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REPORT FROM THE COMMISSION

RESEARCH AND TECHNOLOGICAL DEVELOPMENT ACTIVITIES OF THE EUROPEAN UNION

1999 ANNUAL REPORT

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 23 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 L 126, 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.

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/en/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.

[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).

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1. ADOPTION OF A NEW RESEARCH POLICY

The major development in European Union research policy was the adoption of the 5th Framework Programme[1] 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 23 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.

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[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.

- 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.

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.

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[3] Plus Norway, Iceland, Liechtenstein, Israel; and Switzerland, with which the EC Agreement must yet be ratified.
[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 to 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 results[7]

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. Proposers[8] 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.

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[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.

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 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:

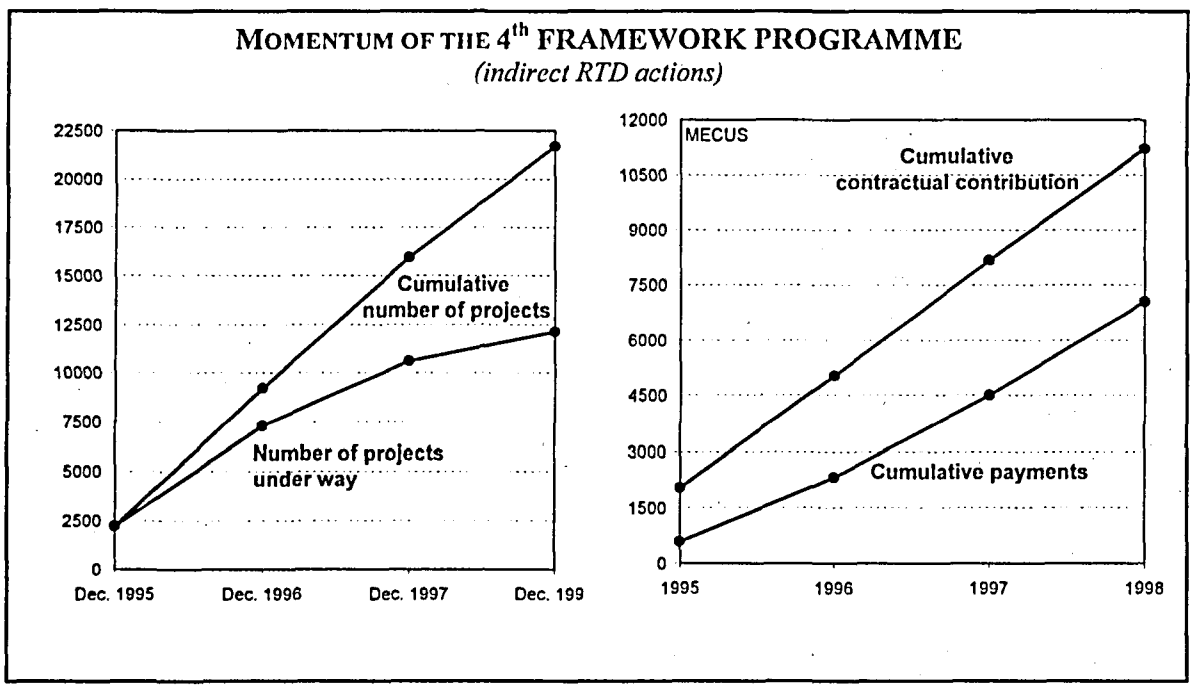
[9] Commission Decision 98/611/EC, Euratom.

- 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.



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 1998[10], 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.

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

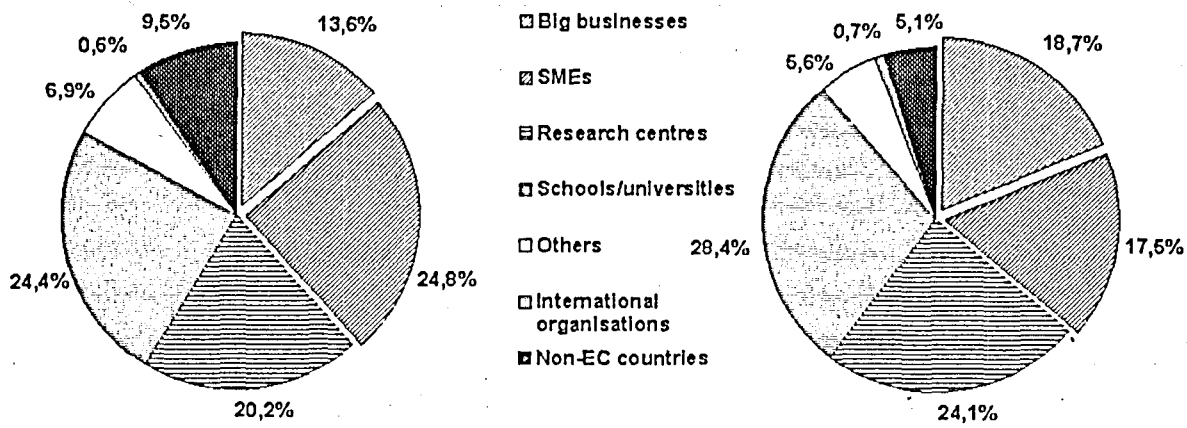
Involvement of firms in Community research is essential not only to make sure that the results of the Community research are applied but also, more broadly, to strengthen the mutually beneficial cooperation between the private sector and public-sector research. In 1998 participation by firms in the EC 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.

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

ACCESS TO THE EC FRAMEWORK PROGRAMME IN 1998

NUMBER OF PARTICIPATIONS | *FINANCIAL CONTRIBUTIONS RECEIVED*



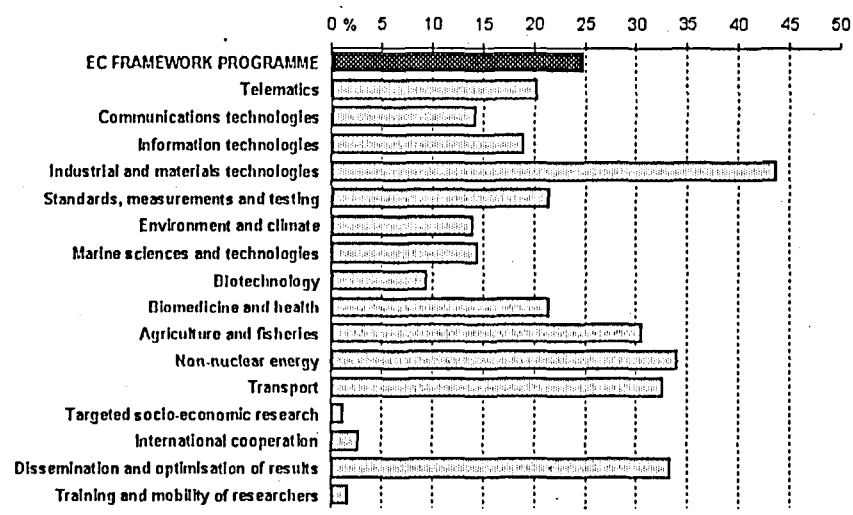
(Shared-cost actions - contracts signed in 1998)

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. 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]

PARTICIPATION BY SMES IN THE EC FRAMEWORK PROGRAMME

(Shared-cost actions - contracts signed in 1998)



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

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.

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.

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 report[13] 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.

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.

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[12] *Industrial technologies: Impact predicted, impact delivered, European Commission, Nov. 1998.*

[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.

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

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 multisensor 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. Another on-going 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 prehistoric 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

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)

[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).

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:

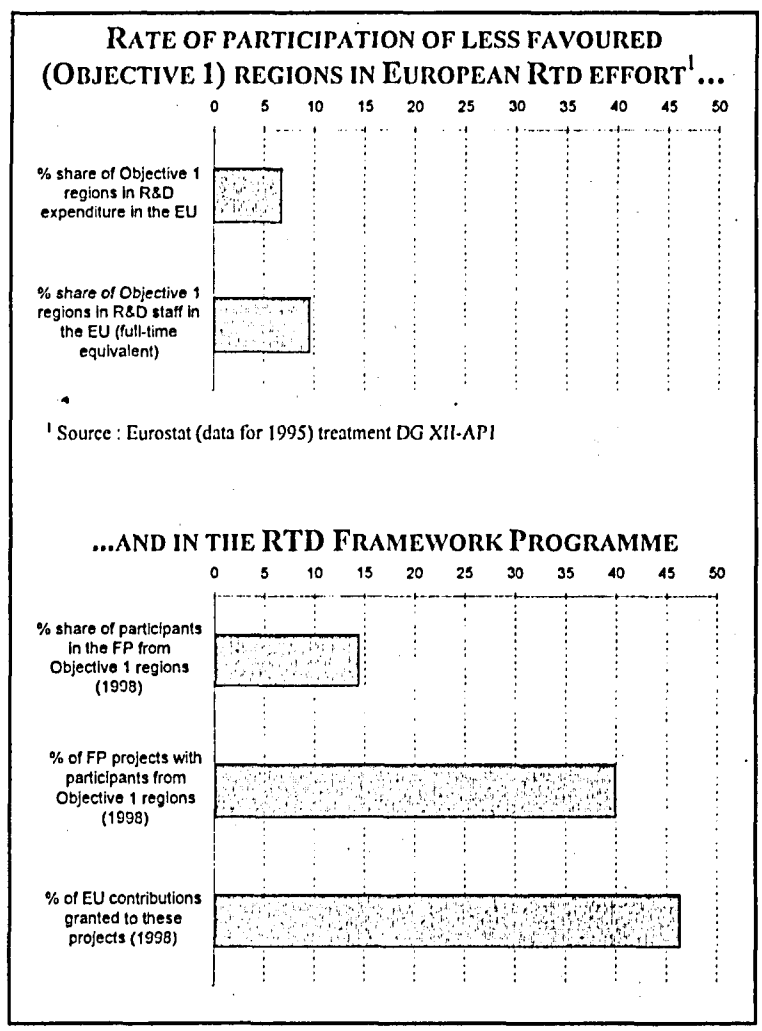
- promoting innovation;
- networking and industrial cooperation;
- strengthening human capabilities.

In the process, the Commission drew on the pilot projects launched by the European Regional Development Fund (ERDE) 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).



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.

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 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 Programme[19] and the synergies between the programme and COST and EUREKA. Generally CREST's opinions showed that the Member States broadly supported the Commission proposals.

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[16] Commission communication COM(1999)76, 17 February 1999.
[17] CREST/1216/1/98.
[18] COM(97)553 and CREST/1201/98; COM(1998)305 and CREST/1208/98.
[19] CREST/1201/1/98.

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.

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 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.

ASSOCIATION AGREEMENTS TO THE 5th FP

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

S/T COOPERATION AGREEMENTS

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

- • Agreement in force (on 1 April 1999).
- o Agreement due to enter into force in 1999; possibility of submission of RTD proposals in advance.

[20] CREST/1215/98.

- In the case of the *emerging economies*, particularly noteworthy 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 Initiative[22]. 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:

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[21] COM(97)174, 25 April 1997.

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

- 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 Innovation[23] 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-TEC[27] 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.

  The BEST[28] 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

[23] COM(96) 589 final.
[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.
[28] Business Environment Simplification Task Force.

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.

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.

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

ANNEX 1

COMMUNITY RTD ACTIVITIES IN 1998

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INFORMATION AND COMMUNICATIONS TECHNOLOGIES

1. TELEMATICS APPLICATIONS

Activities in 1998

Competitiveness, cost-effectiveness and employment have underpinned implementation of the Telematics Applications Programme. The programme has aimed to promote cost-effective, user-friendly systems and services through RTD on applications of information and/or communication technologies in, for example, education and training, transport or health, where future market demand is forecast to expand.

While implementation of 3 main calls for proposals (out of a total of 9 calls in total) received attention in 1997, 1998 saw the launching of the last series of projects selected. Following the time savings achieved in project selection processes through use of the 2-stage call for proposals in 1997, the management of contract and budget handling has enabled full budget take-up during 1998. A smaller call for proposals was implemented in the area of transport. The execution schedule of some 350 new or extended contracts in 1998 for a value of ECU 231 million has been close to the month-on-month forecasts throughout the year. There are some 710 projects for the programme as a whole.

Following recommendations from the 1997 monitoring panel, 1998 has seen consolidation of the promising activities of the inter/cross-programme calls in Educational Multimedia and Integrated Applications for Digital Sites, extensive dissemination and exploitation activity, and the organisation of a major conference in Barcelona, attracting around 2000 people. A management assessment of the programme found that for technical monitoring of projects a return of 5 ECU was realised for every 1 ECU of monitoring costs between 1996 and 1998.

Contribution to Community RTD objectives

With a focus on user requirements, Telematics Applications in 1994-98 has placed a particular emphasis on validation and demonstration of applications. Products, services, and standards are among many of the exploitable results emerging continuously from the completed projects and others. Linked to this is the 21% participation in TAP of SMEs, or 52% participation if all small and medium-sized organisations are aggregated.

A particular contribution of Telematics Applications in the area of employment originates in telematics for education and training. Work has been done to strengthen the position of European educational technologies especially multimedia, enabling users to benefit from the new technologies, to enhance learning, raising adaptability and employability. The inter-programme joint call for proposals on

Examples of results

PROMISE has created an interactive service that gives personalised mobile travel information. The service will provide route planning, traffic and weather reports, allowing travellers to select the optimum means, time, and/or routes for safer, smoother journeys.

CARDLINK is testing the use of data cards and electronic data interchange to ensure that core relevant medical information can be made available whenever treatment is required, regardless of country of origin of the patient or physician.

Educational Multimedia resulted in 46 projects being launched in 1998, involving 425 partners.

Telematics for environment investigates advanced technologies for better information to European citizens and local, regional, and national authorities. Demonstration of use is important, for example, in the ENWAP forum, an EU/Central and Eastern European Country user platform on water resource and air management which endorsed a Declaration in 1998, to strengthen co-operation.

Telematics for Health and for the Disabled and Elderly promote better quality services by strengthening global competitiveness of the underlying industries, through health management systems for professionals or citizens, or through telemedicine services, and by promoting a "Design for all" concept to raise awareness on the opportunities good design affords in the marketability of products and services for any user. A major world conference on assistive technologies was organised in Helsinki in 1998, with attendance of over 500 user organisations and technology providers (mainly SMEs).

Twelve projects began in 1998, as part of the RTD Integrated Applications for Digital Sites initiative. This initiative has set out to develop cross-sector on-line systems and services for citizens and European business from one point of service provision, and will give first indications of the socio-economic acceptability, and the synergies of local service provision in this form. 43 cities/towns and 21 localities participate.

Transport telematics provide cost-effective transport services that improve safety, increase network efficiency, and create employment. During 1998, a joint call for proposals by the RTD programmes for transport telematics (DG XIII) and transport (DG VII) produced 14 projects for a total budget of ECU 12.2 million, to be jointly managed by the two Commission services concerned. The call aims to support the development of different integration modes in the transport chain.

Telematics for Administrations supports efficient services to industry and the citizen within the single market, as well as promoting new ways of working with advanced services inside the client organisations.

On-going activities related to FP4 in 1999

A study will be undertaken in 1999 to investigate the results of completed Telematics projects. On-going monitoring will be required in 1999 of continuing FP4 activities, and particularly dissemination, as projects near conclusion. And a series of studies will deal with different aspects of service provision.

EBR II connects national company registers which contain data on 15 million European companies. With common portable software, client-user interface, and a multi-language facility, it will support small and large business and administrations in their interactions with each other.

UNIVERSE involves 50 libraries in enabling heterogeneous multiple databases to be searched as one. Students, educationalists, and those seeking cultural information will be able to undertake parallel searches, and at the same time request inter-library loans and multimedia document delivery services

SAELN has created a group between schools across Europe to enable language students to communicate live with native speakers of the same age group. Using multimedia products and live video-conferencing, the project will encourage greater ease in learning.

