



**RESEARCH
AND TECHNOLOGICAL
DEVELOPMENT
ACTIVITIES OF THE
EUROPEAN UNION**

**A N N U A L R E P O R T
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EUROPEAN COMMISSION

DG XII AP - Framework Programme Unit

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The 1999 Annual Report presented to the European Parliament and Council also comprises annexes, not included in this publication, on the activities of each specific programme of research and technological development in 1998; the detailed statistics of Community research in 1998; and summary fiches on the new specific programmes under the 5th framework-programme 1998-2002.

These annexes may be obtained with the whole report (ref.COM(1999) 284) on the Internet site of the European Commission / DG XII at the following address:

<http://europa.eu.int/comm/dg12/report99.html>.

The whole report is also available from DG XII Communication Unit, fax +32 2 295 82 20, E-mail info@dg12.cec.be.

Published by the EUROPEAN COMMISSION

Directorate-General XII - Science, Research and Development

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Cataloguing data can be found at the end of this publication.

Luxembourg: Office for Official Publications of the European Communities, 1999

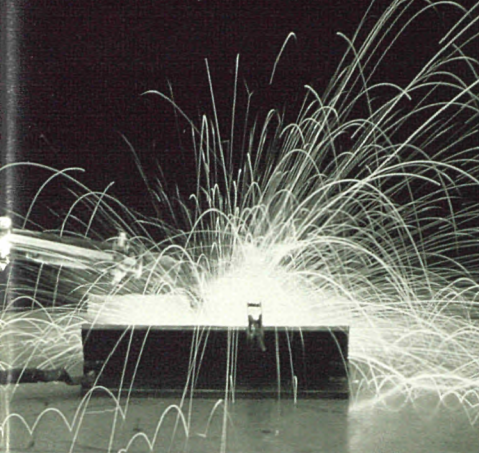
ISBN 92-828-7240-8

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Printed in Belgium

PRINTED ON WHITE CHLORINE-FREE PAPER



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ANNUAL REPORT 1999



SUMMARY

Article 173 (ex-130p) of the Treaty establishing the European Community requires the Commission to send the European Parliament and the Council a report every year on the research and technological development activities of the European Union. This report takes stock of the general direction of RTD policy, of the principal activities in 1998 and of the outlook for 1999.

Adoption of a new research policy

The most important development in Community research policy was *the adoption of the 5th Framework Programme* of the European Community (1998 to 2002) by the European Parliament and the Council in December 1998. This enables the new research policy to be put into action from the start of 1999. As a result, Community research is adapted to the context created by the launch of the single currency and the start of accession negotiations with a view to enlargement of the Union, bringing Europe greater economic integration and closer to its historical and cultural frontiers. However, the major challenge in Europe is still employment which depends, increasingly, on high-tech sectors and on use of new technologies by traditional industries and SMEs.

The new Framework Programme concentrates resources principally on key actions *meeting the priority needs of society*, paying particular attention to the potential for applying the results. Its 14.96 billion euro budget is 3% higher in real terms (allowing for inflation) than that of the 4th Framework Programme. It will be characterised by *greater transparency*, with new External Advisory Groups, improvements in the flow of information to the Council and the European Parliament, as well as fully revamped management tools for *higher efficiency*. Community research will also provide strong support for the process of enlargement of the European Union, in the form of association of the eleven applicant countries with the 5th Framework Programme from 1999 on.

Community RTD in 1998

The Commission continued implementing the 4th Framework Programme and finalised the allocation of its budget. In the process, *6 200 new projects* were started in 1998, with over 28 000 participations. The new shared-cost actions (accounting for almost 90% of the financial contributions from the Community) established *almost 90 000 collaborative links for researchers* in the European Union, 83% of them transnational. Participation by firms remained high in 1998, with 38% of participations, 65% of which were accounted for by SMEs.

Studies in 1998 highlighted the *benefits which the Framework Programme has brought for competitiveness and employment*, for example by contributing to the Community research on standardisation. The link between research and innovation is one of the main themes of the Action Plan for Innovation, which moved into its second phase in 1998. Numerous projects also provided examples of the *contribution made by Community research to quality of life*, in areas such as knowledge and conservation of the environment, measures to combat natural or man-made hazards, health and food, transport and conservation of Europe's cultural heritage. The Framework Programme has also *helped less favoured regions to catch up in science and technology*, as their rate of participation in Community research remains proportionally higher than their research potential.

Outlook for 1999

The first calls for proposals were published in March 1999. The proposals received for all the specific programmes will be evaluated just before and during the summer so that a large number of projects can be started by the end of the year. Starting in 1999 the Commission will also engage in reflexions on the organisation of European research after 2002.

LEGAL BASES FOR THE ANNUAL REPORT⁽¹⁾

Treaty establishing the European Community, Article 173 (ex-130p) :

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

Decision No 1110/94/EC concerning the 4th Framework Programme (OJ L126, 18 May 1994), Article 4(1):

(...) At the beginning of each year, the Commission shall submit a report to the European Parliament and the Council with information on RTD activities and the dissemination of results during the previous year, and the work programme for the current year.

Decision No 94/763/EC concerning the rules for participation (OJ L 306, 30 November 1994), Article 10(1):

The annual report that the Commission submits to the European Parliament and the Council, in accordance with Article 4(1) of Decision No 1110/94/EC, shall contain information on the implementation of this Decision.

1 Similar provisions are made for the Euratom Framework Programme (Euratom treaty art. 11; decision 94/268/Euratom, art. 4.1; decision 94/761/Euratom art 10.1)

SOURCES OF FURTHER INFORMATION

Annual monitoring reports (continual and systematic monitoring): these are published each year for the Framework Programme and each specific programme and provide concise, independent feedback on the progress and quality of the measures taken to implement the programmes.

Five-year assessment reports published every fourth year, both for the Framework Programme and for each specific programme, which present an independent retrospective evaluation of the relevance, efficiency, results and impact of the European Union RTD programmes.

The European report on science and technology indicators which contains descriptions, statistics and detailed analyses of European and national RTD activities in the world context.

Research and development: annual statistics (Eurostat): an annual publication containing comparable international statistics on R&D expenditure, R&D personnel and patents in the Member States, broken down by regional level.

The Commission's *annual budgetary documents*, i.e. the preliminary draft budget, the budget, the consolidated revenue and expenditure account and the balance sheet.

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

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

The Commission's general EUROPA site:

<http://europa.eu.int>

The CORDIS site containing information on the Framework Programme:

<http://www.cordis.lu>

Commission Directorate-General XII's site:

<http://europa.eu.int/comm/dg12>

The EUROSTAT site:

<http://europa.eu.int/comm/eurostat>

The Joint Research Centre (JRC) site:

<http://www.jrc.org>

Extensive information on EU policies can be found on these sites, and in particular, on the CORDIS site which is devoted to the RTD Framework Programme and on DG XII's site, all the reference documents, the texts of calls for proposals and a host of other information, in line with the Commission's transparency and information policy.



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1. Adoption of a new research policy

1- Unless otherwise stated, throughout this report "Framework Programme" or "RTD Framework Programme" means the Framework Programme of the European Community for research, technological development and demonstration activities plus the Framework Programme of the European Atomic Energy Community (Euratom) for research and training activities.

