



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 13.9.2007  
COM(2007)519 final

**REPORT FROM THE COMMISSION**

**Annual Report on research and technological development activities of the European Union in 2006**

{SEC(2007)1153}

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## Annual Report on research and technological development activities of the European Union in 2006

(Text with EEA relevance)

### 1. INTRODUCTION

This Annual Report covers developments and activities during 2006. It has been prepared pursuant to Article 173 of the Treaty establishing the European Community<sup>1</sup>, and Article 4 of the decision on the Sixth Framework Programme.<sup>2</sup>

The report is accompanied by a Commission Staff Working Document, which provides more detailed reporting and statistics. The main chapters are on the activities and results achieved in 2006 and on developments in research and technological development (RTD) activities in the Member States of the European Union.

### 2. COMMUNITY RESEARCH AND TECHNOLOGICAL DEVELOPMENT ACTIVITIES

#### 2.1. Political achievements

Research, and on a broader basis, the knowledge triangle (research, education and innovation) constitutes a cornerstone of the revitalised Lisbon Strategy. Within the context of the new momentum for prosperity, sustainable development and enhanced competitiveness, stability and security, European Research policy globally attained its 2006 objectives related to the launch of Seventh Framework Programme (FP7), the conclusion of FP6 and policy initiatives towards the European Research Area.

The 2006 Commission's Legislative and Work Programme highlighted the need to unlock Europe's potential through policy delivery and respect of better regulatory principles. In 2006, the Integrated Innovation/Research Action Plan continued to be implemented. This Action Plan, adopted in 2005, calls for a major upgrade of the conditions for research and innovation in Europe, through initiatives such as the redeployment of state aid, improved efficiency of intellectual property protection, the mobilisation of additional funds for research, the creation of innovation poles and the enhancement of university-industry partnerships. Improving the

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<sup>1</sup> "At the beginning of each year the Commission shall send a report to the European Parliament and the Council. The report shall include information on research and technological development activities and the dissemination of results during the previous year, and the work programme for the current year."

<sup>2</sup> Decision No 1513/2002/EC of 27 June 2002. Article 4 "In the context of the annual report to be submitted by the Commission pursuant to Article 173 of the Treaty, the Commission shall report in detail on progress with implementing the sixth framework programme, and in particular progress towards achieving its objectives and meeting its priorities...; information on financial aspects and the use of instruments shall also be included".

conditions for private sector investment in R&D and innovation is essential for achieving the 3% Barcelona objective.

The Broad-Based Innovation Strategy for Europe concerning the translation of investments in knowledge into innovative products and services, which was adopted by the Commission in September and endorsed by the Council in November 2006, includes ten priority actions, six of which are directly related to Research. One of the priority actions concerns the establishment of the European Institute of Technology (EIT). The EIT aims at contributing to the development of the Community and Member States innovation capacity. It will complement existing Community and national policies and initiatives by fostering the integration of the knowledge triangle across the EU. The European Council of June 2006 invited the Commission to prepare a formal proposal for the establishment of the EIT. The Commission presented its proposal on the EIT on 18 October 2006. The European Council of 14-15 December 2006 delivered a clear mandate for thorough Council discussions on the EIT proposal that should be drawn to a conclusion by the end of 2007. In addition, priority actions include notably the development of a strategy for innovation-friendly 'lead markets', which was proposed in the report made by the expert group led by former Finnish Prime Minister, Esko Aho, "Creating an Innovative Europe". The Aho Group, set up in the context of the follow up of the Hampton Court Summit in October 2005, delivered its report in January 2006.