2. ADVANCED COMMUNICATIONS TECHNOLOGIES AND SERVICES (ACTS)

Activities in 1998

1998 was marked by the liberalisation of telecommunications infrastructure and service provision in Europe; continued convergence of the telecommunications, media and computer networking technologies; continued rapid growth in Internet and mobile telephony use, and further rapid technology development.

In 1998 the implementation of the ACTS programme was completed with the launch of a final set of 73 new RTD projects. These re-enforced work on interoperable multi-media services; optical network developments; integration of high-speed communications with the Internet protocols; 3rd generation mobile communications and dissemination of results.

The Programme reached its peak in August 1998, with 200 active projects. This represents a tight and selective focus on a relatively small number of projects, each of which has the critical size to achieve strategic goals. The "average" project represents a ECU 6 million investment, 43% funded by the EU, with about 10 partner organisations in 4 or 5 member states.

Each project was subject to an independent Technical Audit each year. This resulted in 78% of projects re-defining work priorities and schedules at mid-term. About 4-5% of projects were terminated by mutual agreement with the partners, in the light of difficulties highlighted. This modification and early termination of unpromising work allowed over 18% of the ACTS Programme budget (around ECU 110 million) to be re-allocated to new work during the course of the Programme.

Examples of results

Through ACTS projects, such as ATLANTIC, DIGISAT and DVBIRD, Europe has gained world leadership in deployment of coherent systems for digital television.

Contribution to Community RTD objectives

Access to state-of-the-art communications infrastructures is now the single most important contributor to the competitiveness of most enterprises. It allows companies to adopt more flexible and efficient working practices; to establish better links with suppliers and customers, and to trade into wider markets, notably through emerging electronic commerce systems.

In 1998, co-operation in the ACTS programme has further reinforced European leadership in key communication systems for the Information Society. Each area of the ACTS programme has contributed with major achievements in 1998, but the highest added value has come from the coherence across the whole programme, ensured through regular concertation between all projects, and the world-leadership level of all work, ensured through annual self-assessment and independent technical auditing of every project.

In interactive multimedia services, the programme has assured full integration of digital video broadcasting (DVB), digital content coding (MPEG) and interactive digital audio-visual service (DAVIC) standards. The co-ordinated demonstrations at the International Broadcasting

ACTS projects like MIDAS, MOON and PHOTON lead the world in key aspects of photonic communications : the next major breakthrough for the 21st century.

Conference in Amsterdam highlighted Europe's world leadership in this area.

In photonic technologies - using laser-light pulses instead of electrical signals – ACTS activity has resulted in a wide industrial consensus on the "Road Map" for development and deployment of these technologies over the next 20 years. They offer dramatic increases in communications performance: ACTS projects lead the world in multiple wavelength systems; in optical routing and multi-wavelength "cross-connects"; in optical "packet switching" and in "soliton" transmission. Over 100 major contributions to international standardisation have already been made.

FRAMES, COBUCO, STORMS, TSUNAMI and other projects were instrumental in the European agreement on the radio access system for 3rd generation multi-media mobile communications

In high-speed networking, ACTS projects lead in combining the ATM backbone technologies with the Internet Protocols, and have made major contributions in 1998 to development of "next generation" Internet Protocols.

In mobile communications, ACTS work was instrumental in achieving the European agreement on radio technologies for multimedia systems (UTRA), which constitutes the cornerstone of UMTS developments. ACTS work has also defined modular "future proof" architectures, and ACTS work on superconductivity applications opens the way to further major progress.

In intelligent services and security issues, Europe leads the world - through ACTS projects - in intelligent network management (TINA) and distributed processing environments. A full set of security services for mobile communications has been demonstrated, and a sound architecture for secure electronic payments has been validated.

ACTS research in socio-economic analysis, for example in the FAIR, SMARTS and SEMPER projects, is a reference for world policy debate on electronic commerce.

Finally, Horizontal Actions cutting across all areas have bridged between technology developments and real-world developments of telework, electronic commerce, multimedia access to cultural heritage and to sustainability in Information Society development. ACTS results in socio-economic analysis have been the "reference" for OECD work on electronic commerce and ACTS projects have involved more than 5000 small businesses in real-business trials.

In collaboration with the Information Society Forum, and other services of the Commission, a first Status report on progress towards a sustainable information society was published in 1998.

On-going activities related to FP4 in 1999

Most projects are of a 2 to 3 year duration, and were selected following the three calls for proposal (in September '94, September '95 and June '97). The volume of project work will fall off rapidly in 1999. 81 projects will have terminated by 31/12/98, and the Programme will involve less than 100 active projects by May 1999, and less than 50 active projects by December 1999. A final major Technical Audit of ACTS projects took place in late January 1999, and a final Monitoring Report was submitted in February. The Final report will be available in late 1999.

3. INFORMATION TECHNOLOGIES (ESPRIT)

Activities in 1998

Since the pilot phase of the ESPRIT programme in 1983, enormous progress has been made with information and communications technologies (ICT), in terms of technology and in the structure of the industry and of the market. Massive use is being made of ICT, as they have pervaded every area of activity and spread into citizens' homes. The EU has fully realised the importance of ICT as they continue to develop at rapid pace and has given the information society a central role in several of its policies. ESPRIT not only contributes to this development in the EU but has also in turn itself evolved. From the original primarily technology-driven approach, it has grown into an instrument for making all European industry more competitive. It is also open to IT suppliers and all users and takes account of the social impact of IT.

The eleventh and final call for proposals, published on 17 March 1998 and allocated a budget of ECU 32.4 million, focused on:

- detection of anti-personnel mines (budget: ECU 12.3 million in addition to the ECU 2.7 million already committed to this subject);
- support measures to promote use of information technologies;
- selection of about 200 SMEs to participate in the "Electronic commerce and multimedia technologies" conference in the USA in April 1999.

ESPRIT takes the form of a consistent mix of traditional cooperative RTD projects and support measures to promote applications (demonstrations, best practices, take-up of new technologies, transfer of technology, etc.). The latter help to broaden the impact of the programme and to target it more on the requirements of industry and users. In all, 2 141 contracts received funding totalling ECU 1 935 million. RTD projects accounted for 48% of the contracts and took 74% of the budget, while 41% were for support measures to promote applications, which received 23% of the budget. The rest were general preparatory, support and transfer activities (dissemination and awareness-raising, working groups, etc.).

ESPRIT revamped its management procedures and is now more flexible, more available and, for SMEs, more accessible and better adapted. This was the repines to a series of recommendations on flexibility in the annual monitoring report. (Other improvements have been reserved for the Fifth Framework Programme, including a further reduction in the time taken to approve projects.) Examples include: frequent calls for proposals, based on a work programme updated every year; publication of a "road map" or timetable of forthcoming calls on different subjects each year to help proposers (particularly small businesses) wishing to participate to plan ahead; introduction of horizontal topics in the work programme; submission of proposals in one step, two steps or continuously; experiment with electronic submission and evaluation (in collaboration with ACTS). The success rate has almost doubled

Examples of results

A very large flat-panel digital X-ray detector allows diagnosis without putting medical staff at risk by projecting the image onto the computer screen. This system could replace radiographic film and end the problem of recycling it.

Commercialisation of a lithography tool capable of transferring integrated circuit patterns less than 0.13 microns thick (necessary, for example, for manufacturing 4 Gigabit dynamic random access memories (DRAMs)), is a world first.

Software optimising the supply-production-demand chain has been developed from theoretical research into artificial intelligence and combinatorial analysis. It has already brought productivity improvements of 30% in the clothing, drink packaging and car industries.

compared with the Third Framework Programme, with around 23% of the proposals now selected. By trying out a host of new approaches, strategies and procedures in this way, ESPRIT has paved the way for the Information Society programme under the Fifth Framework Programme.

Contribution to Community RTD objectives

A 1998 analysis of the impact of ESPRIT on industrial competitiveness shows that the results of 70% of the projects completed were taken up and around 2.7 separate results per project.

Industrial firms received 64% of the funds. Almost two thirds of the industrial participants are users. In the case of big businesses, twice as many users participated as suppliers, whereas small businesses showed an equal balance between users and suppliers, reflecting the important role played by small businesses in technological innovation: 70% of the RTD projects involve at least one small firm.

Eight of the eleven calls for proposals have explicitly involved cooperation with other programmes, whether on networks, education, aeronautics or international cooperation on intelligent manufacturing systems. Work has also been done on intellectual property rights and data system security, in collaboration with Commission Directorate-General XV (Internal Market).

As regards international cooperation, 42 ESPRIT projects attracted 59 participations from 6 industrialised countries, 62% of them from Canada and the USA. The INCO calls for proposals resulted in 149 IT projects, with 78% of the 469 non-EU participations coming from 23 countries in Eastern Europe and the former Soviet Union and 10% from 10 Mediterranean countries.

The RTD projects cover essential fields of technology and a vast range of sectors, for example manufacturing, services, commerce, business management (including health), networks, multimedia applications, publishing, education (tools and dissemination), environmental risk management, on-board monitoring of clean engines, optimum management of fisheries, water, etc. Some of these applications are of direct relevance to various EU policies.

Another crucial issue for the entire economy and society at large - the year 2000 computer problem - was discussed in a communication from the Commission (COM(1998) 102) and an information server accessible via the web was opened (www.ispo.cec.be/y2keuro).

Piece by piece, all mechanical components display variations around their nominal values. These can now be taken into account to produce even more realistic computer simulations of car accidents, heralding further progress on designing safer cars.

A micro-robot allowing high precision positioning of the hands to within 4 nanometres has been developed. Potential applications include manipulation of tissues and cells in biology, microelectronics, etc.

A pilot line of robots and sensors has been developed to sort and package fruit on the basis of ripeness, sugar content, colour and shape. Countless industrial applications and benefits are expected, notably in the form of better products for consumers.

Voice signatures can now be put onto integrated circuits, for example to enhance security for card transactions.

Activities to promote use of IT (best practices and take-up) play a central role in disseminating new technologies and helping to strengthen the single market and economic and social cohesion via over 70 regional technology transfer centres and 1 200 projects on micro-electronics (FUSE: First User Experiments), software technology (ESSI), high-performance computing and networking, integration in manufacturing, multimedia systems and electronic commerce. Finally, 21 thematic networks of excellence provide gateways for access to all the most advanced know-how throughout the EU.

The PROSOMA multimedia results showcase supplements the sector-by-sector dissemination and information campaigns. In 1998 it was extended to include the results of some 1 000 projects in the ESPRIT, ACTS and TELEMATICS programmes. It is accessible via the web (www.prosoma.lu), with links to the partners' sites and regularly issues CD-ROMs and publications.

The annual conference on this and the ACTS, INFO 2000 and TELEMATICS programmes was held in Vienna from 30 November to 2 December 1998. It attracted over 3 200 participants, almost double the usual attendance. Highlights included the Investment Forum exhibition bringing together entrepreneurs and investors and the presentation of the ITEA prizes for innovations placed on the market, which give a valuable boost to all the winners (12 top prizes of ECU 200 000 plus 100 or so winners chosen from almost 1 000 contestants, most of them SMEs).

On-going activities related to FP4 in 1999

The 1998 monitoring report was completed in February 1999. Its recommendations include greater flexibility, with the aid of two-step contracts, selection criteria, mobility, stimulation of SMEs by local interfaces, and the method of measuring the success of the projects. These will be analysed in the context of the 5th Framework Programme. At the same time, 45% of the 700 or so on-going projects and 60% of the 500 or so support measures will be completed in the course of 1999.

An integrated, modular system combining analogue and digital multimedia editing tools allows editors to use any international video input/output format, sweeping away the barriers created by differing national standards. This product is user-friendly, far cheaper than its rivals and a regular prize winner.

Considerable improvements have been made in the performance and services offered by the World Wide Web: protection against undesirable data; access via the same user interface to films, images, graphics, voice communications and texts, plus videoconferences, television and telephony via the web.

4. INDUSTRIAL AND MATERIALS TECHNOLOGIES (IMT)

Activities in 1998

Overall, 1998 was a watershed for the programme, with activities divided between completing the 4th Framework Programme and preparing for FP5.

The calls for proposals for inclusion in the programme were concluded, around 1 000 new proposals were evaluated (on thematic networks, accompanying measures and CRAFT projects) and negotiations were conducted on the projects selected in 1997 and 1998 to meet the budget targets set for this closing year of the programme.

Effective coordination of the RTD activities at European level was one priority in 1998, the principal objective being to create the best conditions for rapid application of the results in Europe.

Activities to this end were stepped up, with notable success in research circles: by the end of 1998 over 100 thematic networks were in operation. These bring together researchers, SMEs and big industrial businesses with similar RTD interests and cover every field in the programme, from environmentally-sustainable construction to flexible manufacturing, clean chemical processes and aircraft structures. In the transport field in particular the number of thematic networks rose from six in 1996 to 27 in 1998.

Other examples of coordination of research activities in 1998 were 14 new RTD projects started in response to joint calls for proposals, together with other Community programmes and focusing on concurrent engineering in aeronautics, water management technologies and intelligent manufacturing systems (IMS).

Contribution to Community RTD objectives

In 1998 the focus was on concentrating and targeting the RTD activities on industrial objectives to reinforce the competitiveness of European industry.

In the area of production technologies for example, the systems approach was reinforced to make sure that the objectives of safety, reliability, competitiveness and environmental sustainability were taken fully into in each project from a life-cycle perspective. This added to the multidisciplinary, multisectoral nature of the projects.

In the case of aeronautics technologies, 1998 saw the opening of a series of networks in fields strategic for European industry. This greater concentration of resources is preparing the ground for the large-scale integrated projects in the 5th Framework Programme.

Examples of results

One project developed a concurrent engineering platform cutting the design time for seats for next generation cars. Bringing together parameters such as vibrational behaviour, side impact and passive safety, it allows faster design of ultra-light, more comfortable seats. This platform is being actively used by a big UK company to design seats for a number of European carmakers.

A consortium of maritime classification societies and university research teams has developed a set of reliability rules for the structural design of ships. Unlike traditional rules based on empirical safety factors, the new rules are derived from detailed analysis of the uncertainties in the computer models used to design the hulls of ships. Numerous shipyards are using these new rules already.

The maritime industries have also set up a number of networks bringing together European and national projects to attain the critical mass required to resolve the most strategic S&T problems.

A survey in 1998 evaluated the benefits of over 300 RTD projects and almost 120 CRAFT projects in the IMT programme - whether economic (higher turnover, lower costs, new market share), environmental or in terms of employment. It concluded that application of the results had produced direct economic gains in the case of 54% of the projects analysed.

A more detailed analysis of a representative sample of 200 industrial partners suggests that the total economic benefit generated by these projects was over ECU 700 million in return for Community funding of around ECU 60 million. This 1:12 ratio between European funding and economic benefits confirms and surpasses the results of a similar study in 1997, which reported a ratio of 1:7.

As in 1997, in 1998 too a study on a sample of 188 recently completed projects measured the environmental impact of industrial application of their results. Over 80% of them showed quantifiable benefits, a higher proportion than in 1997, reflecting the growing importance attached to the environmental dimension at the project selection stage. The benefits most frequently mentioned are, in decreasing order, energy and material savings, lower emissions, reduced use of harmful products, less noise and vibration and better working conditions.

On-going activities related to FP4 in 1999

Work will continue on the 1 243 projects in FP4 still under way on 31 December 1998. Further impact assessments will be conducted. The pilot projects selected from the joint calls for proposals with other programmes will provide useful terms of reference for FP5. Finally, the thematic networks set up in the course of FP4 will help to concentrate RTD activities on the priorities of the new "Competitive and sustainable growth" programme.