2- COM(96)589 final.

The major development in European Union research policy was the adoption of the 5th Framework Programme¹ for RTD activities (1998 to 2002) by the European Parliament and the Council in December 1998. With the new Framework Programme Community research is adapted to the context created by the launch of the single currency and the start of accession negotiations with a view to enlargement of the Union :

- ▶ a Europe showing greater economic integration, better equipped to forge common responses to the globalisation of the economy - but also of science and technology - and about to bring its political contours closer to its cultural and historic frontiers;

- ▶ a Europe where, however, employment is still the major challenge and where the sectors and businesses creating large numbers of high-quality jobs depend, increasingly, on science and technology, for example activities connected with health care, information, the environment or new technology-based services.

The 5th Framework Programme will contribute to harmonious construction of such a Europe, alongside the other Community policies, particularly the Action Plan for Innovation,² with which the relationship will be reinforced.

A new framework for Community research

Building on the principles behind the success of Community research and on the experience gained in the course of the previous Framework Programmes, the new Framework Programme provides appropriate responses to the challenges of the new millennium through innovation on several fronts, particularly:

- ▶ Streamlined structure bringing together the RTD themes under four major programmes (excluding Euratom) instead of the 13 in the 4th Framework Programme (1994 - 1998).

- ▶ Concentration of resources on integrated or coordinated RTD activities meeting the priority needs of citizens and society; the main means of achieving this is with multidisciplinary key actions which

account for over two thirds of the funding under the Framework Programme and which cover all types of RTD, from basic research to demonstration activities; these key actions are backed up by generic RTD activities and support for research infrastructure.

► Contribution of research to the Union's socioeconomic objectives, by means of key actions to resolve specific issues, but also by encouraging participation by SMEs which will receive at least 10% of the budget for the thematic programmes, plus revised rules for participation laying down the selection criteria for projects funded by the Community and attaching greater importance to take-up and dissemination of results.

► Greater transparency and closer involvement of all interested parties, by improving the flow of information to the Council and the European Parliament and with the aid of continuing advice from the 17 External Advisory Groups for the key actions and/or programmes; the Framework Programme will also benefit from advice on ethical issues from the European Group on Ethics in Sciences and New Technologies.

► Association of the eleven countries which have applied to join the Union,³ whose researchers will participate in the 5th (EC and, in the case of some countries, Euratom) Framework Programme on the same eligibility and funding conditions as EU teams, in return for contributions from these countries to the Community budget.

► New strategy for the Commission's Joint Research Centre (JRC), whose role of serving Union policies has been consolidated and reinforced, with a work programme consequently focusing on research serving the citizen, sustainability, European competitiveness and nuclear safety.

► Management tools which have been fully revamped for higher efficiency.

3- Plus Norway, Iceland, Liechtenstein, Israel; and Switzerland, with which the EC Agreement must yet be ratified.

Adoption of the 5th Framework Programme and of the specific programmes

These new elements were included in the Commission's original proposal in April 1997 and then refined throughout 1998 in the course of the co-decision procedure on the EC Framework Programme.

The amended proposal submitted by the Commission on 14 January 1998 took account of the preliminary comments made by the European Parliament and the Council by including a separate thematic programme on energy, environment and sustainable development.

The common position agreed by the Council on 12 February (and officially adopted on 23 March) confirmed the agreement between the three institutions on the structure and principal characteristics of the Framework Programme, but also revealed differences on the total budget and, to a lesser extent, research priorities.

After the European Parliament confirmed, on second reading on 17 June, its wish to secure a total budget for the EC and Euratom Programmes well above the 14 billion euros proposed by the Council and to allocate a higher share of the resources to life sciences in particular, a conciliation committee was set up. After four meetings, on 17 November the committee reached agreement on the full Framework Programme, clearing the way for adoption by Parliament and the Council.⁴

Parallel discussions were conducted on the 5th Euratom Framework Programme, which was adopted by the Council on 22 December at the same time as the Framework Programme on non-nuclear research.⁵

Discussions also continued throughout the year on the specific programmes implementing the Framework Programme, enabling the Council to reach agreement on 22 December, after incorporating most of the amendments proposed by the European Parliament on 15 December. The specific programmes were formally adopted in January 1999.⁶

In the course of the discussions on the specific programmes, the role of the Programme Committees was confirmed and adapted to the 5th Framework Programme. The Commission will keep them regularly and fully informed of the measures taken to implement the specific programmes and the Committees will give their opinion on the RTD activities proposed, within the financial limits set, and will be able to devote more time than in the past to the strategic aspects.

4- Decision No
182/1999/EC,
OJ L 26, 1.2.1999.

5- Decision
1999/64/Euratom,
OJ L 26, 1.2.1999.

6- Decisions
1999/167/EC;
1999/168/EC;
1999/169/EC;
1999/170/EC;
1999/171/EC;
1999/172/EC;
1999/173/EC;
1999/174/EC;
1999/175/Euratom;
1999/176/Euratom,
OJ L 64, 12.3.1999.

A larger budget

The (EC and Euratom) Framework Programme finally adopted was accorded a budget of 14 960 million euros from 1999 to 2002. Allowing for inflation, this represents real growth of the order of 3% compared with the 4th Framework Programme. This increase is principally for actions on quality of life and human potential, which have been granted increases of 32% and 29% respectively in real terms, over the comparable fields in the 4th Framework Programme.

STRUCTURE AND FUNDING OF THE 5th FRAMEWORK PROGRAMME

	Amounts 1999-2002 in million euros
5th EC + Euratom Framework Programmes	14 960
► 5th EC Framework Programme	13 700
Quality of life and management of living resources	2 413
User-friendly information society	3 600
Competitive and sustainable growth	2 705
Energy, environment and sustainable development	2 125
- Environment and sustainable development	(1 083)
- Energy	(1 042)
Confirming the international role of Community research	475
Promotion of innovation and encouragement of SME participation	363
Improving human research potential and the socioeconomic knowledge base	1 280
Direct actions (Joint Research Centre)	739
► 5th Euratom Framework Programme	1 260
Controlled thermonuclear fusion	788
Nuclear fission	191
Direct actions (Joint Research Centre)	281

Rules for participation and dissemination of results⁷

7- In the case of the EC Framework Programme, rules for participation and for the dissemination of results (Decision 1999/65/EC, OJ L 26, 1.2.1999) and in the case of the Euratom Framework Programme rules for participation only (Decision 1999/66/Euratom, OJ L 26, 1.2.1999).

8- EC Framework Programme only.

The rules for participation and dissemination discussed and subsequently adopted at the same time as the Framework Programme included significant changes although, on the whole, with continuity from the previous provisions.

The changes of direction in the 5th Framework Programme have led to project evaluation criteria taking greater account of the economic and social benefits of the projects and of the potential for applying the results. Proposers⁸ will have to submit a "dissemination and exploitation plan" to the Commission and, if selected, the contract concluded with the Commission will include a more detailed "technological implementation plan". Moreover, in return for intellectual property rights better suited to industrial application of research, contractors will be required either to use the knowledge acquired or, after a specified period of time, to disseminate it.