Another priority of the broad-based innovation strategy concerns the creation of an open, single and competitive labour market for researchers. A yearly implementation report reviewed further advancements regarding intra-European, international and inter-sectoral mobility, as well as the career development of researchers at all stages of their careers, following the Mobility Strategy for the ERA, the Communication "One profession, multiple careers", and the Recommendations on a European Charter for Researchers and Code of Conduct for their Recruitment. Other priority areas through which research actively supports the Lisbon process, include the promotion of knowledge transfer between public research organisations and industry, for which guidelines and recommendations have been prepared, a new framework for State aid for research, development and innovation and more effective use of tax incentives in favour of R&D, and a handbook on commercial public procurement to stimulate R&D and innovation. Another major achievement in 2006 for the Lisbon Strategy has been the agreement of Member States to set national targets for R&D expenditure, which were annexed to the conclusions of the Spring European Council of March 2006.

A Communication entitled 'Delivering on the modernisation agenda for universities: education, research and innovation' has been issued and a European strategy on Research Infrastructures developed.

ITER (International Thermonuclear Experimental Reactor) is a prime RTD policy initiative. ITER and 'Privileges and Immunities' Agreements and the Arrangement of the Provisional Application were signed by the Parties (EU, USA, China, India, Russia, Japan and South Korea) in Paris in November 2006, after the initialisation of the process in May and the Council Decision in September. The EU and Japan have further developed their privileged partnership for ITER and Fusion in particular concerning their respective contributions to the complementary 'Broader Approach' activities to be conducted in Japan. A political agreement on the statutes of the European Joint Undertaking was also achieved in December 2006.

Furthermore, the EU Strategic Energy Review, part of the integrated energy and climate change package to cut emission for the 21<sup>st</sup> century, in which research is an important element, has been adopted in early 2007.

Other achievements within the context of international cooperation included the adoption of the recommendations of a Council Decision authorising the Commission to negotiate S&T agreement associating Israel and Switzerland to FP7, the proposal for a Council Decision authorising the Commission to sign an S&T agreement between the EC and Korea and to sign and conclude an agreement for cooperation between the Euratom Community and Korea in the field of fusion energy research. In the area of advanced nuclear systems, the Commission signed the instrument of accession of the Euratom Community to the Framework Agreement of the Generation-IV International Forum, leading to formal accession in May 2006. In the field of Intelligent Manufacturing Systems the Commission adopted the proposal for a Council Decision authorising the conclusion of the renewed and modified agreement on R&D activities between the EC and Australia, Canada, Norway, Switzerland, Korea, Japan, and the USA.

### *2.1.1. Towards the Seventh Framework Programmes*

The adoption and launch of the EC's Seventh Framework Programmes for RTD and the Euratom Seventh Framework Programmes for Nuclear Research and Training Activities has been a major achievement for European Research. After years of preparation and intense negotiations, the main financial and legal instruments for the Commission to contribute to the implementation of the European Research Area for the period 2007 to 2013 were adopted. On 18 and 19 December 2006, the Council, or the Council and the European Parliament, as legislators, adopted the legislative acts concerning the Framework Programmes, the Specific Programmes implementing them, as well as the rules for the participation of undertakings, research centres and universities in action under FP7 and for the dissemination of research results.

The Specific Programmes Cooperation, Ideas, People, Capacities and Euratom and the two specific programmes to be implemented by JRC, were adopted on 19 December. Collaborative research remains a core activity and most thematic priorities are solidly founded on the experience gained through the previous FPs. The Themes identified reflect the key fields of knowledge and technology in which research excellence is particularly important to improve Europe's ability to address the social, economic, public health, environmental and industrial challenges of the future. They are Health, and Food, Agriculture and Fisheries, Biotechnology; Information and Communication technologies; Nanosciences, Nanotechnologies, materials and new production technologies; Energy; Environment; Transport; Socio-Economic Sciences and the Humanities; Space; and Security. New concepts such as the European Research Council (ERC), the Joint Technology Initiatives and large infrastructure investments are of particular interest, together with the continuous efforts to fight the 'brain drain' and favour the 'brain gain' in Europe. The research potential scheme to exploit research excellence in convergence regions, and the risk sharing finance facility to increase the availability of European Investment Bank (EIB) loans, are also important new elements.