The MEBIOCE project has developed a system for identifying pathogens or cancerous cells 100 times more sensitive than conventional laboratory tests. This is the fruit of cooperation between two SMEs and a research centre. It will be on the market soon.

One consortium has developed a lubrication system for industrial applications, particularly for components in the motor industry. The system has been such a success on the market that the manufacturer created almost 100 new jobs in 1998, of which 20 were concerned directly with application of the results of the project. Similar recruitment levels are planned in 1999.

Three cement manufacturers, an additives producer and a research centre have developed a new type of sprayed concrete (used as a tunnel lining), which is cheaper, stronger and cleaner. The manufacturing process has been patented and the product has already been used successfully in Germany and Austria and is now on sale all over the world.

A programme started in 1990 with the ambitious objective of cutting current NOx emissions from aircraft by 80% has attracted 24 partners from eight Member States. The industrial spin-offs are considerable and the results to date have already put European industry in a favourable position over its competitors in a field contributing to sustainable development.

5. STANDARDS, MEASUREMENTS AND TESTING

Activities during 1998

The main aims of this programme are: to support pre-normative research allowing the development of the standards needed by European industry; to develop and improve the measurement and analysis methods necessary for the implementation of Community policies; to facilitate the mutual recognition of the results of measurements and tests; and to encourage the adoption of a European metrology infrastructure including in chemistry and biology, in particular in the least favoured regions.

In 1998, 386 proposals were evaluated, from which 125 projects were funded by the Commission for a total amount of ECU 35,5 million. New funded activities consist of 52 RTD projects for ECU 21 million, 26 SME co-operative projects for ECU 9,4 million, 11 thematic networks for ECU 2,5 million, and 35 supporting measures (including Marie Curie grants) for ECU 2,3 million. One new concerted action was also financed for an amount of ECU 0,3 million.

The emphasis was put on research related to written standards in support to trade and needs of society. In addition 20 new Certified Reference Materials (CRMs) were certified in 1998, bringing the total number of CRMs produced by Community efforts to more than 420.

Two very important concerted actions were also included in the 1998 activities: one was a Euromet-NIST project on mutual recognition and the other concerned a Proficiency testing schemes data base. Finally the contacts and collaboration with European organisations in the reference measurement system and with CEN (STAR) have been intensified.

Activities in 1998 included preparations for the 5th Framework Programme alongside completion of the implementation of FP4.

Contribution to Community RTD objectives

The research supported by this programme has an important impact on industry, trade and the society in general, and their results represent a tool for the protection of consumers, and for the protection of the health, safety and the environment of Europe's citizens.

A recent external evaluation, carried out on a selection of 49 finished projects showed that nearly half of the industrial projects evaluated have demonstrated economic gains.

Among different areas of the programme, two could be mentioned:

- In the field of chemical measurement, there were 26 projects finalised in 1998, clustering in three main areas, namely environment, product characterisation and manufacturing improvement. In the product standards category there were 3 CRMs, all for trace elements in paint.

- Another important part of the programme concerns human biomedicine, with special focus to diagnostics and to a lesser extent to therapy and with sporadic relations to the fields of agriculture,

Examples of results

A more sensitive mass spectrometer has been developed for the on-line determination of isotopic ratios of C, N, S, O and H. It shows that rapid and accurate determinations can be performed on human body fluids for the investigation of genetic child disease (e.g. mucoviscidose), and physiology of agricultural plants. The sensitivity achieved by this technique allowed even the energy expenditure of honey bees to be estimated. A patent has been applied, and other applications are expected in the fields of doping control of natural hormones, food and environmental investigations.

food water, environment, pharmacy/cosmetics, doping in sports, forensic and veterinary medicine. The initiated and finalised projects in 1998 have been spread over the programme objectives of new methods, e.g. immunochemical method for on-site measurement of illicit drugs in saliva; support to directives and standards, e.g. Prostatic Specific Antigen (PSA) CRM in support to the In Vitro Diagnostic Directive; and quality products, e.g., reconstructed skin and sunscreen efficiency for cosmetic alternative testing.

The CRAFT mechanism for SMEs exhibited a positive trend in 1998, in terms of number (73) and quality of proposals submitted. The active involvement of SMEs with less than 50 employees (23 % of the total participants in the 1998 normal RTD projects), as well as the large percentage (70 %) of SMEs with less than 50 employees, acting as core proposers in the CRAFT scheme, is highly satisfactory.

Numerous publications, workshops, training courses have resulted in a wide and efficient dissemination of results (e.g. a monograph on microbiological analysis of food and water, the report on a practical approach for metrology in chemistry and biology, etc.).

On the occasion of the 25th anniversary of the BCR® (Bureau Communautaire de Référence), the SMT programme organised a conference entitled "Measurements: a key to competitiveness" in November 1998 in Brussels, attracting more than 350 participants.

The 1998 monitoring panel concluded that the objectives of SMT have been achieved to a high degree and that valuable progress has been made towards a harmonised system of measurement and testing in Europe, via either the successful development of a number of instruments or the sharing of good measurement practice throughout the EU Member States.

On-going activities related to FP4 in 1999

In 1999 the programme will concentrate on the follow-up of on-going projects: 313 projects were continuing after end 1998.

The ABSODIAM project developed an absolute measurement system suitable for in-process checking of wire, enamelled wire and plastic thread, with diameters ranging from 10 microns to 0.2 mm. It is the first such system commercially available for industry. The technical capabilities of the system, as well as its price have already raised considerable interest. The partners are currently undertaking commercialisation of the product on the European and American markets, and are looking for partners in Asia.

Prostate cancer is the second cause of death in men due to cancer. Measuring a protein, called PSA, in the blood can help detect the disease before it progresses too far to be treated. An extensive clinical study compared the performance of different testing methods and confirmed the level of PSA in blood, at which cancer should be efficiently diagnosed and treated. By using the established protocol, a reduction of about 55% in biopsies could be reached, a very important finding both medically and economically. The partners also produced a certified reference material so that PSA testing kits can be validated for accuracy.

6. ENVIRONMENT AND CLIMATE PROGRAMME

Activities in 1998

1998 has seen the evaluation and selection of research proposals for funding, submitted to the joint call, by the Environment & Climate and IMT Programmes, on water. Nine shared-cost contracts have been negotiated, covering the ECU 7 million additional budget under FP-IV for the Environment & Climate Programme. The projects address the priority subjects of the call, i.e. early warning systems for blue-green algae toxins and endocrine disrupting compounds, the assessment of water resources at catchment scale, and the human dimension of environmental change in the water sector.

Examples of results

Funding decisions resulting from the final call for activities regarding earth observation were taken in early 1998, bringing to 100 the number of earth observation projects.

The thematic project network "WAtER" (Wetland and Aquatic Ecosystem Research) has also been launched formally in 1998 and assembles at present 19 projects , covering a wide spectrum of water and wetland related tasks, including socio-economic aspects.

The BINOCULARS project has perfected a general system for managing the impact of fertilisers at river basin level. A model for the assurance of water quality has been successfully designed and tested on several European river basins such as the Rhine, the Seine, the Loire, the Escaut and the Aliakmon (Greece).

A major event of the Environment and Climate Programme was the organisation of the European Climate Science Conference in Vienna, on 19-23 October 1998. This conference was hosted by the Austrian Ministry of Science and Transport and took place during the Austrian Presidency, bringing together about 120 projects.

Contribution to Community RTD objectives

A number of successful research projects (e.g. EUROFLUX- see box) and enhanced cooperation with DG XI in the context of Post-Kyoto Commission Climate Strategy lead to scientific input in the area of Post-Kyoto deliberations on Article 3 of the Protocol (e.g. sinks issue) and activities of the International Geosphere Biosphere Programme (IGBP) in view of a Special Report of the International Panel on Climate Change (IPCC) on Land Use and Forestry issues relevant to Kyoto Protocol.

The Pioneering methodology developed and used in EU's EUROFLUX project, which is studying exchanges of CO_2, water and energy in 17 forests throughout Europe has paved the way for developing a world-wide integrated monitoring system for carbon sinks: an important aspect of the Kyoto Protocol.

Important progress was made in 1998 in cooperation with Japan and the USA. Following the communication of the Commission on Earthquakes (1996), the cooperation with Japan in the area of seismic risk was officially launched through a joint workshop with the Science and Technology Agency (STA) of Japan. This resulted in strengthened cooperation between the two sides and recently in a number of joint projects.

In the framework of the S&T Cooperation Agreement between the USA and EU, a conference on New Vistas in Transatlantic Science and Technology Cooperation was co-organised with the US National Academy of Sciences. This first conference held in Washington D.C. (June 1998) included Climate Change as one of the four topics of co-

operation. Leading European and US scientists intensively discussed the current issues and recommended the five priority areas for cooperation on Carbon cycle: terrestrial sinks, predictability (needs and limits), comparison of modelling results, impacts assessment, North Atlantic variability.

In the earth observation area, projects have been established to demonstrate how Earth observation can help its users to make decisions better, faster and cheaper than with conventional data sources. A very wide range of themes is covered, from air quality inventories to monitoring refugee camps and helping Member States to assess their own compliance with the Habitats Directive. The European added value for earth observation is evident in the fact that the underlying aim of many of these projects has been to enlarge the European customer base for Earth observation. About a third of partners in these projects are SMEs.
Earth Observation RTD has created an improved understanding of the benefits of the technology. The evaluation criterion for selecting pilot projects ensure that one or more end users, or customers, are involved in the project from start to end.

The Commission co-financed the VEGETATION instrument, an Earth observation system that on March 24 1998 was launched on SPOT 4. The first VEGETATION image was transmitted on March 31st.

In the area of the human dimension of Environmental Change, special emphasis has been put on the publication and exploitation of results[30]. Four workshops on the socio-economic aspects of global change took place to support the Commission Services' preparation for the post-Kyoto negotiations. In the perspective of the commitment by the Structural Funds to contribute more to sustainable development, an International Symposium held in Graz under the Austrian presidency has reviewed research results of relevance to Sustainable Regional Development. In order to test and put into practice the results of the "Greenstamp" project on green accounting and modelling[31], a pilot application has been launched in the Czech Republic and another one is under preparation in Sweden.

Together with the JRC the requirements of the Commission Services for geographical information have been studied in order to determine what areas of EU policy might be advanced by the provision of information derived from Earth observation.

The visibility of the Environment and Climate Programme has been enhanced by making systematically available information on projects and project results through CORDIS and the Internet (http://www.cordis.lu/env/) ; comprehensive project information is available electronically and in a special supplement of CORDIS-focus[32]. Information made available included features on various TV channels and leaflets addressing the general public – "The Threat of Natural Disasters". Following 1997 monitoring recommendations, project consortia have been encouraged to communicate their exploitable results through the CORDIS Results Service where they can be accessed on-line.

On-going activities related to FP4 in 1999

In 1999 the programme will concentrate on the follow-up of on-going projects: 2/3 of research projects launched during 1994-98 will still be continuing at the end of 1999.

[30] The complete list of Environment & Climate publications can be accessed at http://www.cordis.lu/env/scr/pubs1.htm
[31] EV5V-CT94-0363
[32] No 118, 21 September 1998

7. MARINE SCIENCES AND TECHNOLOGIES

Activities in 1998

In response to the second general call for proposals (closing date: 15 October 1996), work started on a package of 27 RTD projects in 1998. Eight of them were on marine science (research area A in the programme). They covered subjects such as applications of molecular biology in oceanography, microbial biological diversity, the contribution of remote sensing to studies on intertidal sediment dynamics, paleoceanography in the Eastern Mediterranean and water mass circulation from the Mediterranean into the North Atlantic system and its impact on ocean circulation.

Four of the six new projects on strategic marine research (research area B) make up MAST's contribution to the second phase of work on ELOISE, the European programme on coastal ecosystems. One of them is looking into toxic microalgae, while another is comparing the characteristics of three lagoons, including Venice. The 29 ELOISE projects are divided between MAST and the Environment and Climate programme. A working party has been set up to take fuller account of the scientific and socio-economic aspects of this research.

Finally, marine technology (area C) was covered by 13 new projects on bioactive substances, a high-resolution seismic method for site studies, novel samplers and measurement systems and the second phase of the GEOSTAR deep sea observatory.

Six new projects were started on predictive operational modelling of marine parameters (currents, waves, temperature, etc.) with the objective of facilitating the activities of all concerned. The six coordinators gave an undertaking to cooperate closely.

Thirteen concerted action projects were started as "supporting initiatives" (area D in the programme). Most of them were concerned with management of oceanographic or geoscientific data. Others had spin-offs for research on biodiversity and on management of marine reserves, while one is aiming at taking stock of Europe's oceanography fleet and foreseeable developments therein.

Three new projects were started as the MAST programme's contribution to ENRICH (the European Network in Research on Global Change), run jointly with the INCO and Environment and Climate programmes. Seven other proposals were accepted under the CRAFT scheme for SMEs.

Under this programme, 12 scholarships were also granted and three advanced courses funded on hydrodynamic and morphodynamic processes in coastal seas, the formation and evolution of the Mediterranean Basin and tropic marine microbial food webs.

Examples of results

The BASYS (Baltic Sea System Study) project is the first attempt at a system approach to the Baltic Sea, which is almost entirely landlocked and under enormous pressure from human activities. This multidisciplinary study looks at various time and space scales. It brings together 52 partners, 16 of whom are from the INCO programme.

The objective of the VEINS (Variability of Exchanges in the Northern Seas) project is to measure and model water mass circulation between the Arctic and the Atlantic. This region plays a crucial role in climate variability, particularly in Northern and Western Europe.

To mark EXPO '98, the Commission (DG XII/MAST and DG XIV) held the 3rd European Conference on Marine Sciences and Technologies in Lisbon in May. MAST also played an active part in organising the OCEANS '98 Conference in Nice in September on technologies for sustainable use of the oceans, at which the USA was strongly represented.

The NUTOX project is testing the impact of human activities on the development of toxic algae blooms. It is demonstrating the role of nitrogen inputs, as they have risen over the last 50 years.

Contribution to Community RTD objectives

The 1998 monitoring panel found that MAST has made a significant contribution to the mobility of European researchers in the field of marine sciences and technologies in the form of building up a critical mass for certain research teams, particularly for regional projects, establishing joint databases and setting up major research facilities.

The European dimension of RTD is reflected in various ways: the scale of some of the projects, geographically complementary site studies and the networking of laboratories on leading-edge subjects.

Work continued on the four major regional projects (MATER for the Mediterranean, BASYS for the Baltic, OMEX for the Atlantic and CANIGO for the Canary Islands-Azores-Gibraltar region). BASYS (see box) and MATER, in particular, covered two areas under extremely heavy pressure from human activities. They are therefore two key projects for laying the scientific foundation for EU environment policy.

The ALIPOR (Autonomous Lander Instrumentation Packages for Oceanographic Research) project has developed a series of instrumentation packages for measurement, monitoring and sampling on the sea floor.

Examples of some of the important products which emerged from many of the projects in 1998 include an operational coastal cartography/bathymetry system (C-STAR project); an operational airborne gravimetric measurement and mapping system (AGMASCO); software for acoustic channel simulation (PROSIM); a prototype to demonstrate core-sampling (HYACE); a prototype for measuring particle transport in the water column (TRIDISMA); an operational system for digitisation of seismic data (SEISCAN); the prototype at the end of the first phase of the GEOSTAR deep sea observatory project. Projects completed in 1998 included MICROMARE, which developed microsensors, MAUVE on a prototype autonomous unmanned underwater mini-vehicle and POSEIDON on the detection of instabilities in intensively prospected areas of the continental shelf. Several projects led to patents being lodged in 1998.

The HYACE (Hydrate Autoclave Coring Equipment System) project is developing a prototype core sampler capable of in-situ recovery of sediments containing gas, under pressure and at high temperature. It seems sure to have a future on the market in the oil industry.