Renewal of advisory bodies

The implementation of the 5th Framework Programme implies a greater involvement of the scientific, industrial and user communities. This has led to a rethinking and reinforcement of the Commission's advisory structures.

At an operational level, the Commission has set up 17 External Advisory Groups to provide it with advice on the content, direction and implementation of the key actions and/or the programmes. The first batch of members were nominated in November 1998. Acting in a personal capacity, they comprise experts from academic and public research organisations as well as members from industry and service enterprises, including SMEs, and organisations of research users. The initial appointments cover only the Member States of the EU; members will also be appointed from associated countries. The External Advisory Groups met several times towards the end of 1998 and the beginning of 1999 to provide initial advice to the Commission on the contents of the work programmes for the specific programmes.

In order to complete the renewal of its advisory structure, the Commission also took the decision to replace its Industrial Research and Development Advisory Committee (IRDAC) and the European Science and Technology Assembly (ESTA) with a high-level European Research Forum.⁹ The Forum will provide advice on strategic issues associated

9- Commission Decision 98/611/EC, Euratom.

with European research policy, choosing the subjects of discussion at its own initiative. The members, who will include the chairmen of the External Advisory Groups, will be assigned to two chambers, one representing academia and science, the other industry, services and users.

Improvements in management procedures

Questions of research management continued to enjoy a high profile in the discussions on the 5th Framework Programme and the specific programmes implementing it. The overall objectives have been to improve harmonisation of procedures, speed and transparency, while maintaining rigour and fairness in the selection process and the follow-up of projects.

To that end, the Commission worked on implementing its plans discussed at the informal ministerial colloquium held in London on 28 April 1998, especially by incorporating the results into the texts for the final decisions on the specific programmes.

Several meetings of the Commission services with personal representatives of research ministers followed, focusing on preparations for the implementation of the 5th Framework Programme. These concerned in particular the setting-up of networks of information and assistance providers within the Member States. Also discussed were relations between COST and the European Union programmes, the interface between the work of the European Science Foundation and the Framework Programme and benchmarking of research management performance between the European programmes and national programmes. More detailed work to compare best practice between various research management agencies will be defined in 1999.

A meeting was also held with the members of the European Parliament Energy, Research and Technology Committee in October 1998. The Commission services presented their proposals for the implementation of the 5th Framework Programme and an exchange of views was held concerning issues such as proposal evaluation and "clustering" of research projects.

With the adoption and launch of the 5th Framework Programme, preparatory work was pursued by an internal interservice working group on programme management. Among the items which have emerged are:

► The preparation of guides to proposers with a common structure and a common part for all specific programmes, as well as harmonised application forms;

► The setting-up of a common system for electronic proposal preparation and submission, and of a common infrastructure for the evaluation of research proposals;

► A common evaluation manual for the 5th Framework Programme, setting out the overall guidelines and procedures to be followed by all programmes;

► An internal code of conduct to speed up the administrative processing of files for which Commission decisions are required; proposers rejected at an early stage in the process will now receive early notification;

► A new set of model contracts, drawn up by the Commission services with the help of a joint IRDAC/ESTA working group representing the interests of industry and academic science.

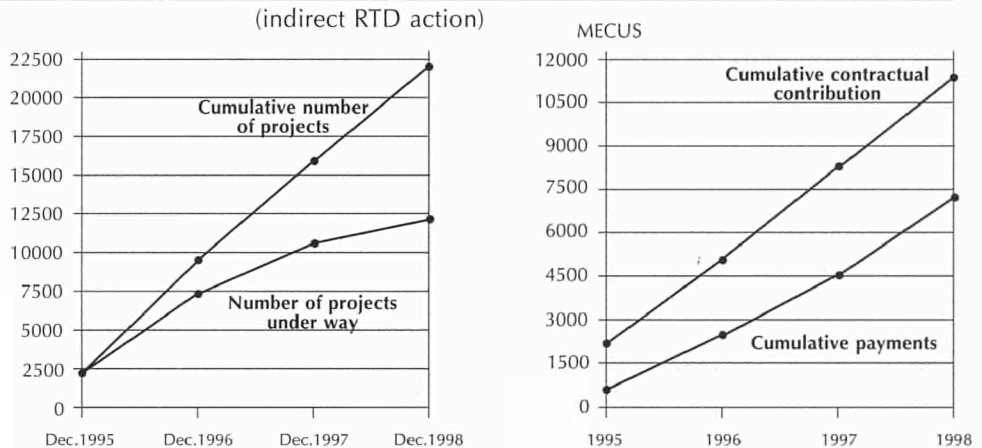
The Commission also recognised that its internal structures needed to be changed in order to reflect better the structure of the 5th Framework Programme and its new “problem solving” approach. Both DG XII and the research directorates of DG III and DG XIII have undergone reorganisations in structure and staffing. The greater size and coverage of FP5 programmes will be reflected in a management structure having greater recourse to “collegiate” management by groups of directors rather than, as in the past, each programme being managed by one director.



2. Community RTD in 1998

The final RTD contracts under the 4th Framework Programme were signed in the course of the year, apart from a few negotiated in 1998 and signed at the start of 1999. However, over 55% of the research projects are continuing in 1999 and many will go on beyond that.

MOMENTUM OF THE 4th FRAMEWORK PROGRAMME



Implementation of the 4th Framework Programme

Over 99 % of the funds available were committed in the course of the year, putting an end to commitment of the budget for the 4th Framework Programme. A large proportion of the payments for the 12 200 projects continuing after 1998 remain to be made, either in 1999 or later. In all, 6 200 new projects were started in 1998¹⁰, taking the total implemented under the 4th Framework Programme up to almost 22 000. The average selection rate for new proposals was up to 37%, compared with 26% in 1996 and 30% in 1997.

10- Of which 3750 were shared-cost actions, 250 concerted actions, and 2200 preparatory accompanying and support measures.

On average, the new shared-cost action RTD projects were over 20% bigger than the projects started in 1997, with the Union's contribution alone averaging ECU 660 000. This increase is not attributable to structural factors (it is repeated in most of the specific programmes) but, instead, to the will to concentrate the available resources on large-scale projects, without however prejudicing the participation of SMEs. This shift has been matched by an increase in the average number of partners to almost six per project in 1999.

Creation of a European research area

One way in which Community research immediately adds value lies in the number and quality of the links which it establishes and maintains between research teams in the Union. In 1998 some 28 000 new participations lent added strength to this European research area. The 21 000 participations in shared-cost action alone created almost 90 000 collaborative links for researchers in the European Union, 83 % of which were transnational links.

In terms of quality, the selection procedures ensure that the Community RTD projects bring together the best teams in Europe. Nevertheless, every region in Europe is involved, including the less-favoured regions eligible under Objective 1 of the Structural Funds, which were represented in 40% of the projects started in 1998.

The Training and Mobility of Researchers programme plays an important role in underpinning sustainable development of a European RTD area, by opening the doors to training or even a European career for young scientists. The Marie Curie fellowships granted under this programme allowed Europe-wide mobility for the equivalent of around 1 100 full-time researchers in 1998, to whom must be added 950 researchers trained in the “research networks” activity and the grants awarded directly under the thematic programmes. Most of these young scientists were given employment contracts with their host institution for the duration of their training.

