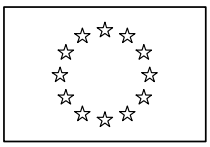

COMMISSION OF THE EUROPEAN COMMUNITIES

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Annex to the

REPORT FROM THE COMMISSION

"Annual Report on Research and Technological Development Activities of the European Union in 2004"

{COM(2005) 517 final}

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1. EUROPEAN SUPPORT TO RESEARCH: ACTIVITIES AND RESULTS IN 2004

1.1 Policy Strategy and coordination

The **Sixth Framework Programme (FP6)**, which was launched in 2002 with a budget of 17,500 million euro for the period 2002-06 (later increased with the enlargement of the Union to 19,200 million euro), is now in full implementation. During 2004 almost 16,000 proposals were submitted with some 84,400 participants. Out of these some 2,000 proposals were retained for funding involving some 13,700 participants. Particular efforts have also been made to encourage participation by the new Member States.

Policy initiatives favouring progress towards the **European Research Area** included those providing financial support for research aimed at reaching a rate of investment in research of 3% of the EU's GDP in 2010 and thereby stimulating growth and competitiveness. Implementation of the 'Investing in Research' action plan[1] was actively continued in 2004. The first concrete results have included the setting up of some 25 technology platforms[2], many of which are already advanced in defining Strategic Research Agendas on important issues with high societal relevance where achieving Europe's future growth, competitiveness and sustainability objectives is dependent upon major research and technological advances in the medium to long term. The Strategic Research Agendas will be used as one of the major inputs for the formulation of the research content of the 7th Framework Programme.

Several specific initiatives have been undertaken with a view to attracting the best researchers in Europe and improving their career prospects. Examples of these are proposals regarding entry and residence of third-country researchers[3], Researchers Mobility portal, the ERA-link network with European researchers in the US, and the ERA-MORE network between mobility centres for European researchers.

In 2004, scientific and technological cooperation agreements were concluded with Brazil and Mexico, and those with Morocco and Tunisia were ratified. The association agreements with Israel and Switzerland on involvement in FP6 were signed, and the cooperation agreements with the United States and China were also renewed. These agreements give powerful political signals showing Europe's willingness to promote lasting partnerships and to boost scientific expertise in global subjects.

Some remarkable breakthroughs were also made in the following areas: nanotechnology with the Communication 'Towards a European Strategy for Nanotechnology'[4]; satellite observation and remote sensing with the plan for implementing the second phase (2004-2008) of the GMES[5] (Global Monitoring for Environment and Security initiative nuclear fusion); and ITER (International Thermonuclear Experimental Reactor) with the international negotiations on the geographical location of the project in Europe, and the new field of security research which has seen the implementation of a preparatory project.

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1 COM(2003) 226
2 See details on: http://www.cordis.lu/technology-platforms/home.html
3 COM(2004) 178, 16.3.2004
4 COM(2004) 338, 12. 5. 2004
5 COM(2004) 65, 3. 2. 2004

The panel of high-level experts chaired by Professor R. Marimón which assessed the new instruments (networks of excellence and integrated projects) acknowledged the objectives, while proposing some adjustments in their implementation. The Commission continued carrying out corrective measures and introduced an action plan for rationalisation and acceleration to improve the implementation of the Framework Programme

A Five-Year Assessment for 1999-2003 was carried out by a panel of high-level experts and chaired by Dr E. Ormala. The panel underlined the importance of the Framework Programmes in developing Europe's knowledge base and correcting the shortcomings in the European research landscape, particularly the networking of researchers and activities. Its recommendations concern both the Sixth Framework Programme and future Framework Programmes, in particular the endorsement of a substantial increase in funds for research and the creation of the European Research Council and technology platforms. This evaluation was supported by a series of impact studies. The impact study concerning the Fifth Framework Programme concluded that it had promoted research of strategic importance which would not have taken place without EU support.

The preparations for the Seventh Framework Programme started in 2004. The Communication entitled 'Europe and basic research'[6] was presented in early 2004, with a new support mechanism for basic research based solely on criteria of scientific excellence, i.e. a European Research Council. This debate also contributed to the preparation of proposals for the Seventh Framework Programmes.

The leading role of research in the knowledge-based society and in competitiveness and growth in Europe was acknowledged and substantiated by a doubling of the funds for research in the Commission's proposals on the Union's financial perspectives for 2007-2013.

In June 2004 the Communication 'Science and technology, the key to Europe's future'[7] set off a political debate on the guidelines for future European research policy and activities. Initiating in this way the preparation of the 7th Framework Programmes, it proposes to strengthen the European research effort and increase the impact of the Union's action by organising it around six major objectives: creating centres of excellence through collaborative research: launching major European technological initiatives; stimulating basic research (and creating a European Research Council); making Europe more attractive to the best researchers; developing research infrastructures of European interest; and improving the coordination of national research programmes.

Two major consultations of stakeholders followed after the Communication, one on general guidelines for the way ahead and the other on future thematic priorities. The preparation of an impact assessment study and ex ante evaluation of the Seventh Framework Programme has reached an advanced stage. This study and evaluation focus in particular on the programmes' economic, social and environmental impact and to integrating the socioeconomic and forecasting aspects into the priorities.

The proposals for the 7th Framework Programme[8] were then launched in the beginning of April 2005.

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6 COM(2004) 9, 14.1.2004
7 COM(2004) 353, 16. 6.2004
8 COM(2005) 119 final, 6.4.2004

1.2. Indirect support actions

1.2.1. Life sciences, genomics and biotechnology for health

The fight against poverty-related diseases (HIV/AIDS, tuberculosis and malaria) remains a major challenge in the world at large. The objective of setting up a lasting partnership between the European Union and developing countries by way of a clinical trials platform on the basis of Article 169 of the Treaty has been achieved. The States participating in the EDCTP (European & Developing Countries Clinical Trials Partnership) programme work in collaboration with the pharmaceutical industry to develop new medicinal products, microbicides and vaccines.

Substantial progress was made with the collection of stem cell information and the setting up of a monitoring framework. An initial inventory of human stem cells was established on the basis of the proposals funded as a result of the first call for proposals.

The public debate on "ethics and science" continued, in particular through the work of the STRATA-ETAN group on the ethical implications of genetic testing, whose recommendations were widely disseminated.

The "Innovative Medicines for Europe" technology platform was established in May 2004. Through the development of a Strategic Research Agenda, four main lines of research were identified (security, efficacy, knowledge management and education and training).

Of the two calls for proposals published after the last amendment of the work programme, one is of particular importance in that it concerns a feasibility study for a cooperative effort on cancer under Article 169.

Among the activities carried out to raise awareness among the science community and the general public, mention should be made in particular of Commissioner Busquin's visit to Senegal to launch the operational phase of the EDCTP (the subject of substantial media coverage in all African countries), the contribution to World AIDS Day and the organisation of four high-level international conferences entitled: 'The future of cardiovascular research in Europe'; 'Diabetes: Europe rising to the research challenge'; 'Structural genomics and proteomics EU projects meeting' and 'Funding basic research in the Life Sciences: Exploring opportunities for European Synergies'. These events provided an opportunity to remind the scientific community of the need to coordinate and form up behind representative speakers in the European institutions. The conference on 'Structural Genomics', with 300 participants, represented a step forward in this direction, culminating in the networking of research consortia in this sector.

The advances made in the area of life sciences, genomics and biotechnology for health were significant and contributed to achieving the aims of the European Research Area, according to the objectives set for 2004.

1.2.2. Information society technologies (IST)

Research projects supported in this area aimed at establishing and maintaining industrial and technology leadership in key fields underpinning Europe's competitiveness and growth potential. These include nano-electronics, microsystems, mobile and broadband communications, embedded systems, audio-visual systems and their innovative applications.

Work on nano-electronics is providing Europe with the means to lead in advancing the world roadmap below the 100 nanometre scale. In mobile communications, research work focuses on 4th generation (4G) technology and new platforms for service development.

Another target was also to enable European industry to seize new opportunities leading to future markets. For instance, in opto-electronics, scientific and technological breakthroughs are now spreading out to other sectors such as security, the environment and healthcare. Organic electronics are opening the door to conformable displays for small hand-held or medium size terminals. Context awareness, cognition and multi-sensorial interactions are making the large amounts of information available today more understandable to people and machines.

Research work in ICT-enabled applications is helping address Europe's key business and societal challenges. For example, projects are developing ICT-based solutions that will modernise public administrations and governments, and that will enable European large and small (SMEs) enterprises, to be connected effectively to worldwide trading systems, anywhere, anytime, and to improve the efficiency of their processes. Work in ICT for health and social care provides new ways of treating patients and develops intelligent systems that empower persons with disabilities and ageing citizens to play a full role in society. Research into integrated safety systems for road transport brings solutions for safer vehicles and transport infrastructures. Work also covers the development of common platforms for crisis management to improve interoperability between civil protection organisations.

Within the Future and Emerging Technologies scheme, the work focuses on the convergence between ICT, bio-technologies, cognitive technologies, nano-technologies and materials where there is a high potential for long term industrial impact. Current work includes enabling technologies for robotics, natural language understanding, man-machine interaction and complex systems.

The EC has facilitated European Technology Platform (ETP) activities to the extent that they help structure and coordinate research, build consensus and partnership and in general, accelerate the innovation process. The latest EC-published list of ETPs contains four ICT-specific ETPs, in the areas of nano-electronics, embedded systems, mobile and wireless communications and, networked electronic media. Eleven coordination actions between national programmes in various ICT fields have been supported aiming to bring together the managers of national programmes so that they can share information, develop common activities and push forward the development of a European Research Area in ICT.

Work has also progressed on the development of a European Research *e*Infrastructure combining the development of interconnected Research Networks in Europe (GÉANT) and of Grid infrastructures for computing, data and knowledge handling. This together with research on Grid technologies enables Europe's researchers today in all fields of science and engineering to have the most advanced computing and networking research infrastructure world wide.

1.2.3. Nano-technologies and nano-sciences, knowledge-based multifunctional, materials, and new production processes and devices

Research in this area has helped to speed up the shift in European industry towards a knowledge-based economy by stimulating a fundamentally different approach and new concepts of production and consumption. Efforts were made to promote the conversion of

small and medium-sized enterprises. With its Communication 'Towards a European strategy for Nanotechnology' of May 2004 on nanosciences and nanotechnologies, the Commission set off a policy debate aimed at developing a coherent strategy for the benefit of European industry. The Council endorsed the safe, integrated and responsible approach proposed by the Commission and supported by the whole of the scientific community in an open consultation. Following the conclusions of the Council of 24 September 2004, the Commission began preparing an action plan on nanosciences and nanotechnologies that is expected to be published in mid 2005.

The 'Manufuture 2004' conference held at Enschede (the Netherlands) was the occasion for a discussion forum on the Vision 2020 document prepared by a high-level group with the aim of establishing a strategy for European manufacturing industry until 2020 and it launched the European Technology Platform on Manufacturing.

Several technology platforms with a direct impact on the competitiveness of European industry were launched in areas such as nanoelectronics, textile and clothing, forest-based industries, industrial safety, sustainable chemistry, production technology and nanomedicine.

In an integrated approach 'materials, production and nanotechnologies', research projects, networks and support measures were financed with the aim of stimulating the new technologies in existing industries and/or making new breakthroughs which may lead to new materials, components, products and industries.

These research actions developing intelligent and sustainable production technologies and high-quality products will have a major impact on the change in European industry while preserving jobs and thereby maintaining economic and social cohesion. Also, nanotechnology is expected to have a considerable impact not only on the competitiveness of our industries but also on the creation of new materials and products which make life easier and can solve many problems of health, security, electronics, environment, and other. As an example for nanomedicine, the 'Cornea Engineering' project will revolutionise eye surgery and drastically reduce the number of experiments carried out on animals, by rebuilding a human cornea *in vitro*.

The activities carried out in this area broadly made it possible to raise the awareness of the circles concerned and are helping to stimulate the new technologies, in particular nanotechnology, in existing industries and/or making new breakthroughs which may lead to new materials, components, products and industries. The objectives for 2004 have therefore been achieved in full.

1.2.4. Aeronautics and space

The European space policy presented in the 2003 White Paper will be implemented through a European space programme and a first complete programme which is now under way.

The White Paper set off, in particular, the debate on satellite applications, a strategic component of the implementation of a space policy. One of the key actions of the high-level group on space policy, set up in 2004 and consisting of representatives of the Union and the European Space Agency, was to monitor preparations for the Space Council. The first meeting took place on 25 November 2004 and brought together the ministers responsible for space affairs in the European Union and the Member States of the European Space Agency.

The initial phase of the Global Monitoring for Environment and Security initiative (GMES), launched by the Commission and the European Space Agency, was completed with the publication of a report and the adoption of a Communication[9]. Following the action plan set out in the Communication, a GMES Advisory Council made up of representatives of the EU and ESA Member States was set up, and the GMES Programme Office was created for the operational management of GMES. Several reflection papers were agreed on with the Advisory Council in preparation of a GMES management structure and operational service implementation.