Finally, to disseminate the results, a one-hour TV documentary on the MATER (Mediterranean Sea) project was broadcast on the Arte channel on 12 December.

On-going activities related to FP4 in 1999

In 1999 work will continue on the on-going projects: 95% of the research projects started between 1994 and 1998 are continuing in 1999.

8. BIOTECHNOLOGY

Activities in 1998

Biotechnology has retained its high political profile during the year with the unprecedented growth of Biotech SMEs in Europe as well as a number of important developments and issues: the Biodiversity Convention's Biosafety Protocol; world trade in genetically modified commodity crops; consumer concerns about Genetically Modified foods; the revision of the EU Biosafety legislation; the introduction of labelling; continuing ethical concerns relating to cloning and the TSE crisis.

In 1998, 154 new RTD contracts involving 1,044 participants where signed as result of the 4th call for proposals (27% success rate). Also, 7 projects with 31 laboratories were launched in the framework of the 1st joint call on TSE[33]. A new joint call on TSE launched in 1998 did not result in any contracts for Biotechnology programme. In total, 514 RTD contracts involving 3,568 participants have been concluded during FP4 with an overall average success rate of 27%.

Under accompanying measures, 49 workshops and conferences were supported involving some 1,500 participants from across Europe dealing with scientific and socio-economic aspects of Biotechnology. 107 training grants were awarded over the year bringing to 367 the total number of trainees financed in the frame of the BIOTECH programme (overall success rate = 42%). On 16 September a meeting of socio-economic experts and scientists was organised in Brussels to discuss job creation in the field of life sciences and training needs opening a stimulating debate that will certainly influence our future training strategies and activities.

Further to the sustained promotion of RTD activities, the last year of the programme has been marked by the emphasis on dissemination activities that opened up the programme to broader audiences, in particular:

- investors through the organisation of the 1st Biotechnology & Finance Forum;
- journalists and the public through targeted press conferences (Paris, March 1998) and
- industrialists and managers through the Uppsala meeting on funded demonstration projects in the fields of healthcare, food production and forestry, and the competitiveness of European industry.

In terms of results assessment, two initiatives have been launched in 1998: i) a systematic project monitoring based on a pre-formatted questionnaire and carried out by independent experts in Brussels who screened the state of advancement of 189 projects; and ii) an in-depth

Examples of results

For the first time, researchers are close to decoding the complete genome sequence of a model plant, *Arabidopsis thaliana*. The most advanced project in the world in its field, it involves nearly 30 laboratories from 10 countries. An astonishing finding : 50% of genes (still) have an unknown function.

Enzymes are widely used both in industrial applications and in domestic products such as washing powder. But almost all are derived from organisms which live at relatively high temperatures, and work best above 40° C. Reducing the temperature at which they operate will produce huge energy savings – washing machines would no longer need heating elements, for example.

[33] Transmissible Spongiform Encephalopathy

analysis of 35 selected projects through hearings in Brussels and site-visits involving both co-ordinators and independent evaluators.

The programme management has also been influenced by the follow-up of the 1997 Programme Monitoring recommendations of which the most important were: the improvement of "task assignment" within projects; the increase of high-tech SMEs involved in projects; increased efforts to inform European journalists and decision makers in order to improve public attitudes towards biotechnology; and emphasis on the development of a coherent European regulatory structure.

The project Forest Trees, devoted to studying genetic diversity in forest species, led to a new technique for extracting and identifying variations in plant DNA. This technology is now available in two kits marketed by a commercial company. This is a key step to identifying the plant tissue and is of interest to diverse users such as conservation bodies, forestry managers, seed companies, zoos and botanical gardens.

Contribution to Community RTD Objectives

The European Plant Biotechnology Network (EPBN) was launched in 1998 aiming at promoting the networking, exploitation and dissemination of the results of 45 existing pan-European projects in the field. These projects will have to provide healthier food products, stress and disease resistant cultures and biodiversity screening methods for the environment, among other results. This activity will have positive returns both for the participants in the Member States, European industry and society at large.

The programme is already producing results in the healthcare area, such as the production of therapeutic antibodies providing lasting protection against diseases and DNA vaccines against virus infections. One project has also made possible the safer production of bio-pharmaceuticals free of any element having a human or animal origin.

EUROFAN's achievements are already numerous: they include the characterisation of carbohydrate metabolic genes, and systems involved in nutrient uptake; construction of a computer-controlled batch reactor with commercial potential; and new insights into yeast which cause human disease, in particular *Candida albicans*, opening the route to new possibilities for therapy.

In terms of programme implementation, industrial involvement in the Biotech research activities has increased both in quantitative and qualitative terms. The overall industrial participation (including SMEs) in FP4 has increased from an initial 14.6% in the 1st call to reach an average level of 18.5%. Comparing this with the average 6.2% in FP3 gives a clear indication of the progress made in attracting industry during FP4. This programme has also witnessed the increase of SME participation with a steady growth from 6% in the 1st call to 10% in the 4th call. It is also to be noted that, on average, 80% of all funded projects in Biotech had at least one industrial participant, with some areas of work scoring 100% of projects. Similarly, 41% of projects had one or more SME participants.

The Biotechnology Programme and the European Association of Securities Dealers have established the Biotechnology & Finance Forum to create a nurturing environment and sustainable interactions between the biotech and finance spheres in Europe. The first conference of the Forum took place on 12-13 May 1998, in conjunction with the Biotechnology Innovation Symposium (14 May 1998).

In order to help scientists get the tools and know-how needed to set up new companies and to access the financial arena, the Biotechnology programme also supported a series of 7 workshops held in Europe during 1998 aiming at helping entrepreneurs to design feasible business plans.

The Biotechnology Research Programme has contributed to the scientific basis for a number of EU policies and regulations such as the Deliberate Release and Cosmetics Directives, the Novel Foods Regulation; the activities of the Scientific Committees of DG XXIV and the work of the European Group of Ethical Advisers.

On-going activities related to FP4 in 1999

In 1999 the programme will concentrate on the follow-up of on-going projects: 658 projects were continuing after end of 1998.

9. BIOMEDICINE AND HEALTH (BIOMED)

Activities in 1998

165 contracts were signed in 1998 for a total budget of ECU 77,8 million, as a result of the 3rd call of BIOMED 2 (plus some projects in the reserve lists from the 2nd and 3rd calls). In addition, 21 of the 45 eligible proposals for Technology Stimulation Measures for SMEs were selected for funding and contracts were signed for a total budget of ECU 11.1 million.

A 2nd TSE joint call for proposals (BIOMED, BIOTECH and FAIR) was launched, covering risk assessment, inactivation procedures and co-ordination activities between Member States. Nine proposals were submitted for BIOMED, four of which have been selected and funded for a total of ECU 2.3 million. Finally, 73 fellowships were selected and funded for a total of ECU 6.3 million.

700 projects were ongoing in the BIOMED 2 Programme during 1998. A Project Review Board (PRB) composed of 23 experts was set up. It analysed a total of 57 projects: as a result three projects were investigated in more depth and one of them had to be discontinued.

Over 60 accompanying measures were funded for a total of ECU 0.9 million. These included the Forum of the European Neuroscience Association which took place in Berlin in June with around 4000 participants; the third European Conference on Experimental AIDS Research held in Munich Feb./March '98 and the first Life Sciences Demonstration Conference which took place in Uppsala in June '98.

During 1998 the Programme published specific reports on "Human Genome" and "Cancer research", as well as Bio-Ethics, Societal, Medical implications of cloning and "Research on Bio-Ethics: AIDS - Ethics, Justice and European Policy". Two BIOMED 2 Newsletters have been published and the BIOMED web site activated (http://www.cordis.lu/biomed).
The BIOMED Ad Hoc Advisory Group to CREST (Art. 130 h) carried out two surveys on "Current status of research into Ageing in Europe" and "Current status on Genome Research in Europe", published in early 1999.

As a follow up of the External Monitoring recommendations, the Programme has endeavoured to improve the existing review process. An effort has been performed to decrease the time involved in contract negotiation, in conformity with budgetary constraints, so that 100 % of the budget was committed and paid.

Contribution to Community RTD Objectives

In the pharmaceutical area, research on pharmaco-toxicology, pharmaco-vigilance, clinical trials and illicit drug abuse was undertaken through collaboration between industry, research centres and authorities. Research was also covering novel therapeutic strategy

Examples of results

Pharmacological research:
European researchers are developing a methodology for detection of exogenously administered Growth Hormone and related substances, particularly in relation to sport. The partners are already performing studies on athletes.

Biomedical Engineering:
A group of European scientists are making progress in the development of a new type of diagnostics that will be essential to gene therapy. By injecting a radioactive oligonucleotide and following it by Positron Emission Tomography, it should be possible to visualise in vivo the expression of a given pathological gene in organs and tissues. The current status of their work has resulted in the cover page of a recent issue of Nature.

to improve cognitive enhancement in elderly subjects, particularly patients with Alzheimer diseases.

Research in biomedical engineering provides for the development of new biomedical devices for diagnosis, such as diagnostic tools essential for therapy. Progress is being made on the development of miniature robotic systems, as well as systems utilising multimodal data and miniaturised tools for surgical operations.

In the area of brain research the projects range from basic science to medical applications and are often multidisciplinary. The understanding of physiological and patho-physiological mechanisms of brain function is being advanced. About half of the projects are concerned with diseases having major socio-economic implications.

Regarding cancer research, the projects are directed towards advances in cellular, molecular and developmental genetics, generating new insight into the underlying causes of cancer. Several projects are developing gene therapy approaches, which appear to be very promising.

The area of AIDS research and infectious diseases is strongly focusing on preventive and therapeutic approaches aiming at clinical applications as well as at vaccine and drug design, favouring European biotechnological/pharmaceutical industry. Tuberculosis has been addressed through the search for novel strategies for a second-generation vaccine.

In the cardiovascular area progress is being made in the understanding of physio-pathological mechanisms leading into disease development and the identification of risk factors.

Current research on chronic and age-related diseases puts special emphasis on chronic inflammatory and autoimmune disease, such as diabetes, asthma, and rheumatic diseases as well as age-related changes. Research also aims at maintaining or restoring optimal quality of life with emphasis on rehabilitation.

Occupational and environmental health research is focusing on the identification of important risk factors and their control. In particular one project is performing a multidisciplinary study on male reproductive health and environmental chemicals.

Under rare diseases, research on Fatal Familial Insomnia has allowed the collection of relevant data throughout Europe. The research also includes the development of educational tools and information on rare diseases.

In human genome research, advances in genetics are being used to improve human health, such as through the identification of genes involved in pathogenesis of non-insulin dependent diabetes, which opens new avenues to understand and cure this disease.

Brain research:
Successful Research on pain and drug addition is carried out by a project searching for novel compounds with selective activity at delta-opioid receptors, to better understand the role of opioid receptors in pain and in drug addiction. An article has been published in Nature with the full behavioural pharmacological and neuro-anatomical characterisation of opioid receptor-knockout mice.

AIDS and Infectious Diseases:
The European researchers involved in EUROSIDA project recently published a study in which 7000 European HIV infected individuals have been monitored, showing a decrease in death rates of 84% as a result of anti-HIV drug treatment. In a study on multidrug resistant Tuberculosis, a group of European researchers has successfully developed a rapid culture-independent test for the prediction of drug resistance.

On-going activities related to FP4 in 1999

BIOMED activities for 1999 will focus on the follow up and the finalisation of the existing contracts. In that regard the Project Review Board activity will continue during 1999. To date two meetings are already planned, the first in February and the other in September. The BIOMED 2 catalogue, providing summaries of all the projects, will be published in 1999.

10. AGRICULTURE AND FISHERIES (Including agro-industry, food technologies, forestry, aquaculture and rural development)

Activities in 1998

Proposals from the reserve list of the fifth call under FP4, which closed on 20 March 1997 and from the sixth (last) call, which closed on 16 January 1998, resulted in contracts for 123 RTD-projects and 42 concerted actions for a total Community contribution of ECU 106 million and ECU 12.5 million respectively. 13 contracts were awarded following a specific call for proposals targeted at transmissible spongiform encephalopathy. 6 studies were awarded in relation to the Commission's complementary risk assessment in the framework of the WTO case "EC measures concerning meat and meat products (hormones)" to evaluate the risk associated with the use of hormones for growth promotion purposes in cattle. 8 April marked the last closing date for co-operative research with 145 proposals received. This represents more than 50 % of all co-operative research proposals received in the FAIR-programme. The SME-specific measures have thus enjoyed an increasing interest. Following the last two calls, 67 co-operative research contracts were signed. 48 Training and mobility grants were awarded.

The programme co-organised a congress on "European research towards safer and better food" in Karlsruhe (DE, 18-20 October) to bring forward results from food research in Europe. This was well received by industry and research organisations.

Dissemination of programme results included a number of publications on overall performance and on specific areas. Two examples are the "FAIR Food Catalogue" and "Success stories from the agro-industrial research programmes".

In a series of workshops, experts from academia and industry were consulted on policy recommendations and scientific priorities for FP5 in the area of agriculture and fisheries research.

Contribution to Community RTD Objectives

Strengthening the competitiveness of agro-industry: Food sector research relates to various aspects of consumer nutrition and well-being. Research strategies necessarily require a multidisciplinary approach involving food industry and research centres. At the technical level this is exemplified by major contributions in the field of process optimisation and technologies for nutritious food. Furthermore, it is essential to integrate the knowledge generated by the medical and nutrition sciences.

Contribution to the reformed Common Agricultural Policy and Community rural development: Agricultural research is very broad and takes into account the objectives of the common agricultural policy, socio-economic perspectives and environmental aspects. The research includes support to CAP, quality policy, diversification, crop management, animal health and welfare, rural development and multifunctional management of forests.

Examples of results

In the project "Fibre reinforced polypropylene composites for industrial applications" a process to produce car parts made of polypropylene reinforced with natural fibres (flax or wood) has been developed. The French car parts manufacturer has already begun product development and marketing of the new materials originating from the project.

A new stove has been developed and commercialised which burns mixtures of solid biomass, and fulfils Clean Air Act regulations. This has resulted from work carried out under a project on "Abatement of emissions from small-scale combustion of biofuels"

Over the last two calls for proposals, an increasing number of projects had direct relevance to policy issues in the context of international trade negotiations, forestry and rural development.

Support for the objectives of the Common Fisheries Policy: The activities carried out have contributed to the implementation of the Common Fisheries Policy through the generation of scientific knowledge on relevant aspects such as the improvement of the methodology for fish stock assessment, the interactions between fisheries, aquaculture and the environment, the socio-economic aspects of the fishing industry and the biology of the aquacultured species. For example, under the last call, the proposal "Stock effects on the recruitment relationships (an operational model of the effects of stock structure and spatio-temporal factors on the recruitment)" was selected because of its high quality, innovative character and direct relevance to CFP. The project aims to improve the methodology for determining limits reference points for the biomass of exploited fish stocks.

A multi-centre intervention study with moderate obese volunteers, including long-term control of food intake, has shown that diets with lower dietary fat/carbohydrate ratios can lead to a significant body weight decrease.

On-going activities related to FP4 in 1999

The activities will focus on the follow up and finalisation of the existing contracts.

A number of publications will be prepared on specific aspects and areas of the programme, notably catalogues providing overviews of projects and their results, as well as more specialised publications including one on the impact of European food research.

Two projects on the application of high pressure treatment involving the major European high pressure equipment manufacturers and food industries have established the basis for the application of this technology to the production of fresher and healthier processed foods.

A project on non-toxic aminoplastic adhesive for medium density fibreboard succeeded in developing a formulation resulting in increased weather resistance (up to 40%) and improved biological resistance, while the level of formaldehyde emission is kept very low. This allows the use of the panels for new exterior applications, in particular those where ground contact is required. The technology will be protected by a provisional patent application while its merit is currently evaluated with pilot scale trials and feasibility studies.