Participation by firms

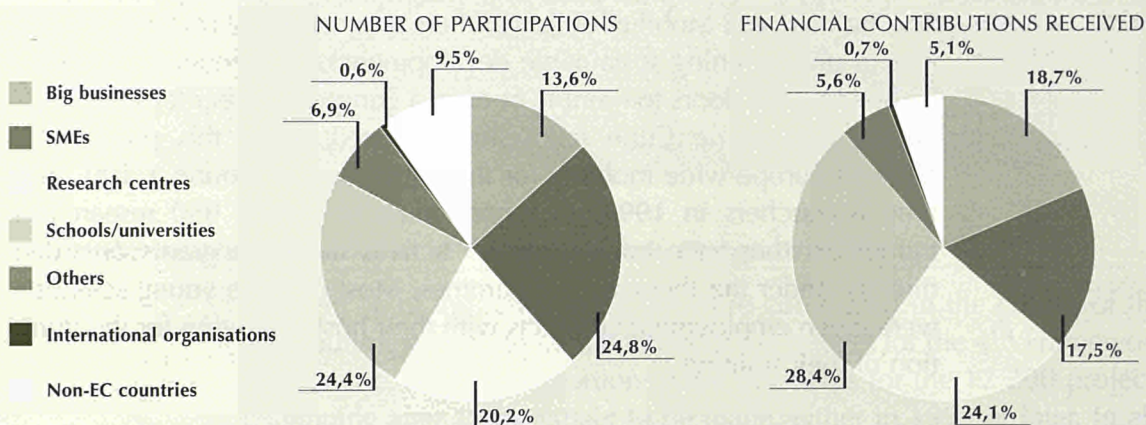
Involvement of firms in Community research is essential not only to make sure that the results of the Community research are applied but also, more broadly, to strengthen the mutually beneficial cooperation between the private sector and public-sector research. In 1998 participation by firms in the EC Framework Programme remained high, accounting for a total of 38% of participations in the new RTD projects.

Although still relatively low, industrial participation in the Training and Mobility of Researchers programme, in particular, has grown steadily over the life of the 4th Framework Programme. As a result, 70% of the networks selected in 1998 in response to the latest call for proposals include links with industry. In the 5th Framework Programme the “Marie Curie Industry Host Fellowships” specially designed for firms will ensure even greater participation by them.

Large enterprises remained heavily involved in the EC Framework Programme in 1998, with almost 14% of the participations and 19% of the financial contributions received, particularly in the field of technological research: information technologies (40% of participations), communications (35%), transport (24%) and industrial and materials technologies (20%).

Small and medium-sized enterprises made further progress compared with the 3rd Framework Programme, in which SMEs accounted for only 18% of participations. With 25% of participations, their access to research in 1998 remained at a similar level to 1997.

ACCESS TO THE EC FRAMEWORK PROGRAMME IN 1998



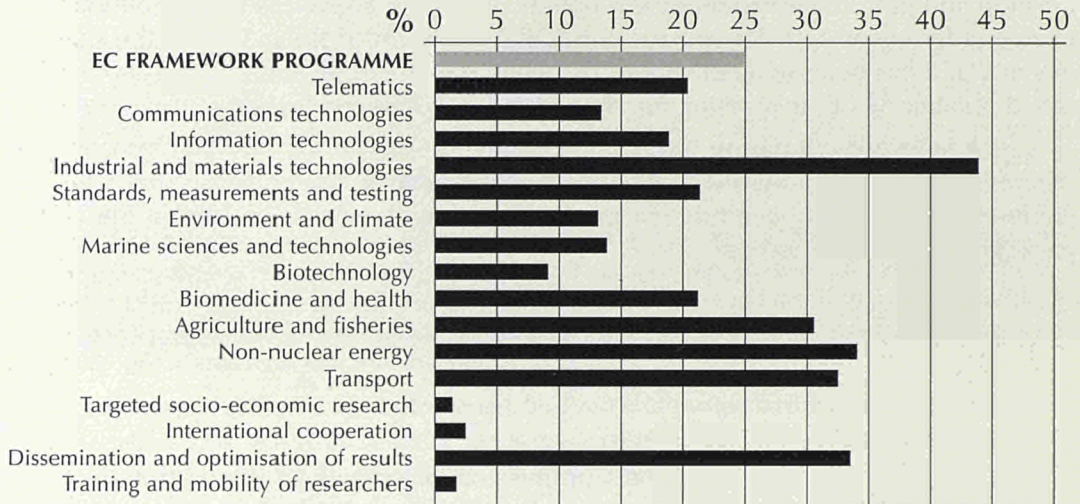
(Shared-cost actions - contracts signed in 1998)

In all, 14 500 SMEs took part in the 4th Framework Programme between 1995 and 1998. Around 20% of them received the exploratory awards granted to help SMEs prepare their RTD proposals, while 35% opted for the CRAFT cooperative research scheme in which SMEs with insufficient research capacity join forces to entrust a third party with the RTD project. An independent study in 1998 confirmed the efficiency of the exploratory awards for opening up access to Community research to SMEs.¹¹

11- Evaluation of the efficiency and outcome of the Exploratory Awards scheme in FP4, Segal Quince and Wicksteed for the European Commission, April 1999.

PARTICIPATION BY SMES IN THE EC FRAMEWORK PROGRAMME

(Shared-cost actions - contracts signed in 1998)



Impact on competitiveness, employment and quality of life

Although it is accepted that the impact of RTD activities on competitiveness and employment is neither direct nor immediate, the fact that they are crucial for the long term remains uncontested. This is easier to evaluate in the case of technological research which results in measurable products: patents, standards, new goods, services or processes, etc.

It is thus possible to observe the effect of a technological research project on the activities of the firms participating several years later. The 1998 survey of a sample of projects from the BRITE-EURAM programme (on industrial and materials technologies) concluded that four years after completion of the research they had had a direct economic impact amounting, on average, to six times the total cost of the research, i.e. 12 times the level of Community funding, and had had a positive net impact on employment.¹² However, surveys of this type cannot analyse all the effects of research which, even in the case of technological research and all the more so for basic research, are largely indirect and diffuse.

12- Industrial technologies: Impact predicted, impact delivered, European Commission, Nov. 1998 .

RTD PROJECTS FOR COMPETITIVENESS AND EMPLOYMENT

► One example of **technology transfer** from Community research in 1998 was the development of a compact (175m instead of 1400) rolling mill causing less pollution, consuming less energy and offering exceptional yield thanks to a continuous production process: the core of the mill is a magnetic induction furnace designed from mathematical and computer models developed in a completely different field for the Controlled Thermonuclear Fusion programme.

► One of the most remarkable examples of **economic development** as a result of Community research was an RTD project on wind power which enabled a German company to develop and put on the market new products, including a gearless turbine offering high performance at far lower cost. These have considerably expanded the market of this company, to the extent that it has built up a network of branches across Europe and in India and has become the world number two in this sector, jumping from 20 to 850 employees.