The establishment of the ERC, the European body to support frontier research, has progressed. Endowed with a substantial budget and independent scientific governance, it represents a dynamic new development. The ERC will be made up of the Scientific Council and its Dedicated Implementation Structure. The scientific strategy is developed according to the orientations of the ERC Scientific Council. The first Call for Proposals for the implementation of the Ideas Programme was launched and the ERC operational mechanisms are being put in place.

It is expected that FP7 will play a fundamental role in stimulating prosperity and welfare in Europe. Ensuring fair and balanced access to FP7 is essential for increasing mutual trust in working together towards a common goal. Simplification has been recognised as a critical success factor and all stakeholders have been invited to contribute with ideas and comments through open consultation. The Rules for Participation, the most visible simplification instrument, have been designed to be as efficient and user-friendly as possible.

CORDIS services were fully migrated to the new EUROPA web site (<http://cordis.europa.eu>); and were revamped to reflect the launching of FP7 with the first annual work programmes under the Specific Programmes adopted by the Commission on 21 December 2006 and the first 42 Calls for Proposals published the following day. With FP7, CORDIS is now the sole trusted source for calls for proposals since only the references of the FP7 calls for proposals are now published in the Official Journal.

## **2.2. Implementation of sixth Framework Programme**

Significant progress has been recorded in 2006, the year of the final commitments under the Sixth Framework Programme (2002-2006), in all domains and horizontal themes of the revised Work Programmes. Most Calls for Proposals have been published as planned and evaluations of proposals led to the negotiation of the last FP6 contracts. Efforts to attract the best researchers and the most innovative companies, organisations and institutions, leading players in structuring the ERA, continued; the most successful schemes included the Marie Curie fellowships and the ERA-NET scheme. Several thousand teams from 99 INCO partner countries have been mobilised in activities across the entire FP6, including specific international cooperation addressing international commitments, such as the Millennium Development Goals, Biodiversity and Desertification conventions.

In the domain of Life science, Genomics and Biotechnology, major actions are continuing in the European & Developing Countries' Clinical Trials Partnership in the fight against AIDS, tuberculosis and malaria. On food quality and safety, most activities relate to the foundations for the implementation of the Knowledge-Based Bio-Economy (KBBE). Following the Communication "Towards a European Strategy for Nanotechnology", the implementation of the Action Plan towards the responsible development of nanosciences and nanotechnologies has advanced. The platform on European manufacturing based on high added-value research and innovation is expected to speed up the rate of industrial transformation in Europe. The implementation of the Environmental Technologies Action Plan is continuing with the development of policy activities notably on sustainable production and consumption. Research on global change and ecosystems, sustainable energy and transport systems continued to make a significant contribution to the reinvigoration of the EU Sustainable Development Strategy and to a broad range of other EU strategies, such as the maritime strategy, the Global Earth Observation System of Systems and the Environment and Health Action Plan.

Substantial progress has been made with the 31 European Technology Platforms (ETP) covering a broad range of areas, from steel to air transport, water, hydrogen and photovoltaic and from nanoelectronics to mutual learning and foresight knowledge, which are instrumental for boosting European industrial competitiveness through strategic research agendas. Joint Technology Initiatives (JTIs) involve a dedicated legal structure for long-term public-private partnerships to ensure that the EU leads in key technology areas. Six JTIs (Innovative medicines, Nanoelectronics, Embedded computing systems, Aeronautics and air transport, Hydrogen and Fuel Cells and Global monitoring for environment and security) are being considered. They involve key industrial partners and are progressing on the basis of a roadmap presented in November 2006.

The capacity to respond to emerging challenges has been demonstrated by the emergency Call for Proposals in response to the avian influenza crisis and work on pandemic flu. The policy-oriented research is being implemented successfully through direct actions performed by the JRC and through SSP (Scientific support to policies) projects related to a wide range of EU policy areas such as environment, sustainability, health, agriculture and fisheries.

