activities will take the form of, in particular, research projects, studies, networking and exchanges, public events and initiatives, prizes, surveys and data collection. In many cases they will imply international partnerships with organisations from third countries.

## **SUPPORT TO THE COHERENT DEVELOPMENT OF RESEARCH POLICIES**

### **Objectives**

Enhancing the effectiveness and coherence of national and Community research policies and their articulation with other policies, improving the impact of public research and its links with industry, and strengthening public support and its leverage effect on investment by private actors.

## **Rationale**

Increasing investment in research and development up to the 3% objective and improving its effectiveness is a top priority of the Lisbon strategy for growth and employment. Thus, developing effective policies to leverage public and private research investments constitute a major concern of public authorities with a view to accelerate the transition towards a competitive knowledge based economy. This calls for adaptability of research policies, the mobilisation of a broader range of instruments, coordination of efforts across national boundaries and the mobilisation of other policies to create better framework conditions for research.

## **Activities**

The activities undertaken under this heading will complement the coordination activities under the Cooperation programme and will aim at improving the coherence and impact of regional, national and Community policies and initiatives (e.g. funding programmes, legislation, recommendations and guidelines). The activities will be the following:

- Monitoring and analysis of research related public policies and industrial strategies and development of indicators to provide information and evidence in support of the design, implementation, evaluation and trans-national coordination of policies.
- Strengthening, on a voluntary basis, the coordination of research policies via actions to support the implementation of the open method of co-ordination (OMC) and bottom-up trans-national cooperation initiatives undertaken at national or regional level on issues of common interest.

## **ACTIVITIES OF INTERNATIONAL CO-OPERATION**

To become competitive and play a leading role at world level, the European Community needs a strong and coherent international science and technology policy.

This international policy has two interdependent objectives:

- To support European competitiveness through strategic partnerships with third countries in selected fields of science and by engaging the best third country scientists to work in and with Europe.
- To address specific problems that third countries face or that have a global character, on the basis of mutual interest and mutual benefit.

Cooperation with third countries in the Framework Programme will be targeted in particular at the following groups of countries:

- Candidate countries;
- Countries neighbouring the EU, Mediterranean partner countries, Western Balkans and the Eastern European, Caucasus and Central Asian countries (EECCA) <sup>22</sup>;
- Developing countries, focusing on the particular needs of each country or region concerned; <sup>23</sup>
- Emerging economies. <sup>36</sup>

The theme-oriented international cooperation actions are carried out under the "Cooperation" programme. The international actions in the area of human potential are carried under the "People" programme.

Under the "Capacities" programme, horizontal support actions and measures with a focus other than a specific thematic or interdisciplinary area covered in "Cooperation" programme, will be implemented, and could be supplemented, in a limited number of cases, by specific cooperation actions of mutual interest. Efforts will be undertaken to improve the coherence of national activities by supporting the co-ordination of national programmes on international scientific co-operation. The overall coordination of the international cooperation actions under the different programmes of the Framework Programme, **as well as with other Community instruments**, will be ensured.

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<sup>22</sup> Formerly called the New Independent States: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. Activities regarding EECCA countries currently undertaken by INTAS will be subsumed in the relevant cooperation activities under this heading.

<sup>23</sup> Noting that Latin America includes both developing countries and emerging economies.

## NON NUCLEAR ACTIONS OF THE JOINT RESEARCH CENTRE

### **Objective**

To provide customer driven scientific and technical support to the Community policy making process, ensuring support to the implementation and monitoring of existing policies and responding to new policy demands.

### **Rationale**

The JRC's independence of special interests, whether private or national, combined with its technical expertise enable it to facilitate communication and consensus building between stakeholders (industry associations, environmental action groups, Member States' competent authorities, other research centres etc.) and policy makers, especially at the Community level. Through scientific and technological support the JRC helps to make the Community policy process more effective, transparent and based on sound science.

The usefulness and credibility of the JRC's support to Community policies is closely linked to the quality of its scientific expertise and its integration in the international scientific community. The JRC will therefore continue investing in research and networking with other centres of excellence in relevant fields. It will participate in indirect actions in all its aspects with emphasis on common scientific reference systems, networking, training and mobility, research infrastructure and participation in Technology Platforms and co-ordination instruments where it has the relevant expertise to produce added value.

The JRC will actively pursue promoting the integration of New Member States and Candidate Countries in its activities to the level currently enjoyed by the EU15.

