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REPORT FROM THE COMMISSION

Annual Report on research and technological development activities of the European Union in 2005

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(Text with EEA relevance)

1. INTRODUCTION

This Annual Report covers developments and activities during 2005. It has been prepared pursuant to Article 173 of the Treaty establishing the European Community,¹ and Article 4 of the decision on the Sixth Framework Programme.²

The report is accompanied by an annexed Commission Staff Working Document, which provides more detailed reporting and statistics. The main chapters are on the activities and results achieved in 2005 and on developments in research and technological development activities in the Member States of the European Union. The statistical tables are in a separate annex.

2. COMMUNITY RESEARCH AND TECHNOLOGICAL DEVELOPMENT ACTIVITIES

2.1. Political achievements

By its nature and scale, EU research policy holds the potential of improving the life of European citizens whilst allowing the EU to increase its global competitiveness. It plays a prominent role in the development of the knowledge-based economy and thus in accomplishing the Lisbon objectives and contributing to the Commission's priorities for EU prosperity, employment and growth. In the area of research, the EU pursues two main objectives: creating a European Research Area (ERA) and increasing and improving public and private research efforts in Europe.

At the Spring European Council 2005, the heads of State and government reinforced the Lisbon Strategy with a new partnership for growth and employment, re-boosting the Barcelona objective of dedicating 3% of its Gross Domestic Product (GDP) to research in 2010 compared with 1.9% today. In its Communication 'Building the ERA of knowledge for growth' of 6 April 2005 which sets out the European Research policy objectives for 2007-2013, the Commission reiterated how crucial it is to provide **new impetus to knowledge for**

¹ “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.”

² 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.

sustainable growth to achieve the Lisbon goals. Building up the European Union's capacity to produce knowledge, disseminate it through education, and consolidate it through innovation is now widely acknowledged as the best means for the EU to stimulate economic growth and produce quantitative and qualitative improvements in employment whilst ensuring social progress and protecting the environment. In this same spirit, the Heads of State and government gathered in Hampton Court reconfirmed research as one of five major action lines to be pursued following which a high level group in this area chaired by ex-prime minister Aho was set up.

With the publication in October of a common approach for more Research and Innovation, the Commission focuses particularly on improving the conditions for private sector investment in research and innovation. A major aim is to improve the framework conditions for research and innovation, in particular through European guidelines or guidance on key issues such as tax incentives for research, the use of public procurement for innovative products and services and cooperation and technology transfer between universities and business. To get industry to invest more in R&D in Europe, it is essential to gear internal market policies more towards fostering the knowledge economy and to boosting market dynamism for research-intensive and innovative goods and services.

2.1.1. Towards the Seventh Framework Programmes

Major steps **towards the Seventh Framework Programmes (FP7)** were made in 2005 with the presentation by the Commission of its proposals for the entire legal framework, including the framework programmes themselves (EC and Euratom) together with an in depth ex ante impact assessment in April, the specific programmes in September and the rules for participation and dissemination of results in December. The Commission proposed an ambitious FP7, both in scope and scale, which is commensurate with the challenges in Europe.

The main objectives of FP7 are presented under four main headings:

- Cooperation, to make the EU the world leader in the fields of science and technology by promoting wider cooperation between research teams, both within the EU and with the rest of the world, including through broadly-based, long-term public-private partnerships.
- Ideas, to allow a major new initiative, the creation of a scientific autonomous European Research Council, to support investigator-driven basic research at the frontiers of knowledge thus promoting researchers whose excellence, creativity and intellectual curiosity will lead to major new discoveries;
- People, to develop the quantity and quality of human resources in research and development;
- Capacities, to develop the means available for research and innovation in order to give science a better place within society and to facilitate the coherent development of international cooperation.

The overall legal framework proposed for FP7 foresees clear improvement in the regulatory and administrative environment of European research through simplified access and procedures and the transfer of certain logistical and administrative tasks to outside structures.