The full implementation of New and Emerging Science and Technology (NEST) has generated broad recognition of the quality and innovation of the trans-disciplinary agenda, including fields such as synthetic biology and measuring the impossible.

The regional dimension of the ERA further advanced with the continuation of the pilot action 'Regions of knowledge' and the development of a new activity on trans-national cooperation among regional knowledge clusters ("Regions of Knowledge – 2").

Concerning research infrastructures, support to the development of a European approach for the emergence of new facilities and for the operation and enhancement of existing infrastructures has been provided through several means, in particular through support to ESFRI (European Strategy Forum on Research Infrastructures) strategic activities. It participated, in particular, in the elaboration of the first European Roadmap for Research Infrastructures needed for the next 10 to 20 years. This document, published in October 2006, identifies 35 infrastructure projects. This Roadmap is the result of an intensive two-year consultation and peer review process.

In relation to the Research Fund for Coal and Steel (RFCS), the Council Decision, under preparation, which lays down the multi-annual technical guidelines for the research programme of the RFCS, will lead to the first revision of the technical guidelines.

The scientific, technical, legal and financial monitoring of many actions initiated under previous Framework Programmes, especially FP5, has continued and a number of projects have been finalised. Their scientific and technical results and the socio-economic impact are the subject of an ongoing multi-annual evaluation programme to maximise and optimise their potential in the innovation and policy-making chain. The technology implementation plans are expected to help advance from knowledge to know-how and to facilitate innovation and capital formation.

### **3. DEVELOPMENTS IN MEMBER STATES AND APPLICATION OF THE OPEN METHOD OF COORDINATION**

#### **3.1. Research and the revised Lisbon strategy**

The re-launch of the Lisbon strategy in 2005 has resulted in renewed commitments by all actors to actively pursue a positive economic reform agenda. 2006 has been the first year of implementation of Member States' National Reform Programmes (NRPs). The national targets for R&D investment which have been set by Member States offer a reflection of the contribution Member States intend to make to the overall Lisbon and Barcelona objectives and have been used as a tool to focus policy attention on the structural reforms needed to optimise the input factors to the R&D and innovation process.

Although most Member States have in 2006 shown true commitment to implement their NRPs and a majority of Member States have now established coherent R&D policy strategies, for a number of Member States further policy initiatives will be needed. The renewed impetus given to the Lisbon strategy offers a real opportunity for breakthrough, but to achieve this, it will be necessary to show stronger commitment and faster policy development and implementation.

Boosting private investment in R&D through increasing the leverage effect of public policy continues to be a major challenge. Addressing issues such as strengthening centres of excellence in research, promoting durable public-private partnerships and improving the cooperation and circulation of knowledge between the public research base and private enterprises continue to be crucial in this respect, as is reforming the public research base with a view to increasing its scientific excellence and its responsiveness to the needs of the private sector. In addition, a more systemic approach towards R&D and innovation is to be encouraged, ensuring synergies with other policies in creating an R&D and innovation friendly business environment.

