

Progress in Europe by integrated research policy: Development and challenges

New objectives for European research policy

At the beginning of April the European Commission submitted its proposals for the Seventh Research Framework Programme (FP7) 2007-2013. To ensure that EU finances are more conducive to growth the decision has been made to push up research spending. The Commission proposes to spend roughly EUR 8 bn per year for the first four years of the FP7, more than double the size of FP6.¹ This confirms the ongoing trend towards an increase in spending on European research policy. True, medium-term financial plans have not been adopted yet but stepping up research funds would be a major element of the Lisbon strategy. At the Lisbon summit in March 2000 the European Heads of State and Government set the target for the Union over the next decade to become the most competitive and dynamic knowledge-based economy in the world. Furthermore, they agreed at the Barcelona meeting of March 2002 to raise spending on research and development from currently 2% to 3% of EU GDP by 2010.² The plans include that the private sector will contribute two-thirds to R&D expenditure. This sub-target is very ambitious as the current share of the private sector in research funding averages 56% in the EU and is thus clearly lower than in the US and Japan. To achieve these ambitious targets the member states must coordinate research policy in order to exploit resources and synergies in research and explore innovative fields.

Structural change requires adjustments in research policy

Besides the political targets, adjustments in European research policy are needed to meet the challenge of global structural changes towards service and knowledge-based economies. Major international economic and research benchmarks show that Europe is not fit for the structural change yet.

Emerging knowledge-based economic systems underscore the increasing degree of international integration of the economy and science. International collaboration has risen strongly, be it in the framework of large cross-border projects, bilateral cooperation or as a result of the mobility of highly qualified researchers.

High-tech research in new general purpose technologies (information and communication technologies (ICT), biotechnology, genetic engineering, micro and nanotechnologies, environmental and health technologies as well as new materials) is becoming interdisciplinary and is increasingly complex, which leads to cost increases for research activities.

The change in conditions is not limited to the area of academic research, though. The research and innovation strategies of companies are also subject to profound changes: corporations are under increasing pressure to translate their R&D activities into measurable results such as patents and marketable products. Many companies

¹ According to the plans of the European Commission, it will conduct a mid-term review of the FP7 by 2010. The funds annually available in the FP are projected to rise continually, with the strongest increase in the research budget in percentage terms taking place in the first four years of FP7. In absolute terms, research spending, at EUR 32.24 bn in the period of 2007-2010 and thus EUR 8.06 bn per year, will more than double.

² This target was reconfirmed in the revised Lisbon agenda of March 2005.

Budgets of EU Framework Research Programmes

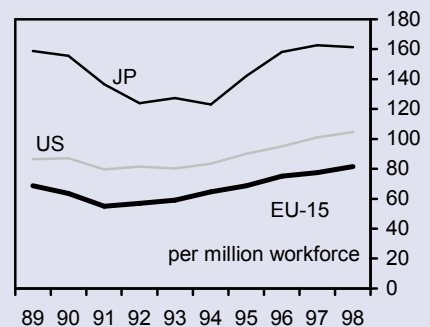
EUR bn

	Year	Total	Volume per year
FP1	1984-87	3.27	0.82
FP2	1987-90	5.40	1.35
FP3	1990-94	6.60	1.32
FP4	1994-98	13.22	2.64
FP5	1998-02	14.96	2.99
FP6	2002-06	19.11	3.82
FP7	2007-13	73.21*	10.40

*current Commission proposal

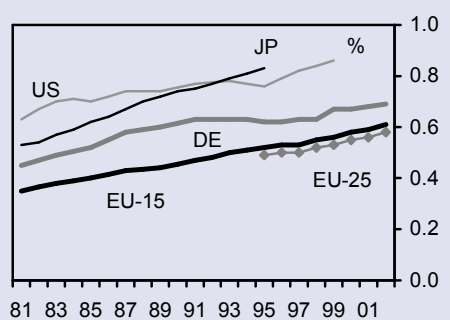
Sources: CORDIS, EARTO, KOWI, European Commission, Deutsche Bank Research

Patent families in the triad



Source: EUROSTAT

Share of researchers in workforce



sources: OECD, Deutsche Bank Research



meet the increased competitive pressure, the innovation dynamics and the increasing technological complexity of product and process innovations as well as the cost problem by focussing on their core competencies. In the area of research, companies are gradually withdrawing from long-term basic research which has been clearly reflected in the dissolution, restructuring and outsourcing of central R&D divisions in large companies.