## **Activities**

The JRC's priorities will be in fields which are strategically important for the Union and where its input provides high added value. Scientific and technical support to Community policies will continue to be delivered in core areas such as sustainable development, climate change, food, energy, transport, chemicals, alternative methods to animal testing, research policy, information technologies, reference methods and materials, biotechnology, risks, hazards and socio-economic impacts. Growth will be in areas of key concern for the Community:

- **Prosperity in a knowledge-intensive society**

- To carry out and develop advanced econometric modelling and analysis techniques in the context of policy definition and monitoring such as the follow-up of the Lisbon agenda, the Internal Market and the Research and Education Policies.
- To develop models to support a new balance between sustainability objectives and competitiveness in a responsible way.

- **Solidarity and responsible management of resources**

- To become a recognised S&T reference centre on sustainable agriculture focusing on food quality, traceability and safety (including GM food and feed), spatial management and cross-compliance and to support the implementation of the CAP.
- To provide S&T support to the Common Fisheries Policy.
- To enhance the provision of harmonised European geo-referenced data and spatial information systems (support to INSPIRE) and to continue developing new approaches to global environmental and resources monitoring (support to GMES).
- To support the implementation of the EU Action Plan on Environment and Health including providing support to on-going activities to establish a Community integrated Environment and Health information system.

- **Freedom, security and justice**
  - To develop activities contributing to the establishment of the area of freedom, security and justice, especially in areas related to protection against terrorism, organised crime and fraud, border security and prevention of major risks, in cooperation with relevant bodies.
  - To support the Community response to natural and technological disasters.
  
- **Europe as world partner**
  - To strengthen support to Community external policies in specific areas such as external aspects of internal security, development cooperation and humanitarian aid.

**INDICATIVE BREAKDOWN AMONG PROGRAMMES**

The indicative breakdown among programmes is as follows (in EUR million):

<b>Cooperation</b> * <sup>24, 25</sup>	<b>32315</b>
Health	6000
Food, Agriculture and Biotechnology	1935
Information and Communication Technologies	9120
Nanosciences, Nanotechnologies, Materials and new Production Technologies	3505
Energy	2300
Environment (including Climate Change)	1900
Transport (including Aeronautics)	4195
Socio-economic Sciences and the Humanities	610
Space	1430
Security	1320
<b>Ideas</b>	<b>7460</b>
<b>People</b>	<b>4728</b>
<b>Capacities</b>	<b>4267</b>
Research Infrastructures *	1900
Research for the benefit of SMEs	1336
Regions of Knowledge	126
Research Potential	370
Science in Society	280
Coherent development of research policies	70
Activities of International Co-operation	185
<b>Non-nuclear actions of the Joint Research Centre</b>	<b>1751</b>
<b>TOTAL</b>	<b>50521</b>

<sup>24</sup> Including Joint Technology Initiatives (including financial plan, etc) and the part of the coordination and international cooperation activities to be funded within the themes.

<sup>25</sup> **The aim will be to enable at least 15% of the funding available under the "Cooperation" part of the programme to go to SMEs.**

\* Including a contribution to the European Investment Bank for the constitution of the "Risk-Sharing Finance Facility" referred to in Annex III. The Council decisions adopting the contributing specific programmes will establish (a) their maximum contribution to the grant, and (b) the modalities under which the Commission will decide on the reallocation of incomes generated by the grant and of any of its leftovers during the lifetime of the seventh framework programme.

**The amount of up to 1 billion EURO for the RSFF is to be matched by an equivalent amount from the EIB. The amount will be made available progressively to the EIB taking account of the level of demand. It will come from the specific programmes "Cooperation" (up to 800 million EURO by proportional contribution of all thematic priorities, except socio-economic research) and "Capacities" (up to 200 million EURO from the research infrastructure line).**

## **FUNDING SCHEMES**

### Indirect Actions

The activities supported by the 7<sup>th</sup> Framework Programme will be funded through a range of "Funding schemes". These schemes will be used, either alone or in combination, to fund different categories of actions implemented throughout the Framework Programme.

The decisions for specific programmes, work programmes and calls for proposals will mention, as and when appropriate:

- The type(s) of scheme(s) used to fund different categories of actions;
- The categories of participants (such as research organisations, universities, industry , SMEs, public authorities) which can benefit from it;
- The types of activities (research, development, demonstration, training, dissemination, transfer of knowledge and other related activities) which can be funded through each of them.

Where different funding schemes can be used, the work programmes may specify the funding scheme to be used for the topic on which proposals are invited.

The funding schemes are the following:

- a) To support actions which are primarily implemented on the basis of calls for proposals:

### **1. Collaborative projects**

Support to research projects carried out by consortia with participants from different countries, aiming at developing new knowledge, new technology, products or common resources for research. The size, scope and internal organisation of projects can vary from field to field and from topic to topic. Projects can range from small or medium-scale focused research actions to large-scale integrating projects for achieving a defined objective. Projects may also be targeted to special groups such as SMEs.