2.1.2. Towards the European Research Area (ERA)

Alongside the preparation of the future research funding framework, the Commission enhanced in 2005 major **policy initiatives towards the ERA**.

The *Mobility Strategy* for the ERA and the *researchers' career development policy* provide a coherent frame for Member States and Commission to create a single, open, attractive and competitive European labour market for researchers. Substantial progress has again been made to reduce mobility obstacles and to enhance skills and competences for career development across sectors and disciplines. In addition, the enhancement of the researchers' status, profession and career development was boosted in 2005 with the Recommendations to Member States on the European Charter for Researchers and on the Code of Conduct for the recruitment of Researchers, of which the concrete uptake started immediately after its adoption, and with the launch of the Researchers in Europe 2005 Initiative.

Twenty eight European Technology Platforms are now in progress. They focus on strategic issues where achieving Europe's future growth, competitiveness and sustainability depends upon major technological advances, ranging from steel to air, rail and maritime transport, hydrogen and photovoltaics, water and chemicals, and from nanoelectronics to innovative medicines, plant genomics or sustainable chemistry (including industrial biotechnology), manufacturing, mutual learning and foresight knowledge. The European Commission does not set-up or lead European Technology Platforms but facilitates and provides guidance to them where appropriate. The platforms involve a "bottom-up" process whereby stakeholders, led by industry, come together to define and implement a medium to long term strategic research agenda fostering the potential for the development, the deployment and the use of key technologies. Where they fit with the objectives of European research policy, the Strategic Research Agendas developed by European Technology Platforms have been taken into account in the development of the Co-operation Specific Programme. In a limited number of areas a Joint Technology Initiative may be set up to implement all or part of the strategic research agenda developed by a European Technology Platform³.

Furthermore, 68 *ERA-NET* projects were selected; these aim at the coordination of national and regional research programmes in fields such as bilateral cooperation with third countries, metrology, agriculture and fisheries, plant and human health, energy, transport or environment. In four areas *joint initiatives under Article 169* of the Treaty are also foreseen in the FP7 proposals, thus bringing programme coordination another step further.

Contribution to the ERA can also be underlined in specific areas. On 28 June 2005, the European Union and the other international partners, Japan, Russia, China, the United States and Korea, joined later by India, signed a 'Joint Declaration' agreeing on the realisation of the *International Thermonuclear Experimental Reactor (ITER)* at the European site of Cadarache. This agreement, involving more than half of the world population, confirmed, *de facto*, Europe as the leader in fusion energy research and marked a historic moment in both international and European scientific cooperation. ITER represents the next step before fusion

³ Commission Staff Working Document, "Report on European Technology Platforms and Joint Technology Initiatives: Fostering Public-Private R&D Partnerships to Boost Europe's Industrial Competitiveness," SEC (2005) 800, 10 June 2005". The role of the European Strategy Forum on Research Infrastructures (ESFRI) in supporting a coherent and strategic approach to policy-making has been consolidated, notably through the preparation of a European Roadmap for new Research Infrastructures of Pan-European interest.

energy can become a reality, contributing to solving the world's energy problems. ITER is one of the largest international research projects ever, with an estimated budget of €10 billion over 35 years.

An action plan for 2005-2009 for the implementation of a safe, integrated and responsible European strategy for the development of *Nanosciences and Nanotechnologies* was adopted in June. The aim is to increase and co-ordinate research in this area in order to contribute to the Union's competitiveness and many of its policies, establishing synergy with education and innovation. Concerted action by European industry, research bodies, universities and financial institutions should make it possible to create products and processes which are commercially viable and genuinely safe.

Research on *global change and ecosystems, sustainable energy and transport systems* provided a significant contribution to the review of the EU strategy on sustainable development. The Commission reported on the successful implementation of the Environmental Technologies Action Plan as well as the Environment and Health Action Plan, which continued in 2005. The 10 Year Implementation Plan for the Global Earth Observation initiative has been adopted at the Brussels Summit organised by the Commission in February 2005.