The level of funding and the concept of European research policy must ensure that it can make a major contribution to meet these challenges. It has to cope with the international integration of the economy and research, the rising costs of research, the complexity of research activities and the restructuring of corporate research.

Transformation of European research policy

Since the signing of the Treaties of Rome in the 1950s, European research and innovation policy has made great progress. As a result of the structural changes in the European economy research policy has become an independent field of policy. If the European constitution is ratified by the EU Member States in the course of the next two years, research policy will finally be laid down in the constitution. In a long political process European research policy has turned from supportive action into an integral part of EU activities. Research policy is thus no longer confined to improving research for the coal and steel sector, the nuclear and energy sectors and agriculture. Research covers a comprehensive range of activities from education, science, technology and industrial policies to competition, economic and social policies.

In this process three principles have emerged on which EU research policy is based. It is no longer under debate that alongside the research activities of the Member States, an autonomous European research policy is central to meeting the more comprehensive global challenges facing all member states. There is also broad consensus that the approach of European research and innovation policy is to create Union-wide framework conditions for research institutions and private-sector innovation and thus to contribute to a variety of political targets. Research and innovation policy mainly focuses on: securing access to a sufficient supply of highly qualified workforce; ensuring a strong public-sector research base and improving contacts to companies; creating an appropriate environment for company start-ups; effectively and systematically protecting intellectual property; fixing research and innovation-friendly competition rules; and encouraging the development of financial markets which support research and innovation activities.

Progress achieved so far by ideas and agents

The cooperation of political agents and above all the activities of the European Commission have given a boost to the institutionalisation of research policy (Edler 2000). In the framework of this institutionalisation, interests and societal agents, company associations, research institutions, representatives of researchers and citizen movements at the level of the Member States as well as European level have been mobilised (Peschke 2001). This commitment has helped to gear the research policy of the Union and the Member States through the integration of different agents, i.a. of civil society, to common goals and give new impetus. The institutionalisation does not only have positive effects, though. Unfortunately, institutionalisation has also had the side-effect of "closed Brussels clubs". This exclusivity leads to differences in the provision of information, so that certain actors in the long-term benefit from research funding under the FP more strongly than others.

Political and legal milestones of European research policy

1951-1973: Treaties of Rome

Sectoral research policy for coal and steel (Art. 55 ECSC), Euratom (Art. 2, 4-29 EAECT) and agriculture (Art. 41, 43 EECT).

1974: Council decision (of January 14, 1974):

Emphasis on the necessity of a European research policy to make the EU competitive (Art. 2 EECT, Art. 235 EECT)

From 1981:

Initiatives and programmes related to the overall economy leading to First Research Framework Programme in 1984

1987: Single European Act

(Art. 24 SEA):

Research and technological development obtain legal status (Art. 130f – Art. 130q EECT).

1992: Treaty of Maastricht

Upgrade of research and technology policy which become a common basis for other areas of EU policy.

1999: Treaty of Amsterdam

No substantial changes with regard to research policy.

March 2000: Lisbon summit

Action plan to transform the EU into "the most competitive and dynamic knowledge-based economy in the world" by 2010.

March 2002: Barcelona summit

Pledge to increase spending on R&D to 3% of GDP by 2010.

October 2004: Signing of the European Constitution

Strengthening of research policy (Art. III-248 to III-255).

March 2005: Brussels summit

New Lisbon agenda reconfirms focus on research policy and the target to increase R&D spending.

April 2005:

Presentation of the plans for FP7 (2007-2013) by European Commission.

Sources: Heinrich 2003, Pfeiffer 2003

Three principles of European research policy:

- **Principle of subsidiarity:**
The EU may only act (i.e. make laws) where member states agree that action of individual countries is insufficient.
- **Principle of European additionality:**
European research funding should benefit from economies of scale in research and achieve a level of utility surpassing that from an allocation of resources at the national level.
- **Principle of cross-border cooperation:**
Several partners from different countries should cooperate to ensure international exchanges of information.

The two important instruments of European research policy – the European Research Framework Programme and the method of open co-ordination – had a key role in the continued increase of research spending on the one hand and the stronger co-ordination of member states' activities on the other.

The open method of coordination, in particular benchmarking and best practice comparisons, has helped to identify instruments to improve the framework conditions for research and development through mutual learning at the national level. This has enhanced the efficiency of research and innovation-policy activities, both on the part of the member states and at EU level (CREST 2004, OST 2004).