A concerted action on the evaluation and comparison of methods for estimating uncertainty in harvesting fish from natural populations will provide a sound tool for medium term fisheries management.

11. NON-NUCLEAR ENERGY

R&D COMPONENT: JOULE

Activities in 1998

The final touches were put to implementation of the 4th Framework Programme, as the 1994 and 1996 calls for proposals for concerted action, accompanying measures, grants and measures in favour of SMEs were closed.

The information and assistance campaign targeted on SMEs has borne fruit. The last call closed attracted a record 62 proposals for joint research involving SMEs, 49 of which were selected for a budget of ECU 19 million.

Contracts were negotiated and work started on all the proposals on renewable energy sources selected for funding from the programme last year.

Preparations for the 5th Framework Programme also occupied all staff in the Directorate throughout the year.

Contribution to Community RTD objectives

The evaluation of the results of all the contracts under the 3rd Framework Programme was completed in 1998. This studied the results project by project against a set of six indicators, including energy savings, cost savings, environmental benefit and job creation. Despite the precompetitive nature of the projects, this exercise by independent experts found a positive impact on each of these indicators.

In preparation for the 5th Framework Programme, energy researchers and users of the research results were consulted in various fora to allow better targeting of the programme, both qualitatively and quantitatively.

On-going activities related to FP4 in 1999

In 1999 the programme will continue monitoring the on-going contracts and disseminating and applying the results. Almost 400 projects were in progress on 31 December 1998.

Examples of results

A prototype vehicle fuelled by a hydrogen cell was tested in 1998. This is the fruit of industrial cooperation between Renault and Volvo and combines the benefits of an electric vehicle (no emissions or noise) with the advantage of a range of 500 km, five times as far as an electric vehicle. The success of this project opens the way for an industrial development structure based on exclusively European technology.

Cooperation between four European research centres has produced a new generation of miniature electricity converters. The prototypes cost half the price of the existing technology. The photovoltaic energy and power electronics industries are now moving on to the continuous production phase.

DEMONSTRATION COMPONENT: THERMIE

Activities in 1998

The focus of the THERMIE component is on the demonstration and promotion of clean and efficient energy technologies in three broad areas: renewable energy sources; rational use of energy in buildings, industry and transport; and cleaner, more efficient use of fossil fuels and more effective exploration, distribution and transportation of hydrocarbons.

In 1998, the programme management prepared and processed 3 Calls for proposals, evaluated 817 proposals, prepared 243 new contracts and monitored the technical progress made by approximately 900 running projects. The budget for 1998 - a further ECU 118 million - has been allocated among the three areas of activities in the following percentages: renewable energy sources 29.6%, rational use of energy 32.9% and fossil fuels 37.6%.

In 1998, special attention was given to targeted calls for proposals which sought further to encourage industrial organisations to participate in the Programme. Technologies were "clustered" together to maximise the resources that could be made available. One such example was in the field of gas turbines and fuel cells for which the revised 1998 edition of the EU strategy was finalised. In addition, to help with market uptake of the technologies demonstrated through the Programme, the link between the technical and the promotional activities in the Programme was brought closer together. This effort was further enhanced by focusing on networking, through the OPET Network (Organisations for the Promotion of Energy Technologies), which held a general meeting in Lisbon in September. The event brought together representatives from 54 organisations in 30 countries.

In the field of international co-operation, 40 proposals were selected (30% of the total received). In general, actions are focused on the dissemination of renewable energy sources and rational use of energy technologies, with a few on promotion of European Oil & Gas technologies. The emphasis continues to be on the markets offered by the neighbouring countries of Central and Eastern Europe and the former Soviet Union. There has been an increase in the number of proposals and projects targeted to Latin America, South East Asia, including China and India, and Mediterranean including the Middle East. A few proposals targeting African and also industrialised countries (Japan and USA) have been received. Following the report of the 1997 Monitoring Panel, during this year, a more aggressive approach to information, communication and dissemination of material has been undertaken. These activities have included: a timely publication of the 1998 activity report, a set of seven detailed sectorial reports including international co-operation and OPETs, and two databases providing details of demonstration projects (SESAME) and associated measures (THEMIS).

Examples of results

The difference in cost of constructing a building with rational use of energy technology, as supported by THERMIE, over one without the energy saving application has shrunk. For example, in the case of external insulation, the installation cost decreased of 35% in the last 10 years. Clean and efficient energy technologies are therefore becoming evermore economically and socially attractive.

The ARBRE project is the first large-scale commercial demonstration of electricity production from a high efficiency gasification process, with wood from established forests and new coppices as its sustainable fuel supplies. This has enabled development of the sector to start, with a large potential ahead and important expected benefits to the environment, job creation and rural diversification.

Contribution to Community RTD objectives

The technologies and applications supported under THERMIE offer access to zero or low emissions of gases such as CO_2, the main greenhouse gas. The impact can be felt in many sectors, from energy supply to energy use. In this context, a task force on climate change has been created in 1998.

The technologies supported under THERMIE have contributed to a more efficient use of resources. For example, in fuels and electricity they help to improve the relative cost-effectiveness of our industries and hence the goods and services they make and sell. These energy benefits directly translate into cost savings and increased competitiveness, thus encouraging economic growth and contributing to employment creation. For example, employment in wind energy in Denmark grew from 3500 in 1992 to 10000 in 1997. Many of the jobs created are highly skilled, or located in priority areas such as rural areas.

In the energy sector, especially renewables and energy efficiency, SMEs constitute the bulk of the market. THERMIE continued its efforts to target these organisations and help them to access Community support schemes for assistance with the take up of new technologies. In 1998 some ECU 3 million have been given to 24 accompanying measures targeted to SMEs. Close co-operation continued with the CRAFT initiative managed by DG XII and with the Euro-Info-Centres of DGXXIII.

For many of the organisations involved in the Programme, for example Universities, Local/Regional Authorities, NGO, the impact of the Programme derives also from other aspects such as: providing information of benefit to raising awareness of environmental issues and of strategy development; improving the management capabilities of organisations and improving technical resources and facilities.

On-going activities related to FP4 in 1999

Activities will focus on the follow-up and finalisation of the existing contracts as well as on their monitoring and the dissemination of their results.

The THERMIE project "Smart-Leg", has demonstrated successfully new technology in the safe and shock-less deck installation of offshore heavy platforms. The technology is based on the principal that whatever the size and mass of a heaving, surging or swaying body, its kinetic energy is zero when its velocity is zero. The demonstration has been done in offshore Nigeria field Ekpe, where the long period swells of the West Africa region were a more severe test of the system, as opposed to locations with shorter swells.

Photovoltaics, producing energy from the sun, is a relatively new technology. In THERMIE, in the last eight years, 300 actors have participated in the sector, from which the 65% were SMEs.

In the transport sector, more than 3000 vehicles with advanced engines and alternative fuels participate in THERMIE projects with a financial support that varies with the degree of innovation (10 to 40% of the innovative components). Their aim is to reduce market barriers of technical and socio-economic nature. Advanced management concepts are demonstrated in 40 cities in the EU. More than 80 cities and 50 public transport or fleet operators are involved. The parties involved have achieved today already some 15% CO_2 reduction and 30% pollutants reduction. These numbers are expected to increase significantly after the official termination of the THERMIE contracts, as almost all operators will continue and enlarge the demonstrated fleets and measures. Moreover a fast growing number of cities observe the projects carefully and implement the positive elements.

12. NUCLEAR FISSION SAFETY

The objective of this programme is to pursue an overall approach to nuclear fission safety taking into account its various aspects, which range from medical applications up to the utilisation of nuclear energy for electricity production.

Examples of results

Activities in 1998

The programme was implemented through a single call with two deadlines for submission of proposals on shared-cost projects (20 March 1995 and 28 February 1996), while a call on concerted action was continuously open until 1 November 1997.

The selection procedure for the last 50 proposals submitted was carried out in 1998. By the end of 1998, 26 contracts had been signed.

From the beginning of the programme up to the end of 1998, 216 multi-partner contracts were signed (out of a total of 460 proposals submitted). Projects with related research subjects have been combined into 38 clusters to ensure better project management and to facilitate the exchange of results among specialists. Where appropriate, mid-term reviews have been carried out in order to adjust project plans.

In 1998, new extractants have been synthesised, which are very selective for Americium and Curium. The removal of these two radionuclides from the high-level liquid waste produced from reprocessing will give a waste that is less radiotoxic than uranium ore after 1,000 years.

Four "EUROCOURSE" training sessions were organised in 1998, including three courses in the field of radiation protection and one in reactor safety. Support for accompanying measures was approved, developing a wide forum for discussion/exchange of results and offering attractive prospects for young scientists and researchers: two conferences (about 300 people), ten workshops (20-50 people) and ten grants.

In addition, efforts were also devoted to the preparation of the key action Nuclear Fission and the generic activity Radiological Sciences under the new EURATOM specific programme (1998-2002).

Innovative accident management measures are being developed to ensure the integrity of reactor containment even in the case of severe core melt accidents. For example, core catchers have been designed on the basis of large-scale spreading experiments using prototypic core melts.

Contribution to Community RTD objectives

The nuclear fission safety programme contributes to the improvement of the safety of nuclear reactors and of the competitiveness of the nuclear industry, in particular through research concerning major accidents, and methods for the safe management of radioactive waste. It also aims at protecting the public and the environment against the possible adverse effects of radiation which might result from the use of nuclear energy and the medical applications of radiation.

In the nuclear installations safety area, new methodologies and databases to improve the reliability of Probabilistic Safety Assessment for design and licensing purposes have been developed in 1998, as well as mitigation systems for severe accident consequences (for example, core catchers and autocatalytic hydrogen recombiners). As far as future reactors go, an review of the pros and cons of the Thorium fuel cycle has been carried out.

In the waste treatment area, different partitioning and transmutation strategies have been evaluated, showing the possibilities of minor actinide burning. In addition, new molecules have been developed that provide improved selective extraction of actinides from actinide/lanthanide mixtures.

In the radioactive waste disposal area, improved understanding has been achieved on basic phenomena for performance assessment for geological disposal, e.g. container corrosion, vitrified waste and spent fuel behaviour, gas generation and radionuclide migration. Important steps forward have been made on the technical feasibility of geological disposal concepts in different underground research laboratories. As far as decommissioning is concerned, databases and strategic planning tools have been further developed.

In the radiological sciences area, three different repair pathways for DNA double strand breaks have been identified and are being genetically characterised.

For the "on-site" restoration assessment of radioactively contaminated areas a database has been established and an associated manual is being written.

In the risk assessment area, the basic elements for carrying out a full scope uncertainty analysis of probabilistic accident consequence codes are now in place and all that remains is to complete the analysis, which will be computationally demanding.

As far as health and diagnostic radiography are concerned, the results of current work complementary to previously established quality criteria will be of direct practical relevance. Morphological characterisation of the 1200 thyroid tumours arising after Chernobyl is making good progress and correlations are being made with molecular biology findings.

On-going activities related to FP4 in 1999

The projects of the 4th programme will be completed. Five training courses will be organised by the programme in the fields of reactor safety and radiation protection.

The Palmottu U-Th mineralisation process in Finland provides an excellent opportunity for studying radionuclide transport within groundwater pathways in fractured crystalline bedrocks. A conceptual hydrogeological model of the site has been developed, which will contribute to performance assessment of deep disposal of radioactive waste.

Knowledge on exposure to cosmic rays at civil aviation flight altitudes has been substantially consolidated, providing an adequate basis for dose assessments of aircraft crew, which will be legally required in the European Union after 13 May 2000. The work is based on a comprehensive approach including dosimetric and spectrometric measurements during flights, at high mountain altitudes, and in a high-energy radiation reference field at CERN, as well as cosmic ray transport calculations.

13. CONTROLLED THERMONUCLEAR FUSION

Activities in 1998

The long-term objective of the programme is "the joint production of safe, environmentally sound prototype reactors which should result in the construction of economically viable power stations, which will meet the needs of potential users."[34] To this end, the Community provides financial support for RTD in the fusion sector, principally in the form of shared-cost action and accompanying measures (grants, support for conferences and seminars, take-up of results, etc.).

"Next Step" activities on construction of an experimental fusion reactor culminated in 1998 with the adoption of the final report on the International Thermonuclear Experimental Reactor (ITER), in the context of the quadripartite cooperation between Euratom, Japan, Russia and the USA. It was decided to extend ITER-EDA (Engineering Design Activities) for three years[35] for specific studies, particularly on limited technical objectives making it possible to attain ITER's final objective at the lowest cost.

Concept improvement and long-term technology activities continued, geared primarily to the DEMO demonstration reactor. The results of the 1997/98 studies on the socio-economic aspects of fusion were analysed, with particular reference to the long-term scenarios, energy production costs with fusion and the problems of public acceptability.

The Commission is responsible for implementation of the programme, principally in the form of contracts of association with the Member States (plus Switzerland), the JET (Joint European Torus) joint undertaking and the NET (Next European Torus) agreement, which includes Euratom's participation in ITER-EDA. A new administrative and structural framework was prepared in 1998, in particular to allow the associated laboratories to use the JET facilities after its joint undertaking status expires on 31 December 1999. The plan is to entrust the UK Atomic Energy Authority (UKAEA) with operation of the plant.

As regards facilities, the large W-7X superconducting stellarator is under construction at Greiswald (Germany), where the buildings are virtually complete, while the TJ-II heliac stellarator in Madrid and the MAST compact tokamak in Culham (UK) are now operational. New priority projects (45% funding) were adopted on neutral injection at TJ-II and MAST, peak diagnostics at TEXTOR (Jülich, Germany) and improvements on ASDEX Upgrade (Garching, Germany).

In its latest annual report the monitoring panel acknowledged the quality of the Community's management of the programme, the commitment shown by the associations and the achievements at the associated laboratories.

Examples of results

The JET Tokamak is the only magnetic confinement reactor in the world capable of using real fusion fuel.

After setting records for energy generation by fusion, the divertor system has been entirely replaced by remote handling - a world first in fusion RTD and a key component for the reactor.

[34] Decision 94/268/Euratom concerning the 1994 to 1998 framework programme.

[35] Decision 98/704/Euratom concerning the extension of the duration of the ITER-EDA agreement.

Contribution to Community RTD objectives

Europe is one of the world leaders in RTD in the fusion sector. The results obtained at the associated fusion laboratories laid the foundation for advanced plasma scenarios culminating in the performances of JET, a facility which no Member State could have built on its own. The measures taken to keep JET in service will enable the Union to continue to reap the benefits. Now construction of the first experimental fusion reactor can be envisaged.

As recommended by the 1997 monitoring panel, big efforts have been made on information on fusion and the security of supply and environmental benefits of this energy option. These include the Fusion travelling exhibition and preparation of a book on the history of fusion.

European industry is closely involved in the programme to develop and supply the components required for construction and operation of fusion plants. The competition between European suppliers generated by the programme has helped to make them more competitive against their rivals in the quadripartite cooperation on the ITER.

The programme also encourages transfers of technology developed in the course of the fusion research to other high-tech fields. There were several encouraging examples of this in 1998 (see boxes). In this way, the multidisciplinary nature of the RTD work on fusion and the potential for immediate application of this high technology is being fully harnessed.

Finally, care has been taken to disseminate the leading-edge knowledge built up in the course of the programme, not only via the 2000 or so publications which the programme generates every year but also by training and involving young researchers in the activities. Over 150 members of research teams working on the programme carried out teaching duties in 1998 while over 350 students received training in these teams.

Technology transfer: a laser developed at Risoe (Denmark) to study plasma turbulence is used as an anemometer to obtain optimum efficiency from wind turbines in all weathers.

Technology transfer: based on numerical models developed at Frascati (Italy) to study the effects of magnetic fields on fusion materials, smaller, cleaner rolling mills with lower energy consumption have been built.