#### **3.2. Progress towards the 3 % objective**

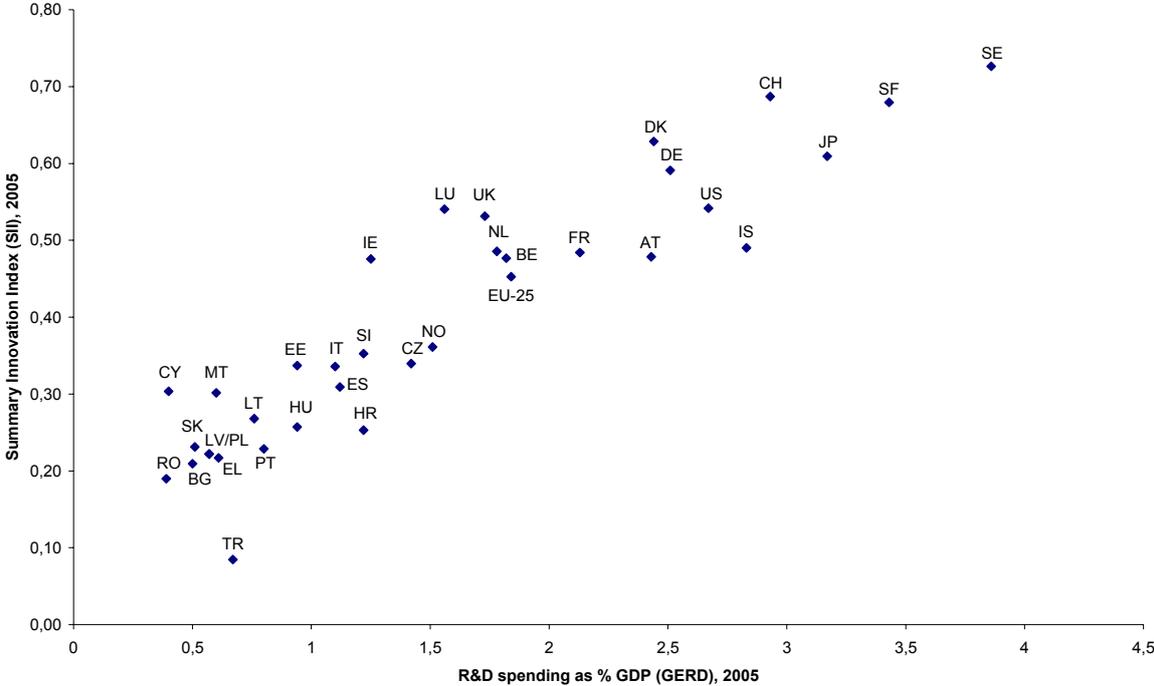
The volume of financial resources allocated to R&D is an indicator of the commitment of a country to the production and exploitation of new knowledge, as well as an element determining a country's innovative performance. As is illustrated by figure 3.1, the Summary Innovation Index (SII), a measure of a country's overall innovative performance, correlates strongly with R&D intensity, indicating that R&D intensity is not merely an input measure, but could possibly also be one of the main determinants of innovation performance.

In 2005, the EU's R&D intensity amounted to 1.84 % GDP, showing no signs of recovery after its stagnation in 2001-2002. It should, however, be noted that the latest available information still predates the renewed commitments made by Member States in the context of the re-launch of the Lisbon strategy.

In terms of R&D intensity, one can distinguish between three groups of countries. A first group contains countries with an R&D intensity above 2.4 % GDP (Sweden, Finland, Denmark, Germany and Austria), having already made important progress towards becoming knowledge based economies. A second group is made up of countries having an intensity close to the EU average with values between 1.5 and 2.1 % GDP (France, Belgium, Netherlands, UK, Luxemburg), indicating that the economies of these countries are

transforming, but that the pace of development should be increased. A third and larger group consists of countries with an R&D intensity below 1.5 % GDP (although differences within this group are large), exhibiting the fact that these countries still need to catch up with the shift towards knowledge intensification.