The Research Framework Programmes implemented since 1984 have had far-reaching effects. As a supplement to national grants the Framework Programmes have contributed to expand the scientific and technological competences and capacities of stakeholders, to create critical mass and related networking, to promote reputational effects, support international cooperation and networking and lay the foundations for stable partnerships. These activities will contribute to improved EU research competitiveness at international level in the long term and push up socio-economic cohesion within the EU. However, it has been criticised that the Framework Programmes have so far concentrated on research in the pre-competitive area and that projects under the FP have in most cases been focused on basic research results rather than on applying these results for commercial use (CREST 2004 / OST 2004).

As analysis demonstrates, thematic priorities of the European Framework Programme have developed further. Besides the promotion of information and communication technology, which has always accounted for the largest share in the FP, and the encouragement of energy and industry-related technological research, priority areas for funding have from FP4 (1994) shifted towards other research areas such as life sciences, the transport sector and socio-economic research (Ormala 2005). These new priorities can be advocated as European research policy thus supports research teams in different fields whose results contribute to productivity growth.

Besides the further thematic development, the foundations of the European Research Area founded in 2000 have been strengthened since 1990. Young European researchers have thus been offered cross-border career opportunities, e.g. on the basis of the Marie Curie Programmes, and are benefiting from the promotion of mobility. Furthermore, FP6 features a stronger coordination of activities at the national level and a better communication of research results.

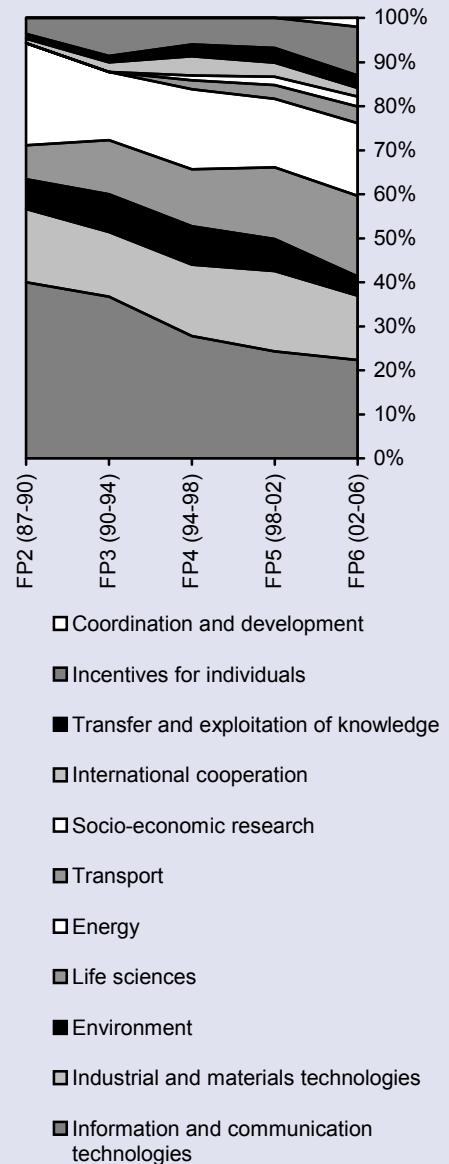
Main priorities of next Framework Programme

Despite the progress of European research policy, the current developments in the science and research sector as well as in the economic area require a quick, well coordinated and cohesive reaction of the European Union. The European Commission is trying to meet this challenge and seeks to use the increase in spending under the FP to achieve the further development of European research around three main lines of activities.

In the first line of research policy the European Commission aims to upgrade scientific knowledge. One of the key tools is to make Europe more attractive as a location for the best researchers by stepping up support to individuals. Other aims in this context are the promotion of basic research and the strengthening of the technological excellence of European research by increasing the coordination of research and innovation activities.

Development of thematic priorities in Research Framework Programmes

in terms of changes in the budget breakdown in %



Sources: Ormala five year assessment (December 15, 2004) and Deutsche Bank Research



To strengthen scientific and technological excellence, an independent European Research Council³ is to be established under the leadership of renowned researchers at European level. It will be in charge of the funding of investigator-led research at the forefront of science and the encouragement of competition between research teams in basic research.