► Software optimising the supply-production-demand chain has been developed from theoretical research into artificial intelligence and combinatorial analysis under the ESPRIT programme. Applications have brought **productivity improvements** of 30% in the clothing, drink packaging and car industries.

13- Options and Limits for Assessing the Socioeconomic Impact of European RTD Programmes, report by the Independent Group of Experts to the European Commission, DG XII (Evaluation Unit), January 1999.

In May 1998 the Commission organised an international conference on evaluation of the results and impact of RTD and gave a group of experts a mandate to pursue this subject. Their report¹³ stressed that research has a wide variety of effects, depending on external factors, such as other complementary RTD projects, the creation of the right climate for application or dissemination of the results, the availability of competent managers, etc. These points validate the integrated approach taken in the 5th Framework Programme, while highlighting the inherent limits of evaluation of the socioeconomic impact. As recommended by the group of experts, the Commission will continue this evaluation, applying a variety of complementary approaches and methods.

14- Research and Standardisation, Commission working paper COM(1998) 31, 27 January 1998.

The important contribution made by the European Union's research to standardisation was underlined in a working paper published by the Commission in 1998.¹⁴ In addition to the Standards, Measurements and Testing programme, the Joint Research Centre and several of the specific programmes have established formal links with the European standardisation bodies; to varying degrees, all the programmes include a prenormative dimension. The technological implementation plan attached to each RTD contract under the 5th Framework Programme will ensure that attention is always paid to the standardisation aspects.

This standardisation side of Community research plays an important role in quality of life; for example, the 20 certified reference materials (CRM) prepared in 1998 in the Standards, Measurements and Testing programme provide the baseline required for activities as diverse as medical diagnosis, cosmetics and environmental monitoring.

More broadly, however, most of the specific programmes support projects contributing to improving quality of life.

RTD PROJECTS FOR QUALITY OF LIFE

► Numerous innovative avenues are being explored in the research on **health and nutrition**. For example, a consortium funded by the Biomed programme has developed a gene therapy against arteriosclerosis, one of the leading causes of death in Europe. In the food sector, a European project developed an ultrasonic method for monitoring cheese quality in the days following production, whereas conventional methods work only for cheeses over four months' old.

► To **understand and conserve the environment**, an Earth observation instrument specially adapted for monitoring vegetation cover was fitted to the SPOT4 satellite launched in March 1998, thanks to a Community contribution of 46%. This instrument, named "Végétation", frees the European Union of its dependence on US satellites which, in any case, are less suitable for applications of this type and allows virtually day-to-day monitoring of vegetation cover all over the world, certain aspects of degradation of the environment, forest fires, agricultural performance, etc.

► A number of European projects are helping to **combat natural or man-made hazards**. For example, the PROVOST project was able to model the impact of the "El Niño" cycle in order to predict well in advance the changes which it produces in the climate - droughts, flooding, etc., not only in Europe but throughout the world. The Nuclear Safety programme is supporting a series of RTD activities to improve treatment and storage of nuclear wastes and to make the existing nuclear power stations even safer. Another example is the research supported by the Union on demining which should lead, in particular, to multi-sensor detectors combining several different methods of detection to achieve optimum efficiency.

► Turning to **transport**, European research has for example enabled a methodology for estimating emissions and energy consumption to be established for all modes of transport (road, rail, maritime and air). This methodology will allow environmental aspects to be taken into account in a harmonised fashion in the planning of transport systems, notably in the framework of emission inventories defined under international conventions. In the shorter term, the CREST project will bring big improvements in child safety in motor vehicles; analysis and reconstruction of the conditions for large numbers of real accidents have already resulted in more realistic dummies of children for use in safety tests.

► **Conservation of Europe's cultural heritage** was also covered by one set of research projects supported by the Framework Programme. The IMMACO project, for example, to produce certified reference materials for five alloys representative of the great metal age civilisations will make it easier to study pre-historic and ancient objects and to develop new precision tools for conserving and restoring them. Another European partnership has devised a laser system for cleaning buildings capable of removing dirt without abrasion of the stonework. It is particularly suitable for fragile historic monuments and has been tested on Milan Cathedral and the Strozzi Palace in Florence and was used recently to clean the statues on Brussels City Hall.

The Framework Programme and cohesion in the European Union

15- Reinforcing cohesion and competitiveness through research, technological development and innovation, Communication from the Commission, COM(1998)275, 27 May 1998 (<http://www.cordis.lu/cohesion/home.html>).

In May 1998 the Commission published an analysis of the contribution made by Community RTD policy to cohesion in the Union.¹⁵ This highlighted the big increase in aid from the Structural Funds for RTD and how it has concentrated on the less favoured regions. Between 1994 and 1999 this aid for RTD totalled ECU 8.5 billion; over 90% was for regional objectives (objectives 1, 2, 5b and 6) and 60% for the Objective 1 regions alone. Although still not enough, this significantly narrowed the technology gap in terms of research effort and, in particular, private-sector research.

To make further progress, the communication recommends the development of integrated regional RTD and innovation strategies focusing on three priorities:

- ▶ Promoting innovation;
- ▶ Networking and industrial cooperation;
- ▶ Strengthening human capabilities.

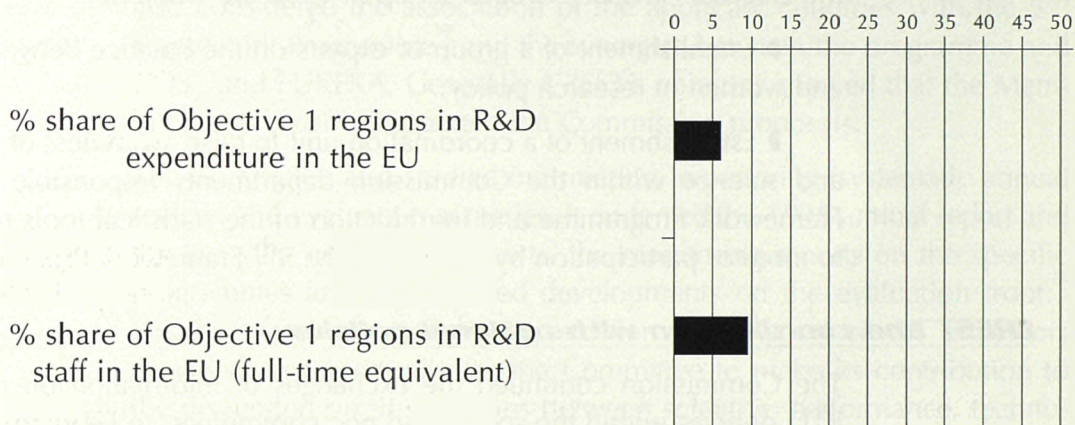
In the process, the Commission drew on the pilot projects launched by the European Regional Development Fund (ERDF) and on the “regional innovation and technology transfer strategies and infrastructures” established by the Framework Programme in the context of the Innovation programme.

More broadly, the entire Framework Programme will contribute to implementation of these regional strategies. Geographical analysis of the RTD projects started in 1998 confirms that the Framework Programme is helping the less favoured regions to catch up, as their rate of participation in Community research remains proportionally higher than their research potential (see graph below).