**Figure 3.1 : Summary Innovation Index versus R&D intensity**



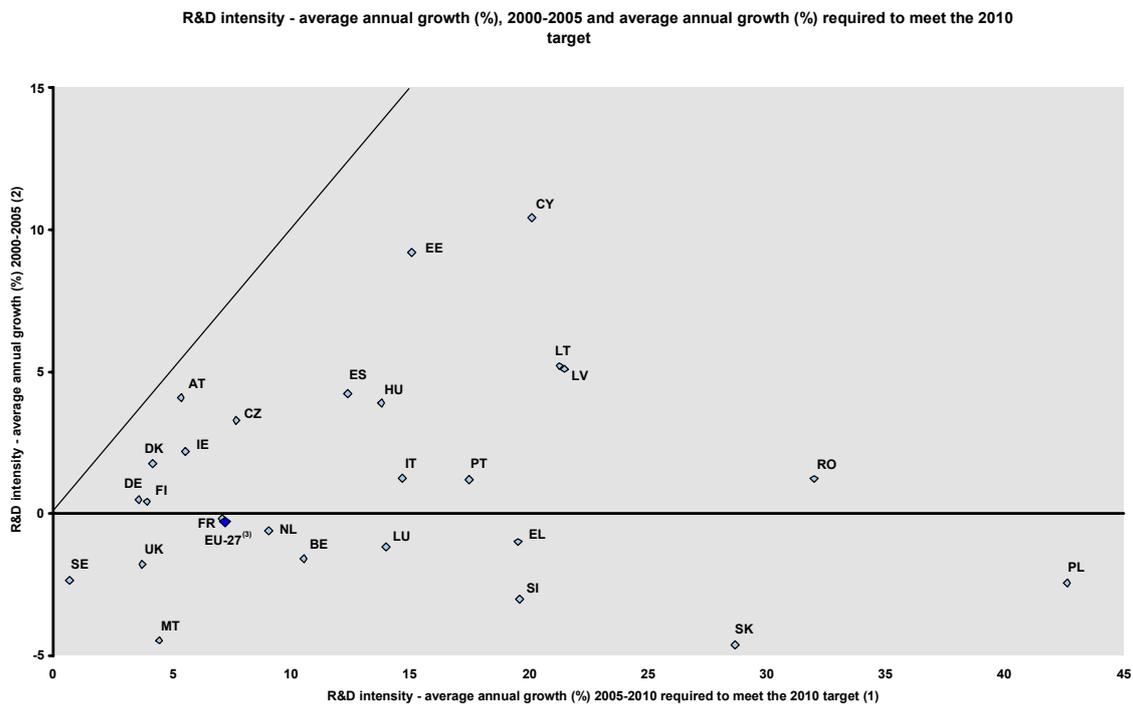
Source R&D intensity : DG Research - Data : EUROSTAT, OECD

Note : R&D intensity data for IT, NL, RO, UK, HR, TR, IS, CH, US, JP are for 2004; data for AT, FI are for 2006

Source SII : European Innovation Scoreboard 2006

Comparing for each Member State the annual rate of growth in R&D intensity required to meet the national target with the rate of growth experienced since 2000 (2000-2005) enables us to assess the ambition of the targets (see figure 3.2). Only a limited number of countries (Austria, Denmark, Ireland, Germany, Finland) have recently experienced rates of growth which would be sufficient to make these countries advance significantly towards their targets. All other countries will need to step up their efforts significantly if they are to deliver on the level of ambition reflected in their targets. The group of countries having recently experienced a negative average rate of growth will need to first reverse a declining trend, meaning that the targets set are extremely ambitious and advancing towards them will require major R&D policy reform packages, commensurate with their targets.

**Figure 3.2: R&D intensity: average annual growth (%) 2000-2005 and average annual growth (%) required to meet the 2010 target**



Data: Eurostat, Member States

Key Figures 2007

Notes: (1) RO : 2004-2009; IT, NL, UK : 2004-2010; PL : 2005-2008; AT, FI : 2006-2010.

(2) IT, NL, RO, UK : 2000-2004; AT, FI : 2000-2006; EL, SE : 2001-2005; MT : 2004-2005.

(3) EU-27 does not include Bulgaria.

(4) IE, PL, RO, UK : R&D intensity targets for 2010 were estimated on the basis of data provided by these countries.

### 3.3. The Open Method of Coordination (OMC)

Looking at recent evolutions in Member States' policy mixes for R&D, the overall view that emerges is that Member States have subscribed to a number of similar objectives and challenges and are, explicitly or implicitly, taking guidance from discussions at the European level (such as through the Open Method of Coordination or as a follow-up of Commission Communications) or through the identification and transfer of good practices identified in other Member States.