To strengthen basic research and make Europe more dynamic in high-tech sectors, platforms are currently being established for various research agents such as universities, research centres and companies but also for the financial community and regulators in different sectors, e.g. the hydrogen economy, photovoltaics, aviation, mobile communication and information systems as well as nanotechnology. These platforms are designed to bring EU and national, public and private-sector resources together, thus mobilising a critical mass of excellence, knowledge and funds. In the next FP Technology Platforms in the next FP may to an increasing extent be based on initiatives from European industry due to its greater scope for action. The objective is to increase the participation of industry and in particular of small and medium-sized enterprises (SMEs) in European research projects.

The second line of research policy is oriented to the funding and creation of research infrastructures and research capacities along the lines of the trans-European networks, i.e. the expansion of research infrastructures of European interest which provide basic services to European research institutions.⁴

The third line of research policy is related to the strengthening of the foundations of the European Research Area: this is to be achieved by a stronger coordination of national scientific and technology policies and programmes, by cooperation and support for researchers.

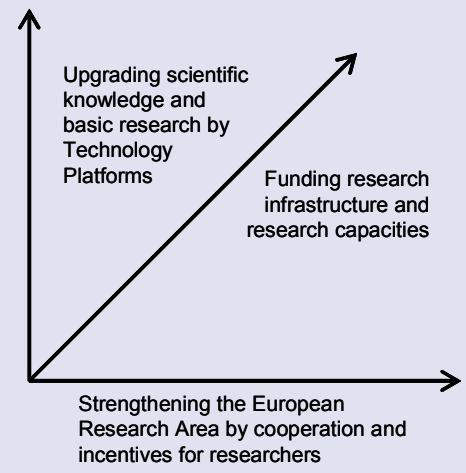
Framework conditions to be improved: patents and tax incentives

Besides these three main lines of research policy, the European Commission aims to improve other framework conditions as well. These include the improvement of intellectual property rights regimes for technological discoveries and the implementation of a better environment for research spending by tax relief. Experience with tax cuts designed to promote research and development activities in countries such as Canada and the Netherlands has shown that fiscal incentives for R&D may lead to a moderate increase in private-sector R&D spending.⁵

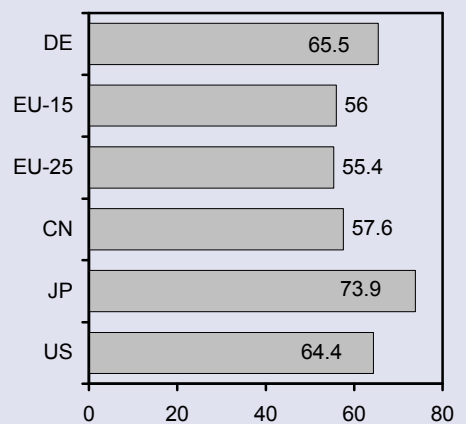
Lessons are drawn: EU to cut red tape

With its proposals, the European Commission seems to have drawn lessons from its previous experiences and evaluations. The European Commission is considering to simplify the heavily criticised large number of innovation-hampering provisions with regard to Community research subsidies. The Commission holds the view that some administrative processes and management tasks ought to be outsourced by management through partnership. It remains to be seen, however, whether the proposals of April 2005 will actually reduce EU bureaucracy. In a worst-case scenario, the new plans could even lead

Three main lines of research policy (2007-2013)



Corporate R&D spending
% of total spending



Source: EUROSTAT 2005

³ The Research Council will select projects determined by the academic interest and quality of research rather than political aspects, which is of major importance as research funding is increasingly becoming "politicised".

⁴ These include projects such as CERN and large computer networks.

⁵ In particular, tax incentives on R&D lead to an increase in private-sector R&D investment if they are clearly visible for companies, i.e. if tax savings from an R&D tax incentive are treated e.g. like taxable income of a corporation (Canada) or grants are allocated as direct subsidies to payroll spending as in the Netherlands (Rammer et al. 2004).

to additional administrative structures causing lasting transaction costs without actually benefiting research.

Participation of industry and SMEs called for

In response to the assessment of previous participations and well aware that the next FP will be a catalyst for private-sector research spending only if small and medium-sized companies (SMEs) boost investment, the European Commission plans to promote SMEs more strongly.

