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A plain guide to the 2006 annual activity report
of the European Commission's Directorate-General for Research

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2006: a time of transition



Research lies at the heart of the European Union's strategy for becoming the world's most competitive and dynamic knowledge-based economy by 2010. As confirmed by the Commission in 2005, research – and on a broader basis, knowledge (comprising research, education and innovation) – play a crucial role in achieving the goals of sustainable growth and employment.

In this context, 2006 was a pivotal year for the Directorate General for Research (DG Research), marking the transition between the Sixth and Seventh Framework Programmes – which are the main vehicles for EU support of collaborative research and technological development at a trans-national level.

The Sixth Framework Programme (FP6 – 2002-2006) was the first to include the specific objective of creating a European Research Area (ERA), intended to overcome the fragmentation of efforts and promote greater complementarity and synergy in the generation of knowledge. This is, indeed, the overall objective of the European research policy, and thus assumes highest priority at DG Research.

Against the political background of a new momentum for prosperity and enhanced competitiveness, stability and security, DG Research globally attained its 2006 targets regarding the conception and implementation of the ERA. It completed the final commitments under FP6, and ensured the successful adoption and launch of the Seventh Framework Programme (FP7 – 2007-2013) package. Significant accomplishments were reported by all DG Research services for the great majority of actions across all areas defined in the Annual Management Plan 2006.

These are outlined in the following pages, together with brief examples illustrating some of the more outstanding projects. Surveys have indicated that many of these would not have taken place without the impetus of EU funding and support. Their outcomes show just how much can be achieved by combining the talents and resources of Europe's Member States and other partners into cooperating teams working for the benefit of all EU citizens.

J.M. Silva Rodríguez
Director General

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The year in brief – policy highlights

In 2006, DG Research received nearly 7 000 research proposals. By the year-end, more than 2 000 contracts had been signed, with an EU contribution of € 3.2 billion and over 14 000 participants.

Throughout 2006, DG Research implemented the Integrated Innovation/Research Action Plan adopted in 2005, which calls for a major upgrade of the conditions for research and innovation in Europe. This is intended to help Member States promote innovation and research through initiatives such as the redeployment of state aid, improved protection of intellectual property, mobilisation of additional funds for research (including private sector investment), creation of innovation centres and the enhancement of university-industry partnerships.

DG Research also provided substantial input to the Broad-Based Innovation Strategy for Europe, which translates investments in knowledge into innovative products and services.

FP7: a milestone

A major milestone of the year was the adoption of FP7⁽¹⁾ for the Commission and EURATOM (the European Atomic Energy Community). The final step in this lengthy process took place in December, and the first calls for project proposals were launched on 22 December.

International agreement on nuclear fusion, ITER

Another clear highlight was the conclusion of several years of difficult international negotiations regarding ITER (the international thermonuclear experimental reactor) (see page 30). Signing of the agreement in November by the EU, USA, China, Russia, Japan and South Korea makes this the world's largest scientific collaboration of its kind.

Towards a European Research Council

The setting up of a European Research Council, the first pan-European funding body to support investigator-driven frontier research, took several steps forward. Although the formation of its executive agency was still underway, a first call for proposals was issued on 22 December. This was for ERC Starting Independent Researcher Grants, assisting young researchers about to establish or consolidate an independent research team, or to begin conducting independent research in Europe.

(1) See <http://ec.europa.eu/research/fp7>

New measures adopted

The concept of European Technology Platforms (ETP) has seen widespread take-up, providing a framework for industry-led stakeholders to define research and development priorities in particular sectors or areas of interest. Certain domains were also selected for the implementation of Joint Technology Initiatives: long-term public-private partnerships designed to ensure that the EU leads in key technology areas.

During FP6, the ‘European and Developing Countries Clinical Trials Partnership’ (see page 10), became the first application of Article 169 of the European Community Treaty, enabling the Community to add its support to research and development (R&D) programmes shared by several Member States. Drawing valuable lessons from this experience, DG Research backed several more activities aimed at raising regional involvement in the knowledge-based economy.

Reaching out to the world

Achievements on the international cooperation front included progress in negotiations to:

- associate Israel and Switzerland with FP7;
- sign an S&T agreement between the EC and the Republic of Korea; and
- conclude an agreement for cooperation between EURATOM and Korea in the field of fusion energy research.

In the nuclear domain, EURATOM acceded to the Framework Agreement for International Collaboration on Research and Development of Generation IV Nuclear Energy Systems. This is a significant development, opening the door to EU countries that are not members on an individual basis.

The Commission also adopted the proposal for a new agreement between the EU, Australia, Canada, Norway, Switzerland, Korea, Japan, and the USA on R&D in Intelligent Manufacturing Systems.

FP6 concluded, monitoring continues

Examples of the results and successes for the final year of FP6 are summarised in this document. Scientific, technical, legal and financial monitoring of many actions initiated under previous Framework Programmes also continued, and a number of projects were finalised with very promising outcomes. Their scientific, technical and socio-economic impacts are the subject of an on-going multi-annual evaluation programme aiming to maximise their potential in the innovation and policy-making chain.

Strategy for simplification and innovation

The finalisation of FP6 and adoption of FP7 made 2006 a year of intense activity. At its conclusion, major steps had been taken to simplify entry into the Framework Programmes and tackle fundamental issues of access to finance.

FP6 concluded with a better than 99% deployment of the available budget. Proposal submissions were managed without problems, as were as the tasks of the programme committees and the revision of the work programmes. New large-scale funding instruments (Networks of Excellence, Integrated Projects) proved effective in fulfilling their intended purpose of assembling a critical mass of expertise and resources to achieve ambitious research objectives.

After years of preparation and intense negotiations, the main financial and legal instruments of FP7 were finally put in place to contribute to the implementation of the ERA for the period 2007-2013. One of the guiding principles in the preparation of the new Framework Programme was to simplify procedures in order to lower the barriers to entry, especially for the SMEs that constitute the vast majority of European businesses.

The number of funding schemes has been reduced, and fewer reports will be requested from the beneficiaries. At the same time, new intervention mechanisms – such as loans from the European Investment Bank (EIB), admission of third-country partners and the strengthening of cooperation with other European programmes – will encourage greater participation.

Funding for high-risk ventures

The European Research Council (ERC) represents a dynamic new development in European research funding. In FP7, its €7.51 billion budget will support high-risk frontier projects.

DG Research also initiated consultation with the European Council and Parliament on a new EIB funding scheme, known as the Risk-Sharing Finance Facility. It will provide loans and guarantees for projects and research infrastructures that would not otherwise receive sufficient finance. Up to €10 billion could be available to stimulate private investment in R&D and innovation.