The Group on Earth Observations (GEO) met at senior government official level in Cape Town, Tokyo and Ottawa and at ministerial level at the Second Earth Observation Summit in Tokyo. In Brussels, a GEO Special Session on Governance and an Earth Observation Partnerships Conference (with more than 50 countries participating in each) were held.

The FP6 projects in the space priority will contribute to the development of these initial GMES services in the 'Land cover and vegetation' and 'Ocean monitoring' application fields. A network of excellence will make it possible to improve the utilisation of Earth Observation data for civil security. Service development projects in further application fields ('Risk management', 'Atmospheric monitoring') were evaluated and negotiated for a start in 2005.

In the aeronautical field, the majority of projects selected from the 2003 call for proposals started. These projects addressed all the significant areas of the work programme, such as environmental related research, design tools and technologies for industrial competitiveness, methods and systems for prevention of accidents and improvement of safety and security of aviation, and finally avionics and air traffic management for improved air transport capacity. It is worth noting the launch of five integrated projects covering development of virtual design tools in the extended enterprise concept, maintenance, environmentally friendly helicopters, security protection of aircraft, advanced systems for approach and landing procedures and one network of excellence on the European capacities in wind tunnel testing.

There was a significant presence in the large international conference on numerical methods of the European network ECCOMAS in Jyväskylä, Finland, in July 2004, through some 40 presentations of Community research projects in special technology sessions.

In 2004, the policy oriented aeronautical research covered airports and air traffic management with projects in co-operative ATM, advanced surface movement guidence and control systems and airport efficiency. Preparations for the Single European Sky ATM Modernisation programme (SESAME) began.

Launched in 2001, the Advisory Council for Aeronautics Research in Europe (ACARE), was the first technology platform. Significant progress was made in 2004, with the support of the Commission, notably in revising the Strategic Research Agenda (SRA). ACARE was also involved in monitoring the implementation of the SRA, analysing the capabilities in the Member States with less developed aeronautical industry and the economic impact of air transportation in Europe, establishing a common European taxonomy for aeronautical RTD and analysing possible air transport scenarios and aeronautical education schemes in European universities and possibilities for improvement.

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[9] "Global Monitoring for Environment and Security (GMES): establishing a GMES capacity by 2008 – (Action plan (2004-2008))" ; COM(2004) 65, 3.2.2004

The development activities which have been undertaken in 2004 for the Galileo Programme have allowed the Council to approve the full set of specification for the infrastructure and the related Galileo satellite navigation services. The Council also agreed to proceed with the deployment and exploitation phase under a public private partnership agreement. These achievements have partially been made possible due to the research activities managed by Galileo Joint Undertaking, which have demonstrated the high value of satellite navigation across all sectors of the economy.

The regulatory agency which will sign the concession contract and ensure that the concessionaire fulfils its obligation (the "European GNSS Supervisory Authority") will take over the management all future community research activities related to satellite navigation.

A solid foundation has already been laid for a European space policy. The objectives for 2004 were reached on the whole despite the difficulties due in particular to the international negotiations connected with these activities. Nevertheless, a particular effort is still needed in the very sensitive area (politically as well as industrially/commercially) of satellite launchers.

It should be noted that the redistribution of portfolios in the new Commission has moved space-related activities managed by the Research DG to the Enterprise DG (effective transfer of resources 1 January 2005). The Galileo programme, however, is still managed by the Energy and Transport DG.

1.2.5. Food quality and safety

Multilateral interaction on scientific support for biotechnology, agriculture and food research (in the Commission and other Community institutions, the Member States and the European Food Safety Authority) increased the contribution made by this area to other Community policies and to the European Research Area. The management of the Standing Committee on Agricultural Research (SCAR) was transferred from the Agriculture DG to the Research DG.

A Communication on 'Life sciences and biotechnology - A Strategy for Europe: second progress report and future orientations', underlines in particular the revision of pharmaceuticals legislation, adoption of the regulatory framework on genetically modified organisms and the publication of guidelines for the coexistence of genetically modified, conventional and organic crops in agriculture.

Three major technology platforms were launched in this area: 'Plants for the future', on plant biotechnology, brings together all the stakeholders to find a consensus and establish an action plan to create plant-based applications (chemistry, energy production, pharmaceutical industry, food sector); 'Sustainable Chemistry' comprises a sub-platform on industrial or 'white' biotechnology as the application of modern biotechnology for the sustainable and eco-efficiant industrial production of cheamicals, materials and energy; and finally, 'Global Animal Health' aims to facilitate and speed up the development and distribution of new vaccines and diagnostic tools against major animal diseases. While confirming Europe's leading role in plant genomics research, an ERA-Net network integrates national and regional programmes into a coherent policy.

Four examples of projects show the many different applications of research into food quality and safety. The 'NeuroPrion' network of excellence, launched at the "Prion 2004" international conference in Paris, which was led by talks given by the Commissioner and four Nobel laureates, links 52 laboratories which are collaborating on research into prions in

animals and humans, from the molecular to the epidemiological level. An integrated projet launched in 2004, 'Welfare Quality' aims to integrate animal health and welfare in the whole of the food chain, with particular attention to transparency and public concern.

The TRACE integrated project 'Tracing the origin of food in Europe' (TRACE) seeks to develop systems of traceability both generic and specific to foodstuffs which allow neutral verification of the origin of food and animal feed. The integrated project 'Diet, obesity and genes' (DIOGENES) examines the main genetic and lifestyle factors underlying the rapid increase in obesity and the associated morbidity in Europe, more particularly in children.

The activities carried out in this area contributed to consolidating international strategic links and improving the mechanisms of governance. In line with the objectives set in 2004, they helped ensure the health and well-being of European citizens and boosted the competitiveness of the European food and biotechnology industries. Bilateral agreements and joint events strengthened international cooperation with several countries, in particular Russia, China and Chile.

As regards the programmatic implementation, the introduction of a 'two-stage evaluation' approach was a success and made it possible significantly to reduce the number of integrated project/network of excellence 'full proposals' submissions and hence to increase the success rate.

1.2.6. Sustainable development, global change and ecosystems

The Research DG contributed to the preparation and implementation of the Environmental Technologies Action Plan (ETAP)[10]. The priorities set out in the research field concern developing targeted research programmes, creating European technological testing networks and establishing technology platforms. Two of the latter are fully operational already, one of them dedicated to water supply and the other to sustainable chemistry.

Having been very active in the preparation of the European Environment and Health Action Plan 2004-2010[11], the Research DG is continuing its activities in this area and taking account more particularly of the more vulnerable populations, including children.

With a view to developing a post-Kyoto strategy for the period 2012-2025, the Research DG made use of its scientific networks as well as political analysts and advisors. The aim is to assess the role of investment in research and technology for combating climate change on the basis of recent results, particularly in the field of economic and technological modelling.

The Research DG was also closely involved in the preparation of a 10-year implementation plan for a Global Earth Observation System of Systems (GEOSS) being developed by the ad hoc Group on Earth Observations (GEO) mentioned above. The Second Earth Observation Summit in April 2004 in Tokyo identified nine GEOSS societal benefit areas (water, weather, biodiversity, climate, ecosystems, disasters, energy, agriculture and desertification, health), which are closely related to research activities at European level. The Research DG supports GEOSS implementation in the societal benefit areas through its environment research FP6 projects. The Third Earth Observation Summit and a GEO meeting at senior government official level, both to be held in February 2005 in Brussels, are in preparation.

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[10] COM(2004) 38 final, 28.1.2004

[11] COM(2004) 416 final, 9.6.2004

In the area of biodiversity**,** the utilisation of resources and the marine environment were the subject of the 'Galway Declaration', which lays the foundations for marine research in the years to come. The Commission is also contributing to the research necessary for implementing key EU policies such as the Water Framework Directive, the International Convention on Desertification, the EU Water Initiative involving the developing countries or the Energy Efficiency for Buildings Directive.

The Research DG actively contributed to the review of the EU Sustainable Development Strategy (SDS), which started in July 2004. It was also a key actor in the UN CSD-12 (Commission on Sustainable Development – 12) process which aims to follow up and monitor the commitments made at the World Summit on Sustainable Development (WSSD) in 2002. It participated to the EU efforts on CSD-12 which addressed three thematic areas: human settlements, water and sanitation. In the field of urban sustainability, it initiated an informal cooperation with UN-HABITAT to foster the application of EU R&D results outside Europe, and in particular in developing countries, hence supporting both the EU SDS and the UN CSD process.

The sustainable development of surface transport in the Union – vehicles and vessels, their infrastructures and the processes for manufacturing them – is a major priority. In this context, activities have been supported through technology platforms on rail (ERRAC) and road (ERTRAC), as well as by networks of excellence. ERRAC embarked on the implementation of its strategic research agenda, in particular through some far-reaching research projects with railway undertakings and industries working together. ERTRAC published the document 'Vision 2020' and prepared a draft strategic agenda. In addition, the European Maritime Industries Forum began setting up the 'WATERBORNE' technology platform, which was launched in January 2005.

Activities for research in support of the European Transport Policy focused on infrastructure pricing, rail transport and CIVITAS. The second phase of the research initiative CIVITAS adresses clean urban transport combining alternative fuels, energy efficient vehicles and transport policy measure in innovative packages in European cities. The CIVITAS Initiative addresses energy and transport objectives in an integrated way.

In the field of sustainable energy systems substantial progress was achieved in the work of the technology platforms: The 'Hydrogen and Fuel Cells Technology Platform' – through its two steering panels – developed a strategic research agenda and a deployment strategy. The 'Photovoltaics Technology Platform' – through its Research Advisory Council – developed a vision report for Photovoltaics for 2030 and beyond. This report was strongly endorsed by the stakeholders. The Technologies Platforms for 'Biofuels for Transport', 'Electricity Networks of the Future' and 'Zero Emission Fossil Fuel Power Plants' were also initiated in the second half of 2004. The three respective Advisory Councils were set-up and started working during fist half of 2005.

A considerable Community presence continued in the global initiatives 'International Partnership for the Hydrogen Economy' and 'Carbon Sequestration Leadership Forum'.

A First International Conference on the Integration of Renewable Energy Sources and Distributed Energy Resources was held in Brussels 1-3 December 2004. A parliamentary evening also took place in Brussels the 31st of November 2004 for an exchange of views on the political, technical and regulatory framework that is needed in order to prepare the

infrastructure for renewable energies and distributed generation whilst maintaining a high level of security of supply.

Actions were taken to develop a harmonised information system in order to support integration of national and Community research policies and to permit benchmarking and comparison of the strengths and weaknesses of Community research, industries and policies in the face of the principal competitors.

In order to support European research efforts in the new technologies for a sustainable environment, the Research DG issued joint calls for proposals in the field of hydrogen and fuel cells, in order to combine efforts with the other thematic priorities.

Two very successful media events were organised to present research results in the area of renewable energy technologies (solar-thermal power, geothermal and ocean energy, and biomass and photovoltaics) in Almeria in March and Uppsala in November. The events resulted in more than 150 articles, TV programmes, etc, all over Europe. Sixth Framework Programme projects in the fields of hydrogen and fuel cells, CO_2 capture and storage and distributed generation renewable energies, and socio-economic aspects of energy were presented in a series of publications.

Some energy policy and strategy studies were also published in 2004 on the folllowing topics: 'Ways of improving complementarities and synergy between national and community research in the field of non nuclear energy', 'Energy RTD Statistics in Europe, Synthetic Analysis and Evaluation' study, 'Improving and networking of Energy RTD Information Systems – Assessing user's needs (Info Systems)', 'Priority energy technologies (comparison of strengths, weaknesses, achievements/opportunities, performance and threats) – SWOT', 'Energy Scientific and Technological Indicators and References' (ESTIR) and 'Assessing the impact of energy research'. All those documents were presented to Member States' representatives and are available on the Cordis web site.

Other contributions were made at international congresses such as the World Rail Congress, the Forum for European Railway Operators and Owners, the Euro Ocean 2004 conference, INNOTRANS (the largest rail industry trade fair in the world) and the 'Bibendum Challenge' for ultra-green cars which was held in China. Also, relations with India were strengthened on the basis of the existing memorandum of understanding.

The action carried out on sustainable development, global change and ecosystems made it possible to reach the objectives set for this priority area in 2004. Both targeted and multidisciplinary approaches were developed, focusing in particular on long-term strategies. More international participation in the research projects in this area would be desirable, however.

1.2.7. Citizens and governance in a knowledge-based society

Several activities were conceived and planned with a view to developing an overall strategic approach for the social sciences and humanities in the framework of the European Research Area. They are designed to facilitate the coordination of policies and programmes and to create infrastructures which can help to improve the quality of comparative and multidisciplinary research in the field in the European Union. In this perspective, preparatory work was carried out on the establishment of a social sciences and humanities observatory.