The Training and Mobility of Researchers programme plays an important role in this respect, in the form of specific aid such as the return grants for young researchers from the less favoured regions. In the 5th Framework Programme these measures are supplemented by the Marie Curie development host fellowships for young researchers to work in research centres in the less favoured regions.

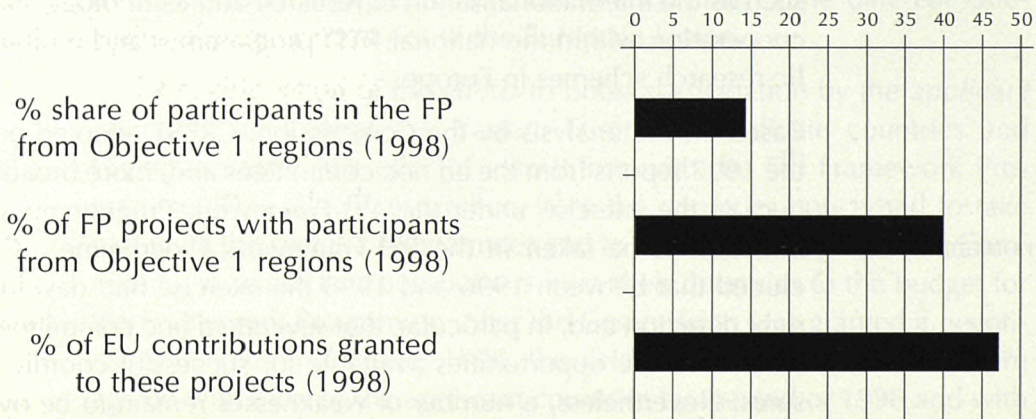
Finally, for the 5th Framework Programme, space on the CORDIS Internet site has been reserved to allow Member States and regions to publicise their RTD potential and their participation in Community research. Scotland and the Mid-West of Ireland are amongst the less favoured regions already participating (<http://www.cordis.lu/regions/home.html>).

RATE OF PARTICIPATION OF LESS FAVOURED (OBJECTIVE 1) REGIONS IN EUROPEAN RTD EFFORT ⁽¹⁾ ...



(1) Source: Eurostat (data for 1995), treatment DG XII-AP1

...AND IN THE RTD FRAMEWORK PROGRAMME



Women in Community research

The 5th Framework Programme explicitly refers to “the need to encourage the participation of women in the fields of research and technological development”. The European Commission and the European Parliament held a major conference on “Women and Science” on 28 and 29 April 1998, bringing together almost 300 leading scientists and politicians. The Commission also drafted a communication reviewing the action taken already or planned in future with a view to mobilising women to enrich European research.¹⁶ The first tangible measures have been taken, notably:

- An increase in the proportion of women in the groups appointed by the Commission to advise it on RTD policy: 27% of the members of the External Advisory Groups set up in 1998 are women;
- Establishment of a group of experts on the balance between men and women in research policy;
- Establishment of a coordination unit to raise awareness of women and science within the Commission departments responsible for the Framework Programme and introduction of the statistical tools required to monitor participation by women in the 5th Framework Programme.

16- Commission communication COM(1999)76, 17 February 1999.

CREST and coordination with national policies

The Commission continued the exchanges of information on national RTD policies within the specific ad hoc committees. In February 1998 a second seminar with the rapporteurs of the ad hoc committees provided an opportunity for a more detailed exchange of experience and to take account of the conclusions of the Scientific and Technical Research Committee (CREST). To back this up, specific measures were taken on issues such as the internationalisation of research and technology, transnational cooperation within the national RTD programmes and multilateral public research schemes in Europe.

Based on the analysis by the Commission, CREST adopted positions on the 1997 reports from the ad hoc committees and, more broadly, on conduct of the exercise under the 4th Framework Programme and on the direction to be taken in the 5th Framework Programme.¹⁷ CREST concluded that between 1996 and 1998 the exercise had developed in the right direction and, in particular, that several ad hoc committees had capitalised on the opportunities available for successful coordination measures. Nevertheless, a number of weaknesses remain to be overcome in

17- CREST/1216/1/98.

the 5th Framework Programme. CREST and the Commission therefore recommended that the exercise should continue, but taking account of the characteristics of the new Framework Programme and of the lessons drawn from the experience gained. Framework conditions were defined with this in mind.

In addition, a large proportion of CREST's activities were devoted to preparation of the 5th Framework Programme, including opinions on the working paper and, subsequently, on the formal proposals for the specific programmes.¹⁸ In particular, the committee examined the programmes on the international role of Community research, improving human research potential and socioeconomic research, those of the JRC, and coordination of transport research between the different key actions concerned. It also considered the association of the applicant countries with the 5th Framework Programme¹⁹ and the synergies between the programme and COST and EUREKA. Generally CREST's opinions showed that the Member States broadly supported the Commission proposals.

The Committee also studied information, monitoring (systematic annual review) and evaluation activities. It endorsed the 1998 annual report and the five-year assessment reports, the monitoring reports on the specific programmes and the planned developments on the evaluation front.²⁰ Finally, examination of the Second European Report on S/T indicators provided an opportunity for the Committee to make its contribution to the discussion on the relations between scientific performance, technological development, innovation and technology prospects

18- COM(97)553 and CREST/1201/98; COM(1998)305 and CREST/1208/98.

19- CREST/1201/1/98.

20- CREST/1215/98.

International cooperation

The international cooperation activities in 1998 took place in the context of cooperation strategies differentiated according to the different categories of partner countries of the European Union.

► Continuation of the efforts to boost participation by the *applicant countries*: all Central and Eastern European candidate countries and Cyprus accepted the offer of association with the 5th Framework Programme. This allows researchers from the countries concerned to take part in all the specific programmes and to receive funding from the Community, in return for contributions from their countries to the budget for the Framework Programme. After the Commission was granted a negotiating mandate in October 1998, the detailed terms of association were agreed with most of the applicant countries by the end of 1998 and with

ASSOCIATION AGREEMENTS TO THE 5th FP

	EC	Euratom
European Economic Area		
Iceland	▲	
Liechtenstein	▲	
Norway	▲	
Applicant countries		
Bulgaria	▲	▲
Cyprus	▲	
Czech Republic	▲	▲
Estonia	▲	▲
Hungary	▲	
Latvia	▲	
Lithuania	▲	▲
Poland	▲	
Romania	▲	▲
Slovak Republic	▲	▲
Slovenia	▲	▲
Other countries		
Israel	●	
Switzerland	Prep.	●

S/T COOPERATION AGREEMENTS

	EC	Euratom
South Africa	●	
Argentina	Prep.	●
Australia	●	
Canada	●	●
China	Prep.	
USA	●	●
Russia	Prep.	

● Agreement in force (on 1 April 1999).

▲ Agreement due to enter into force in 1999; possibility of submission of RTD proposals in advance.

the rest at the start of 1999 so that they will be able to take effect with the start of the 5th Framework Programme. As regards Malta and Turkey, their association with the 5th Framework Programme will be possible once they have made formal demand and the necessary agreements have been concluded.