Multiple issues shape ERA structure

Structuring the ERA covers an extremely broad spread of actions: from addressing public concerns and the risks of research, to ethics and gender issues; from improving the scientific education of young people, to providing an environment and infrastructures in which knowledge creation can flourish.

Education shortfall

Despite the growing numbers of young people entering university, sciences – and especially the physical sciences – are losing ground. In response to this, the Commission has created a high-level group of experts to look into how best to support science education in Europe's primary and secondary schools. It is also exploring a way to interest the general public, by introducing a cultural dimension of science into European cities.

Gender

Gender statistics published by DG Research for 2006 show that only 29% of European scientists were female, while a mere 5.8% figured in engineering and technology research. A European Platform of Women Scientists has now been established to encourage experience sharing and networking at European level.

Ethics

All EU-funded research activities must comply with a strict ethical code, so the Commission reviews project proposals with an ethically sensitive content. The number of proposals evaluated has continued to increase dramatically, from 89 in 2003 to 411 in 2006. This is due to a greater attention to ethical issues by the scientific evaluators, coupled with a lack of awareness among project proposers of how to identify, explain and address such matters.

Funding

The first-ever conference on the role of philanthropy in funding research, organised by the EC and with the European Foundation Centre in Brussels in March 2006, resulted in the resolution to create a European Forum in charge of developing an appropriate policy agenda.

Infrastructures

Community activity helps the structuring of the scientific community in the reinforcement of an efficient ERA. In 2006, a total of 45 new projects were signed, utilising a budget of € 150 million. In total, some 250 networked infrastructures were supported under FP6. These directly serve around 20 000 scientists, while millions more benefit from the databases and Internet-based services.

The Commission also supported the European Strategy Forum for Research Infrastructures (ESFRI) in its development of a coherent and strategic approach to policy-making. In particular, it participated in the elaboration of the first European Roadmap for Research Infrastructures needed in the next 10 to 20 years. A document published in October 2006 identifies 35 projects.



Training, mobility, career development for researchers

An FP6 budget of €1 580 million was used to encourage mobility of EU researchers. Of this, €482 million was allocated in 2006 to Marie Curie actions, designed to give European researchers opportunities to gain experience across the EU and beyond, to attract top-class researchers from third countries or Associate Countries, and to transfer knowledge between the private and the public sectors.

During the year, around 870 individuals benefited from Marie Curie Fellowships.

Some 800 European research organisations were supported by the Marie Curie Research Training Networks action, which provides a platform for training in the framework of defined collaborative projects.

The Marie Curie action for promotion of scientific excellence allowed 55 Marie Curie Team leaders and Chairholders to occupy teaching and research positions at prestigious universities and research institutions in Europe, and to work together with their newly recruited international teams.

The 36 new contracts signed for Marie Curie conferences will allow a total of 3 245 events to be held, with approximately 93 000 researchers from across FP6 participating in sessions covering a broad range of scientific topics.

The Transfer of Knowledge Actions, with 79 new contracts in place, will facilitate the further development of research capacities and the establishment of durable industry/academia partnerships through exchanges of research staff and recruitment of international experienced researchers.

European Charter for Researchers

The 'European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers' contributes to the development of an attractive, open and sustainable European labour market for researchers, where the framework conditions allow for recruiting and retaining high-quality researchers in environments conducive to effective performance and productivity. The number of signatory research organisations increases regularly – there were more than 100 at the end of 2006 representing more than 300 individual research organisations.

National/regional actors add strength to ERA

Support for research coordination and joint actions at national and regional levels, as well as among European organisations, is stimulating the coherent development of research policy and programmes across the EU.

One way in which FP6 has contributed to the process of building the ERA is by stepping up the cooperation and coordination of research activities carried out at national and regional levels, and through non-EU programmes.

Teamwork among national programmes

Launched in 2002, the ERA-NET scheme encourages the exchange of information, common activities and best practices between a series of intercommunicating national and/or regional programmes. It affords a long-term perspective and is flexible enough to allow for the different ways in which public research funding is organised in individual Member States and Associated States.

A call for proposals that closed in October 2005 resulted in the launch of 20 new initiatives in 2006, bringing the total of ERA-NET actions receiving Community support under FP6 to 71.

The complete portfolio covers a broad spectrum of disciplines and research areas, including horizontal and cross-cutting topics, sometimes in very basic scientific fields. So far, more than half of these actions have started, or have been the subjects of joint calls for proposals. Some 38 countries are already involved, and the number is likely to increase under FP7.

A 2006 expert group report calls on politicians, the Commission and programme owners to initiate strategic reviews of their needs and priorities in this area, which should lead to the development of national strategies for involvement in desirable ERA-NETs and other collaborative activities.

Links to external agencies

As an aid to realisation of the ERA, a coherent set of activities was deployed in 2006 to improve coordination with European inter-governmental research frameworks and various European-level research organisations. Particular effort has been made to enhance the complementarity and synergy between the Framework Programme and activities carried out under intergovernmental structures such as EUREKA, COST (European Cooperation in the field of Scientific and Technical Research) and EIROforum (a partnership of Europe's seven largest intergovernmental research organisations). DG Research has formed a dedicated unit for this purpose.

COST activities were funded through the COST office at the maximum level of €80 million for the whole of FP6. The Commission also continued its cooperation with EUREKA, which led to the setting-up of the EUROSTARS initiative for research-performing SMEs.



Networking solution to SMEs' bio-research needs

European biotech SMEs face real problems in gaining critical size on the global market in terms of R&D project portfolio, capitalisation, and scientific and managerial excellence. Although national R&D programmes and public research laboratories do exist in many Member States, trans-national funding programmes are rare.

The ERA-NET EUROTRANS-BIO therefore pools the resources of 12 ministries and agencies from six EU countries and regions in order to support private/private and private/public co-operations between companies (especially SMEs) and academic laboratories, by coordinating their national or regional public funding programmes.

In 2006, a first call resulted in the selection of 23 industrial R&D projects, for a total budget of €95 million. A second will allow more R&D-intensive SMEs to be supported in their strategic partnerships for a total budget of up to €70 million.

Project title:
European network of trans-national collaborative RTD for SME's projects in the field of biotechnology

EU contribution:
€ 2.9 million

Total budget:
€ 2.9 million

Project duration:
October 2004-September 2008

Participant countries:
Austria, Finland, France, Germany, Netherlands, Spain

Website:
www.eurotransbio.net

Social sciences and humanities map a changing Europe

How does globalisation affect Europe? Are its enterprises ready to innovate? Can social models be modernised without jeopardizing our societies? How should migration be regulated? These are some of the hard questions that the European socio-economic sciences and humanities (SESH) programme is trying to answer in order to help citizens, politicians, social and economic actors to understand the new Europe.