In the context of the Commission's strategy on *life sciences and biotechnology*, its importance for promoting growth and strengthening the EU's position in the global market for high-technology was highlighted in the Commission's third progress report on achievements and future orientations. In parallel, the first results were presented from the platform on clinical trials to confront the poverty related diseases HIV/AIDS, malaria and tuberculosis under the European & Developing Countries Clinical Trials Partnership Programme (Article 169 of the Treaty).

Transversal issues promoting the ERA such as *Science in Society, gender equality* in science and *international co-operation* were addressed for example through major public events, in depth analysis and action plans, bi-lateral and bi-regional dialogues, preparation of international co-operation agreements with Japan, South Korea, Jordan and Egypt, as well as concluding an agreement with Switzerland.

The Preparatory Action for Security Research (PASR), launched in 2004, was continued in 2005. PASR is preparing the ground for a fully-fledged security research priority under the Security and Space theme within FP7. Concerning Space, two communications on "Preliminary Elements of European Space Policy" and on "GMES: from Concept to Reality" were adopted in 2005. Space research activities in FP7 will be defined with the objective to support the European Space Policy and focus in particular on GMES (Global Monitoring of Environment and Security).

2.2. Implementation of sixth Framework Programme

While FP7 is planned to take off in 2007, the **implementation of research activities under FP6** continues. For 2002-2006 the EU has available a budget of approximately € 20 billion allocated notably to seven thematic priorities: life sciences, genomics and biotechnology for health; information society technologies; nanosciences and nanotechnologies, intelligent materials and new production processes; aeronautics and space; food quality and safety; sustainable development, global change and ecosystems; and social sciences and humanities. In 2005, the budget was fully committed. Efforts were pursued for the FP6 to continue to

attract the best research groups and the most innovative companies, organisations and institutions and significant scientific and technological progress was achieved in all thematic priorities. Most thematic areas pay special attention to the opening of topics especially conducive to industrial participation, and in particular SMEs, and to international co-operation. Furthermore, research is being carried out to support policies in areas such as agriculture, fishing, health and consumer protection, education, youth, employment and social policies, justice and home affairs, the environment, the single market, energy and transport. Concerning the regulatory and administrative environment, further improvement and progress continued where appropriate, notably concerning simplification.

To **capitalise on previous Framework Programmes**, the scientific and technical results and the socio-economic impact of the research actions launched under previous Framework Programmes are the subject of dissemination, analysis and evaluation to optimise their potential in the innovation and policy-making chain. The Five Year Assessment report and studies of Community Research Framework Programmes 1999-2003 and the Commission's response to them have been broadly disseminated and discussed in different policy fora and were taken duly into account notably for the preparation of FP7.

CORDIS continues to be the dissemination service of FP6 projects and results, with all indicators showing significant growth of usage of the main services, project descriptions, news and calls services.

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

3.1. Research and the Renewed Lisbon strategy

At the Spring European Council in March 2005, EU leaders put growth and jobs at the top of Europe's political priorities. The renewed Lisbon Strategy meant a fresh commitment by all to mobilise behind a positive reform agenda, given that success depends on a comprehensive approach, bringing the maximum leverage to bear and with strong input from every Member State in Europe. This commitment was given further weight by agreement on the integrated guidelines for growth and jobs, which provide a clear roadmap for the design of national reforms, and also by the informal meeting in Hampton Court in October.

The first step to translate this ambition into action has been to set up the necessary tools to boost job creation. This requires a partnership approach, with the right measures taken at the right level. Member States have drawn up country-by-country national reform programmes on the common basis of the integrated guidelines. In addition, the Council, the European Parliament, and the Commission are working together on the actions needed at Community level to complement initiatives taken by Member States.