A new work programme covering the years 2004 to 2006 was discussed with all the stakeholders. It aims to maintain a balance between continuity of support for important areas of research (like for example European governance and social relations) and the need to face new challenges arising out of changes in the political context (such as, for example, linguistic diversity and conflict resolution).

Based on this updated work programme a series of calls was launched in December 2004. Taken together they represent the most important call for proposals ever launched in Europe in the field of social sciences and humanities (SSH).

In November 2004 a so-called 'kick-off' meeting, organised in order to develop additional synergies between the activities funded under this programme, brought together some 75 projects, mobilising more than 1,000 research teams throughout Europe.

A mid-term synthesis report on the Integration of socio-economic and foresight dimensions (SED) in FP6 was launched. The development of an IT system in support to the quantitative monitoring of the integration of SED was also completed and tested.

A particular effort to promote research results carried out in previous and current programmes was undertaken, through the systematic publication of reports, further use and systematic update of websites (CORDIS and EUROPA), the distribution of a quarterly newsletter on EU research in SSH and the establishment of a plan for the dialogue workshops to be organised during the next year.

First steps in the preparation of FP7 were also made. In support to the preparation of the Impact Assessment of the FP7 a report on the 'ex ante' *social* impact of FP7 was written. The report is based on the contributions of past research projects to policy support and technological innovation that are beneficial to social issues, also in view of gathering insight on the future role of research in understanding and solving future social problems.

In addition to the report, a large consultation process with other DG policies on one side and with stakeholders through a web-based consultation on the other side, was carried out in order to include as many ideas as possible to be shared in the preparation of the socio-economic aspects of FP7.

1.2.8. Specific measures covering a wider field of research

The **NEST programme (New and Emerging Science and Technology)** supports and anticipates scientific and technological needs. The programme makes it possible to identify and target research areas, with the aim of developing and consolidating the bases of European research in areas of great promise for the future. Areas opened up in 2004 were 'Tackling complexity in science', 'Synthetic biology' and 'What it means to be human'.

The NEST work programme for 2004 was completed in full. The proposals selected and the new projects demonstrate the viability of the NEST objectives and operational methodology in creating opportunities for basic research achieved by concentrating on excellence without any disciplinary barriers. The participants in all fields come mainly from the public and university sector, as was expected considering the profile of NEST projects (visionary, emerging scientific communities, high novelty, high ambition, high risk).

Scientific support to policies (SSP)[12] is an activity in the 6th Framework Programme to provide support to Community policies in areas such as fisheries, environment, health, justice, home affairs, security, internal market, competitiveness, employment, education, culture, energy, transport, regional development, external relations, etc. In January 2004, the 3rd call closed, with an indicative budget of 83.1 M€. A total of 231 eligible proposals were submitted and 78 retained for funding. The 4th SSP call for proposals was prepared during 2004 and was published in October 2004.

An Action Plan: 'SSP awareness raising and exploitation of results' seeking to promote attention to SSP has been implemented jointly with other policy DGs. A folder and some information sheets were prepared in order to inform policy makers.

Concerning Horizontal Research Activities involving SMEs, the 2004 update of the Work Programme introduced two calls for proposals, one for co-operative and one for collective research, also taking into account the new definition for SMEs (Small and Medium-sized Enterprises). The co-operative research projects selected in 2004, deal with technological problems of high relevance and importance to SME participants. The collective research projects selected are expected to generate a positive impact on the competitiveness within large groupings of SMEs and contribute to a wider dissemination of knowledge.

The SME Interservice Task Force continued to monitor the implementation of action plans prepared by the priority thematic areas within the context of the 15 % target provided for in the Framework Programme decision on SME participation. For calls with deadlines closing in 2003, the SME Interservice Task Force reported in its third progress report that the funding requested by the SMEs in project proposals proposed for funding comes to 13 % in total for all participants.

Other activities in this area include: an analysis of the barriers to participation of SMEs, specific consultation with stakeholders and an external cost-benefit analysis and risk assessment study with a view to possible outsourcing of operational management tasks of the horizontal research activities for SMEs.

The high-level expert group on SMEs held meetings to discuss the implementation of horizontal research activities involving SMEs and on SME specific activities in the next Framework Programme. In particular it made recommendations for the terms of reference for the impact assessment study. It was also consulted on SME specific issues for FP7 such as those relating to IPR, financial engineering and evaluation of proposals.

Furthermore, the Commission contributed to the preparation of and participated actively in the Irish Presidency conference on 'Research, Innovation and European SMEs' and the session on SMEs in the Dutch Presidency conference 'Investing in Research and Innovation' which it supported financially.

The SME TechWeb[13], which supplies useful information and assistance to SMEs, was updated throughout 2004 with on-line access to the most important publications, such as the SME newsletters, SME success stories and a brochure entitled 'Connected and competitive: SMEs and Integrated Projects in FP6'. Information on funded projects (cooperative, collective research and ETI) was also made available on this web site.

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12 See details on : http://www.cordis.lu/fp6/support.htm

13 http://sme.cordis.lu/home/index.cfm

Two press briefings were organised. One in Belgium in March 2004 entitled 'FP6: What's in it for SMEs', the other in Estonia in July 2004 entitled 'New opportunities for SMEs in an enlarged Europe'.

Specific calls targeted research bodies in certain Associated Candidate countries (Bulgaria, Romania and Turkey), in countries which have or are negotiating a cooperation agreement, Russia and other Newly Independent States, developing countries and Mediterranean partner countries. To facilitate their integration into the Sixth Framework Programme, it was decided to reduce the national contribution from associated candidate countries for 2005 and 2006.

Awareness-raising actions took place vis-à-vis the scientific community, political circles and the general public by way of publications like: 'A world view for European research: prospects for international cooperation in S&T', 'International scientific cooperation; are you eligible for funding?', impact studies on the S&T cooperation agreements with China and the United States and a newssheet on international cooperation.

The bi-regional dialogues with Latin America, the ACP countries, ASEAN and the Mediterranean, as well as active participation in the projects being undertaken by External Relations DG in its policies of enlargement, good neighbourliness, Euro-Mediterranean cooperation and cooperation with the new independent States, have made it possible to strengthen cooperation around common objectives.

1.2.9. Strengthening the foundations of the European Research Area

The Commission carried out science and technology foresight activities mainly by setting up a 'European science and technology foresight knowledge sharing platform', developed in close collaboration with the policy-makers and research and innovation policy specialists of the Member States and associated countries. The platform is a set of activities that fosters the active promotion of mutual learning between foresight practitioners, users and stakeholders in Europe in cooperation with the JRC-IPTS. Monitoring foresight in Europe and in major world-regions as well as disseminating the related information to practitioners, users and stakeholders are key functions.

In addition ten specific studies on key issues for the future of EU research and innovation policy have been launched on the basis of two calls for tender.

Exchanges of information were promoted by means of seminars involving, for example, managers of national foresight initiatives, by conferences such as 'Foresight and Competitiveness', co-organised with the Irish Presidency and 'Present Needs, Future Options: Issues and Topics for Transnational Foresight' co-organised with the Dutch Presidency; and by expert groups such as the 'Foresighting the New Technology Wave' and 'Blueprints' (regional foresight) groups.

The communication of foresight activities was also improved through the publication of a regular newsletter with the title 'Foresighting Europe'.

In early 2002, EU research ministers recognised the importance of the mutual opening of national research programmes, which CREST followed up by launching five pilot actions for the mutual opening of national programmes in March 2002. During the course of 2003 CREST came to the conclusion that the ERA-NET scheme was the most suitable mechanism

for pursuing the first stages of coordination and by 2004 ERA-NET projects were actually set up in four of the five pilot areas.

ERA-NET, whose participants are mainly ministries and research councils, met with great success. The coverage of initiatives increased and is becoming more and more homogeneous. Many ERA-Nets now have links with other activities, for example 'IWRM.Net', which is intended to back up the Water Framework Directive and 'HY-CO', the hydrogen and fuel cell technology platform. The ERA-NET scheme has proved to be an opportunity responding to needs of European research programme 'owners' and 'managers' for developing joint collaborative research programmes in many field of research. This is evidenced by the enthusiastic response registered following the open call for proposals.

Based on experience gained from the first application of Article 169 of the Treaty - the 'European and Developing Countries Clinical Trials Partnership' (EDCTP) initiative - the Commission's services identified in close cooperation with Member States further 'Article 169' initiatives to be implemented under FP7. To this end, the Commission has drawn up a set of criteria to help identify other potential initiatives and has made an inventory of those ongoing ERA-NET projects and similar initiatives that specifically aim at developing an 'Article 169' initiative in the future. Thirteen potential topics have been identified which could potentially be suitable for an 'Article 169' decision.

During the course of 2004, some 25 European Technology Platforms were set up. Within these fora a wide range of stakeholders are defining Strategic Research Agendas on important issues with high societal relevance where achieving Europe's future growth, competitiveness and sustainability objectives is dependent upon major research and technological advances in the medium to long term.

The Commission services have strongly encouraged this bottom-up, industry led approach to defining medium to long-term research needs and, during 2005, will use the Strategic Research Agendas as one of the major inputs for the formulation of the research content of the 7th Framework Programme. In this context, they are participating as observers in many of the platforms, playing an overall guiding role and providing limited Community financial support for operational entities whenever the objectives and activities of the technology platforms concerned correspond closely with the thematic areas of the 6th Framework Programme.

Specific actions during 2004 centred on co-ordinating this process, raising awareness and encouraging openness and transparency. In this respect, the Commission services published a report on 'Technology Platforms, from Definition to Implementation of a Common Research Agenda' (EUR 21265, 21 September 2004), set up a dedicated web-site from which information on each technology platform can be readily accessed and organised in December 2004 a first meeting of the industrial leaders of the technology platforms.

The implementation of the 'Regions of Knowledge' pilot action launched in 2003 by the Commission on an initial concept of the European Parliament supported policy initiatives at the regional level aimed at building up institutional capacities and know-how necessary for stimulating a faster creation of the European Research Area. In addition an FP6 call was issued at the end of 2004 ('Regions of Knowledge-2') to cover prospective studies, benchmarking and other analytical techniques focusing on increasing R&D investment at regional level.

The synergies with COST were reinforced through the implementation of the contract between the Commission and the European Science Foundation (ESF), as well as through the Partnership between the Commission and COST. There were exchanges of assessment expertise between EUREKA and the Commission. At the ministerial meeting in Paris in June 2004, new ways of coordination and cooperation were discussed. Following this meeting, EUREKA Clusters were involved in relevant European Technology Platforms and a Task Force was set up, to prepare an articulated proposal in favour of R&D intensive SME in the framework of Article 169 of the Treaty.

The European Innovation Scoreboard and the Trend Chart on Innovation in Europe are in an expansion phase as regards both sectoral analysis and insights into innovation policies of other world regions, such as Asia and NAFTA. The European Innovation Scoreboard 2004 confirms that the innovation gap between the EU and the US was not reduced since the adoption of the Lisbon agenda. The US leads Europe in nine out of eleven indicators, which are used to compare innovation performance between the two regions.

The development of an integrated service of information and intelligence on national and regional research policies was launched in collaboration with JRC/IPTS. A first scoreboard of European industrial investment in research and development was published.

The prototype phase of the integrated information and intelligence service on national and regional research policies which is developed in collaboration with JRC/IPTS started in February 2004. A first scoreboard of European industrial investment in research and development was published.

Work started with the European Investment Bank (EIB) and the European Investment Fund (EIF) to define the basic principles of a 'Risk Sharing Finance Facility' to leverage EIB loan financing of large European research projects and infrastructures.

Major steps towards the coherent development of research at the regional, national and European scale, through prospective studies, analyses and networking efforts, have helped to reinforce a common knowledge base in accordance with the objectives set in 2004.

The first series of innovation policy studies under the 6th Framework Programme contracts were concluded for studies on innovation clusters in the new Member States, governance, public procurement and organisational innovation. The launch of a second series has been prepared with studies on open source software and innovation, as well as the impact of off-shoring on the innovation capacity of EU companies.

1.2.10. Structuring the European Research Area

The Research and Innovation Programme aims to encourage a more innovation-friendly environment throughout the EU, and to stimulate technological innovation and the setting up of innovative technology business as well as other innovation support services.

The 2004 updates of the Research and Innovation Work Programme introduced a number of new activities. A call for proposals was launched to set up 10 networks of clusters, 10 sectoral innovation financing networks and a study on sector specific leverages and barriers to innovation as well as to define sectoral benchmarks and indicators.