On-going activities related to FP4 in 1999

The on-going projects under FP4 will be continued: over 120 projects were under way on 31 December 1998.

14. TRANSPORT

Activities in 1998

The context: the pre-accession process with CEEC countries, the extension of the trans-European transport network, and the numerous measures, technical or not, to be taken to reach the new CO_2 emission targets agreed at the Kyoto summit of December 1997, have a strong impact on the transport sector as a whole and as such have their repercussions on the Transport RTD Programme.
In view of the enlargement of the European Union, all Programme dissemination activities are now targeting the key players in the accession countries. The objectives are to ease the access to existing networks and to raise awareness in all user groups. In the field of emissions resulting from transport, the Programme is funding a series of projects whose results were fed into the recent Communication on "Transport and CO_2".

Implementation of the Programme: available funds under FP4 have been committed by the end of the year, with a total of 278 projects, of which 211 shared cost actions, funded. This includes 25 projects selected in 1998 following the 4th Call for proposals focusing on urgent policy matters as well as on the consolidation of results from ongoing research work in key transport areas such as Logistics, Environment and Transport Economics. The 18 Concerted Actions that have now been set up in the Programme ensure the involvement of end users like policy makers from Member States in ongoing research activities and enhance the deployment of research findings.
The 278 projects also include 14 projects selected in 1998 following a Joint Call with the Telematics Applications Programme on Transport Intermodality. They will for example demonstrate the possibilities of intermodal freight transport on short and medium distances, of new concepts for the distribution of goods in metropolitan areas and of improved services for long distance intermodal passenger transport.

Programme management: during 1998 a series of financial audits was performed. These resulted in the termination of some contracts with individual partners. Furthermore, a service contract for a technical review of ongoing projects was concluded. Reviews will take place in the course of 1999. The time taken to complete contract negotiations has decreased considerably during the lifetime of the Programme. After the first two calls only some 50% of the contracts were signed by the end of the year in which the call closed (i.e. within nine months). After the third and fourth call, the Programme managed to sign all contracts by the end of the year in which the call closed.
The 1998 Monitoring Panel of the Transport RTD Programme concluded that the Programme is well managed and that programme procedures are transparent and well documented. It commended that all major recommendations of previous Monitoring Panels have now been fully implemented, to the extent feasible within FP4 procedures.

Examples of results

The METARAIL project developed testing methods and tested different low noise freight wagons in 4 Member States. It was shown that a 50-75 % noise reduction is feasible. The UIC (Union International des Chemins de Fer) has decided in favour of a voluntary agreement to retrofit the brake shoes and wheels of the entire fleet of freight wagons, which will lead to 50 % noise reductions at unchanged costs.

The IMPULSE project tested and implemented improved transfer systems and rolling stock for increased efficiency of rail-road terminals/transfer points in 4 European test sites. The impact is a direct reduction of terminal cost and transit times that can be applied all over Europe.

Contribution to Community RTD objectives

The objectives of the research carried out under the Transport RTD Programme are to improve the efficiency of the individual transport modes and to speed up their integration into the European transport system. A major Programme characteristic is its support to policy making at European, national and regional level

Contribution to the competitiveness of European industry: the Programme succeeded in enhancing industrial co-operation at European level where previously it was largely absent.

In the rail sector, for example, it was possible to unite all major European railway operators and the supply industry in order to work together and develop rail operating systems that will meet future requirements at European level. Deployment of the "European Rail Traffic Management System" could go far beyond the European boundaries with countries like India, China and South Africa interested in its use, resulting in considerable export potential for European industry.

As a result of the work in the waterborne transport area, all major European ship equipment manufacturers accepted the developed platform for an integrated ship control standard. This is strongly contributing to bring together a formerly fragmented European industry sector, which represents 50% of the world market.

Contribution to Community policies: the programme encouraged co-operation among city and regional authorities in different Member States and stimulated the exchange of operational practices among transport suppliers, managers and local authorities. Through projects on benchmarking and best practice guides, city authorities may learn from experiences in other Member States. One example is the recently established "European Local Transport Information Service" (ELTIS), a unique information platform on the Internet providing policy makers, transport operators and user groups with a steadily growing number of case studies and best practices from different countries (http://www.eltis.org).

Due to the policy relevance of the majority of projects financed under the Programme, findings of these projects have represented an important contribution to the development and follow-up of policy actions. Examples include policy documents such as the "White paper on Fair Payment for Infrastructure Use", the Communication on "Transport and CO_2" and the follow up to the "Green Paper on the Citizen's Network". Significant input was also delivered to the Auto Oil II programme (European programme on air quality, road traffic emissions, fuels and engine technologies), the ongoing revision of the trans-European transport networks guidelines, in particular with regard to their impact assessment, and the Quality Shipping initiative promoted by the EC. The latter was also promoted through a dedicated conference, a series of workshops and a full-scale ship bridge demonstrator during EXPO'98.

The ECOTTRIS project developed guidelines for the improved training of flight crew transitioning from conventional to advanced 'glass' cockpits. These guidelines will be used to amend regulations of the Joint Aviation Authorities (JAA) and the training syllabi of the European Flight Training Centres.

ARCDEV is the first large-scale industrial co-operation project of the Programme with Russia. It undertook an exploratory voyage to the Arctic region to assess the technical and economic feasibility of year-round shipping capable of linking the energy-rich region of Siberia and EU markets. It was also used as a demonstration platform for developments of several waterborne transport research projects.

On-going activities related to FP4 in 1999

The majority of projects funded under the Programme will continue their work in 1999 and a strong emphasis will be put on the dissemination and exploitation of the results of these projects. To this end, a Programme-wide dissemination event is planned for the end of the year to present to decision-makers and end-users the findings of the research work. Many of the results will also feed into areas for further research work to be financed in FP5 and particularly the key action "Sustainable Mobility and Intermodality" within Thematic Programme 3.

The QUATTRO project has analysed how quality management tools can be used to improve quality of service in public transport. A set of quality indicators has been developed that will be standardised by CEN. The use of these indicators for benchmarking is being tested.

15. TARGETED SOCIO-ECONOMIC RESEARCH

Activities in 1998

1998 was a very important year in the evolution of the TSER programme. Introduced in 1994 as a new element to the Framework Programme, much had to be done in the early stages of the programme to sensitise researchers and policy makers to the importance of European level socio-economic research. However, the negotiation of successful projects under the third and last call under TSER, and the arrival of a significant number of first call project final reports demonstrates that attention is turning to the consolidation and follow-up of funded activities. Indeed, the programme now comprises a broadly-based portfolio of complementary activities ranging from collaborative research projects and thematic networks, studies and support for conferences in key areas, to specific European Technology Assessment Network (ETAN) activities, and to the programme's participation in the Educational Multimedia Task Force.

Given the current stage of development of the programme and taking in account the recommendations made in 1997's TSER monitoring report, the organisation and preparation of dissemination activities were a significant part of the 1998 TSER activities.

Contribution to Community RTD objectives

A characteristic of this programme is that its activities are expected to lead to policy relevant insights. Many of the second call projects negotiated during 1997 started their activities in the beginning of 1998. Following the third call selection of 51 successful projects, dealing with topics such as sectoral innovation systems, and the shaping of technology, lifelong learning and educational goals, immigration, and segregated urban areas, a total of 164 shared actions will have received Community support.

In addition to this, some 48 grants were awarded in 1998 for accompanying measures (out of a total of 98 for the whole duration of TSER). Funded activities include studies and fora on the effects of labour markets on employment, policy challenges of the new migrant diasporas, gender and citizenship, new pathways for labour market policy, the new organisation of work. At the same time the assembly of information needed to set up the data base on local initiatives to combat social exclusion in Europe (LOCIN) was continued in all 15 Member States. This data base should be accessible to the public via Internet by the end of 1999.

As the number of completed research projects from the first call of TSER is increasing while ongoing projects are presenting interesting interim results, the decision was taken to prepare a 'European Socio-Economic Research Conference'. The preparatory work was launched in the second half of 1998 and the conference is expected to take place in mid 1999. A workshop organised in November 1998 was a good starting point to structure the various contributions to be expected. The conference will become a focal point for the various dissemination and exploitation activities of the programme, which intensified during this year as more

Examples of results

FORUM is a new fast growing network on vocational education and training. It is proving to be a major focal point for activities in this area and is attracting the participation of teams from LEONARDO and SOCRATES projects, from Eastern Europe and North America.

"Coping with Homelessness: Problems to be tackled and the best practices in Europe" is the title of the book illustrating the findings of the EUROHOME project.

The INPART project produced its first report drawing interesting comparisons with respect to social policies in Belgium, Denmark, the Netherlands, Portugal, Spain and the United Kingdom.

and more research results became available. The range of activities includes inter alias a growing visibility at major conferences, targeted workshops involving policy-makers, a study guide and a number of publications, on paper as well as on the Internet.

In the framework of the European Technology Assessment Network (ETAN), a seminar was held on "ageing population and technology" involving some 60 high-level experts, policy-makers and stakeholders. As regards activities on "technology policy in the context of internationalisation" and the "implications of climate change for RTD policy", expert groups completed reports which will be discussed in ETAN seminars during 1999. .Six new ETAN expert working groups were also set up, on women and science, intellectual property rights and technology policy, employment-promoting indirect RTD policy measures, assessment of the impact of RTD programmes, implications of information and communication technology for science, and improving communication between experts and policy-makers in science and technology policy.

The "Universities, technology transfer and spin-off activities" project has presented an examination of the process of technology transfer from universities to industry within seven European countries.

A further significant event of 1998 was the management of 7 projects, part-funded by TSER programme for a total of ECU 2 million, submitted under the Task Force on Educational Multimedia joint call for proposals. These projects, dealing with new learning models and processes and the effectiveness of the introduction of educational multimedia in schools and training institutions with the attendant socio-economic consequences, demonstrate the importance of socio-economic and pedagogical research in the shaping of technology.

The IDEA project has produced a series of strategic papers, which will be published in a near future. Among those we can find a "guide for policy makers" on science, technology and innovation indicators.

A major part of 1998 activities was related to the role of the socio-economic research Key Action in the Fifth Framework Programme and to the preparation of its work programme.

On-going activities related to FP4 in 1999

TSER ongoing projects and dissemination of TSER projects' results will be pursued during 1999.

ETAN will be completing the activities under the six expert working groups set up during 1998 and will be organising seminars on "technology policy in the context of internationalisation" and the "implications of climate change for RTD policy" based on the expert reports. Furthermore the Educational Multimedia Task Force programmes will be reviewed on their progress and quality as well as on the socio-economic research component during the course of 1999.

A series of national reports as well as a synthesis report on "changing structure, organisation and nature of public research systems" was presented by the project "European Comparison of Public Research Systems".

PARLEUNET, a Multimedia Educational Task Force project is the first European initiative to permit secondary school students to use networks and multimedia resources to learn about and do collaborative projects on the European Parliament. 35 secondary schools from 15 Member States are participating.

COOPERATION WITH THIRD COUNTRIES AND INTERNATIONAL ORGANISATIONS

Activities in 1998

International cooperation by the Community under the 4th Framework Programme took the following main forms:

- The INCO programme proper which funds RTD projects bringing together researchers from non-EU countries and European partners and is targeted specifically on:
  - the countries of Central and Eastern Europe and the New Independent States in the case of INCO-Copernicus: in 1998 a total of 224 new projects and various accompanying measures were started with funding totalling ECU 53 million from the Community;
  - the developing countries, including the Mediterranean countries and emerging economies, in the case of INCO-DC: 134 new research projects and 79 accompanying measures were started in these countries in 1998.

- Participation by non-EU countries and international organisations in the other specific RTD programmes. For example, in 1998 three Central and Eastern European bodies were selected to take part in research projects in the Transport programme.
  Some countries' participation is also secured by bilateral scientific and technical cooperation agreements or association agreements with the Framework Programme (which allow researchers from the non-EU countries concerned to receive Community funding in return for a flat-rate contribution by their country to the FP budget).
  In 1998 association agreements with the 5th Framework Programme were negotiated with Norway, Iceland, Liechtenstein, Switzerland, Israel and the eleven applicant countries.
  Scientific and technical cooperation agreements with a number of non-EU countries were also negotiated or brought into force in 1998, including agreements with such important partners as the USA (agreement entered into force on 14 October), China (agreement signed on 22 December) and Russia (negotiations completed in 1998). A mandate to negotiate with Argentina has been requested. The agreements already in force with Canada, Australia and South Africa were extended for the 5th Framework Programme. And a supplementary agreement in the nuclear field was signed with Canada on 17 December 1998.

- Logistical or financial support from scientific and technical cooperation instruments complementing the Community framework, such as the COST and EUREKA schemes or INTAS (International Association for Cooperation with Scientists from the New Independent States funded, principally, by the Community).
  In 1998, another 17 COST projects began, bringing the total in progress to 162. At the same time the Commission was involved in six projects and nine initiatives under the EUREKA programme.

Examples of results

An integrated information system is indispensable for building up cooperation between researchers from Eastern and Western Europe. The ESATT (European S&T Transfer Network) and INDIS (Information Dissemination in European RTD) projects have laid the foundations, notably in the form of a website on RTD institutions and programmes in all European countries (http://ariadne.iief.de).

Every year three million people in the developing countries die from tuberculosis. The resurgence of this pandemic is closely linked with Aids, which renders the traditional vaccine ineffective, if not dangerous. For this reason, an interdisciplinary team of European and Ethiopian researchers is working on development of an acellular vaccine for injecting only proteins developed *in vitro*.

The 1998 monitoring report recognised the quality of the management of INCO and the growing interest generated by the programme in non-EU and EU countries alike.

Plasterm, a Romanian surface treatment specialist with excellent know-how and facilities, has survived the drying-up of State funds by participating in three RTD partnerships with UK, Hungarian, Polish and German researchers. These have enabled the company to diversify its technologies and products. It now exports 90% of its production and has saved 70 jobs in the process.

Contribution to Community RTD objectives

While opening up new opportunities for European research, the cooperation and association agreements form an integral part of the Union's external relations policy and are negotiated in close collaboration with the Commission departments responsible for this policy.

For example, the agreement with the USA marks a big step forward in the trans-Atlantic dialogue. Like the other cooperation agreements it allows reciprocal access, without funding, by US bodies to the first activity in the Framework Programme and by EU bodies to the corresponding Federal programmes, subject to adequate protection of industrial property rights.

Looking ahead to the forthcoming enlargements, the programme plays a major part in modernising RTD facilities in the applicant countries and progressively fitting them into the Union's research. The plans for association of these countries with the 5th Framework Programme will play a decisive role in this respect. Pre-accession screening of six applicants has already concluded that they will be capable of meeting their RTD obligations and made it possible to establish the negotiating position on this issue.

International cooperation also contributes to the Union's international competitiveness, both by giving European researchers access to programmes in non-EU countries and, reciprocally, by opening up the possibility of drawing on their expertise in European programmes. In 1998 the programme prepared the way for extending this possibility to the entire first activity under the 5th Framework Programme.

INCO-DC is closely associated with the European Initiative for Agricultural Research for Development (EIARD)which brings together the 15 Member States, Norway and Switzerland around the principal objective of world food security. For example, EIARD has established the Infosys information and communication system - a gateway to the European databases on agronomic research for development.

On a broader front, the influence of European science and technology in the world is safeguarded by cooperation activities, particularly with developing countries, but also with the New Independent States. The Union's participation in the International Science and Technology Centre (ISTC) in Moscow is particularly important from this point of view. This Centre redeploys military researchers from the former Soviet Union to civil activities. Since 1998 the Union has also been involved with the Science and Technology Centre in Ukraine (STCU) in Kiev, which performs a similar function.