► Closer cooperation with the Union's *industrialised partners*: the scientific and technical cooperation agreement signed with the USA in December 1997 entered into force on 14 October 1998. The negotiations with Russia were completed with a view to a cooperation agreement expanding current scientific and technological links by putting them on a long-term footing and resolving the intellectual property and tax issues. The Commission negotiated extension of the association with Israel to the 5th Framework Programme, clearing the way for signature of the agreement on 3 March 1999. The association agreement with Norway, Iceland and Liechtenstein was also extended to the 5th Framework Programme, as was the scientific and technical cooperation agreement with South Africa. The

scope of agreements with Australia and Canada was enlarged to cover all the thematic programmes of the 5th Framework Programme. Finally, an agreement is being negotiated with Switzerland.

21- COM(97)1174, 25 April 1997.

22- Ocean Food Webs and Economic Productivity, Integrated Coastal Zone Management and Sustainable Use of Aquatic Biodiversity: Data, Tools and Collaboration.

► In the case of the *emerging economies*, one particularly noteworthy event was the signature of the scientific and technical cooperation agreement with China on 22 December 1998, as well as the preparation of a similar agreement with Argentina which has been initialled early 1999.

► For the *developing countries*, various coordination schemes were started in line with the communication on “scientific and technological research - a strategic part of the European Union’s development cooperation with developing countries”.²¹ In the health sector, for example, the European malaria vaccine initiative (IEMV) coordinates efforts in Europe. In the case of the environment, the Convention on Desertification was implemented. In 1998 three thematically inter-connected scientific conferences took place at EXPO ‘98 as part of the ACP-EU Fisheries’ Research Initiative²². Finally, the members of the European Initiative for Agricultural Research for Development continued their coordination activities, in liaison with the Consultative Group on International Agricultural Research (CGIAR).

► To strengthen the synergies between the different forms of scientific and technical cooperation in Europe, the Commission continued to support the COST programme, which started 17 new projects in 1998. The Commission also contributed to six projects and nine “umbrella initiatives” under the EUREKA programme in 1998. Detailed discussions with industry on the interaction between these instruments and the Framework Programme led to the inclusion of clauses in the specific programmes, in particular to open up the possibility of projects in cooperation with EUREKA as part of the key actions.

Monitoring of the Framework Programme and activities of the advisory bodies

As the *Framework Programme monitoring exercise* was conducted during the final year of FP4, the Panel, composed of eight senior experts, focused not only on major trends during 1998 but also on the potential impact of the Programme. It concluded that the main objectives of the

specific programmes have been achieved and that they were implemented in a satisfactory manner. In the Panel's view, this is in itself a major achievement, considering that the Framework Programme is the world's largest and most complex multinational research programme.

The Panel noted that during 1998 efforts were undertaken to promote innovation across Europe with emphasis on the commercialisation of the funded research. The Panel commended the improved capacity to respond rapidly to emerging issues and the development of better coordination across specific programmes in support of EU policies. However, it warned against institutional "memory loss" concerning FP4 best practice and stressed the need to follow up and measure the impact of FP4 activities. The Commission acknowledged the importance of this and has taken the necessary measures to ensure that every ongoing project under FP4 will be adequately followed by the relevant units in the new structure.

It was recognised by the Panel that there has been a good implementation of monitoring recommendations over the lifetime of FP4, although this has been rather unevenly reflected in the different specific programmes. With FP4 coming to a close, the most important concern in 1998 was to ensure that the main 1997 monitoring recommendations are reflected in the management of FP5.

The bodies set up to advise the Commission continued their work, contributing to implementing the 4th Framework Programme and preparing the 5th:

► **European Science and Technology Assembly (ESTA)**

During 1998 the Assembly met on two occasions and its Bureau on four occasions. It commented on the integration of socioeconomic research in the specific programmes of FP5; support for research infrastructure under FP5; links between FP5 and the first EU Action Plan for Innovation; research links between the Central and Eastern European countries and the EU; and aspects of EU research policy and cohesion.

In addition, numerous contacts were made between ESTA members and senior programme managers, a very effective, although less externally visible, means by which ESTA provided timely advice to assist in the development and implementation of the Framework Programme.

While not agreeing with the totality of the Commission's plans for the new advisory structures under FP5, ESTA recognised the need for change and for the increased involvement of external experts in the implementation of the key actions.

► Industrial Research and Development Advisory Committee (IRDAC)

In preparation for the new Framework Programme, IRDAC published a report on revision of the rules for participation and of the model contract. It also continued its deliberations on venture capital and analysed the action taken by the Commission for the association of venture capital to Community projects. In addition, the Committee examined management of the European RTD programmes and organised a round table on State aid for research. Finally, at its latest plenary IRDAC exchanged views with Commissioner Papoutsis on SMEs' contribution to competitiveness and employment. On the same note, the theme for its annual seminar was the impact of RTD and innovation on competitiveness and employment.

IRDAC considered it imperative that industry should be able to continue to express its points of view freely and clearly. IRDAC's members therefore welcomed the setting-up of the European Research Forum (ERF) consisting of two independent but closely linked chambers.

Taking account of the ethical aspects of science and technology

Throughout the procedure for adoption of the 5th Framework Programme in 1998, great attention was paid to the ethical aspects of research, particularly on the part of the European Parliament. Article 7 of the Framework Programme expressly states that the Community research activities must be carried out in compliance with fundamental ethical principles.

In addition, the Framework Programme will fund studies on medical and biomedical ethics and has imposed strict controls on genetic research on human beings and experiments on animals. To allow fuller discussion of these aspects, the Commission was involved in the preparation of a major conference on ethics in science and technology, which will be held in Tübingen in June 1999.

Community research is one of the main remits of the European Group on Ethics in Science and New Technologies (EGE). This was set up in January 1998, under the authority of the President of the Commission, to continue and expand the work of the Group of Advisers on the Ethical Implications of Biotechnology, whose mandate expired in December 1997. It will cover not only biotechnology but all new technologies, some of which, such as information technology, are having a growing impact on citizens' everyday life, raising ethical issues in the process. The Group consists of twelve independent specialists in law, genetics, philosophy, theology, sociology, medicine and biology.

In 1998 the EGE published two opinions on fields of direct relevance to Community research - one on the ethical aspects of tissue banks (21 July 1998), the other on the ethical aspects of research involving use of human embryos in the context of the 5th Framework Programme (23 November 1998). Its first task in 1999 is to prepare an opinion on new information technologies. The Group also attended a hearing of the European Parliament Committee on Research in March 1999.

Action Plan for Innovation

One of the objectives during the preparations for the 5th Framework Programme was to place Community research more clearly in the context of innovation. However, the Action Plan for Innovation²³ puts the interrelation between research and innovation in a broader context, in which entrepreneurship and funding are equally important for promoting innovation in Europe. The second phase of implementation of the Action Plan started in 1998, bringing together the specific measures under the Innovation programme and action from other Community programmes and policies, including other areas of the Framework Programme.

► Gearing research more to innovation

In the 5th Framework Programme, the horizontal programme on “Promotion of innovation and encouragement of SME participation” coordinates and supports the innovation activities in the thematic programmes which, in turn, have each set up functions dealing with application of research results and innovation. In 1998 the Commission launched wide consultations on ways of creating an environment conducive to innovation in Europe. This produced specific proposals for regional, national and Community policy. These were discussed at the first European forum for innovative businesses in Vienna on 12 and 13 November 1998, in response to which the Commission proposed a new pilot scheme bringing together local/regional, national and Community levels.