Under FP6, the SESH programme tackled two broad sets of issues: knowledge-based society and social cohesion on the one hand; citizenship, democracy and new forms of governance on the other. It has launched studies on the knowledge society, the knowledge economy, European integration, the impact of enlargement, governance, citizenship and cultural identities, conflicts and peace.

From 2002 to 2006, 169 SESH projects were funded, some of which will run until 2011. They include 34 large-scale initiatives with budgets of up to €5.5 million and up to 50 institutional partners. All in all, they have gathered 2 060 partners from 67 countries, and promoted interdisciplinary research.

At the same time, several projects started in 2006 are tackling the fundamental question: how can SESH shape the future of the EU?

Social sciences in the ERA

The national authorities are now convinced that they should cooperate and join their programmes of research. The two existing ERA-NETs in SESH are developing remarkably well and making steps towards the definition of common research agendas.

The opinions of the scientists themselves on the future of the ERA are very important. In order to prepare for FP7, the views of the scientific community and other interested stakeholders were gathered through a large on-line consultation, from which 450 responses were fed into the first EU SESH Work Programme.

Europe and the world

Since many problems regarding economic development, social models, employment, sustainable development, democratic participation, safety and security have a global dimension – or at least relate to neighbouring countries – the SESH research must include a strategy on international cooperation.



In 2006, a specific dedicated call fostered the strengthening of international cooperation in some of the existing SESH projects. Altogether FP6 now includes 82 partners from 29 different third countries in 33 projects, which is a clear improvement on FP5.

The first work programme for FP7 opens up a totally new area for research called 'Europe and the world', which will investigate the wider political and economic role of the EU in the global context.

Measuring migration made easier

International migration and asylum are at the top of the political agenda in the EU. In order to interpret evolving trends, journalists, NGOs, researchers, lawyers and policy-makers need reliable information.

The THESIM project brought together seven research teams and EUROSTAT, the European statistics organisation, to compare statistical sources in the 25 Member States and to provide an up-to-date and comprehensive information on the systems delivering national migration facts and figures.

Its final report and the THESIM book published in February 2006 show real progress. As well as bringing together data suppliers and users at the national and EU level, the initiative resulted in the creation of a strong international network of key academic experts on migration statistics in the EU. While primarily geared to the needs of specialists, it also gives the wider public access to information on questions of migration, which are of ever increasing importance to society at large.

Project title:
Towards harmonised European statistics on international migration

EU contribution:
€ 0.5 million

Total budget:
€ 0.6 million

Project duration:
April 2004-March 2005

Participant countries:
Austria, Belgium, Estonia, France, Germany, Netherlands, Italy

Website:
www.uclouvain.be/en-7823.html

New knowledge enhances healthcare

Europe is undergoing rapid institutional change, with all countries working on various aspects of healthcare reform. This diversity makes the EU a 'natural laboratory', yielding valuable lessons about the effects of public policy on the behaviour and wellbeing of citizens.

In 2006, actions addressing healthcare issues concentrated on integrating post-genomic research into the more established biomedical and biotechnological approaches. They also sought to unite public and private capabilities in a bid to increase coherence and achieve critical mass.

Selection of the final generation of FP6 projects led to a global figure of more than 600 European collaborations involving around 7 500 research teams, with a total EU contribution of €2.5 billion and a matching investment of approximately €1.25 billion in the Member and Associated States.

Significant advances were also made in the preparation of a Commission proposal to establish an Innovative Medicines Joint Undertaking in conjunction with the European Federation of Pharmaceutical Industries and Associations (EFPIA).

Timely response to threat

To combat the threat of a 'bird flu' pandemic arising from the westward spread of the deadly H5N1 virus strain observed in 2005, six projects were quickly launched with a global budget of €14 million. These bring together 40 collaborators, including 10 SMEs and two large vaccine companies, as well as partners from China and Russia.

Furthermore, progress was noted with the European and Developing Countries Clinical Trials Programme (EDCTP), the first application of Article 169 of the EC Treaty (whereby the Community can participate in research programmes undertaken by several Member States) with the objective of reducing the burden of HIV/AIDS, malaria and tuberculosis via clinical trials and capacity-building in Africa. In 2006, EDCTP started a real co-funding process, with additional finance provided by Member States and other funding organisations. Two calls for proposals were published, one on HIV mother-to-child transmission and another, a joint EDCTP-Bill and Melinda Gates Foundation call, on capacity building for HIV/AIDS vaccine.



Coordinated research advances fight against 'superbugs'

Widespread over-prescription of antibiotics has resulted in the evolution of increasingly resistant bacterial strains. As a result, previously effective drugs have lost their power against a growing list of infectious diseases.

Children, the elderly and the immunologically-deficient, including HIV-positive individuals, are the groups most at risk from infections that may be acquired in hospitals, day-care centres, schools or the workplace.

In the PREVIS project, partners from eight countries studied the bacterium streptococcus pneumoniae – a major cause of pneumonia, septicaemia and meningitis. Through coordinated examination of samples gathered from healthy and diseased subjects, they investigated the molecular mechanisms by which the bacterium acquires its resistance. By also considering ecological and societal factors, such as the use of antibiotics and day-care centre attendance across Europe, the project has shed new light on previously unexplored aspects of the problem.

One SME partner has identified specific bacterial genes linked to the infective process. The long-term goal is to develop drugs that will inhibit the proteins essential to development of the disease. This work is an important step towards the provision of improved treatments, and will aid the identification of new prevention and intervention strategies.

Project title:
Pneumococcal resistance, epidemicity and virulence – an international study

EU contribution:
€ 3 million

Total budget:
€ 4.5 million

Project duration:
January 2004-June 2007

Participant countries:
Czech Republic, Germany, Iceland, Portugal, Sweden, UK, USA

Website:
<http://previs.itqb.unl.pt/>

Technologies and materials are transforming industry

The development of innovative technologies, materials, processes and production patterns, under FP6 has helped to accelerate the industrial transformation necessary for realisation of a sustainable, knowledge-based European economy.

Nanotechnology, in particular, is seen as a key driver for growth in the 21st century. The Action Plan on Nanotechnology adopted by the Commission makes research a real policy instrument, allowing coherence between Community and Member States' activities to keep Europe at the forefront in the field. This was positively endorsed by the European Parliament in September 2006, and research has been allocated funding with the full agreement of the Member States.