The Commission intends to integrate the SMEs into the consultations at an earlier stage; this is to prevent SMEs from being discouraged from participating in the FP as a result of the high expense and efforts involved. The budget increase for SMEs is of major importance as the involvement of industry as a whole in previous Framework Programmes has developed negatively. According to an assessment of the Austrian Federal Ministry for Education, the participation of European industry has declined to 25% in FP6, down from 37% in FP5. The participation of SMEs in FP6 has even halved compared to FP5 (Proviso 2005). The total share of SME involvement currently accounts for only 12.5%, far below the Commission's target of 15% (Proviso 2005). In the light of this negative finding, the budget for Community research activities has to be stepped up. What is more, legal and process-related uncertainties with regard to the structure of the Framework Programmes have to be eliminated to ensure a stronger participation of SMEs.

Future tasks of European research policy

Although the European Commission's course surely goes in the right direction with its thematic priorities on Security and Aeronautics and space in the FP, some more measures need to be taken.

Support development of instruments

As companies have reined in investment in basic research, the EU's basic research should encourage above all the development of new scientific and measurement techniques. Here, especially the encouragement of research by an integrated research policy is required in areas such as bioanalytics, research on simulation and visualisation instruments and technologies as well as medical technology, instrumental technologies, control and regulation technology and optics. A Union-wide promotion of these sectors could give a boost to national government support and help to achieve the critical mass for the development of instruments.

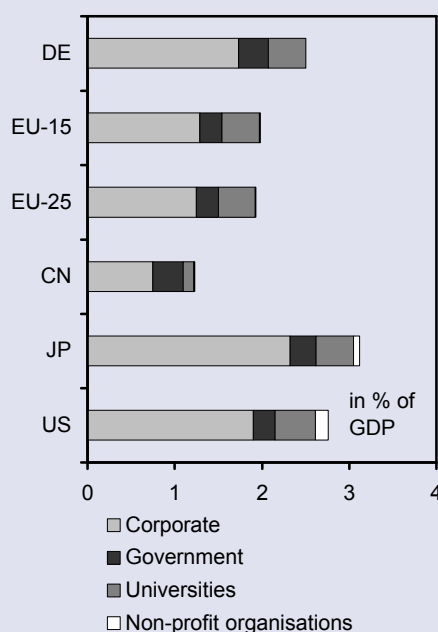
Encourage harmonisation activities

Increasing time pressure on R&D requires swifter patenting procedures as well as the support of consensus on the setting and enforcement of new standards at national, Community and international levels by European agents. As a result of new products and the internationalisation of R&D activities, norms and standardisation in the technological and economic sectors will continue to gain importance; in Germany, they already account for almost 1% of GDP (Büthe 2003) and are thus of major importance to the SMEs. In the field of standardisation, Union-wide initiatives should be advocated as they lower transaction costs because not every single country will be obliged to implement new standardisation rules. This in turn can neutralise imbalances resulting from the promotion of standardisation activities by other countries such as the US in international technology competition.

Promote research as service

As part of its standardisation efforts, the European Commission should also create framework conditions to establish research activities more strongly as services. It should encourage the establishment of markets

R&D spending by sector



Source: Eurostat 2005

New priority research themes: Security and Aeronautics and space

Besides the already existing priorities, i.e. climate change, health and sustainable development, the European Commission plans to promote research on Security and Aeronautics and space.

The European security research programme is aimed at promoting research on the security of citizens as well as emergency management operations in case of crisis (civil protection) and the protection against bioterrorism, and the security of transport and telecommunications networks.

In Aeronautics and space, the objective is to encourage the implementation of an integrated space policy. Efforts are concentrated on technologies to better exploit space in the areas of navigation (GALILEO project), terrestrial observation to enhance the monitoring for the environment and security (GMES) and Satellite Telecommunications. A further objective is to support technologies which ensure Europe's independent access to space.



where scientists offer their knowledge and abilities as services. Following the example of “Rent a scientist” (Pollack 2004), scientists could become self-employed in the long term. This kind of promotion for new companies could lead to start-ups in the old and new member states, so that companies in turn will invest in R&D. The further development of scientific services at EU level could thus open up new development perspectives to researchers. This would be very important to widen young researchers’ career prospects. In the context of encouraging scientific services, European research policy should focus on creating framework conditions at EU level; concrete support can be carried out more efficiently in the respective regions – in Germany e.g. the federal states.