The need to build a knowledge economy and to improve Europe's attractiveness as a location to do business and invest is generally well reflected in the national reform programmes submitted by all Member States in autumn 2005. The assessment of the research part of the 25 Member States national reform programmes by the Commission shows that R&D is considered as a main priority by all Member States alongside the need to build a knowledge economy and to improve Europe's attractiveness as a location to do business and invest. In many countries R&D and innovation policies are increasingly integrated and this has led in some cases to the creation of R&D and Innovation councils including social partners and

relevant ministries in order to advise governments on a strategic level. In addition, Member States face a number of common challenges such as the need for improving Human resources, the promotion of research intensive SME's and the need to improve knowledge transfer between the public and the private sectors.

A number of measures have been put in place in response to these challenges but the overall EU R&D intensity has stagnated over recent years. Several Member States have taken concrete actions to increase public expenditure and improve effectiveness and efficiency, including the development of Public Private Partnerships (PPPs) to stimulate business R&D and the introduction of monitoring and evaluation systems for public R&D. Modernising the management of research institutions and universities to increase the autonomy of management is being considered by all Member States. About half of them have some form of fiscal measures as an incentive to leverage private R&D and several others are considering introducing them. Finally many Member States have measures or intentions to ensure a sufficient supply of qualified researchers by attracting more students into scientific, technical and engineering disciplines and by enhancing their career development prospects. Overall the National Reform Programmes (NRPs) reflect an increased awareness of the need for coherent policy mixes to support research and innovation.

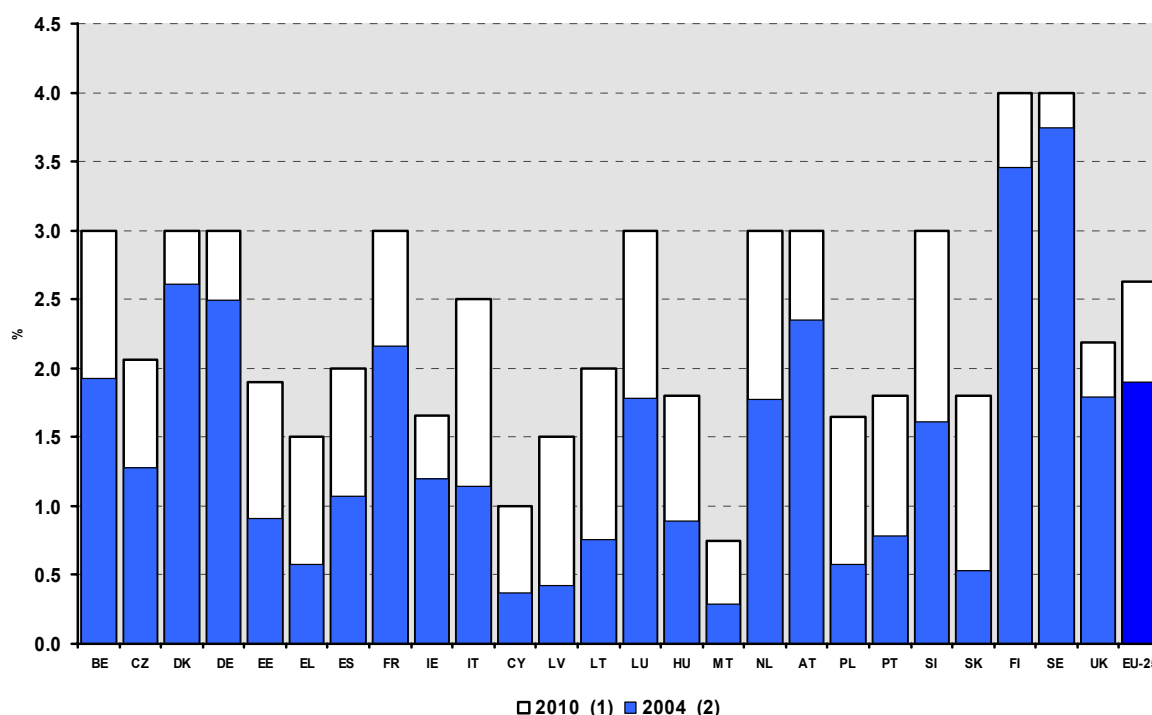
In view of the importance of R&D for future growth and in providing solutions for many of the problems confronting our society today, it is important that investments in R&D are intensified. There is considerable scope in the Member States for improving the quality of public expenditure by shifting resources, notably state aid, to more productive use and by closer co-ordination between Member States to avoid costly duplication of efforts. The effectiveness of public sector support for R&D can also be improved. The European Commission's proposal to earmark Lisbon-related cohesion expenditure, accepted by the European Council in relation to the EU15 Member States, shows how priorities such as research can be mainstreamed across a range of policies. The biggest contribution, however, should come from the private sector, and this depends on ensuring favourable prospects for a return on R&D investments in Europe. This in turn depends on demand for innovative products and services, the availability of people with the necessary skills, and on the availability of an adequate regulatory framework.