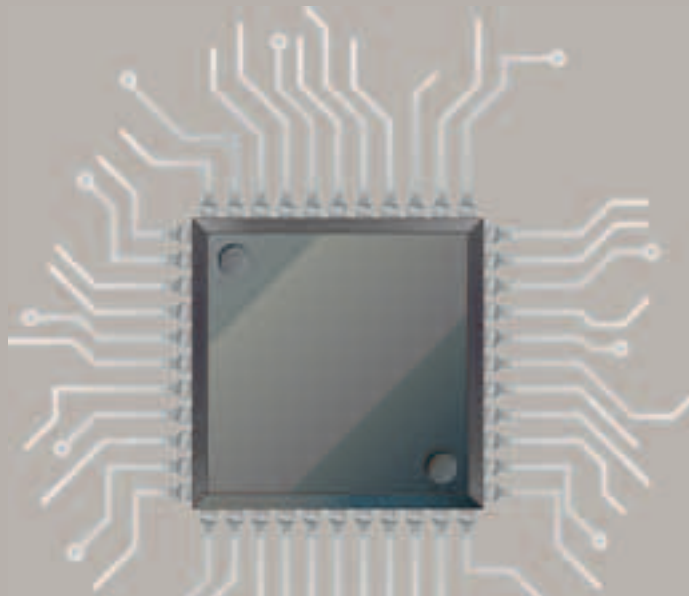
Research actions in nanosciences and nanotechnologies are already providing a considerable impact in terms of new products and processes capable of solving problems in health, security and the environment.

Advanced materials with improved performance derived from a high knowledge content are crucial in the development of high-added-value products that will enable the EU to compete in the global market. Many very successful projects in this area promise early take-up in medical devices, organic electronics, high temperature superconductors and numerous other application sectors.

New production processes are vital to support industrial transformation and create new high-value products and product/services across the whole spectrum of industrial sectors, including SMEs. The projects financed have fulfilled targets of structural integration by bringing together joint programmes of activities in areas such as industrial and engineering design, intelligent production systems, chemical engineering and micro-manufacturing.

Holistic strategy

Fostering the finalisation of research road-maps for ETPs in more than 15 industrial sectors has contributed to the overarching objective of proposing a holistic strategy based on research and innovation. The ETPs are complemented by a number of national platforms, with the shared goal of building the European Research Area in industrial technologies. In the growing sphere of nanotechnology, coordination between Member States and Community policies has been ensured.



Tomorrow's electronics will be organic

In the large-scale NAIMO project, a consortium drawn from nine Member States is devising cost- and energy-effective processing and manufacturing methods for assembling multifunctional nanomaterials onto flexible polymer films.

The new materials will be produced using environment-friendly solution-based techniques such as direct printing. They are likely to give rise to a new industry manufacturing organic electronic devices to complement conventional electronics in many different applications, from energy generation and displays, to health and safety monitoring.

Typical thin-film products will include flexible electronic labels, electronic paper, solar cells and biosensors.

Although still a year from completion in 2006, NAIMO had already contributed strongly to the creation of one spin-off company and to the expansion of a second. Results included nine patent applications and 169 publications.

Support for projects such as this is helping the EU to build a strong and secure position in the potentially huge global nanotechnology market.

Project title:
Nanoscale integrated processing of self-organizing multifunctional organic materials

EU contribution:
€ 14.9 million

Total budget:
€ 23.5 million

Project duration:
April 2004-March 2008

Participant countries:
Belgium, Denmark, Germany, Italy, Netherlands, Poland, Spain, Sweden, UK

Website:
www.naimo-project.org

Research cuts aircraft noise and pollution

By developing lighter materials and composites, more environment-friendly engines, better performing equipment, systems and operational concepts, EU funding has contributed to improving the competitiveness of the aeronautics sector. At the same time, it is minimising the negative impact on environment, energy usage, safety, security and public health.

The air transport sector accounts for around €300 billion in added value and 2.6% of the EU-25 GDP. At present, it employs 3.1 million people in Europe, and strong growth is foreseen for the coming years.

In the final year of FP6, 173 projects were initiated or already underway, with an EU contribution of €827 million.

A number of notable examples can be cited:

- results from SILENCER (Significantly lower community exposure to aircraft noise) have already been incorporated into aircraft currently under development. A special engine inlet for the new Airbus A380 earned its makers the 'Decibel d'Or' award from the French council for noise abatement;
- by permitting better management of airspace capacity through on-board satellite-based communication, navigation and surveillance, ANASTASIA (Airborne new advanced satellite techniques and technologies in a system integrated approach) promises to combine enhanced safety with reductions in air pollution, noise and fuel consumption;

- AERONET, a thematic network on the reduction of aircraft emissions, intends to strengthen the body of European expertise by identifying knowledge gaps and supporting revisions to policy and regulation.

International expansion

Europe has a long record of cooperation in civil aviation research, from which the most visible fruits are seen in the highly successful Airbus consortium. Until now, however, EU support has largely been confined to countries with the strongest aeronautical sectors.

Air Transport Net (AirTN), a new ERA-NET coordination action launched in 2006, will extend collaboration to all EU and Associated States with significant aeronautical research programmes. By coordinating national research efforts and establishing joint activities, it will help European industry to respond to the technological and environmental challenges of the future.

As part of the drive to promote international collaboration, a specific Call for Proposals was introduced to incorporate third countries into existing FP6 projects. Cooperation with Russia and China has received particular attention, with several conferences and joint workshops taking place during the year.



In addition, the Commission has launched the ‘Clean Sky’ Joint Technology Initiative as a project of common European interest. This aims at a quantum leap in the technological capability of Europe to produce aircraft with minimal environmental impact that will ensure EU industrial competitiveness by 2020 and beyond.

Unconventional approach to aircraft design

Current commercial aircraft designs have converged on a near-universal configuration, which may be unable to accommodate the demand for higher operating efficiency and reduced environmental impact in tomorrow’s crowded skies.

The NACRE consortium, comprising 35 partners from 13 countries, is therefore exploring new directions spanning the full range of aeronautical disciplines and technologies. Rather than concentrating on a specific aircraft type, it is developing generic component-level solutions for fuselages, wings, engines and cabins in an unconventional set of concepts described as the ‘Pro Green Aircraft’, the ‘Payload Driven Aircraft’ and the ‘Simple Flying Bus’.

The rationale is to allow examination of alternative versions of the various components, which might have been rejected in a unified, all-embracing approach. This will provide Europe’s plane-makers with a greater design space, enabling them to compete more effectively in the hard-fought global marketplace.