Support research on services

Furthermore, it seems to be of major importance to support integrated research activities in the services sector. Although services account for almost 70% of EU GDP, corporate investment on services in the EU-15 on average accounted for only roughly 13% of companies’ total expenditure (around EUR 14 bn) in 2000. Especially in Germany and France, an increase in research on services is urgently called for to catch up with countries such as the US where spending on R&D in the services sector accounts for around 34% of total corporate spending (European Commission 2004). Initiatives at EU level could help to promote service standards and new – mainly cross-border and Union-wide – services, a more efficient strategy than incentives at national level.

Strengthen socio-economic research

Socio-economic research with analysis on the development of social capital in the EU and on the risks and opportunities of new technologies and societal dynamics is gaining importance against the backdrop of structural change and EU enlargement to improve the implementation and efficiency of political reforms.

Ensure access to scientific results

Another important challenge of integrated research policy is to ensure the access to scientific results for scientists by agreements at EU level. Currently, there is a risk that scientists will no longer have sufficient up-to-date access to new research results as libraries have reduced the number of subscriptions to scientific magazines and journals for cost-cutting reasons. Although the possibilities of access to scientific results have multiplied as a result of the internet, there are quite a few results which can only be found in specialised scientific journals. For this reason future-oriented approaches ought to be encouraged as scientists rely on the availability of high-quality information to be able to deliver further new results in all fields of scientific research.

Promote cross-border cooperations

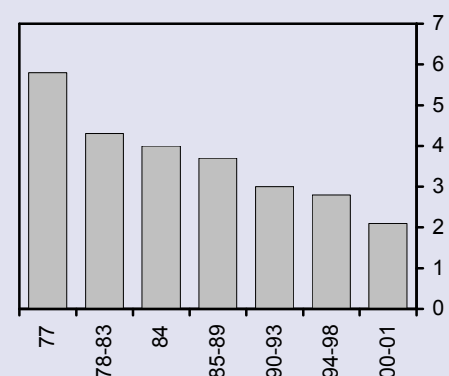
As a result of structural changes companies’ internal innovation capacities have to be supplemented by strategic R&D cooperations and new forms of collaboration between companies and science. Thus a chief task of EU research policy will be ongoing support of cross-border cooperation between companies, scientific organisations, universities and other organisations. Despite European research policy currently only about 2% of total research funding in the member states is spent on cross-border projects. Therefore integrated research policy above all has to enable companies to cooperate with other agents and to create networks which enhance innovations and their effective marketing.

Progress for Europe depends on Member States

All European research-policy projects have in common that the further development of the European Research Area can only have a catalysing effect. Large progress can only be achieved if all member states, both the old EU-15 and the new members of the EU-25, ensure

Subscriptions to scientific journals

per researcher in the US



Source: Association of Research Libraries Statistics 2004

and improve the institutional framework for an active participation in the EU process.

The EU funds, which are limited compared to national research funding, can only have a catalysing effect if the EU member states participate more strongly in setting thematic priorities and define priorities themselves. Furthermore, they will have to expand R&D infrastructures, adjust European targets intelligently to the requirements and starting positions in their countries and transpose them into national development targets, action plans and initiatives.

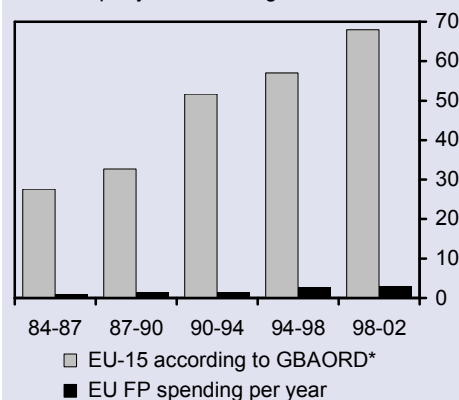
If the aim of stronger coordination of research and innovation activities in the member states is not achieved, if new, important fields are not addressed and the increased budget funds are not used to support research and business initiatives but pumped into the further build-up of bureaucratic structures of EU policy, integrated research policy could fail to see the progress urgently required to make Europe one of the most competitive economic areas in the world by 2010.

The priorities of European research policy as set out in the new plans will probably create added value for Europe: by the formation of human capital, new ideas and their exploitation, cross-border cooperation and networking and, as a result, social capital as well as the development of new technologies and new markets. If this potential is used properly, the EU will be able to come closer to the targets of the Lisbon strategy.

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(with the assistance of Meike Fischer)

Comparison of R&D spending of EU-15 and EU-25

EUR bn per year on average



*Government Budget Appropriations or Outlays on R&D

Sources: CORDIS, Eurostat, Deutsche Bank Research

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