### **2. Networks of Excellence**

Support to joint research programmes implemented by a number of research organisations integrating their activities in a given field, carried out by research teams in the framework of longer term co-operation. The implementation of these joint programmes will require a formal commitment from the organisations integrating part of their resources and their activities.

### **3. Coordination and support actions**

Support to activities aimed at coordinating or supporting research activities and policies (networking, exchanges, trans-national access to research infrastructures, studies, conferences, etc). These actions may also be implemented by means other than calls for proposals.

### **4. Individual projects**

Support to projects carried out by individual national or transnational research teams. This scheme will mainly be used to support investigator-driven "frontier" research projects funded in the framework of the European Research Council.

### **5. Support for training and career development of researchers**

Support for training and career development of researchers, mainly used for the implementation of the Marie Curie actions.

### **6. Research for the benefit of specific groups (in particular SMEs)**

Support to research projects where the bulk of the research is carried out by universities, research centres or other legal entities, for the benefit of specific groups, in particular SMEs or associations of SMEs.

- b) To support actions implemented on the basis of decisions by the Council and the European Parliament (or by the Council in consultation with the European Parliament), based on a proposal from the Commission, the Community will provide financial support to multi-financed large-scale initiatives.
- A financial contribution from the Community to the joint implementation of well identified national research programmes, on the basis of Article 169 of the Treaty. This joint implementation will require the establishment or existence of a dedicated implementation structure. Community financial support will be provided subject to the definition of a financing plan based on formal commitments from competent national authorities.
  - A financial contribution from the Community to the implementation of Joint Technology Initiatives to realise objectives that cannot be achieved through the funding schemes identified in point 1 above. Joint Technology Initiatives will mobilise a combination of funding of different nature and from different sources, private and public, European and national. This funding can take different forms and can be allocated or mobilised through a range of mechanisms: support from the Framework Programme, loans from the European Investment Bank, support to risk capital. Joint Technology Initiatives may be decided and implemented on the basis of Article 171 of the Treaty (this may include the creation of joint undertakings) or through the Specific Programme Decisions. Community support will be provided subject to the definition of an overall blueprint of financial engineering, based on formal commitments from all parties concerned.
  - A financial contribution from the Community to the development of new infrastructures of European interest. This contribution may be decided on the basis of Article 171 of the Treaty or through the Specific Programme Decisions. The development of new infrastructures will mobilise a combination of funding of different nature and origin: national funding, Framework Programme, Structural funds, loans from the European Investment Bank and others. Community support will be provided subject to the definition of an overall financial plan based on a formal commitment from all parties concerned.

The Community will implement the funding schemes in compliance with the provisions of the regulation to be adopted pursuant to Article 167 of the Treaty, the relevant State Aid instruments, in particular the Community framework for state aid to research and development, as well as international rules in this area. In compliance with this international framework, it will be necessary to be able to adjust the scale and form of financial participation 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 European Investment Bank (EIB).

In addition to direct financial support to participants in RTD actions, the Community will improve their access to debt finance through the "Risk-Sharing Finance Facility" by providing a **contribution** to the EIB. The Community grant shall be used by the EIB, which will be a risk sharing partner, to contribute to the provisioning and capital allocation for loan and guarantee financing from its own resources. There will be no liability for the Community budget. Subject to and in accordance with modalities to be established by the regulation adopted pursuant Article 167 of the Treaty and the Council decisions adopting the specific programmes, this mechanism will enable the EIB to increase the amount of financing of European RTD actions (such as joint technology initiatives, large projects-including Eureka projects, and new research infrastructures) to help overcome market deficiencies.

In the case of participants to an indirect action established in a region lagging in development (convergence regions and outermost regions<sup>26</sup>), complementary funding from the Structural Funds will be mobilised wherever possible and appropriate. In the case of participation of entities from the candidate countries, an additional contribution from the pre-accession financial instruments could be granted under similar conditions. As regards actions in the "research infrastructures" part of the "capacities" programme of the 7<sup>th</sup> Framework Programme, the detailed funding arrangements for these will be defined with a view to ensuring that there is effective complementarity between community research funding and other Community and national instruments, notably the Structural Funds.

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<sup>26</sup> Convergence regions are those set out in Article 5 of the proposal for a Council Regulation laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund - COM(2004) 492. This includes "convergence" objective regions, regions eligible for funding from the Cohesion fund, and outermost regions.

## Direct actions

The Community will undertake activities implemented by the Joint Research Centre, which are referred to as direct actions.

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