In 2004 the Commission continued to support the Innovation Relay Centres (IRC) as well as their cooperation with other business oriented networks, EUREKA and the ESA. The work of the IRC-Innovating Regions of Europe Central Unit continued. A call on Regional Innovation Policies including new tools and approaches was successfully completed and a number of contracts signed. The IPR Helpdesk was established following a call for proposals to deliver assistance, disseminate information and deliver training activities by tackling IPR issues relevant to Community-funded trans-national research and innovation projects. A contract was signed for the editorial services for the innovation newsletters following a call for tender. The annual contract for the European 'Innobarometer' survey was renewed.

Among the FP5 activities, the PAXIS networks, which helps innovative small companies to set up and develop, and Gate2Growth networks, which facilitate investment opportunities in innovating companies continued in 2004.

The work programme for Economic and Technological Intelligence (ETI) has been updated with the main objectives to encourage SME-participation in FP6 and in the future Framework Programme. A workshop bringing together ETI projects was attended by National Contact Point members and project co-ordinators with a view to foster synergies between ETI projects.

An independent high-level group on human resources in science and technology in Europe, chaired by Professor Gago, analysed the current situation in Europe and undertook broad consultations. Its conclusions were presented and discussed at an international conference and were used for preparing a modified version of the work programme. The Commission is preparing a suitable reply to the report.

On 16 March 2004, the Commission adopted a proposal for a directive and two recommendations on the entry and residence of researchers from third countries.

In June and November 2004 the Member States achieved a political agreement respectively on the first recommendation and the directive (for the adoption of which the non-binding opinion of the European Parliament will be required). In June 2004 the Council also reached a political agreement on the second recommendation on short-term visa (co-decision procedure). The texts could be finally adopted in July 2005.

The proposal for a recommendation on the European Researchers' Charter and on a code of conduct for the recruitment of researchers was prepared through a public consultation process (from March to December 2004). Following the stakeholders' request for extra time for the national consultation process, the adoption of the recommendation by the Commission was delayed and scheduled for March 2005. A seminar on the Charter and the Code was organised in the context of the Dutch Presidency conference 'Braingain – the Instruments' in September 2004 in The Hague.

A dedicated call for proposals for the '2005 Researchers in Europe Initiative' was launched with a deadline in early December 2004. The initiative is an ambitious European-wide awareness campaign, which aims to promote better awareness of the exciting multi-faceted lives and careers of researchers: ordinary people with a passion for science, without whom our society's progress would not be possible. It is focused at enhancing the participation of organisations located at local, regional, national or international level. A total of 54 proposals were submitted in response to the call. Following the evaluation of the proposals the entities selected for funding are expected to initiate their work in early summer 2005.

The 'researchers' mobility portal increased the number of links to more than 3 000 sites and increased its functionalities for the storage of CVs and several hundred job offers. In addition, interoperability is assured with 20 national mobility portals. The work to integrate the international dimension was also progressed and the opening of a 'mobility' section dedicated to career development and mobility opportunities in Canada and New Zealand is due at the beginning of 2005, with others to follow.

A new European network of mobility centres for researchers (ERA-MORE) was launched in June, connecting 200 centres in 33 countries. The centres aim to help to improve information and practical assistance to researchers in Europe and address the current obstacles to geographical and intersectoral mobility, optimise scientific careers and make Europe more attractive.

The ERA-Link (European Researchers Abroad Link) initiative has the aim of building up links of communication and interaction between the thousands of European researchers working in the United States. A study was carried out to determine the characteristics of the network and services to be provided. The results showed a broad consensus on the creation of such a network and offered suggestions as to the best way to satisfy the needs and expectations of European researchers in the United States.

Additionally, 2004 has seen a successful implementation of all 12 Marie Curie Actions. Overall, the number of proposals submitted in 2004 surpassed dramatically the available call budgets resulting in a significantly low success rate. As a measure to avoid any negative effects, two types of evaluation/submission methods were introduced in the calls published in 2004 for seven highly oversubscribed Actions. A two-stage submission/evaluation procedure was used for two host actions while a two-step evaluation following a single submission was applied to the other five.

The Directorate-General initiated (with the IPTS) the launch of an information portal related to the mobility flows and typical career paths for researchers in Europe[14]. The aim of the project is to gather all existing information on these flows and career paths and to find any gaps requiring additional work. In the area of research infrastructures, two major activities were completed, in addition to the calls for proposals. The debate on research infrastructures and their roles in the promotion of science and technology, taking account of the experience gained both in the Framework Programmes and in other similar Community actions (for example Structural Funds) was continued and some common questions were clarified. The role of the European Strategic Forum on Research Infrastructures (ESFRI)[15] in supporting a coherent and strategic approach to policy-making and multilateral initiatives was extended and consolidated. ESFRI (at the end of 2004) started working, , on the elaboration of a Roadmap for new pan-European research infrastructures.

Science and Society is a horizontal activity which endorses the inclusion of societal issues throughout the Sixth Framework Programme. Solid progress has been made with the Science

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14 With regard to statistics, this portal is largely based on statistics produced by Eurostat (Statistics on Human resources on science and technology complemented by the new project on statistics on the career development of doctorate holders initiated by Eurostat, the OECD and Unesco)

15 ESFRI is made up of representatives of the 25 Member States – appointed by the research ministers – and representatives of the Commission. The countries associated with the research framework programme were invited to join the Forum in 2004.

and Society action plan, implemented in particular through calls for proposals under the Sixth Framework Programme.

> The ENWISE expert group's report (**En**larging **W**omen **i**n **S**cience to the **E**ast) 'Waste of Talent: turning private struggles into a public issue' identifies the obstacles (lack of funding, difficult access to senior positions, lack of data/analysis on the situation of women scientists) faced by female scientists in the region and offers recommendations for policy makers and to the research actors on ways of improving their place in the European Research Area.

154 projects were the subject of ethical review in 2004, double the number in the previous year. This review allowed sensitive subjects to be dealt with properly and consistently.

A Conference on 'The role of the universities in the Europe of Knowledge' dealt with subjects such as the creation and certification of knowledge, the changing nature of research training, public/private partnerships, the role of the universities for research in the regions, and the challenge of interdisciplinary research. After this event, a forum on university research was set up. This will come up with recommendations for concrete action essential to promoting the necessary change and the university reforms required for building the European Research Area and achieving the Lisbon and Barcelona targets.

In spite of the diversity of the actions conducted in this priority area, the overall aim of remedying certain structural weaknesses in European research was broadly achieved. The capacity for satisfying EU citizens' research aspirations was also developed in 2004.

1.3. Direct actions by the Joint Research Centre (JRC)

In April 2004, an independent multidisciplinary panel of 17 experts from 13 Member States published the results of their Five-Year Assessment (FYA) of DG JRC (http://www.jrc.cec.eu.int/). The panel was impressed with the progress made since the last FYA, especially in realising DG JRC's new mission as a service to the Commission. In the panel's view, "the clarity of this mission has reinvigorated DG JRC, giving a clear purpose to its work" and the chairman wrote that: "In several important cases [DG JRC] has been a champion of technical innovation in the EU's work and brought about effective implementation of policies that would not otherwise have happened."

The 2004 JRC Annual Report[16] contains an overview of last year's activities, of which the following achievements can be noted.

In food safety and quality, DG JRC was nominated as Community Reference Laboratory (CRL) on two occasions, for the authorisation of feed additives and genetically modified organisms (GMOs). In support to the Common Agricultural Policy, 2004 has witnessed five million farmers and farm businesses declare around 50 million fields in the nationally managed Land Parcel Identification Systems (LPIS). Here, through its remote sensing capabilities, DG JRC has provided input to the technical guidelines for the 2004 Commission Regulation (796/04), helped the Member States ensure compliance when making agricultural subsidy claims and worked to develop a prototype internet-based image server, currently loaded with around 8 000 images acquired between the mid-1990s and 2004.

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16 EUR 21557 EN

DG JRC published an extensive report on 'Climate Change and the European Water Dimension', co-authored by more than 40 scientists from both DG JRC and throughout Europe. The report accumulates knowledge acquired since 2001 and analyses the real and potential impacts of climate change on aquatic ecosystems such as lakes, coastal systems and coastal lagoons. It describes the impact of climate change on European floods and droughts and the corresponding challenges to water use in agriculture.

DG JRC has developed real-time disaster alert (http://dma.jrc.it/Services/gdas/) and damage analysis systems which have been applied to earthquakes, floods, forest fires, tropical storms and, more recently, the tsunami in Asia (http://tsunami.jrc.it/). These services are being used in humanitarian aid and crisis management operations both in the Commission (RELEX, ECHO, AIDCO, ENV and REGIO DGs), and in relevant UN agencies (OCHA, UNOSAT). For example, in 2004, DG JRC has used satellite imagery to assess refugee camps (such as Lukole, Tanzania) and monitor crop substitution programmes (such as illicit coca crops) in Colombia.

Turning to nuclear safeguards, 2004 marked ten years of assistance and support to the Russian Federation via the TACIS programme. Celebrated on 12 November 2004, this successful co-operation has focused on training, the development of Nuclear Material Accountancy and Control (NMAC) systems and monitoring systems to survey nuclear inventories.

The European Reference Centre for Ultraviolet Radiation Measurements (ECUV) was developed by and hosted at DG JRC and today, more than 25 European UV monitoring sites have been quality assessed by ECUV's travelling reference spectroradiometer. In 2004 alone, it was transported to 11 European UV monitoring stations to check the absolute calibration and the overall performance of local spectro-radiometers.

In 2004, support to enlargement of the European Union continued to focus on integration, training and the uptake of the 'acquis communautaire' with 98 workshops and training courses organised by DG JRC. Examples of technology transfer contracts signed in 2004 were for a project on plasma coating technology and a robotic surgical arm for nuclear applications.

Last, but not least, the JRC evaluated and granted excellence awards to its top young scientists, stressing the importance it accords to research training. In its increasing endeavours to promote science in schools, DG JRC also organised an open schools day at its Ispra site whereby 1,352 students and teachers visited laboratories, took part in hands-on experiments and attended captivating scientific presentations.

1.4. Achievements of previous Framework Programmes and other activities, including the research fund for coal and steel

A Five Year Assessment of the implementation and achievements of Community research over the five preceding years was carried out between June and December 2004 by a panel of independent high level experts. The assessment was based on analysis of an extensive database of evaluation and policy reports concerning Community research, eight separate studies and analyses prepared specifically as inputs to the assessment exercise; interviews with and presentations by Commission staff; and discussion by panel members within their own constituencies. A synthesis of the key findings of the Five Year Assessment report is as follows:

- The Panel concluded that the Framework Programmes have played an important role in developing the European knowledge base over the period of the assessment (1999-2003) although the direct contribution to innovations with the potential to deliver dominance in global markets has been more modest.

- It was noted that the Framework Programmes have corrected some of the deficiencies in the European research landscape and contributed significantly to bridging the gap between RTD and innovation.

- In addition, it was recorded that the Framework Programmes have played an important part in the generation and diffusion of new knowledge and the formation and reinforcement of inter-organisational networks, both amongst European players and including players in Associated States.

- In overall terms, the panel concluded that the Framework Programmes have provided significant additionality and European Added Value.

In 2004, the Research Programme of the Research Fund for Coal and Steel (RFCS) has contracted 58 projects resulting from the call 2003 (annual budget: 60 M€) and continued to manage the first 60 RFCS projects (call 2002) and the 199 ECSC projects (liquidation of the ECSC). 208 proposals have been received and evaluated under the call 2004. This resulted in 49 new steel projects and 10 new coal projects, co-financed by the RFCS with respectively 40.6 M€ and 15.9 M€. Projects funded under the RFCS aim at reinforcing both the competitiveness and the sustainable development of the European steel industry. It is worth noting that a major integrated project on reducing CO2 emissions - called ULCOS - has been contracted in 2004 in close cooperation with the FP6.

The European steel technology platform was launched in March by Commissioner Busquin and major stakeholders from the European Steel industry. The aim of this platform is to define a long term vision in order to ensure a sustainable and global leadership of this industry over the next thirty years. To this end, a steel strategic research agenda has been adopted by the steering committee of the platform in December. It will be published in 2005 within the framework of dissemination activities. The updated version of this key document including implementation actions will be prepared in 2005.

1.5. Research and training actions under the Euratom treaty

Within the area of fusion energy research in 2004, the Parties engaged in the decision-making process on ITER (the next major step on the way to fusion power) moved forward with the joint technical assessment of the two candidate sites for hosting the facility (Cadarache / France and Rokkasho-Mura / Japan) and examined the possible content and timetable of a "Broader Approach" to fusion power. The three principles of completing ITER at Cadarache, in the broadest possible framework of international co-operation and in the context of the Broader Approach, were reaffirmed by the Council of Ministers. The guidelines received by the Commission from Council were amended so that the negotiations could be carried towards a conclusion in the framework of a preferrably six-party agreement. The Commissioner and the Presidency jointly invited the five other Parties to share the EU vision so as to arrive at a consensus in time to begin construction of ITER before the end of 2005.