Project title:
New aircraft concepts research

EU contribution:
€ 16.9 million

Total budget:
€ 30.3 million

Project duration:
April 2005-March 2009

Participant countries:
Czech Republic, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Portugal, Spain, Sweden, UK, Russian Federation

We are what we eat

Food research not only entails making progress in technology and science; it must also take account of social factors such as public awareness and confidence. In 2006, European research policy placed special emphasis on the latter aspects, while also reacting promptly to occurrences of serious animal diseases.

Food safety is usually taken for granted – until something goes wrong. Yet food poisoning, contamination and outbreaks of livestock diseases like BSE, bluetongue (sheep) and avian influenza ('bird flu') can have swift and often lasting impacts. Today, even 'safe' foods are causing concern as levels of heart disease and obesity continue to rise.

Alongside the quest for more quality food, sustainable production and use of renewable bio-resources, current hot research topics therefore include the study of food-related disorders and investigation of the safety of additives. For example, a debate over hydrogenated vegetable fat is currently taking place. The study, funded under FP6, is trying to identify cultural differences in five EU Member States: the Netherlands, Greece, the UK, Denmark and Germany. It used focus groups to determine opinion through discussion, with 'expert' and 'non-expert' groups in each country.

Opportunities and threats

The Standing Committee on Agricultural Research (SCAR) contributed significantly to the formulation of innovative agricultural research in FP7 on the basis of its foresight activities and working group discussions. Moreover, 'Knowledge-based Bio-economy' KBBE-Net, a network of high-level officials representing Member States in the KBBE, was created to facilitate the coordination of policy responses to shared challenges in key areas.

Network highlights food: allergy links

Allergies can be fatal. According to the World Health Organization, asthma kills one European every hour. And the problem is becoming more widespread.

Food intake is one suspect behind the increasing susceptibility to a variety of allergic reactions. Experts suggest that a fundamental shift in diets over the past 20 to 40 years is exposing children and adults alike to greater risks.



Trends indicate that, by 2015, half of the population may be affected by chronic diseases such as asthma, eczema and hay fever. As well as diminishing the quality of life for sufferers, these can have major economic consequences through losses in working time or education. The total cost to the EU is estimated at around €100 billion per year.

The GA2LEN network brings together more than 70 allergy research centres (31 partners and nearly 50 collaborating centres) from around Europe – including the European patients’ organisation, EFA, and the European Academy of Allergology and Clinical Immunology, EAACI – with the aim of advancing diagnosis, prevention and treatment methods.

This project is unprecedented in treating separate allergies as related phenomena. Although the triggers and symptoms differ, this unique worldwide partnership offers a platform for comprehensive understanding of allergic diseases as a whole. Furthermore, advanced scientific results are directly translated into improved quality of care for allergy sufferers by constant updating of the GA2LEN/EAACI guidelines.

The partners have already published breakthrough results related to the later-life immunity benefits of breast feeding and baby-food supplements, and to the diagnosis of sensitisation caused by ingesting aspirin and other anti-inflammatories.

Their recently completed European database of comparable epidemiological studies should help scientists to conduct a more reliable analysis of the multiple genetic and environmental factors underlying this major threat to life and health.

Project title:
**Global allergy and asthma
European network**

EU contribution:
€ 14.4 million

Total budget:
€ 29 million

Project duration:
February 2004-January 2009

Participant countries:
**Austria, Belgium, Denmark,
Finland, France, Germany,
Greece, Italy, Netherlands,
Norway, Poland, Portugal, Spain,
Sweden, Switzerland, UK**

Website:
www.gazlen.net

Sustainability is the only long-term solution

Sustainable development embraces surface transport, environmental issues and the energy technologies needed to combat climate change, all of which have global dimensions. Considerable progress has been made in all three areas, both within the EU and in wider international partnerships.

Drive for research integration

Because efficient surface transport – by road, rail and water – is critical to Europe’s competitiveness and employment, 2006 saw a strong focus on the Sustainable Surface Transport part of FP6. 169 projects are currently underway, with EU funding of €493 million.

ETPs had already been established in several key sectors and produced vision documents, which are major drivers of integration at the European level. ERRAC (rail), ERTRAC (road) and WATERBORNE (water-borne), as well as the EIRAC (intermodal) and EURFORUM (urban) coordination actions, have produced new or revised strategic research agendas and started to implement them.

Problem-solving technologies

Technologies are being developed to face critical problems relating to transport and the environment (recycling, pollution and noise reduction), mobility, safety and security.

Given that 90% of the EU’s external trade goods and 40% of its internal trade are carried by sea, maritime transport is of particularly high strategic relevance. Much of the world’s shipping is owned by Europeans, and the turnover of Europe’s maritime transport sector is more than €37 billion.

In February, WATERBORNE’s new strategic vision for 2020 was launched in Brussels. DG Research itself was also actively involved in the Maritime Policy Task Force. It coordinated the research contributions to a Green Paper ‘Towards a Future Maritime Policy for the Union: A European Vision for the Oceans and Seas’, which was adopted and launched in June 2006.

Among highlights in the road transport area were an EU-Russian workshop, an FP6 call targeting the inclusion of more third countries, and the Transport Research Arena conference and exhibition, mounted in cooperation with ERTRAC and the Conference of European Directors of Roads.

Environment knows no frontiers

Environmental problems go beyond national frontiers and require a coordinated approach at a pan-European and often global level. To promote sustainable management of the environment and its resources, EU research is directed towards:

- strengthening the capacity to understand, detect and predict global change;
- developing strategies for disaster prevention and mitigation; and
- preserving ecosystems and protecting biodiversity.



A budget of €852 million was allocated to environmental projects in FP6, €214 million of which was distributed in 2006. The supported research ranges from alternative land use assessment, marine ecosystem monitoring and climatic studies, to global earth observation and development of an early warning system for tsunamis in the Mediterranean.

Polar climate research will guide global warming strategy

Scientists working on the FP5 European Project for Ice Coring in the Antarctic (EPICA) established a link between temperature changes in the Arctic and Antarctic by looking at air bubbles trapped in ice cores. They found that temperature variations at the poles are related, even over quite short timescales, by a 'see-saw' effect due to changes in deep oceanic currents in the Atlantic.

In the FP6 follow-up EPICA-MIS, completion of two Antarctic deep ice cores will for the first time reveal atmospheric records of greenhouse gases like CO₂ and methane extending back 800 000 years (it has already reached 650 000 years for CO₂). Multi-parameter reconstructions will provide an excellent basis for understanding and modelling past and present climate shifts. This will enable climatic coupling between the northern and southern hemispheres to be addressed with new perspectives, producing fresh evidence to guide and refine models relating to current global warming.