Finally, international cooperation enables the Union to join forces with non-EU countries to meet certain global challenges. For example, in 1998 INCO and the Environment and Climate programme jointly organised the first EU-Japan seminar on seismic risks at Crete University. This gathering resulted in a cooperation programme to make further progress with research into earthquakes and responses to them.

On-going activities related to FP4 in 1999

Work will continue on the projects in progress under FP4: on 31 December 1998 a total of 1159 projects were in progress.

DISSEMINATION AND OPTIMISATION OF RESULTS (INNOVATION PROGRAMME)

Activities in 1998

In 1998 implementation of the Innovation programme concentrated on: (i) continuation of the activities of the network of Innovation Relay Centres (IRCs) and information and dissemination activities; (ii) support for regional innovation infrastructure; and (iii) action on the financing of innovation and intellectual property.

Examples of results

The network of IRCs continued its activities. In the first six months of 1998, a total of 5 600 customers received assistance on transnational technology transfer, resulting in 480 negotiations and the conclusion of 65 agreements to add to the 260 signed in earlier years. Over the same period the IRCs also handled over 5 000 requests for assistance with submission of proposals for inclusion in the EU RTD programmes, following on from the 21 000 requests dealt with between 1995 and 1997.

Growing interest is being shown in the information and dissemination services offered by the programme, with 10 million hits on the CORDIS website in 1998, plus 11 000 new subscribers to the Cordis-Focus magazine taking the total to 40 000 and 4 000 to ITT (Innovation and Technology Transfer) to bring the readership up to 36 000.

The audits of regional strategies and infrastructure to support innovation and technology transfer were stepped up, with 43 new schemes started with a budget of around ECU 11 million. In addition, a conference organised in Brussels brought together representatives of over 100 regions in Europe and the RINNO (*Regional Innovation Observatory*) study was launched, under the auspices of DG XVI, to identify and analyse best practice in this area.

Fresh impetus was given to financing innovation: 28 venture capital funds were started up under the I-TEC (*Innovation and Technology Equity Capital*) pilot project to finance high-tech projects in SMEs and under its successor I-TEC2. A venture capital unit administered by the EIF was also opened.

The 16 venture capital funds selected under the I-TEC 1 pilot project represent a total investment capacity of in the order of ECU 770 million, of which ECU 291 million is for the start-up phase of technology innovation projects. One year after the inception of I-TEC, the first seven funds established have invested ECU 16.7 million in 25 undertakings employing over 150 staff.

The FIT (Finance, Innovation and Technology) project started in 1998 focused on three main themes: guarantee mechanisms, business angels and technology rating. Finally, in the LIFT project a help desk was set up to assist participants in Community RTD programmes to establish links to innovation financing for technology.

In the area of intellectual property another help desk (IPR help desk) was set up to provide participants in the Framework Programme with the relevant tools for transfer and application of the results and assistance with contracts.

In line with the action plan for innovation, a cycle of conferences on "Innovation, creation of new businesses and employment" in Paris in December 1997, Luxembourg in May 1998 and Vienna in November 1998 maintained a continuous dialogue between over 400 decision-makers from the worlds of business, finance and research and the public authorities. These meetings provided an opportunity to identify the major difficulties encountered by inventors and innovators, notably with acquisition of know-how and access to funding and markets. Very soon the consensus reached at the end of this process will create an environment more conducive to innovation and, consequently, to jobs, prosperity and well being.

The ERGO (European Research Gateways On-Line) pilot project opened a website giving on-line access to an experimental central catalogue of some 71 000 research projects (www.cordis.lu/ergo)

On-going activities related to FP4 in 1999

Alongside launching the 3rd activity under the 5th Framework Programme, 1999 will be a year for continuing the ongoing activities, implementing the action plan for innovation and, in particular, putting into action the conclusions reached at the conferences on "Innovation, creation of new businesses and employment".

The Innovation programme contributed to establishment of esp@cenet by the European Patent Office. This service gives users access to the publications on intellectual property by the Member States, the European Patent Office and the World Intellectual Property Organisation over the last 24 months. It is also designed to raise awareness of national and international intellectual property issues amongst SMEs.

STIMULATION OF THE TRAINING AND MOBILITY OF RESEARCHERS (TMR)

1. Activities in 1998

Work on the ongoing contracts and application and dissemination of the results of the training and mobility of researchers programme and of its predecessors continued in 1998. Also the proposals submitted in response to the calls for proposals under the "Science meetings" activity in 1998 and for "Marie Curie fellowships" at the end of 1997 were evaluated.

Besides day-to-day management, this final year of the programme was marked by intensive preparations for the 5th Framework Programme and, as recommended by the monitoring panel, systematic monitoring of contracts and evaluation of the impact of the various ongoing activities: (a) mid-term evaluations of the activities on networks and on large-scale facilities by panels of independent experts, together with a technical audit of each contract; (b) surveys in the form of on-the-spot inspections or questionnaires sent to Marie Curie fellows, users of large-scale facilities and participants in Euroconferences. This exercise made a considerable contribution to drafting the specific programme on "Improving the human research potential and the socio-economic base" in the 5th Framework Programme. Approval was also given for two complementary studies - one to establish a method for evaluating the impact of the Marie Curie fellowships, the other to evaluate participation by women in science, particularly in the framework of this activity.

As recommended by the monitoring panel, considerable efforts were made to bring into line the Marie Curie fellowships under all the specific programmes in the 4th Framework Programme and to create a common legal and social framework for the fellows.

The accompanying measures included the tenth EU contest for young scientists which drew 88 contestants aged between 15 and 20 from 28 European countries to Porto (Portugal) from 20 to 27 September 1998. The programme also provided support to establish a secretariat for the Marie Curie Fellowship Association, which now has 1 400 members. Activities to coordinate, in particular, receipt and administration of proposals for Marie Curie fellowships for eight other specific programmes also continued.

Turning to information for the public, in 1998 the infopoint for the programme replied to 2 600 requests for information by E-mail and sent out some 4 000 information packs. The Internet site on the programme recorded almost 1.3 million hits this year. Several publications were written and distributed (11 500 copies) on individual activities in the programme or on clusters of research projects.

Examples of results

A French Marie Curie fellow working in Heidelberg has identified and cloned two proteins involved in activation of type T immune-system cells controlling defence responses in vertebrates.

Besides its scientific successes, a network on non-linear dynamics has created remarkable career prospects for young trainee researchers. Over the first two years of the contract, this network has trained 30 young researchers, almost half of whom have found permanent jobs already. Most of those still working on the network have received job offers.

Three leading pharmaceuticals firms have joined forces with seven universities to offer targeted training on innovatory organic synthesis.

Contribution to Community RTD objectives

Assuming comparable scientific merit, the programme continued to give preference to applications with an industrial or cohesion component, with satisfactory results.

The return grants, together with the grants to established researchers, promote participation by the less favoured regions of the Community.

Industrial participation in the programme continued to increase. Approximately 70% of the contracts concluded following the 1997 call for proposals for the "Research networks" activity included links with industry, notably innovatory SMEs. As recommended by the monitoring panel, in 1998 consultations were started with representatives of industry to explore ways of making the programme more attractive for businesses. As a result, it was decided to introduce "Marie Curie industry host fellowships" in the 5th Framework Programme.

The programme has a big impact on employment for young researchers in the Union and their career prospects. The Marie Curie fellowships granted under the TMR programme account for 5 600 researcher years and the training under the research networks activity for around 6 500. What is more, many young researchers have been recruited for a stable job directly after participating in a TMR research project.

On-going activities related to FP4 in 1999

Management of all 2 300 or so ongoing projects under the 3rd and 4th Framework Programmes will continue. The 11th European contest for young scientists will be held in Thessalonika (Greece) from 21 to 26 September 1999.

In the "Large-scale facilities" activity, networking of the leading earthquake simulation centres will help to prevent disasters while acceptance of Eurocode 8 as the international building standard in earthquake areas would give a competitive advantage to the European building industry.

A German Marie Curie fellow working in Paris has published five articles in top reviews on his research into the force needed to separate the strands of the DNA double helix. He found a correlation between this force and the base sequence of the DNA molecule. Building on this result, he developed a new optical DNA analyser.

Two of the concerted action projects concerned neutron beam facilities and synchrotron light sources. They will act as a catalyst for coordinating and sharing such facilities and for collaboration at European level on development of the instrumentation.

1998 was a period of change for the Joint Research Centre, the European Union's scientific and technical research laboratory. Renewed emphasis was placed on the JRC's role of providing independent scientific and research support underpinning Community policy. This has been reflected at the strategic level in the reformulated mission statement:

The mission of the Joint Research Centre is to provide customer-driven scientific and technical support for the conception, implementation and monitoring of European Union policies. As a service of the European Commission, the Joint Research Centre functions as a centre of science and technology reference for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, private or national.

To carry out its mission, the Joint Research Centre has a unique combination of facilities and expertise transcending national boundaries. Moreover through its networks it stimulates collaborative research and broadens its knowledge base.

On a practical level, this has also been reflected in the creation of the Institute of Health & Consumer Protection (IHCP) at Ispra. The new institute consolidates the numerous contributions of the JRC to this increasingly important area.

Alongside this, much effort was devoted to the detailed preparation of the new Fifth Framework RTD Programme. For the first time the JRC has its own separate work-programme; its activities are thematically organised to reflect the main policy areas of JRC support: i) serving the citizen; ii) enhancing sustainability; iii) underpinning European competitiveness; iv) safety and security of nuclear energy. The work programme is the product of close consultation with and valuable feedback from client DGs, and has resulted in streamlining over 700 individual projects in FP4 to 100 projects.

Examples of results

Prompt and accurate response to new health concerns is essential. The JRC validated analytical methods for the detection of GMOs (genetically modified organisms) in food and provides the necessary reference materials to carry out the tests. These are the first steps in support of the «Novel Food Regulation» which requires foods containing GMOs to be labelled.

Institutional activities

The JRC's institutional work accounted for 80% of its activity in 1998. A flavour of the work is provided below, with more detailed information available in the JRC's Annual Report and the reports of its eight institutes.

A new test facility at the JRC's Institute of Advanced Materials enables damage caused by the effect of hydrogen on steel in vessels to be assessed.

The JRC continued to provide customer-driven research as independent scientific and technical support for a variety of Community policies.

Around 25 % of this institutional work was devoted to environmental policy and research. The JRC provided background for the definition and implementation of Community policy on chemical and atmospheric pollution, water quality, chemical waste, industrial risks and nuclear safety. The European Reference Laboratory for Water Pollution (LEPE)

was established to consolidate scientific and technical support to Community policy on water. An operational tropical forest information system was set up by the Space Applications Institute. Significant efforts were devoted by the Centre of Earth Observation to presenting of the results of CEO-initiated projects and the launch of the Earth Observation data and information exchange system (INFEO).

Work on the analysis of the cyclic behaviour of construction materials under earthquake conditions and crash resistance of vehicles contributed to policies reducing the impact of natural and man-made hazards.

Actinide research resulted in the isolation of a monolayer (1 atom thick) of plutonium for the first time and also demonstrated that this monolayer exhibits different properties from plutonium in the bulk.

Activities to improve food quality, the information given to consumers and the registration of pharmaceuticals, were carried out as support to consumer policy and agricultural policy, and accounted for approximately 12 % of the JRC's institutional budget.

In the nuclear safety area, the JRC designed and implemented systems, procedures, instruments and the training of inspectors under its support for nuclear safeguards. Actinide research results continued to improve the understanding of the complex behaviour of actinides in different parts of the fuel cycle, including waste management.

Help to industrial policy was provided via high performance computing and networks and in system support. In addition, the Commission's anti-fraud services were assisted by specialised software, systems and satellite data from the JRC.

Reference materials were prepared and distributed for environmental monitoring, quality assurance in the production of foodstuffs and for neutron dosimetry. Consumer health concerns were addressed by the preparation of reference materials for the detection of genetically modified organisms in food and BSE contamination in animal feed.

Eight new production or distribution licence contracts were signed in 1998 and one new company was created by a former JRC-staff member.

Finally, in view of future EU policies the "Futures project" was launched to analyse the likely impacts of change in Europe in the next ten years.

Competitive activities & other measures

Competitive work remains an important part of JRC's activity, both to test the relevance of its expertise and to stay abreast of recent advances. Such work is always related to the core competence and the mission statement of the JRC. Competitive income for 1998 was ECU 42 million, composed of ECU 10 million obtained in shared-cost actions, ECU 25.2 million awarded for competitive scientific and technical support, and third party work of ECU 6.8 million.

Technology transfer measures undertaken throughout 1998 included the launch of a "Secondment Programme" to train scientists from industry and other research centres at the JRC, an "Access to large installations and specialised laboratories" programme and the development of an Entrepreneurship Training programme aimed at teaching business skills to JRC short-term scientific staff.

COMPETITIVE SCIENTIFIC AND TECHNICAL SUPPORT ACTIVITIES

The 4th RTD Framework Programme provides for a competitive approach for scientific and technical support to Community policies. These activities cover the work carried out for the Commission departments and which, since 1995, may be carried out either by a research organisation from a Member State or by the JRC as part of its competitive approach.

In order to guarantee appropriate transparency and satisfy the needs, the resources are allocated by an interdepartmental group representing all the Directorates-General and services concerned and convened and chaired by the Commission's Secretariat-General. This group analyses requests from the departments, verifies compatibility with the objectives of the Framework Programme and decides on an annual allocation within the limits of the available budget. Account is also taken of any funding available from other programmes and scope for integration or convergence between several projects.

The Directorates-General and services whose proposals are selected are responsible for managing the funds allocated. They bring into play competition between suppliers in order to secure the best terms in the light of their requirements. The resources allocated are managed in accordance with the relevant rules in force, in particular the provisions of the financial regulation applicable to the general budget of the European Communities.

From financial commitments totalling almost ECU 52 million available in 1998, the 19 spending departments (most of the Directorates-General plus Eurostat, UCLAF and the Forward Studies Unit) funded projects totalling ECU 49 million, i.e. an implementation rate of almost 95%.

A total of ECU 28.3 million was paid out of a total of ECU 32.2 million available for all the projects in progress in 1998 to research institutes, universities, bodies, other contract signatories and to the JRC, all selected on a competitive basis.

Examples of results

Earth observation satellites and geographical information systems allow precision analysis of forest cover. One of the projects funded in 1998 is using these remote sensing technologies to produce more comparable, compatible international biodiversity and sustainability indicators for forests. In this way, this project is contributing to establishment of a European forestry information and communication system (EFICS).

The LOCIN data base on local initiatives to combat social exclusion should be accessible to the public via Internet by the end of 1999. It will provide an important source of information and tool for analysis and will favour the spread of best practice.

The second Netd@ys Europe event, funded under the "Learning in the information society" action plan, turned into the biggest event in the world to raise awareness and promote use of the Internet. Some 35 000 schools from all over Europe took part. The Netd@ys have also speeded up equipment and connection of almost 10 000 new schools in Europe.

ANNEX 2

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INTRODUCTION

Tables 1 to 7 provide figures on Community RTD activities in 1998 (number and types of project, participation, Community contribution, etc.). The cumulative totals are also set out in Tables 3A and 3B. These statistics are compiled by specific programme on the basis of the contracts signed, apart from the figures on payments which are from the Commission's budget data base.