CREST (Scientific and Technical Research Committee) adopted its final report on the second cycle of OMC implementation in July 2006. CREST affirmed that the application of the OMC can continue to play an important role in strengthening and aligning Member States' policies to meet the challenge of achieving the Lisbon and Barcelona objectives. In its report, CREST called upon Member States to adopt holistic approaches to research and innovation policy making, including by ensuring an inclusive approach to policy governance and implementation. The results of the CREST group on fiscal measures for R&D were subsequently used as a source of information feeding into the Commission's Communication on how to better make use of tax incentives for stimulating R&D activity.

CREST decided to further develop the OMC work in a third cycle and subsequently engaged in a discussion with a view to selecting appropriate topics. The selected topics were those (policy mixes for R&D, coordinating Structural Funds and the Framework Programme, R&D in services, internationalisation of R&D) where the interest of a large majority of CREST delegations was shown and where Member States displayed a clear will to take ownership of the process and to provide the leadership necessary to drive the discussions to tangible results.

In addition to its work on specific R&D policy issues, in November 2006, CREST engaged in a dedicated mutual learning session on the basis of the National Reform Programmes and their 2006 Progress Reports. In its report on this exercise CREST recognised that the re-launch of the Lisbon strategy had brought about positive effects and called on political decision makers to sustain their commitment to the Lisbon reform process. In the field of R&D policy, CREST concluded that Member States should engage in a continuous cycle of adapting their policies, priorities and strategies in light of new challenges, including by considering coordinated action with other Member States or at the Community level. CREST furthermore acknowledged that much work still needed to be done to bridge the cultural divide between science and industry and recognised the need to make the academic environment more competitive.

#### **4. OUTLOOK FOR THE FUTURE**

All these achievements paved the way for 2007, the first year of implementation of FP7 and a year of major new developments for ERA.

Preparatory work was initiated in the second semester of 2006 in view of launching a debate on new challenges and future perspectives for the European Research Area. This work led to the adoption of the Green Paper 'The European Research Area: New Perspectives' COM(2007)161) on 4 April 2007, on which basis a wide debate and public consultation is now taking place throughout Europe. Building on the debate and consultation results, new initiatives are expected to be proposed in 2008.

#### **5. SOURCES OF FURTHER INFORMATION**

More details are included in the Commission Working Document that accompanies this Report. For further information, the following are publicly available:

- Annual Monitoring Reports for the Framework Programme and Specific Programmes, which provide a concise, independent summary of the progress and quality of the measures taken to implement the programmes.
- Five-year Assessment Reports which examine implementation and achievements of Community research activities over the five previous years.
- Key Figures reports published each year, providing a set of indicators to take stock of Europe's position in science, technology and innovation.
- Statistics on Science and Technology in Europe (Eurostat): statistics on R&D budgets, R&D expenditure, R&D personnel and patents in the Member States, broken down by region.

- Studies and analyses published in connection with the Community RTD programmes and addressing issues specific to the fields of RTD which they cover.

Most of these documents can be obtained or ordered from the Commission's Internet sites:

- The Gateway to the European Union, EUROPA site: [http://europa.eu/index\\_en.htm](http://europa.eu/index_en.htm)
- The CORDIS site containing comprehensive information on the RTD Framework Programme: <http://cordis.europa.eu>
- The site of the Commission's Directorate-General for Research: [http://ec.europa.eu/dgs/research/index\\_en.html](http://ec.europa.eu/dgs/research/index_en.html)
- The site of the Commission's Directorate-General for the Information Society: [http://ec.europa.eu/dgs/information\\_society/index\\_en.htm](http://ec.europa.eu/dgs/information_society/index_en.htm)
- The site of the Commission's Directorate-General for Enterprise: [http://ec.europa.eu/dgs/enterprise/index\\_en.htm](http://ec.europa.eu/dgs/enterprise/index_en.htm)
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- The Joint Research Centre (JRC) site: <http://www.jrc.ec.europa.eu>
- The Eurostat site: <http://epp.eurostat.ec.europa.eu/portal/page>