Project title:
New paleoreconstructions from antarctic ice and marine records

EU contribution:
€2.5 million

Total budget:
€5.5 million

Project duration:
December 2004-November 2007

Participant countries:
Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, UK

Website:
www.awi-bremerhaven.de/GPH/EPICA/

Energy options explored

Energy technologies will help Europe to face the issues of global climate change, greenhouse gas emissions and the security of supply. With a 2006 budget of €124 million, the aim is to provide clean, reliable and affordable energy, as well as more resilient and intelligent distribution networks able to deal with the challenges of the future.

Forty-three projects were launched in the last year of FP6, relating to conversion, transport and renewable energy sources. More were funded via the Research Fund for Coal and Steel (see page 26).

Three ETPs – respectively dealing with hydrogen and fuel cells; zero emission fossil fuel power plants; and future electricity networks – aim to integrate activities and develop links with all European stakeholders. Throughout 2006, each was developing its particular vision for the necessary research strategies. The hydrogen and fuel cells consortium plans a proposal to the European Council in 2007.

In the domain of electricity networks, large projects explored alternative architectures with a high renewable energy content and distributed generation capability. Furthermore, in line with the Energy Green Paper 2006, preparations continued for the creation of a European Centre for Energy Networks.

Early in the year, an agreement was signed with China to demonstrate a near-zero-emissions coal power plant with CO₂ capture and storage. The EU also co-financed a project with the US on the development of fuel cells for residential heating.

Alternatives to fossil fuels

A major European policy target remains the development of technologies to complement and replace fossil fuels for electricity and fuel production.

A new ETP on biofuels launched in 2006 is the most recent initiative of this nature, aiming to develop cost-competitive technologies whereby the EU can cover a quarter of its road transport fuel needs by 2030.

At present, EU road transport accounts for more than 30% of the total energy consumption in the Community. It is 98% dependent on fossil fuels, with a high share of imports making it extremely vulnerable to oil market disturbance. This is also one of the main reasons for the EU failing to meet its Kyoto targets.

Meeting ambitious goals for the development of biofuels will enable the EU to increase domestic energy security, improve the overall CO₂ balance and sustain competitiveness by creating opportunities for biomass providers, biofuel producers and the automotive industry.

Global wind energy markets continued to boom in 2006, as more decision-makers became aware of the benefits that the technology can bring to a region.

The Global Wind Energy Council (GWEC) released annual figures quoting developments in more than 70 countries around the world. The addition of 15,197 MW in 2006 took the total installed capacity to 74,223 MW – a growth rate of 32%.

CASTOR



At the end of the year, the Commission adopted an overall energy policy for Europe, including the communication 'Towards a European Strategic Energy Technology Plan', co-authored by DG Research and DG Energy and Transport.

On 15 March, the partners inaugurated an industrial pilot unit at the coal-fired Esbjerg power plant, Denmark, which is the largest installation of its kind in the world. For national and EU governments, this will give a clearer view on clean fossil fuels as a means of achieving the Kyoto objectives, while ensuring security of energy supply for Europe.

CO₂ removal key to Kyoto compliance

CASTOR groups 30 partners from 11 European countries in the bid to develop and validate the innovative technologies needed to capture post-combustion CO₂ and store it in a reliable and safe way.

Its aims include a reduction in capture costs, from €50-60 to €20-30 per ton of CO₂ extracted from large volumes of flue gases with low CO₂ content and at low pressure. To advance general acceptance of the concept, it is also investigating the viability of various geological storage sites in terms of capacity, CO₂ residence time, security and environmental effects.

Project title:
CO₂, from capture to storage

EU contribution:
€ 8.5 million

Total budget:
€ 15.8 million

Project duration:
February 2004-January 2008

Participant countries:
**Austria, Denmark, France,
Germany, Greece, Italy,
Netherlands, Norway, Spain,
Sweden, UK**

Website:
www.co2castor.com

Coal and steel remain crucial

The Research Fund for Coal and Steel Programme (RFCS) was created on the expiry of the European Coal and Steel Community (ECSC) Treaty in July 2002. Although managed outside the Framework Programmes, it represents a valuable complement in meeting EU goals for growth and prosperity through cooperative research.

With a yearly budget of around €60 million, financed by the interests accrued each year from the assets of the ECSC at the time of the Treaty's expiry, the RFCS supports research projects in the hard-pressed traditional industry sectors of coal and steel.

In 2006, the Steel Advisory Group (SAG) and the Programme Committee (COSCO) assisted the European Commission in the identification of research priorities for the steel sector. These covered the full range of research topics, from the development of new or improved technologies to guarantee the economic, clean and safe production of steel, to the development of steel products characterised by steadily improving performance, suitability of use, customer satisfaction, prolonged service life, ease of recovery and recycling.

Meeting urgent objectives

The priorities were based on short-term objectives identified by working groups of the European Steel Technology Platform (ESTEP) published in the ESTEP document 'From a Strategic Research Agenda to Implementation' in March 2006. They were used to complement the selection criteria for the evaluation of research proposals submitted by 15 September.

Businesses and research organisations from the new EU Member States have been able to participate fully in the activities of the Programme since 1 May 2004. Although still modest in 2006, their involvement has increased. Measures to stimulate interest included ad hoc presentations and pro-active invitations for national experts to join in the evaluation exercise and benefit from its many networking opportunities.



Cleaner route to steel production

With 47 partners from 15 countries, ULCOS project has mounted a major effort to help the steel industry find innovative solutions for reducing its CO₂ emissions. It intends to develop the concept for a breakthrough process technology producing steel from iron ore with CO₂ emissions cut by half or more compared with those of today's state-of-the-art blast furnaces.

The ultimate objective is to build a pilot plant to demonstrate the potential of the method, thus promoting preservation of the ecosystem in relation to steelmaking.

A large panel of candidate technologies is presently under examination. The most sustainable will be chosen in a post-Kyoto scenario for the first half of the 21st century.

This ambitious and strategic project is closely coordinated with FP6, which provides funding of 20M€ for a separate part of ULCOS.

Project title:
Ultra Low CO₂ Steelmaking

EU contribution:
€ 9.6 million (RFCS) + €20 million (Framework Programme)

Total budget:
€ 19.8 million (RFCS) + €35.3 million (Framework Programme)

Project duration:
July 2004-June 2009 (Step I)

Participant countries (RFCS):
Austria, Belgium, France, Germany, Italy, Luxembourg, Netherlands, Sweden, UK

Fission and fusion for safe and secure energy supply

Research and training under the EURATOM Treaty are key elements in Europe's approach to energy generation by the established route of nuclear fission. As well as addressing advanced reactor technology with greatly enhanced sustainability and safety, they cover the attendant questions of radiation protection and waste management. The Treaty also embraces nuclear fusion which, within a few decades, could provide a safe and sustainable energy supply with very low environmental impact.