3.2. Progress towards the 3% objective

In recent years, the EU R&D intensity (share of R&D expenditure in GDP) has shown no sign of approaching the targets set by the European Council in Barcelona in 2002 (R&D intensity to approach 3% by 2010, 2/3 of which to be funded by the private sector). A period of slow but continued growth between 1997 and 2001 has been followed by a slight decrease since 2002 (from 1.92% in 2001-2002 to 1.90% in 2004). These variations have been due mainly to the fluctuations in private funding. Private funding has decreased recently due to the economic downturn in 2002-2003 and the bursting of the technology bubble. In 2004 it constituted 55 % of the total expenditure on R&D.

However, all Member States have now set generally quite ambitious R&D expenditure targets either in the context of their NRP or soon after (Figure 1).

Figure 1 Gross Domestic Expenditure on R&D (GERD) as % of GDP



Assuming that all the R&D expenditure targets were met, R&D expenditure in the EU would increase significantly to around 2.6% of GDP in 2010.

By comparing, both within each Member State and the EU-25 as a whole, the annual rate of growth of the R&D intensity required between 2004 and 2010 to meet the target with the rate of growth experienced over recent years (1997-2004), we can assess the level of the target. Countries such as Denmark, Finland, Sweden, Germany and Austria have experienced a rate of growth which, if they continue on the same trend, is sufficient to reach their target: while these countries have R&D intensities already higher than the EU average, in recent years they have managed to pull even further ahead. For countries such as Belgium, France or the UK and for the EU-25 as a whole, the target will be reached only if there is a substantial acceleration of the growth of R&D expenditure. For countries such as Poland, Slovakia, Malta, Latvia and Greece, the target is extremely ambitious.

Exploring the reasons of the successes of the countries 'pulling further ahead' on the road towards the Barcelona targets, it is pertinent to look at the contributions of the various sectors of the economy to the growth of the business R&D intensity of these countries. Indeed, behind all these success stories, there are one (in Finland and in Germany), two (in Denmark) or three (in Sweden) R&D intensive sectors⁴ which played a key role. This highlights the importance of some kind of specialisation within the national/regional innovation systems and economies, including some R&D intensive companies. However, the role of publicly-funded R&D for moving toward the Barcelona target should not be underestimated given that in all these Member States, the publicly-funded R&D intensity is also higher than the EU average, illustrating its complementary role with the business-funded R&D.

⁴ Finland: Communication equipments, Germany: Motor vehicles, Denmark: Pharmaceuticals/biotech and ICT services, Sweden: Pharmaceuticals, Motor vehicles and Communication equipments.

3.3. The Open Method of Coordination (OMC)

Building on the experience of the first cycle, CREST (Scientific and Technical Research Committee) launched the second cycle in January 2005. Five CREST Expert Groups were established on specific topics and an increased level of ownership by Member States has been achieved. Expert Groups have been led by one or two Member States and the work of the expert groups has resulted in more practice-oriented recommendations.