The European Fusion Development Agreement (EFDA, a multilateral framework contract between Euratom and its European partners in fusion energy research) was extended until the

end of 2006, and the Work Programmes for Fusion Technology and for the Joint European Torus (JET) were updated. The successful scientific exploitation of the JET facilities under EFDA is particularly noteworthy. Following enlargement, an important meeting was organised to promote the increased integration of the new partners into the fusion programme. New work programmes, extending to the end of 2006 for the 21 existing fusion Contracts of Association and two new contracts of Association (Poland and Slovenia), were agreed and the procedures for signature of the amended contracts were launched. These actions have contributed to the achievement of the objective of coordinating European fusion physics and technology R&D, in preparation of ITER (which will be the key international fusion research infrastructure, with a very strong European dimension) and for the longer term.

Public information activities were conducted with the aim of communicating progress in fusion research to audiences across the EU, and particularly in the new Member States. The Fusion Expo organised under the aegis of EFDA visited Latvia, Poland, Italy, Portugal and Bulgaria for almost 100 days and received around 18,000 visitors (about 60% of whom were students).

The 6th Framework Programme in the area of nuclear fission and radiation protection was implemented largely through the use of the new instruments, Integrated Projects and Networks of Excellence. Ambitious projects were implemented in a number of strategically important areas, including geological disposal of radioactive waste, partitioning and transmutation, severe accident management, actinide chemistry, materials research, emergency management and the risks from low doses of radiation. These projects, in particular, are making important contributions to the further integration and better structuring of research within the European Union and providing a framework for establishing stronger and more meaningful collaboration with third countries, in particular those with significant research activities in the nuclear area (eg, USA, Russian Federation, Canada, Japan, etc). Generation IV activities and epidemiological research in the Southern Urals exemplify the increasing international dimension of Euratom research in the nuclear fission and radiation protection area.

Training remains an important part of the programme, in particular aimed at alleviating the decline of nuclear competence due to an ageing workforce, the absence of new build and moratoria on nuclear energy in several countries. An integrated approach to training across all sectors of the programme (ie, waste management, nuclear safety, next generation reactor systems, radiation protection) has been developed and is being implemented. Particular attention has been given to promoting the development and adoption of common syllabuses and qualifcations across Europe. An important outcome of this support has been the establishment of a legal body to coordinate nuclear engineering teaching in European universities and research institutes. The extension to other sectors is being promoted.

A call for expressions of interest was held and this informed the scope and content of the work programme for 2005/6. Increasing interest is evident on making better use of existing, and seeking support for the development of new, infrastructures. The potential of platforms as more effective mechansims for achieving the strategic objectives of European research also the subject of interest in several quarters. These aspects will be taken up in the final call of the 6th Framework Programme and will influence the scope and content of the next Framework Programme.

2. DEVELOPMENTS IN EUROPEAN UNION MEMBER STATES

This section reports on RTD activities and policies across the EU Member States, with a focus on the realisation of the Lisbon agenda. It draws on work within the European Commission on policy evolution, funding trends, human resources and corporate RTD. The section offers five broad perspectives on trends in the European RTD landscape:

- it outlines the progress in Member States towards the 3% objective and the two thirds objective for business funding;
- it provides an overview of trends in investment in R&D across the Member States and business R&D spending based on corporate R&D data;
- it provides also and overview of government funding for RTD across the Member States of the EU;
- it explores trends in training and employment of researchers;
- it outlines trends in policy concepts and organisation across the Member States; and
- it discusses trends in the 'Europeanisation' of Member State RTD policies and the organisation of the Open Method of Coordination in research policy.

2.1 The Open Method of Coordination in support of reaching the Barcelona objectives

The first cycle of the open method of co-ordination ended in October 2004 with the submission by CREST to the Commission and the Council of its first report on the application of the Open method of Coordination to research in favour of the 3% Barcelona research investment objective. The work was been organised in five working groups:

- Public research spending and policy mixes;
- Public research base and its links to industry;
- Fiscal measures and research;
- Intellectual property and research; and
- SMEs and research.

The CREST report from the first cycle includes 30 recommendations for Member States spread over these five areas. The first cycle demonstrated the feasibility of the Open Method of Coordination applied to research, and its added value was acknowledged by Member States and the Council. Member States' positions evolved throughout the cycle in favour of the need for more coherent policies and for EU actions or recommendations to reinforce the actions of Member States.

A second cycle has subsequently been launched. It aims at producing three types of tangible outcomes:

(1) More effective and coherent national policies through enhanced mutual learning and peer review;

(2) Concerted actions by a number of Member States on issues of common interest; and

(3) Mutually reinforcing actions at EU and national levels, including Community legislation, guidelines or recommendations on critical issues of EU dimension.

As for the first cycle, the work is organised around five expert groups focusing on the following topics:

- Encourage the reform of public research centres and universities, in particular to promote the transfer of knowledge to society and industry. The topic of the group is based on recommendation five of the CREST report from the first cycle. The tasks of the group will include "light" peer reviews of the knowledge transfer systems in 3-4 Member States.

- Design measures to promote the growth of young research intensive SMEs. In line with the 3% Action Plan and the recommendations from the first cycle, the focus of the work of the group will be on topics such as financing, support services, and growth barriers. The work will in particular be based on cases from individual Member States to be reviewed in a 'light' peer review process.

- 'Design and evaluation of fiscal measures to promote business research, development and innovation'. The work of the group will in particular focus on developing guidelines for the evaluation of fiscal measures. In addition, the group should develop guidelines for the design and use of fiscal measures The tasks will include an assessment of evaluation that have been performed and an analysis of the existing large amount of material on the design of fiscal measures.

- 'Improve the design and implementation of national policy mixes'. The starting point for the group consists in the development and pilot implementation of a methodology to peer review national policy mixes in the domain of research. Three such policy mix peer reviews are scheduled in 2005. The expected outcome is mutual learning on the design, implementation and evaluation of policy mixes.

- 'IPR ownership regimes in the public sector'. In continuation of the recommendations from CREST emphasis will in particular be given to improve the coherence and effectiveness of Intellectual Property Right ownership regime for publicly funded research. One of the objectives is to elaborate a practical set of guidelines. The work will include an analysis of ways to facilitate cross-border cooperation and the examination of inconsistencies of national rules and arrangements of licences.

- The groups will report to CREST, whose role is maintained given its unique position reporting both to the Commission and to the Council. It is expected that a report on the second cycle will be adopted by CREST in March 2006.

Finally, the adoption of the revised Lisbon strategy introduced a streamlined reporting on progress on the Lisbon strategy objectives. The new reporting integrates all existing reports of relevance to the Lisbon strategy including reporting on most of the Open Methods of Coordination. For the reporting on the Open Method of Coordination applied to research the

existing reporting in CREST will continue, but complementary to this Member States will report on the results of the Open Method of Coordination applied to research.

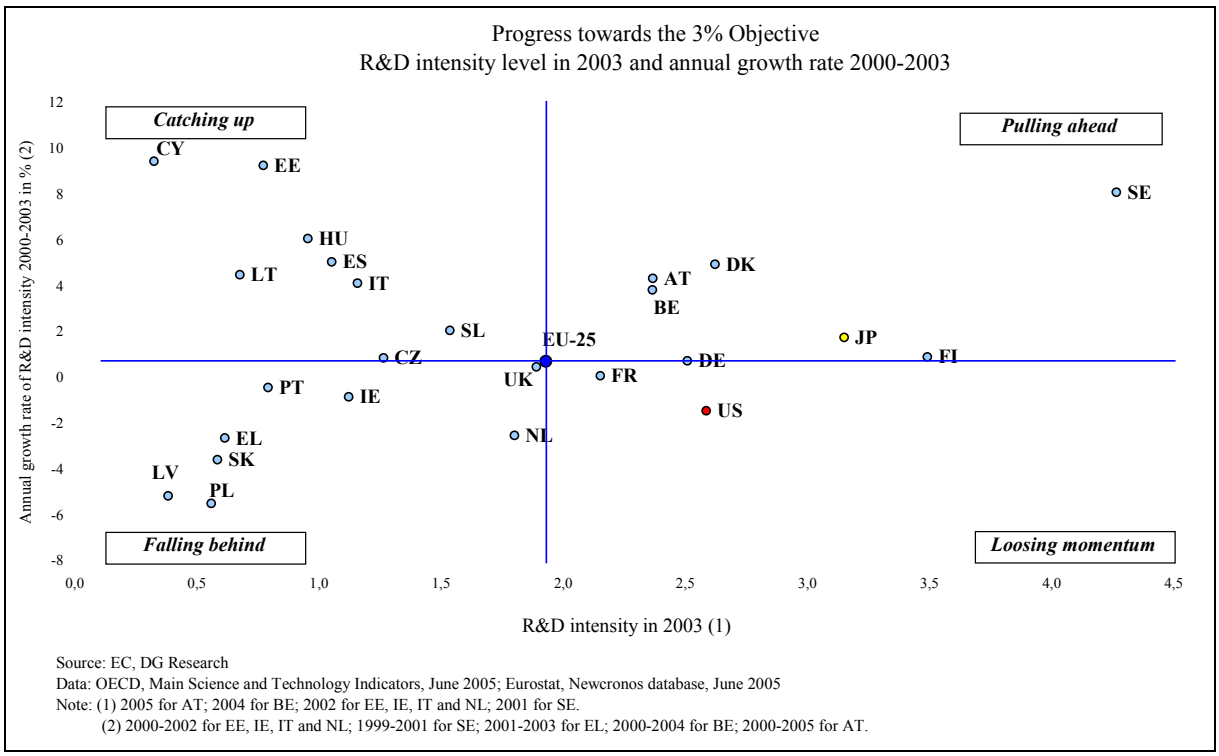
2.2 Recent trends in R&D investments

The overall trend of R&D intensity in the EU 25 in the period after 2000 is close to stagnation. Although many EU Member States are increasing their R&D intensities, the really large R&D performers (Germany, France and the UK) are doing so only very slowly. Against this, some smaller countries (mainly the accession states but also Portugal, Ireland and the Netherlands) are showing lower R&D/GDP ratios. The economic slowdown had a negative impact on public funding of R&D that was put under pressure in many countries by the obligations to restrict the budget deficits. But the 2004 government budget allocations indicate a modest increase on average.

Progress towards the 3% objective:

At EU-25 level, the annual growth rate in R&D intensity of 0.7% (average annual growth between 2000 and 2003[17]) is far from sufficient to reach the 3% objective by 2010. The stagnation was mainly the effect of the economic slowdown, but if this trend remains unchanged (*i.e.* assuming a linear forecast applied on the 2000-2003 trend), the EU's R&D intensity will be about 2.20% in 2010. The EU's R&D intensity, however, grew at a higher rate than that of the US. As a result, the EU-25 as a whole has been catching up with the US since 2000. The growth of R&D intensity is higher in Japan than in both the EU and the US, although this seemingly good performance can be partially explained by the low growth rate of Japan's GDP (denominator) over recent years.

[17] R&D intensity is the relation of Gross Expenditures for Research & Development (GERD) to Gross Domestic Product (GDP). All indicators are extracted from the *Key Figures 2005 on Science, Technology and Innovation. Towards a European Knowledge Area*' (to be published in 2005). 2003 is the latest available complete series.



Source: EC, DG Research
Data: OECD, Main Science and Technology Indicators, June 2005; Eurostat, Newcronos database, June 2005
Note: (1) 2005 for AT; 2004 for BE; 2002 for EE, IE, IT and NL; 2001 for SE.
(2) 2000-2002 for EE, IE, IT and NL; 1999-2001 for SE; 2001-2003 for EL; 2000-2004 for BE; 2000-2005 for AT.

An examination of the evolution of R&D intensity in individual Member States in the period 2000-2003 allows for making a distinction between four groups of countries that impact in divergent ways the progress towards the 3% objective at the EU-level.

– The first group consists of the countries that define the general trend towards stagnation in R&D intensity. France, the UK and to a lesser extent Germany hold back the progress made at EU-level by other countries. As they are the biggest investors they determine the overall trend.

– The second group consists of leaders in R&D (Sweden, Denmark, Austria and Belgium) that are pulling ahead of the EU average, but their weight is far less. Especially Sweden has been able to progress very substantially over the recent years, however in 2003 business expenditures slowed down. Finland, that is known as a traditional R&D champion has seen its R&D intensity stagnating since 2000 .