The FP6 research programme on Nuclear Fission and Radiation Protection underpins key policy objectives for the EU, including the protection of society and the environment, the security of energy supply, sustainable economic growth and the knowledge-based society. In 2006, €55 million of funding was committed to actions in the areas of radioactive waste management, radiation protection and other activities in the field of nuclear science and technology, training and infrastructures.

Project ERICA, for example, is providing an integrated approach to scientific, managerial and societal issues concerned with the environmental effects of contaminants emitting ionising radiation, with an emphasis on the consequences on biota (animals, plants) and whole ecosystems.

Fourth generation systems

EURATOM formally acceded to the Framework Agreement of the Generation IV International Forum (GIF), an international initiative for collaborative research and development on fourth generation nuclear energy systems. This platform for inter-

national research cooperation is investigating innovative nuclear energy system concepts to meet future energy challenges. Fourth generation systems could be deployed by 2030.

Looking east

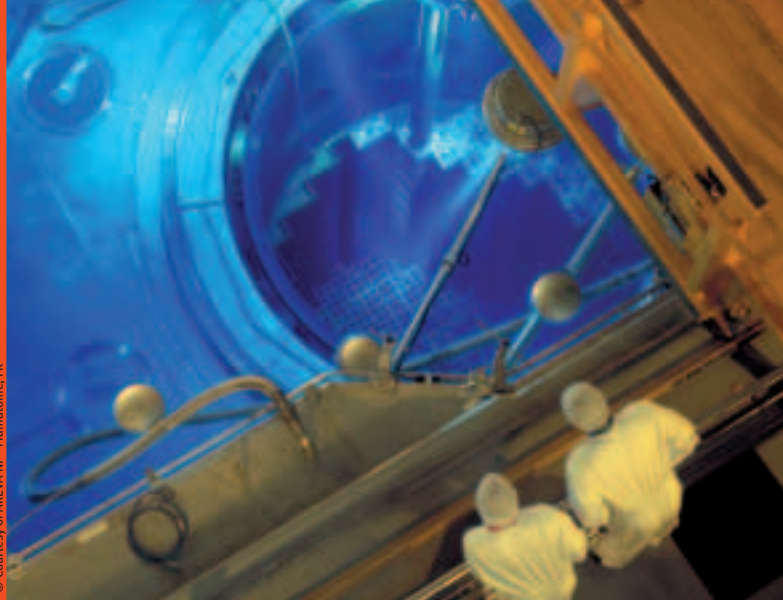
Several actions have been taken to promote enhanced cooperation between the European scientific community and researchers from the New Independent States of the former Soviet Union. Russian partners are already involved in FP6 projects dealing with Russian reactor technology. The intention is to reinforce this cooperation in FP7.

Major conference

The FISA 2006 Conference, held in Luxembourg in March 2006, attracted a large attendance. For the first time, it not only covered EURATOM fission safety research, but also included political and industrial discussions covering European research in nuclear plant life management for existing reactors, severe accident management, assessment of future nuclear fission systems, partitioning and transmutation systems, and nuclear education and training.

RAPHAEL

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High temperature hope for power and hydrogen

In RAPHAEL, 34 organisations from ten European countries are studying the viability and performance of an innovative system for the next generation of power plants: the Very High Temperature Reactor (VHTR).

Because the VHTR system produces energy using a small, inherently safe reactor, it will be competitive for conventional electricity production and many industrial heating needs. These include CO₂-free hydrogen generation, chemical and metallurgical processing, and lower temperature applications such as desalination or district heating.

The RAPHAEL consortium embraces most of the EU's leading HTR community, and has close links with China and South Africa. It is amassing performance data on fuel and materials for operation at up to 1 000°C, assessing the operating characteristics of high temperature components, gathering data for the qualification of computer models for designing and licensing the system, and seeking solutions for the disposal of spent fuel.

Safety, fuel flexibility, cost-effectiveness and waste minimisation are key assets that will boost public acceptance of nuclear fission and its positive impact on the economy, the environment, and the security of energy supply in Europe. A VHTR prototype can be expected within 15 years.

Project title:
**Reactor for process heat,
hydrogen and electricity
generation**

EU contribution:
€ 9 million

Total budget:
€ 20 million

Project duration:
April 2005-April 2009

Participant countries:
**Belgium, Czech Republic,
France, Germany, Italy,
Netherlands, Spain, Sweden,
Switzerland, UK,
EU Joint Research Centre**

Website:
**[http://www.raphael-
project.org/index.html](http://www.raphael-project.org/index.html)**

Global agreements frame fusion research

Global interest in nuclear fusion as a possible sustainable future energy source centres on the ITER project (see below).

The continuation of the European Fusion Development Agreement (EFDA) was also approved in 2006. EFDA is an agreement between the Commission and the Fusion Associations, its usual partners in this research area, to strengthen their coordination and collaboration, and to promote their participation in collective activities. It includes provision for the work programmes on fusion technology and the joint exploitation of the UK-based Joint European Torus (JET). The JET facilities were successfully operated by task forces of scientists from all Fusion Associations.

European site for world-leading fusion experiment

Designed to demonstrate the scientific and technological feasibility of fusion energy for peaceful purposes, ITER ranks second only in scale to the International Space Station among the world's large international scientific projects.

The objective of fusion research is to harness the nuclear energy provided by the fusion of light atoms, as occurs naturally in the sun. This work has made tremendous progress over recent decades, and the fusion community is now ready to embark on an ambitious international experiment.

Following several years of negotiations, a series of agreements was signed on 21 November 2006, paving the way for establishment of the ITER International Organisation on a provisional basis pending the entering into force of the ITER Agreement, expected mid-2007. The signature of the ITER Agreement and related instruments gives consent to construction of the ITER experimental reactor at the European ITER site in Cadarache, southern France. Scheduled for completion in 2017, this will test all of the components and systems needed for efficient electricity generation, safe remote handling and disposal of all irradiated components.

On 22 November 2006, EURATOM and Japan initialled the so-called 'Broader Approach Agreement', on the joint implementation of fusion R&D activities in support of ITER and the fast realisation of fusion energy.



© ITER

On the same day, the EU and the Republic of Korea signed a cooperation agreement to promote joint R&D in fusion energy research. Europe already has such bilateral agreements with some ITER Parties (Japan, the Russian Federation and the US), and aims to have similar arrangements with all ITER Parties. First steps have been taken to initiate negotiations with China and India.