In the area of policy mixes, a specific peer-review process was developed and applied to three countries (Sweden, Spain and Romania⁵) with the aim to encourage the sharing of information about policy-related issues and to generate both country-specific and generic lessons for the formulation and implementation of effective policy mixes needed to raise R&D intensity. In the area of fiscal measures, the work focused on the evaluation and design of tax measures for research which led to the development of a practical guide on the evaluation of tax measures. Many Member States have been introducing, extending or improving fiscal schemes for research in recent years.

In the area of the reform of public research centres the work entailed the mapping of current policy developments to support knowledge transfer between public research organisations and industry and the development of policy recommendations and implementation guidance on knowledge exchange, organisation of PROs (Public Research Organisations), ventures/spin-offs and incentive schemes for researchers. In the area of SMEs, the focus in this second cycle was on the needs of research intensive SMEs and high-tech start-ups. The expert group organised its activities according to 5 topics considered as key issues for an integrated approach of research and innovation policies in this field: financing issues; improving management skills; collaboration with research institutes; technology procurement and opportunities for high growth. The work on IPR focuses on producing a toolkit for setting up cross-border collaborations involving public research organisations, and producing key building blocks for development of skills for Technology Transfer professionals across Europe.

Regarding the OMC's application to Human Resources in research, the Steering Group on Human Resources and Mobility (SG HRM) has been active since 2002. The Steering Group is composed of representatives from Member States and in 2005 they focused on mutual learning exercises concerning the mobility of researchers between academia and industry.

CREST will submit a report on the second cycle OMC 3% to the Council and the Commission in September 2006 for it to be considered in the preparation of the Commission's Annual Progress Report and of the 2007 Spring Council Conclusions on the revised Lisbon Strategy. CREST will also use the NRP and their progress reports as a basis for mutual learning in order to improve national research policies and will report on the main lessons of this exercise in autumn 2006.

To reinforce and complement the OMC application to the 3% objective, a pilot RTD **OMC-NET** call (estimated overall budget of 8.7 M€) was launched. The objective is to support mutual learning and co-operation initiatives undertaken by groups of Member States on policy issues of common interest. The new scheme will be pursued under the 7th Framework Programme.

⁵ Invited to participate in CREST meeting in view of accession.

4. OUTLOOK FOR THE FUTURE

All these achievements paved the way for 2006, a year of challenges in terms of run up of negotiations leading to the final adoption of FP7 and boosting investment in research and in researchers' careers in Europe.

Since an agreement on the European budget 2007-2013 has been reached on 4 April 2006 during a 'trilogue' between the European Parliament, the Commission and the Presidency of the EU, it is foreseen to adopt FP7 and the specific programmes by the end of 2006 or in early 2007. The first calls for proposals should be launched in early 2007.

In the context of the Lisbon strategy for Growth and Jobs, in autumn 2006 the Member States will submit their first Progress Reports. The Commission will assess the research part of the Member States strategies as well as progress towards the individual R&D objectives established in the Spring Council and progress towards the 3% objective. In order to reinforce Member States research strategies the Commission will adopt before the end of the year voluntary guidelines to promote knowledge transfer between Universities and public research organisations and industry. In addition, the Commission will also adopt a new framework for state aid to R&D and innovation as well a detailed guidance for the design and evaluation of tax incentives for R&D. The Commission also intends to put forward a proposal to create a European Institute of Technology with a view to it becoming operational by 2009.

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.
- The European Report on Science and Technology Indicators, which contains descriptions, statistics and detailed analyses of European and national RTD activities in the world context.
- 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 Commission's general EUROPA site: <http://europa.eu/>
- 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/research/>
- The site of the Commission's Directorate-General for the Information Society: http://ec.europa.eu/information_society/index_en.htm
- The site of the Commission's Directorate-General for Enterprise: <http://ec.europa.eu/dgs/enterprise/>
- The site of the Commission's Directorate-General for Energy and Transport: http://ec.europa.eu/dgs/energy_transport/index.html
- The Joint Research Centre (JRC) site: <http://www.jrc.ec.europa.eu/>
- The Eurostat site: <http://epp.eurostat.ec.europa.eu/>