► Setting up a legal, regulatory and financial framework conducive to innovation

In conjunction with the national patent offices and the members of the profession, the Commission continued the preparations for the introduction of a Community patent. A Commission communication on the subject was published in 1999.²⁴ The European Patent Office opened the esp@cenet service on patent information on the Internet.²⁵ On Community research, an IPR (intellectual property rights) help desk was also opened.²⁶

As regards innovation financing, the Commission is preparing an action plan to follow up the communication on “Risk capital: a key to job creation in the European Union” submitted at the Council meeting on economic and financial affairs in April 1998. The I-TEC²⁷ pilot project to help venture capital firms to invest in the start-up phases of innovatory projects has produced encouraging results. These moves form part of a comprehensive Community strategy involving not only the Innovation programme but also the European Investment Bank, the European Investment Fund and the Structural Funds.

24- COM(1999)42,
5 February 1999.

25- <http://www.european-patent-office.org/espacenet>.

26- <http://www.cordis.lu/ipr-helpdesk>.

27- Innovation and Technology Equity Capital.

The BEST²⁸ Task Force also made further progress, culminating in the Commission proposals for action submitted at the Council meeting on industry in November 1998.

► **Fostering an innovation culture**

The first phase of the “Dashboard for innovation” project gathered detailed information on almost 200 national measures to foster innovation and started a comparative analysis. A restricted access Intranet service will give national officials access to all the information available and enable them to exchange experience. In addition, 30 projects were conducted in 1998 to promote organisation and management methods for innovation by SMEs. To back up these moves, tools were developed for training on best practices for industrial innovation, and, in the framework of enterprise policy, through launching studies on the access of SMEs to innovation, evaluation methods and SME competitiveness, and on networking of clusters of SMEs and technological centres of competence. In the research sector, in 1998 the Commission introduced training focusing on innovation management at its Joint Research Centre (JRC) in order to stimulate application of RTD results there.



3. Outlook for 1999

The biggest challenge this year is successful launching of the new Framework Programme, from publication of the calls for proposals in March to signature of the first contracts, scheduled in autumn 1999. The German Presidency, followed by the Finnish, have both put implementation of the Framework Programme at the top of their priorities in the research field, but without neglecting preparation for the future. Accordingly, at the Council meeting on research on 20 May the German Presidency will start an in-depth debate on the future of European research.

Implementation of the 5th Framework Programme

The instruments essential for implementation of the new Framework Programme were finalised at the start of 1999, clearing the way for opening the first calls for proposals in March. For each specific programme a detailed work programme for 1999 has been published plus an information pack for proposers containing the work programme and a guide to submission of proposals and evaluation manual.

Following publication of the first calls for proposals in March, the proposals received for all the specific programmes will be evaluated just before or during the summer (for at least some of the fields covered). This will make it possible to conclude most of the negotiations, to commit the funds available and, as far as feasible, to sign contracts before the end of the year. However, the Commission will keep a watch to ensure that this particularly tight, heavy schedule in 1999 will not be at the expense of rigorous evaluation of all the proposals expected.

Multiannual plans ("road maps") for 1999 to 2002 have been included in the work programmes to enable potential proposers to plan ahead. As stated in these plans, the calls for proposals in some fields will remain permanently open, with regular rounds of evaluations up to 2002. This is the case, in particular, with the Marie Curie fellowships, the technology stimulation measures for SMEs and the measures in support of research infrastructure.

On the international cooperation front, the major challenge for 1999 is the entry into force of the association agreements with the 11 applicant countries.

Implementation of the Action Plan for Innovation will in turn continue in 1999, when the Commission will study new approaches taking account of developments on the national scene, technological progress and changes in the world context.

Monitoring of the Framework Programme and strategic reflexion

CREST will study the implementation and development of coordination with national policies, particularly by means of exchanges of information. Specific issues will also be examined such as, in the first six months, the internationalisation of RTD, its institutional funding arrangements, and transfrontier cooperation within the national RTD programmes. CREST will also be consulted on various issues relating to the 5th Framework Programme, such as the S/T cooperation agreements with non-EU countries and the Action Plan for Innovation.

The external advisory groups will continue to advise the Commission on the first steps to implement the key actions. The five-year assessment of Community research will start in the second half of this year in order to be completed in 2001.

As requested by the Council Presidency, in 1999 the Commission will also initiate discussions on European research after the 5th Framework Programme, including topics such as cooperation and reinforcing the synergies between the Framework Programme and the Member States' RTD policies. Its forward studies will continue in particular under the key action on "improving the socioeconomic knowledge base",²⁹ in conjunction with the JRC Institute for Prospective Technological Studies ("Futures" project) and with the Forward Studies Unit ("Scenarios 2010"). The study on the costs and benefits of Community research launched at the initiative of the European Parliament's Scientific and Technological Options Assessment (STOA) office will, in turn, provide further input for this debate.

29- Strategic analysis of science and technology policies (STRATA).

All these activities will pave the way for adapting Community research to the Europe of post-2002: a Europe in the process of enlargement within an increasingly integrated world where the Union's scientific and technological excellence and capacity to innovate are likely to be more crucial than ever in order to build and uphold a European model striking a balance between competitiveness and cohesion, quality of life and employment.



ACRONYMS AND ABBREVIATIONS

BIOMED	Biomedicine and health (specific RTD programme)
BRITE-EURAM	Basic research in industrial technologies for Europe - European research in advanced materials (3 rd Framework Programme)
CEECs	Central and Eastern European countries
CORDIS	Community research and development information service
COST	European cooperation in the field of scientific and technical research
CRAFT	Cooperative research action for technology (technology stimulation measures for SMEs)
CREST	Scientific and Technical Research Committee (advises the Commission and the Council)
DC	Developing country
DG	Directorate-General
EC	European Community
EEA	European Economic Area
ERF	European Research Forum
ESPRIT	European strategic programme for research and development in information technologies (specific RTD programme)
ESTA	European Science and Technology Assembly
EU	European Union
EURATOM	European Atomic Energy Community
EUREKA	Framework for European technological cooperation
FP	Framework (RTD) Programme
INCO	Cooperation with third countries and international organisations in the field of RTD (second activity under 4 th Framework Programme)
IPTS	Institute for Prospective Technological Studies (JRC, Seville)
IRDAC	Industrial Research and Development Advisory Committee
JOULE	Joint opportunities for unconventional or long-term energy supply (specific RTD programme on non-nuclear energy)
JRC	Joint Research Centre
OJ	Official Journal
R&D	Research and development
RTD	Research and technological development (including demonstration)
SME	Small and medium-sized enterprise

European Commission

EUR 19067 — RESEARCH AND TECHNOLOGICAL DEVELOPMENT
ACTIVITIES OF THE EUROPEAN UNION - ANNUAL REPORT 1999

Luxembourg: Office for Official Publications of the European Communities

1999 — 38 pp. — 17.6 x 25 cm

ISBN 92-828-7240-8

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