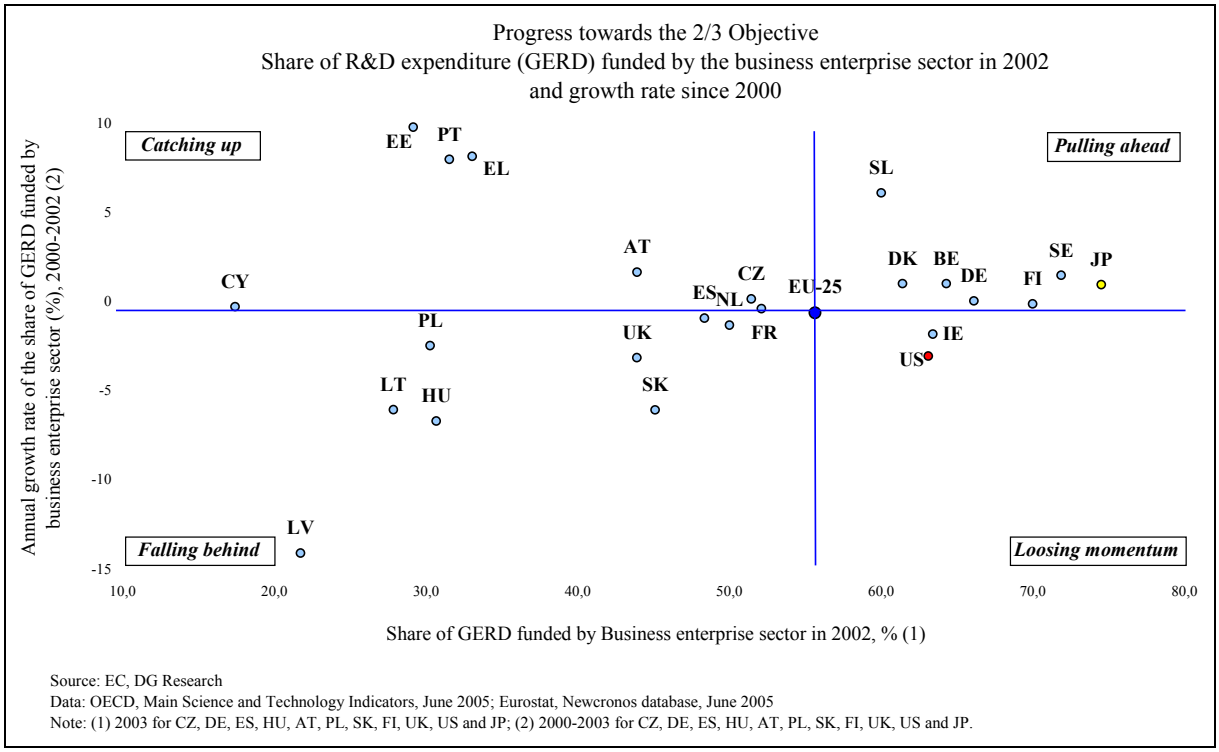
– A third group with Cyprus, Estonia, Hungary, Lithuania, Spain, Italy and Slovenia are rapidly catching up with the rest of the EU. Their impact on the overall R&D-intensity is small.

– A fourth group consisting of Latvia, Poland, Slovakia, Greece, Portugal and Ireland is falling behind the EU average. The Netherlands can also be classified in this fourth group, although their R&D intensity is still very close to the EU average.

Progress towards the 2/3 business funding objective:

At EU-25 level, the share of R&D expenditure funded by the private sector (GERD funded by the business enterprise sector) is significantly lower than in the US and Japan. The contribution of the private sector to the financing of research has even been reduced over recent years in both the EU and the US, although the reduction was of a larger magnitude in

the US. Conversely, the share of R&D expenditure funded by the business enterprise sector has been increasing in Japan.



Source: EC, DG Research
Data: OECD, Main Science and Technology Indicators, June 2005; Eurostat, Newcronos database, June 2005
Note: (1) 2003 for CZ, DE, ES, HU, AT, PL, SK, FI, UK, US and JP; (2) 2000-2003 for CZ, DE, ES, HU, AT, PL, SK, FI, UK, US and JP.

In general the share of business funding has suffered from the economic downturn. In the majority of the EU countries it was stagnating or deteriorating leading to a small decrease of the overall share of business funding. The analysis of the situation and progress of each Member State with regard to the 2/3 objective allows a distinction between several groups of EU countries:

– The R&D intensive countries Sweden, Finland, Denmark, Germany and Belgium, are maintaining or even slightly improving the share of R&D funded by the private sector. Slovenia is the only one pulling further ahead of the EU average strongly.

– On the other hand France and other countries with some weight such as Spain, the Netherlands and the Czech Republic, that were close to the average level confirm the trend to stagnation or even fall back of the business share. Ireland, a country falling further behind EU average in terms of overall R&D intensity, has also suffered from a weakening involvement from the private sector in the financing of R&D.

– Another group composed of Greece, Portugal, Estonia, and to a lesser extent Austria, are catching-up strongly with the rest of the EU. The good performance of Greece and Portugal as regards the share of the private sector, however, should not hide the weakening position of these countries in terms of overall R&D intensity.

– A last group with Latvia, Hungary, Lithuania, Slovakia, and to a lesser extent Poland and the UK are falling further behind the EU average. Especially for Poland, Slovakia and Latvia, the low and decreasing contribution from the private sector to R&D may explain a large part of the weak performance in terms of R&D intensity.

The impact of fiscal policies – which have been expanded recently in countries as Austria, France, Ireland, Italy, the UK, Spain, Portugal, the Netherlands and Norway - on the level and distribution of government funding and the evolution of business funding cannot be integrated in the policy analysis because of lack of data.

Government budget allocations for R&D

This section briefly discusses government budget allocations of R&D (GBOARD) across EU Member States in 2004. There is significant inter-country variation. Data is not available for the whole of the EU25, so we deal here with the EU15 plus the Czech Republic, Latvia and Slovakia. Between 2003 and 2004 GBOARD rose in the above mentioned group by between 1.5% and 2.0%.

Some countries have significantly increased government budget allocations of R&D between 2003 and 2004:: by 16.7% for Luxembourg, 15.2% for Austria, 7.5% for Belgium, 5.9% for Sweden and Finland, 5.8% for Portugal and 5.2% for the UK (all in current prices). Given their relative weights in the total of the EU GBOARD, these countries altogether accounted for an increase of 1.7 percentage points in the EU as a whole. Some countries have augmented their efforts but on a lower scale: 3.9% for Denmark and 2.7% for Spain, for example. Decreases of GBOARD were found for Germany, where GBOARD fell by 2.2%, and the Netherlands, which fell by 1.3%.

The diverse composition of government funding across the EU

How does the composition of government funding vary across the EU? Year after year, around 83.5% of the GBOARD of the EU25 are oriented towards civil research and about 16.5% towards defence. In 2003, the respective shares changed to 82% and 18% which resulted from a rise in resources devoted to defence. In 2003, research financed from general university funds received 28% of the total, whereas the five-year average is rather higher (31%). Two other important items were non-oriented research and industrial production and technology which represented respectively 13% and 11%. In 2004, more resources were applied to each.

But as with other components of RTD, it is important to be aware of inter-country variation in Europe. First, some countries have strong defence components: in 2003, France, Spain, Sweden and the UK exhibited a higher share of GBOARD devoted to defence: respectively 24%, 25%, 22% and 35%.

Second, some countries have significantly higher percentage of GBOARD dedicated to research financed from general university funds as compared with the EU25: Austria (65%), Denmark (42%), Germany (39%), Greece (51% in 2002), Italy (44% in 2001), the Netherlands (47%), Slovakia (39%) and Sweden (38%) are examples of this.

Third, four countries have a relatively stronger emphasis on industrial production, and technology - Belgium (31%), Ireland (26%), Finland (27%) and Spain (22%) all spend more of their GBOARD on this area.

Funding of major agencies: recent trends

The data above is drawn from official statistics. Here we discuss trends using data from agency budgets across the major RTD-performing Member States. The Member States of the

EU are characterised by significant organisational diversity. Typically, EU Member States have funding ministries that channel resources to RTD agencies. But these agencies can be of three broad types. First, there are Research Councils that distribute funds via block grants or competitive programme or project funding to research performers. This is the case for the UK research councils; their funding is both intramural (to government labs) and extramural. Second, there are agencies that receive funding from Ministries, often on a large scale, but then allocate resources to sub-agencies that perform RTD. Examples would be the Max-Planck Society or the Fraunhofer Society in Germany. Here the funding is entirely intramural. Then there are organisations that perform a combination of extramural funding and intramural allocation of funds, such as CNRS in France or CNR in Italy. In this section we briefly discuss trends for the main agencies in the UK, Germany, France and Italy, which together account for more than two-thirds of public R & D spending in the EU.

A substantial part of European scientific research is funded by these 4 countries (It should be noted that this asymmetry is also present in industrial R&D – these countries account for about 75% of corporate R&D headquartered in Europe). From the available data it can be concluded that government support for the large non-university R&D organisations in Germany, France and Italy) grew faster than GBOARD; the research councils in the UK grew at a slower rate than GBOARD. In Germany where GBOARD grew between 1995 and 2003 by 1.5%, the major public research organisations grew by 20% in the same period.

It appears that for Germany at least the internal allocation of funding is increasingly directed towards applied activities. This trend can probably be explained by a shift in the missions of the PRO system. While the focus of the PROs in the past was mainly on strategic R&D on issues of public interest (health, energy, environment, etc.) their missions are now are increasingly linked to collaboration with the private sector R&D (and hence to the Lisbon agenda).

Corporate R&D in Europe: the perspective of top R&Dinvesting firms

Corporate R&D in Europe is a key issue for the Lisbon agenda: most of the increases in R&D investment needed to reach the 3% target must come from this sector. This section discusses corporate R&D drawing on the 2004 *EU Industrial R&D Investment Scoreboard*[18]. The *Scoreboard* lists the research investments of the top 500 corporate investors in R&D whose ultimate parent is located in the EU and of the top 500 companies whose ultimate parent is outside the EU. A key point emerging from the *Scoreboard* is that across the main R&D performing-sectors EU companies often have higher R&D/Sales ratios that those outside the EU. But there are important differences in industrial structure – Europe has more of its large corporations in low R&D-performing sectors. This has the effect of lowering the aggregate R&D intensity of European companies as a whole.

Funding Trends

The basic trends are as follows. The compound annual growth rates of corporate R&D funding, over the period 2000-2003, were 1.2 % and 3.8% for the EU and non-EU respectively, the difference being mainly caused by a reduction in corporate EU R&D spending in 2003. There has been an overall decrease in the R&D/Sales ratio in 2003, as

[18] European Commission, Monitoring Industrial Research : the 2004 EU Industrial R&D Investment Scoreboard, Vol 1: Analysis, Vol 2: Data, EUR 21399 EN, DG Joint Research Centre and DG Research; http://eu-iriscoreboard.jrd.es/index.htm

compared to 2002, for both EU and non-EU companies (from 3.31% to 3.21% in the case the top 500 EU-based companies and from 4.66% to 4.51% in the case of the top 500 non-EU companies).

Three dimensions of concentration

EU corporate R&D is highly concentrated across firms, sectors and countries. The top 20 EU companies (4% of the sample of companies) accounted for more than 55% of the total R&D investment by the EU 500 group of companies from the *Scoreboard*. For the non-EU region, this proportion was almost 37%.

The four largest R&D-performing sectors for the EU top 500 companies are automobiles & parts (23.8%), pharmaceuticals & biotechnology (17%), IT hardware (12.4%) and electronics & electrical equipment (10.3%). The order differs significantly from the non-EU world where the top sectors are IT hardware (19.6% of all RTD), pharmaceuticals & biotechnology (18.8%), automobiles & parts (18.1%) and electronics & electrical equipment (10.8%).

R&D investment is also highly concentrated geographically in three major EU Member States: Germany, France and United Kingdom, which in 2003 accounted for 73.5% of the aggregate R&D investment of the *Scoreboard's* top 500 EU-based companies.

Specialisation

With one important exception, namely French companies, EU companies, when grouped by Member State, tend to show at least one strong specialisation when compared to the average for the EU 500. German top R&D-investing companies are particularly strong in automobiles & parts, which is one of the Europe's most important sectors in terms of its investment in research. Finnish companies concentrate more than 80% of their R&D investment in IT hardware. Swedish companies show R&D strength and specialisation in IT hardware and its traditional engineering & machinery sector. Dutch companies make an interesting case with three clear sector specialisations: aerospace, chemicals and electronics & electrical equipment (although aerospace reflects the fact that EADS is registered in the Netherlands despite its operations and research being almost completely implemented outside this country). United Kingdom companies specialise in the pharmaceuticals & biotechnology sector, but are also well above the EU average in aerospace & defence.

R&D Intensity and the effects of industrial structure

EU head-quartered companies have higher R&D/Sales ratios than non-EU companies across all sectors except for engineering & machinery, telecommunications, oil and gas, and health. EU companies have higher R&D/Sales ratios in each of the top 5 R&D performing sectors in the EU, and in each of the top 5 R&D performing sectors in the non-EU. However, looking at the overall R&D/Sales ratio across all sectors for comparable-size companies, the overall R&D/Sales ratio for EU companies is 3.6%, significantly less than that of Japanese companies at 4.2% and US companies at 4.9%.