At the ITER work site in Cadarache, scientists will study high-temperature plasmas in conditions similar to those expected in a future fusion power plant. The installation will generate 500 MW of fusion power for extended periods of time, ten times more than the power input needed to keep the plasma at the right temperature. It will therefore be the first fusion experiment to produce substantially more fusion power than the power needed to sustain the plasma.

Given the in-kind contributions to be provided for ITER and the Broader Approach activities, preparation continued for the creation of a joint undertaking under the EURATOM Treaty. It will manage the procurement and construction, by European industry and research organisations, of about half of the high-technology components that make up the ITER facility. In order to reinforce the engineering capabilities needed for its construction, EURATOM has also implemented a fusion training scheme for young engineers and researchers.

In general terms, it can be stated that the objective of the Community Fusion Programme to coordinate and integrate all European fusion technology and physics research and development activities was fully achieved.

Project title:
**International thermonuclear
experimental reactor**

Total budget:
€ 10 000 million

Participant countries:
**EU (EURATOM), India, Japan,
People's Republic of China,
Republic of Korea,
Russian Federation, USA**

Website:
www.iter.org

Spreading the benefits: international collaboration and projects for SMEs

Activities fostering international cooperation and projects designed specifically to attract SME participation have both contributed strongly to the spread of knowledge and scientific excellence throughout the Community.

Enabling European universities, research institutions and businesses to pursue contacts with partners in third countries has greatly facilitated access to research environments outside Europe and promoted synergies on a global scale.

Under FP6, an investment of €350 million supported collaborative research actions between EU and developing countries, Mediterranean Partner Countries, the Western Balkans, Russia and the Newly Independent States. In addition, specific calls for proposals targeting the capacities of the best research institutes in Associated Candidate Countries permitted better integration of these nations into the Framework Programme. A total of 393 international cooperation contracts was signed, covering topics from agriculture to dangerous infective diseases and global access to safe drinking water.

Accent on SMEs

Because SMEs play a crucial role in European competitiveness and job creation, those with good ideas but lacking research capability were afforded opportunities to leverage their innovative potential through cooperative research with other SMEs and research-performing organisations. With a total FP6 budget of around €450 million, 513 such projects were launched in 2006 alone.

Yet another breakthrough was the development of instruments permitting EU coordination of national and regional programmes assisting SMEs in international R&D cooperation. Based on Article 169 of the Community Treaty, funding was proposed for the EUROSTARS Programme undertaken jointly by Member States and Associated Countries via the EUREKA organisation.

PARADOX



Health secret behind 'French paradox' revealed

The so-called 'French paradox' notes that the French have one of the world's lowest rates of heart disease despite indulging in rich foods. In the PARADOX project, 10 SMEs and seven institutions joined forces to solve the mystery, focussing particularly on the health-preserving properties of red wine.

Waste grape skins and seeds left over after wine pressing were already known to be rich in antioxidants. These inhibit the action of the enzyme ET-1, which is involved in deterioration of blood vessels, and also reduce oxidative stress to living cells.

The partners successfully developed a 'green' process for extracting the oxidative compounds, and derived a microencapsulation method to improve their stability when incorporated into industrial foods.

Clinical trials on dosed fruit juice confirmed that antioxidant levels in subjects' bloodstreams increased after only 14 days. The additive is now being marketed as Paradox PLY by project leader GAT Food Essentials.

Project title:
**French paradox – red wine
extract food additives**

EU contribution:
€ 1 million

Total budget:
€ 1.4 million

Project duration:
February 2004-February 2006

Participant countries:
**Austria, France, Germany,
Greece, Hungary Italy,
Slovenia, Spain, UK**

Website:
www.gat-foodessentials.com

Previous programmes continue to bear fruit

While 2006 was the final year for launching calls for proposals within FP6, initiatives from previous Framework Programmes have continued to produce results. To optimise the outcomes and ensure the best use of resources, a big effort was made to complete the scientific, technical, legal and financial monitoring of these projects.

Two recent studies concluded that the previous Framework Programmes have played an important and positive role in Europe. The number of registered patents and the commercial exploitation of the results show that they improve the EU's innovative performance, while the volume of scientific research publications confirms the dynamism of the knowledge creation process.

Analysis of 600 projects completed under the FP5 Competitive and Sustainable Growth Programme, for example, reveals that:

- 68% would not have been undertaken at all without EC funding;
- 75% were effective in achieving their scientific-technical objectives; and
- 39% reached both their scientific-technical and their exploitation objectives.

The actual/expected results include 1 730 prototypes/pilots, 480 new services and software tools, 7 500 publications, 400 patent applications, creation of 220 spin-off companies, and input to 270 EU legislative texts.

Successes in fields ranging from nano-fabrication to high-temperature reactor technology are likely to have significant impact in terms of quality of life and employment prospects, protection of the environment, energy and safety.

CLEVER



CLEVER car wins international acclaim

Named by TIME magazine as one of its 'Best Inventions of 2006', the three-wheeled CLEVER car could be the answer to urban traffic congestion and future fuel shortages. Partners from four EU Member States collaborated in the design of a gas-powered prototype that is less than 1 m wide, carries two people in tandem, reaches nearly 100 km/h and emits less than 60g/km of CO₂ (below 50% of the 130 g/km currently targeted by the EU).

The stylish vehicle accelerates from 0-60 km/h in under 7 seconds, and runs for more than 38 km on one litre of fuel. Its computer-controlled tilting suspension makes cornering a stimulating yet comfortable experience. Moreover, the attention to safety is such that it would merit a 3-star EURO NCAP rating.

Project title:
**Compact low-emission
vehicle for urban transport**

EU contribution:
€ 2.2 million

Total budget:
€ 5.3 million

Project duration:
December 2002-March 2006

Participant countries:
Austria, France, Germany, UK

Website:
www.clever-project.net

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2006: EU research at the crossroads

Providing financial support and a favourable environment for research is central to the European Union's strategy for becoming the world's most competitive and dynamic knowledge-based economy by 2010. The European Commission's Directorate-General for Research (DG Research) is responsible for administering much of this activity, mainly through the series of R&D Framework Programmes (FPs) originated in 1984.

For the Directorate, 2006 was a pivotal year. It marked the conclusion of obligations under FP6. This was notable as the first FP with the specific objective of creating a European Research Area to build critical mass in sectors with key relevance to competitiveness in the global marketplace. At the same time, preparation for the 2007-2013 FP7 was reaching its final stages.

In its Annual Activity Report, DG Research reports a high level of success in meeting both of these objectives. This publication summarises the main events and outcomes. It is illustrated by examples of some outstanding funded projects, which clearly demonstrate the benefits of transnational cooperation in assuring a better future for the EU and its citizens.