The reason for this is the EU's sector mix (that is, the composition of main activities declared by the companies listed on the *Scoreboard*). The structure of European industry differs from that of the non EU world – with the EU companies having a much larger proportion of output flowing from relatively low R&D/Sales sectors, and a smaller proportion of its output flowing from such high R&D/Sales industries such as IT hardware, pharmaceuticals, and software &

computer services. This means that at the level of individual sectors, EU 500 companies can be strong compared to the rest of the world, while the overall R&D/Sales ratio is lower in the EU because the very high R&D/Sales sectors are relatively smaller, not because individual company performance is weaker.

Recent trends in human resources and mobility – researcher training

It has frequently been pointed out that the Lisbon 3% target is not simply an expenditure target. It implies a significant increase in numbers of researchers in Europe, and this in turn requires a real expansion of researcher training and growth of attractive research careers. Concern that the supply of science and technology graduates is not increasing fast enough to keep up with either future needs or existing demand from industry and the academia is not evidence based: overall the supply of graduates in S&T continues to rise, although a few countries have seen a decline in specific fields such as chemistry and physics.

There are positive trends in the stocks of Human Resources for R&D in the EU at the present time. From available Eurostat statistics[19], it appears that the total number of research personnel (that is, researchers plus support and administrative staff) has been growing since 1997, up to 2.75 million for R&D personnel in head counts (HC) in and 2.03 million in full-time equivalents (FTE) by 2002. This corresponds to an overall growth of 17% for HC and 16% for FTE between 1997-2002. The number of researchers during that period increased even more, namely by 22, 5% or from 1.36 million to 1.67 million for HC and from 0.95 million to 1.16 million for FTE. This growth could be observed for the business sector and for higher education but not for the government sector, which remained constant

With respect to graduates as future potential researchers, it can be observed that the number of post-graduate students (which includes future PhD holders), and of diplomas awarded every year in science and engineering, would allow an increase of the number of research personnel at the same growth rate as observed since 1997. From 1998 to 2001 the average number of graduates having received five or more years of tertiary education (ISCED 5) was 620,000 per year of which 26% in Science and Engineering.

The average number of ISCED 6 (that is, the second state of tertiary education – equivalent to PhD level) yearly graduates was 76,750 between 1998-2001, 44% of which were in Science & Engineering. Moreover, during that period research graduates in Europe as a whole have been increasing at approximately 4% per year. All in all, about 200,000 new graduates in Science and Engineering that could spur a career as a researcher are entering the labour market every year.

It has been estimated that to fulfil the Lisbon/Barcelona targets an extra 1.2 million researchers are needed over a ten-year-period: 500,000 for renewal of the research labour force (to replace retirees) and 700,000 net new researchers. These researchers will be available if current graduation trends continue as described.

Whether such trends can be transformed into a real increase in research performance depends not only on the training of researchers and the growth of graduate students, but also on their transition into employment in the research system. Looking at the demand side for researchers, the news appears to be mixed. The Lisbon target would be achieved if about 60%

[19] JRC-IPTS calculations based on Eurostat New Cronos databse on human resources in R&D

of science and engineering graduates enter research as a career. Looking at the most recent survey on doctorate holders' careers, performed in 2004 in the UK, it seems that only around 40% of PhD graduates working in the UK are performing research activities both in academia (22%) and outside academia (18%). As for the employment sectors, slightly fewer than half of these graduates (48%) remain in the higher education sector. Manufacturing (principally the pharmaceutical and chemical industries) and the health service each attract around 16% of PhD graduates. In terms of the availability of research skills, the problems appear to be on the demand side rather than the supply side: across the EU there is little evidence of strong upward pressure on wages for S&T professionals. In fact, poor career prospects in the scientific occupations are often cited as one of the main reasons behind the decline in scientific studies among the young people.

Here it is important to note that the labour market for researchers is undergoing profound mutations. Indeed, the sources of demand are more varied than before (with demand emanating from services, transnational firms, and start-ups, for example). Knowledge-intensive services, including sectors of activity such as education, health and social work employ most of these highly qualified people. However, in the public sector, which accounts for half of researchers employment in many EU countries, slow growing budgets and the need for flexibility have given way to a rise in temporary positions.

In the private sector manufacturing is the activity least oriented towards employing high qualified human resources. Across the 10 top NACE RTD-performing sectors, more than 40% of all researchers working in industry are employed within three main sectors namely, electronic equipment, chemicals and motor vehicles. This reflects the European corporate specialisations discussed above. As for the regional pattern of R&D personnel distribution across Europe, R&D personnel are clustered in the capital regions and/or important industrial and technological regions such as those in the Southern part of Germany or Northern Italy.

2.3. Recent trends in Research Policies

This section discusses policy concepts, trends in policy mixes and complexity, and organisation and coordination issues. RTD policy appears to be occupying a more prominent position across the EU Member States – some evidence for this is an increasing rate of publication of policy documents (strategy documents, position papers, White Papers etc) across the Member States. Study of these documents suggests firstly that RTD policy is increasingly seen as a means for achieving wider socio-economic objectives, and secondly, that the range of topics relevant to RTD policy is becoming wider.

There appears to be a clear trend in conceptual approaches to RTD policy across the Member States. Policy-makers across the Member States appear to be thinking more in terms of the interconnections between different types of policies. This is in many cases expressed via the so-called 'systems' framework, a policy approach that focuses on the overall 'system' of institutions and organisations that foster research and innovation, and on the linkages between actors.

For example, the 'systems' approach was explicitly adopted in Finland by the Science and Technology Policy Council in the early 1990s, and continues to inform and structure Finnish policy: the Council is responsible for general planning of research and innovation funding. A similar approach is taken in Germany, where the objective is "a clearer division of labour between the various PROs, improved knowledge and technology transfer, and better cooperation structures within the system". In The Netherlands, systems approaches inform the

work of the Ministry of Economic Affairs. In the UK, policy "deals with science and technology as an integral part of the UK innovation system". In Sweden this approach is explicitly part of the recent joint White Paper by the Ministries of Education and Industry, and a new agency, the 'Agency for the Innovation System' deals with system-wide approaches.

A second clear trend is towards increasing complexity of policy mixes: the range of policies undertaken by governments is expanding across the Member States. Long-standing forms of support, such as 'traditional' programme or project RTD funding – to research institutes or companies - through RTD-funding agencies, and funding for research through general university funds are continuing. However there are expanding policy actions related to education and researcher training and mobility, public support of science, environmental sustainability, the role of the public sector as a user of RTD, clustering policies, research infrastructures, collaboration and cooperation programmes, IPR systems, regulatory policies, financial support programmes (including venture capital operations), fiscal support measures for RTD, company formation etc. The precise array of measures and instruments varies significantly across countries, as does the relative 'weight' of the policies. The expanding set of policies means that across the Member States the line between RTD policy and innovation policy is increasingly blurred. The situation in Britain is probably typical of Member State developments: "UK science and technology policy has evolved into an innovation policy wherein S&T concerns are fully integrated into the broader national system of innovation. This 'traditional' support for funding streams along disciplinary lines has shifted to support for the constituent and contributory processes of innovation.", with a strong emphasis on collaborative programmes.

A third development across the Member States is a practical consequence of the first two. There has been a strong commonality across countries in terms of seeing coordination issues as more important. This has probably progressed furthest in Finland where collaboration between agencies such as TEKES (the industrial R&D and innovation funding agency) and the Academy of Finland (basic science) is continuous. Other countries see coordination more as a problem than as an achievement – the German system is 'scattered', the Estonian system is 'fragmented'. In Greece a major target is to "improve the interconnection of research and the business sector". In general it is important to note that the systemic and co-ordination objectives sought by the Member States have only partially been translated into real organisational integration. At the Member State level the RTDI system in Europe is extremely complex, and this raises major questions as to whether or how coordination might be improved.

The Europeanisation of Member State RTD Policy: ERA objectives and actions in the Member States

This issue can be addressed on two levels – firstly, in terms of the explicit adoption of Lisbon targets, and secondly in terms of implicit coherence with the Lisbon strategy.

A number of Member States explicitly refer to Lisbon targets in policy strategy documents, usually in terms of the 3% R&D intensity target – Germany's *Federal Report on Research* treats the 3% target as a policy goal, and proposes changes in R&D funding mechanisms and in human resources policy that are compatible with the EU's 3% Action Plan. Italy has also adopted R&D intensity targets aimed at the Lisbon objectives. The UK has the goal of increasing business R&D intensity to 1.7%, which is also consistent with the Action Plan. The Netherlands has had a number of strategy documents assessing the ERA objectives, and exploring the strategic frameworks for a greater internationalisation of RTD policy, and for

the 3% target. These targets are also found in the smaller countries, including Luxembourg, and in associated states such as Norway, which has adopted the 3% target.

The 3% Action Plan set out an array of initiatives to increase and improve R&D investment. The competence for a majority of them clearly lies with Member States. At the present time most Member States are running programmes or policies covering many of the set of 25 broad objectives for RTD policy part of the 3% Action Plan, although they are not all explicitly linked to the Lisbon agenda or the Action Plan. For example, about half of EU Member States have implemented specific fiscal measures in support of R&D that are consistent with the Action Plan. Similarly an attempt to improve links between public research organisations and industry is frequently found in the Member States. Most countries see participation in European programmes and increased internationalisation of RTD as key objectives. The Action Plan target to "enhance the innovation impact of R&D programmes by encouraging and supporting the integration of innovation-oriented activities in research projects" is also a consistent objective across Member States. Likewise, the Action Plan elements concerning the design of policy mixes are currently being addressed in many Member States, and this is reflected in the coordination efforts mentioned above.

3. INTERNATIONAL COOPERATION AGREEMENTS

The scientific and technological agreements signed with third countries are underpinning the international dimension of the European Research Area. The established partnerships are based on equitable access to knowledge and know-how and to a sharing of the risks and benefits of undertaking joint high level research.

During the year 2004, the following activities took place promoting/concluding International S&T cooperation agreements:

Switzerland: the Association agreement was signed on 16.01.04.

Israel: the Association agreement was concluded on 30.04.04

Brazil: the decision on the conclusion of an S&T cooperation agreement was adopted by the Commission on 04.10.04.

Mexico: the decision on the conclusion of an S&T cooperation agreement was adopted by the Commission on 14.12.04 and entered into force on 08.07.05.

Egypt: the decision on the signature of an S&T agreement was adopted by the Commission on 09.07.04.

Korea: the decision on the mandate for negotiating an S&T agreement was adopted by the Commission on 23.12.04.

United States: the renewal of the Cooperation agreement was completed on 04.10.04.

China: the renewal of the cooperation agreement on 08.12.04.

Moldavia: the Commission decision associating Moldavia to STCU was adopted on 18.10.04.

Morocco and Tunisia: The agreements were ratified and entered into force in April 2004.

4. CONSULTATION AND MONITORING PROCEDURES

4.1. Scientific and Technical Research Committee (CREST)

Within the framework of CREST's mandate to promote the co-ordination of Member State RTD activities in order to ensure mutual consistency between national policies and Community policy and, in particular, the invitation by the Competitiveness Council (Council Resolution of 22 September 2003. 'Investing in Research in Europe') to CREST to act as the operational interface between Member States when applying the open method of co-ordination (OMC) to policies supporting the Barcelona 3% objective, the work of the Committee during 2004 concentrated mainly on: (i) the opening and co-ordination of national programmes; (ii) the implementation of the OMC within the context of the Barcelona objective; (ii) national basic research schemes; and (iv) national evaluation schemes.

With respect to the opening of national research programmes and OMC, details can be found in section 2.3 (Developments in member States) of this document.

Regarding national basic research schemes, delegates have started an exercise of presenting their national policies to each other. Besides continuing with these presentations, under reflection is the development of a report that would attempt to draw some conclusions about the different national schemes.

Finally, in terms of the CREST Evaluation Network, an Action Plan, which proposed a role for the Network, namely to prepare and inform discussions in CREST by providing information available at the national level, was adopted by the Committee. The objective is to support better co-ordination of European RTD evaluation, through contributing to an information base on the organisation of national policy/programme evaluation systems, and through reflections and other informed analysis on the experience of implementing and using evaluation.

On the occasion of CREST meetings held in the Presidency countries (namely, Ireland and the Netherlands); the national research policies of these countries were presented.

4.2. Programme Committees

The three programme committees of the EC and Euratom Specific Programmes for the Sixth Framework Programme were now fully operational.

The programme committee for the Specific Programme 'Integrating and strengthening the European research area' (SP1) met in eight different configurations, seven thematic and one horizontal, and the Specific programme 'Structuring the European Research Area' in five configurations, four specific and one horizontal. The configurations relate to the different priorities and areas of FP6, but they belong to the same committee (SP1 or SP2 respectively) and a coherent approach in their work is therefore vital. Some coordination efforts were made to ensure that the Committees work in the same way.

The two EC Committees held in total some 50 meetings in 2004. They were asked for 185 opinions by the Commission, both on draft decisions on the selection of proposals and on changes to the work programmes. All opinions given were favourable. The Commission also consulted the committees informally for exchanges of views and for information on various issues.

The Specific Programme under the Euratom treaty met in total nine times in 2004, the Fission committee four times and the Consultation Committee on Fusion five times.

On 1 July 2004, the responsibility of the existing Standing Committee on Agricultural Research (SCAR) was also transferred from DG AGRI to DG RTD, but there were no meetings held in the second half of 2004.

4.3. Advisory Groups

The twelve advisory groups (AGs) created to cover the research activities and areas of FP6, (namely: Genomics And Biotechnology For Health; Information Society; Nanotechnologies And Nanosciences, Knowledge-Based Multifunctional Materials And New Production Processes And Devices' Technologies; Aeronautics; Space; Food Quality And Safety; Sustainable Energy Systems And Nuclear Energy; Sustainable Surface Transport; Global Change And Ecosystems; Social Sciences And Humanities In The European Research Area; Human Resources; Science And Society) continued in 2004 to give the Commission advice on the overall strategy to be followed in the development in the various research activities, and in particular on the review of the various work-programmes.

In addition, some AGs produced reports on their activities which were put on-line and therefore made accessible to all at the following address: http://www.cordis.lu/fp6/eags.

It should also be noted that a meeting between the Research Director-General, Achilleas Mitsos and all Chairs and Vice-chairs was held on 29 March 2004. The purpose of the meeting was to present the recently adopted Commission Communication on the financial perspectives 2007-2013, and to consequently have a free discussion about future options for European RTD. This initiative was very much appreciated by all participants.

4.4. European Research Advisory Board (EURAB)

The European Research Advisory Board (EURAB) is a high level, independent, advisory committee set up by the Commission in September 2001 and consisting of 45 top experts from academia and industry to provide advice on the design and implementation of Community research policy[20]. EURAB has focused its attention on the impact of policy instruments such as the Framework Programmes, delivering advice and opinions on specific issues either at the request of the Commission or on its own initiative.

In July 2004 EURAB completed its first cycle of operation (3 years) and half of its members were changed.

EURAB has greatly contributed to raising the profile of European research policy. From March 2004 and June 2005 EURAB, produced a number of new recommendations. The recommendations concerned the design of the new Framework Programme (FP7), the Financial Perspectives, the criteria for selection of research themes and an assessment of the FP6 instruments with a forward look to FP7. In addition, EURAB is working on recommendations on the increase in the industrial participation in FP7, on International Cooperation, on the integration of Social Sciences and Humanities in FP7, on the regional

[20] For the composition and opinions of EURAB, see http://europa.eu.int/comm/research/eurab/index_en.html

potential of research and innovation and the role and importance of Research and Technology Organisations (RTOs) in the European RTD scene.

Furthermore, EURAB offered advice on the establishment of a European Institute of Technology and launched a European action in support of increased funding for European research.

4.5. Monitoring and Evaluation

There was a significant increase in the level of evaluation activity during 2004 compared with previous years. This reflected major policy needs, particularly in the light of the preparation of proposals for a new Framework Programme and a trend towards increased numbers of evaluations generally.

In total there were eighteen evaluations running during the course of the year. Twelve evaluations were completed, of which five had started during the year and seven had been carried over from previous years. Five evaluations were started and will be completed in subsequent years and one evaluation was carried over from a previous year and was due to be completed in 2005.

There were five main areas of evaluation activity: implementation of the Five-Year Assessment (1999-2003), including the supporting studies and analyses that fed into the assessment; a major strategic level evaluation of the effectiveness of the instruments used under the 6th Framework Programme; the ex ante Impact Assessment of proposals for a future Framework Programme; the annual Monitoring exercise; and the evaluation studies managed at operational level.

The Five Year Assessment (1999-2003), which was carried out between June and December 2004 by a Panel of 13 independent high level experts Chaired by Dr E. Ormala, provided an examination of the achievements and impacts of Community research over the five preceding years. Although it was primarily an *ex-post* assessment, it also incorporated significant intermediate and *ex ante* evaluative aspects and thus contributed to the ex ante Impact Assessment of proposals for a new Framework Programme. The results of the Five Year Assessment were made available on 10 February 2005.

The specific studies that were implemented to provide input for the Five-Year Assessment (1999-2003) were: an impact evaluation of FP3 and FP4; an impact evaluation of FP5; a bibliometrics study of scientific publishing resulting from FP4 and FP5; a study of High Impact Research Activities under FP4 and FP5. Additional work of an evaluative nature was carried out through four analyses by independent experts, the subjects being: an analysis of Europe's changing economic landscape; an analysis of Europe's changing research policy landscape; an analysis of the implementation of Community research; an analysis to synthesise the record of evaluation reports and studies on Community research at EC and Member States level. (Further information on the findings of the Five Year Assessment are provided in section 1.4)

At the horizontal level, the evaluation of the effectiveness of the new instruments was carried out by a high level expert panel under the Chairmanship of Professor R. Marimón. The report was communicated to the Commission on 1 July and the Commission gave its response to the recommendations on 27th August.

The ex ante Impact Assessment in progress during the year examined the case for and the possible form of a future Community research Framework Programme. It was the first time in the 20 year history of the Framework Programme that such an ex-ante impact assessment was produced, systematically probing the potential economic, social and environmental impacts of the proposal in the course of its development. The exercise involved a coordinated series of inputs from DG RTD services and the services of other Directorates General that are involved with the Framework Programme, as well as separate analyses and studies and stakeholders' consultation. The work also evolved methodologies and templates for ex-ante Impact Assessments (and ex-ante financial evaluations) of this type. The final report accompanied the proposals for the 7th Framework Programme launched in the beginning of April 2005.

The annual Monitoring exercise**,** which was carried out between March and July 2004, provided an intermediate evaluation of the implementation of Community research and assessed the processes and level of achievement of programmes. This year saw the introduction of a new lighter format based on inter alia a follow-up of the Annual Management Plan and the use of a single panel in place of the previous panels at FP, ERA and thematic programme levels. This approach proved very effective and was commended by the panel.

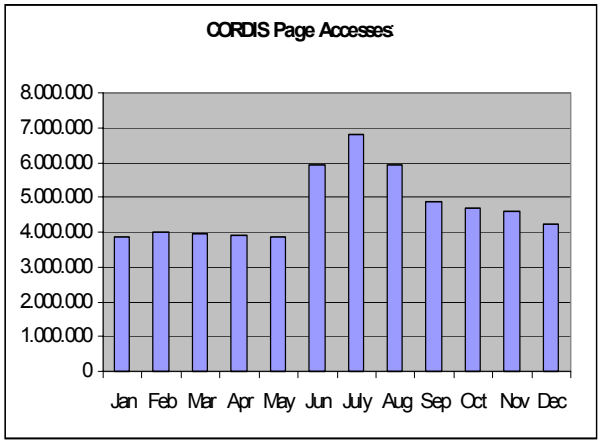
At the operational level seven evaluations were completed during the year. Three of these were in fields related to the social sciences, two in research fields connected to quality of life and health improvement, one related to agricultural research and the other concerning the EU-China science agreement.

4.6 Dissemination

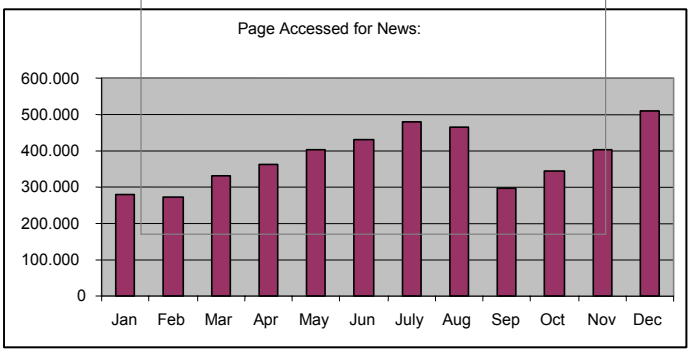
Information dissemination is a generic requirement for all FP 6 projects. With a view to fostering the exploitation of the knowledge generated by the Framework Programmes, particular emphasis is placed on the dissemination of results.

Information Dissemination of results occurs through a number of channels. Through CORDIS – the **CO**mmunity **R**&**D** **I**nformation **S**ervice, an additional 2,000 projects were made available for access, bringing the total to 64,000; as well as 1,300 publishable reports, bringing that total to over 86,000. There was also a substantial increase in the document library, which was accessed heavily by both proposers and projects. The 'Results' service showed a healthy growth of about 15%, mainly through outputs of FP5 projects, thus growth has been sustained into 2005. This contributed to a virtual doubling in size of CORDIS during the year to over 200,000 pages hosted, and an increase in document downloads to 3,500,000 full documents annually.

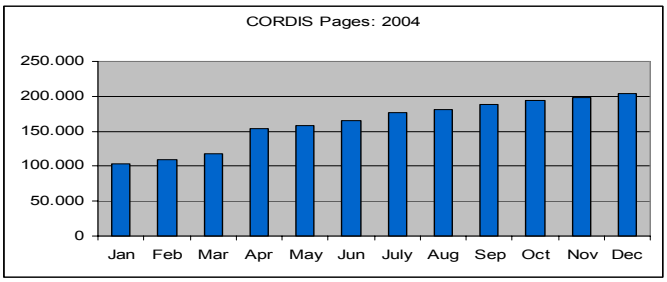
During the year, some 56 million pages were accessed, peaking in the summer to coincide with calls published.



The use of the daily News service on CORDIS which is produced in five languages continued to rise also throughout the year. Even after a relapse during the later summer, once calls had been published, the news service usage is up by over 60%.



The number of pages hosted by CORDIS doubled during the year, rising steadily month on month.



5. STATISTICAL TABLES ON THE IMPLEMENTATION OF THE 6TH FRAMEWORK PROGRAMME

The statistical annex which accompanies this working document provides data on proposals received in 2004, on proposals retained for funding that were submitted in 2004, and on contracts signed in 2004 under the 6th Framework Programme. The format of the tables is the same as for the previous Annual Report and reflects the structure of the 6th Framework Programme.

5.1. Explanatory notes

The following notes apply to the tables:

- The group 'EU25-Member States' includes Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia, although they acceded to the European Union in May 2004.

- In the group 'Candidate and Associated Countries', Bulgaria, Romania are both candidate and associated countries. Turkey and Croatia are candidate countries but not associated countries. Iceland, Liechtenstein and Norway are associated countries in the framework of the European Economic Area, and Switzerland and Israel are associated countries in the framework of an association agreement.

- It is not possible to calculate countries' 'success rates' from the number of proposals received and/or selected and those that result in contracts signed, since a proposal selected in year *n* might not result in a signed contract until year *n+1*.

- EC funding breakdown by participants is not available for Networks of Excellence. As a result, the total EC funding to FP6 participants is less than the total EC contribution to FP6 contracts.

- SME participation information is missing due to gaps in the provision of relevant data for recording in the central FP6 contracts database. Work to complete the database is ongoing.

- Euratom actions in the areas of research infrastructures and human resources and mobility are included under Specific Support Actions

- A collaborative link is assumed to exist between each pair of participants in each contract. The number of collaborative links created by a project is calculated in the following way:

    (a) When there are *n* participants from a given country in a project, the number of collaborative links between participants from the given country formed as a result of the project is assumed to be *n*(n-1)/2*.

    (b) When there are *m* participants from one country and *p* from another country in a project, the number of collaborative links created between the two countries as a result of the project is assumed to be *m*p*.

The total number of collaborative links is calculated by summing across all projects.

5.2. List of tables in the statistical annex

Table 1a: FP6 Proposals submitted in 2004: Participation by Priority Area & Instrument

Table 1b: FP6 Proposals submitted in 2004: Participation by Priority Area & Country

Table 2a: FP6 Proposals retained for funding that were submitted in 2004: Participation by

Priority Area & Instrument

Table 2b: FP6 Proposals retained for funding that were submitted in 2004: Participation by Priority Area and Country

Table 3a: FP6 Contracts signed in 2004: Participation & Contribution by Priority Area and Instrument

Table 3b: FP6 Contracts signed in 2004: Participation & Contribution by Priority Area and Type of Beneficiary

Table 3c: FP6 Contracts signed in 2004: Participation & Contribution by Priority Area and Country

Table 3d: FP6 Contracts signed in 2004: Participation & Contribution by Instrument and Country

Table 3e: FP6 Contracts signed in 2004: Participation & Contribution by Type of Beneficiary and Country

Table 4: Collaborative Links within contracts signed in 2004