- **Tables 1 and 2** concern all Community RTD activities: shared-cost action, special measures, concerted action, and preparatory, accompanying and support measures. Table 1 gives an overview which is then broken down by specific programme in Table 2 for the new projects under the 4th Framework Programme.
- **Tables 3A and 3B** concern all Community RTD activities under the 3rd and 4th Framework Programmes respectively. For each specific programme, they indicate the number of projects under way, the number of projects and the cumulative Community contribution since the beginning of the relevant programme and payments made in 1998.
- **Table 4** follows the project selection procedure for the calls for proposals evaluated by the Commission in 1998. It is compiled from an *ad hoc* survey of the information from the specific programmes.
- **Tables 5A, 5B, 6 and 7** concern the new shared-cost actions under the 4th Framework Programme:
  - *Tables 5A and 5B* show the breakdown of the Community contribution and number of participations by type of organisation, in terms of amounts and percentages respectively.
  - *Table 6* shows access to research for Objective 1 regions in terms of number of projects, number of participations and Community contribution.
  - *Table 7* shows the number of collaboration links created by these activities between different countries and between participants from the same country.
- **Tables 8 and 9** give details of funding of the 4th and 5th EC and Euratom Framework Programmes respectively and of the budget for the 5th Framework Programme in 1999.
- **Tables 10 and 11** show the trend in commitments for the successive Framework Programmes from 1984 to 1998 and the forecasts for 1999 to 2002 in current prices and 1992 prices respectively.

MAIN ACRONYMS AND ABBREVIATIONS USED IN THIS ANNEX	
Agriculture and fisheries	Specific programme on "Agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development)"
APAS	Accompanying, preparatory and support measures
EU-15	European Union (15 Member States)
JRC	Joint Research Centre
MECU	Million ECU
OJ	Official Journal of the European Communities
SCA	Shared-cost actions

Table 1: EC FP4 + Euratom FP: New projects; all projects under way

	New projects (contracts signed (2) in 1998 - EC FP4 + Euratom FP)						All projects under way (3) (EC FP2 + FP3 + FP4 + Euratom FP)	
	Community contribution (ECU million) (4)	Number of projects	Number of participations	Average number of participations per project	Average number of MS per project (5)	Average Community contribution per project (ECU million)	Number of projects under way at 31.12.98 (6)	Total payments 1998 (ECU million)
Shared cost actions (1)	2 497.63	3 773	21 239	5.63	3.06	0.66	8 895	2 383.64
Concerted actions (1)	90.75	271	2 946	10.87	5.56	0.33	605	86.61
Preparatory, accompanying and support measures (1)	248.19	2 209	4 159	1.88	1.51	0.11	2 768	236.86
TOTAL (7)	2 836.57	6 253	28 344	4.53	2.62	0.45	12 268	2 707.12

(1) Special measures are attached either to shared-cost actions, or to concerted actions, or to preparatory, accompanying and support measures, as appropriate.
(2) Contracts signed in 1998, whether or not amended by supplementary contracts signed in 1998: see (7).
(3) All signed contracts under way (completion date after 31.12.1998) for all specific programmes under EC FP4 + Euratom FP; EC FP2 + FP3.
(4) Sum of the total Community contributions to all new projects, as stipulated in the contracts (i.e. for the entire duration of each project).
(5) MS = Member States
(6) Projects under way at 31.12.1998 = contracts and supplementary contracts signed before 01.01.1999 with a completion date for research work after 31.12.1998.
(7) The supplementary contracts signed in 1998, amending contracts originally signed in 1995, 1996 and 1997, accounted for a further ECU 226 million.

Direct actions - JRC : ECU 259.01 million in commitments

Table 2: Specific programmes EC FP4 + Euratom FP: New projects (contracts signed in 1998)

	Total new projects (contracts signed (2) in 1998; EC FP4 + Euratom FP)						Shared-cost actions (1)		Concerted actions (1)	Accompanying measures (1)
Names of specific programmes (EC FP4 + EURATOM FP)	Community contribution (ECU million) (3)	Number of projects	Number of participations	Average number of participations per project	Average number of MS per project (4)	Average Community contribution per project (ECU million)	Community contribution (ECU million)	Average Community contribution per project	Community contribution (ECU million)	Community contribution (ECU million)
Telematics applications	165.27	202	1 834	9.08	3.88	0.82	151.74	1.08	0.57	12.96
Communication technologies	84.59	73	578	7.92	4.22	1.16	76.59	1.24	1.00	7.00
Information technologies	446.30	641	2 854	4.45	2.66	0.70	347.96	1.16	1.13	97.21
Industrial and materials technologies	497.68	641	5 499	8.58	3.89	0.78	493.08	0.89	0.20	4.40
Standards, measurements and testing	41.47	139	880	6.33	3.94	0.30	39.18	0.39	0.35	1.94
Environment and climate	151.58	344	1 577	4.58	2.83	0.44	139.58	0.66	4.23	7.77
Marine science and technology	56.78	84	451	5.37	3.29	0.68	48.97	1.22	5.46	2.36
Biotechnology	155.92	323	1 181	3.66	2.47	0.48	141.62	0.92	2.50	11.79
Biomedicine and health	112.13	366	2 027	5.54	3.40	0.31	65.81	0.65	37.73	8.59
Agriculture and fisheries	172.85	468	2 045	4.37	2.74	0.37	141.73	0.69	13.57	17.55
Non-nuclear energy	263.96	568	2 608	4.59	3.21	0.46	230.49	0.76	6.61	26.86
Transport	18.93	34	284	8.35	5.03	0.56	10.48	0.70	2.12	6.33
Targeted socio-economic research	30.35	84	388	4.62	3.87	0.36	29.65	0.62	0.00	0.70
International cooperation (5)	146.44	778	2 749	3.53	1.57	0.19	104.37	0.37	12.32	29.75
Dissemination and utilisation of the results	110.64	337	1 325	3.93	2.23	0.33	110.64	0.33	0.00	0.00
Training and mobility of researchers	213.69	964	1 638	1.70	1.41	0.22	202.92	0.25	0.00	10.77
Nuclear fission safety	4.23	58	259	4.47	2.90	0.07	0.00	0.00	2.96	1.27
Controlled thermonuclear fusion	163.76	149	167	1.12	1.10	1.10	162.82	1.15	0.00	0.94
TOTAL (6)	2 836.57	6 253	28 344	4.53	2.62	0.45	2 497.63	0.66	90.75	248.19

(1) Special measures are attached either to shared-cost actions, or to concerted actions, or to preparatory, accompanying and support measures, as appropriate.
(2) Contracts signed in 1998, whether or not amended by supplementary contracts signed in 1998: see (6).
(3) Sum of the total Community contributions to all new projects, as stipulated in the contracts (i.e. for the entire duration of each project).
(4) MS = Member States
(5) Horizontal international cooperation actions permitting certain non-member countries (e.g. those of Central and Eastern Europe) to participate in projects under specific programmes account for a further Community contribution of ECU 20.72 million.
(6) The supplementary contracts signed in 1998, amending contracts originally signed in 1995, 1996 and 1997, accounted for a further ECU 226 million.

Table 3A: Specific programmes under EC FP3 + Eurotom FP: All projects (contracts signed) projects under way, cumulative figures and payments in 1998

Names of specific programmes under EC FP3	Number of projects under way at 31.12.98 (1)	Overall number of projects (2)	Total payments 1998 (ECU million)	Overall Community contribution (ECU million) (3)
Information technologies	1	715	22.40	1 488.00
Communication technologies	0	123	2.27	523.70
Telematics applications of common interest	0	312	1.85	379.00
Industrial and materials technologies	4	1 655	22.50	761.42
Measurements and testing	4	202	2.57	57.70
Environment	0	659	3.14	305.72
Marine science and technology	0	145	1.18	107.72
Biotechnology	0	374	2.88	174.77
Agriculture and agro-industrial research, fisheries	5	634	20.18	350.06
Biomedicine and health	0	627	5.05	144.26
Life sciences and technologies for developing countries	9	355	2.92	121.16
Non-nuclear energy	0	506	3.06	242.14
Nuclear fission safety	0	125	0.00	46.28
Controlled thermonuclear fusion (4)	2	396	9.00	465.94
Human capital and mobility	11	3 461	28.33	548.06
Centralized action for diffusion and utilization of results	0	207	0.29	60.76
TOTAL	36	10 496	127.62	5 776.69

(1) Projects under way at 31.12.1998: contracts signed before 01.01.1999 with a completion date for research work after 31.12.1998.
(2) Total number of projects since the beginning of the third framework programme, including those which have already been completed.
(3) Overall Community contribution over the whole duration of the framework programme.
(4) The Fusion programme involves an additional 26.6 MECU from 3rd country receipts.

N.B.: Data on the Thermie programme are not included in this table, since up to 1994 Thermie was not covered by FP3.

Table 3B: Specific programmes under EC FP4 + Euratom FP: All projects (contracts signed (1)) projects under way, cumulative figures and payments in 1998

Names of specific programmes under EC FP4 + Euratom FP	Number of projects under way at 31.12.98 (2)	Overall number of projects (3)	Total payments 1998 (ECU million)	Overall Community contribution (ECU million) (4)
Telematics applications	367	710	191.37	811.24
Communication technologies	146	227	150.00	620.30
Information technologies	1 252	2 141	478.03	1 934.71
Industrial and materials technologies	1 243	2 449	383.72	1 616.13
Standards, measurements & testing	313	541	41.36	162.24
Environment and climate	638	1 141	130.68	532.70
Marine science and technology	170	309	53.27	227.68
Biotechnology	658	1 071	151.70	580.46
Biomedicine and health	700	1 037	81.66	363.38
Agriculture and fisheries	903	1 406	129.44	595.61
Non-nuclear energy	1 239	1 986	156.83	976.98
Transport	143	278	44.71	245.81
Targeted socio-economic research	151	246	22.76	89.64
International cooperation	1 159	2 479	116.62	460.59
Dissemination & utilization of the results	499	758	62.34	297.70
Training and mobility of researchers	2 313	3 928	177.87	765.90
Competitive S/T support (5)			28.29	
Nuclear fission safety	200	310	35.75	136.60
Controlled thermonuclear fusion	117	698	141.61	807.31
TOTAL	12 211	21 715	2 578.02	11 224.98

(1) Except where a specific programme provides otherwise, a project includes the initial and any supplementary contracts.
(2) Projects under way at 31.12.1998: contracts signed before 01.01.1999 with a completion date for research work after 31.12.1998.
(3) Total number of projects since the beginning of the fourth framework programme, including those which have already been completed.
(4) Overall Community contribution over the whole duration of the framework programme (including supplementary contracts).
(5) For competitive S/T support no statistical analysis is done on signed contracts; see however the presentation in Annex 1.

Table 4 : Specific programmes under EC FP4 + Euratom FP : Calls for proposals evaluated by the Commission in 1998

Names of specific programmes (EC FP4 + Euratom FP) and areas of work programme	Date and OJ reference of calls for proposals	Number of proposals received	Number of proposals eligible	Proposals approved by the Commission (1)		
				Number	Percentage of total number eligible	Forecast EC contribution (ECU million)
TELEMATICS APPLICATIONS						
Joint call for telematics applications and transport (intermodality)	C381/16 (16/12/97)	66	61	14	23.0%	12.18
INFORMATION TECHNOLOGY (ESPRIT)						
Software technologies (ST)	C81/08 (17/03/98)	9	7	2	28.6%	0.40
Technologies for components and subsystems (TCS)	C81/08 (17/03/98)	22	19	9	47.4%	10.00
High performance computing and networking (HPCN) (including ECU 12.3 million for demining)	C81/08 (17/03/98)	63	58	12	20.7%	16.00
Integration in manufacturing (IiM)	C81/08 (17/03/98)	45	39	5	12.8%	6.00
INDUSTRIAL AND MATERIALS TECHNOLOGIES (BRITE-EURAM)						
Brite-Euram-Esprit joint call (aeronautics) (Aeronautics)	C329/10 (31/10/97)	5	5	2	40.0%	20.86
Brite-Euram-Environment joint call (water)	C329/11 (31/10/97)	19	13	5	38.5%	4.65
Brite-Euram-Esprit joint call (intelligent manufacturing systems)	C117/15 (15/4/97)	7	7	7	100.0%	22.91
Thematic networks : stage 1	C357/4 (15/12/94)	102	102	33	32.4%	46.27
Thematic networks : stage 2	C357/4 (15/12/94)	12	12	7	58.3%	5.15
Accompanying measures	C337/2 (15/12/95)	135	135	87	64.4%	8.47
Training grants	C337/2 (15/12/95)	75	71	39	54.9%	3.30
Technology stimulation measures for SMEs	C337/33 (15/12/95)	670	588	304	51.7%	124.52
STANDARDS, MEASUREMENTS AND TESTING						
Standards and technical support to trade; measurements related to the needs of society	C183/08 (17/06/97)	196	187	37	19.8%	20.29
Targeted call: subjects related to the activities of the European standardisation bodies and in support of Community policy	C183/07 (17/06/97)	36	32	17	53.1%	5.91
Thematic networks	C357/06 (15/12/94)	31	30	13	43.3%	3.32
Accompanying measures	C148/06 (15/06/95)	45	45	22	48.9%	1.42
Training grants	C148/06 (15/06/95)	18	18	13	72.2%	1.17
Technology stimulation measures for SMEs	C357/06 (15/12/94)	73	73	27	37.0%	9.81
ENVIRONMENT AND CLIMATE						
Brite-Euram-Environment joint call - (water)	C329/11 (31/10/97)	59	58	9	15.5%	7.00
Advanced study courses	C381/09 (16/12/97)	66	66	12	18.2%	0.78
Technology stimulation measures for SMEs	C271/18 (17/09/96)	59	59	12	20.3%	4.14
MARINE SCIENCE AND TECHNOLOGY (MAST)						
Supporting initiatives	C183/16 (17/06/97)	13	11	3	27.3%	0.98
Advanced study courses	C381/10 (16/12/97)	9	9	3	33.3%	0.22
Technology stimulation measures for SMEs	C357/19 (15/12/94)	14	14	5	35.7%	2.01

(1) Including the reserve list, where appropriate.

Table 4 (cont'd) : Specific programmes under EC FP4 + Euratom FP : Calls for proposals evaluated by the Commission in 1998

Names of specific programmes (EC FP4 + Euratom FP) and areas of work programme	Date and OJ reference of calls for proposals	Number of proposals received	Number of eligible	Proposals approved by the Commission (1)		
				Number	Percentage of total number eligible	Forecast EC contribution (ECU million)
BIOTECHNOLOGY						
Cell factory; genome analysis; plant biotechnology; immunology and trans-disease vaccinology; structural biology; pre-normative research, biodiversity and social acceptance; infrastructure; ELSA	C183/05 (17/06/97)	572	572	154	26.9%	138.00
Training grants (open call)	C337/09 (15/12/95)					
-closing date 01/11/97		47	47	27	57.4%	2.54
-closing date 01/03/98		113	113	53	46.9%	4.59
-closing date 01/07/98		177	173	43	24.9%	4.06
Training grants for advanced study courses (open call)	C381/25 (17/12/96)					
-closing date 15/09/97		8	8	5	62.5%	0.24
-closing date 15/03/98		5	5	3	60.0%	0.14
-closing date 15/09/98		5	5	5	100.0%	0.20
BIOMEDICINE AND HEALTH (BIOMED)						
2nd BIOMED-BIOTECH-FAIR joint call (bovine spongiform encephalopathy)	C81/09 (17/03/98)	9	7	4	57.1%	2.57
Training grants (open call)	C12/7 (17/01/95)	176	175	73	41.7%	6.30
AGRICULTURE AND FISHERIES including agro-industry, food technologies, forestry, aquaculture and rural development (FAIR)						
Areas 3, 4 and 5 : nutritious foods, agriculture, forestry and rural development, fisheries and aquaculture	C313/08 (15/10/97)	388				
Technology stimulation measures for SMEs	C357/10 (15/12/94)	145				
NON-NUCLEAR ENERGY (JOULE-THERMIE)						
JOULE						
Open call: concerted action, accompanying measures, training grants, technology stimulation measures for SMEs	C357/11 (15/12/94)	127	126	84	66.7%	25.98
Rational use of energy - renewable sources of energy - fossil fuels	C18/05 (17/01/97)	353	324	124	38.3%	98.00
THERMIE						
Demonstration projects	C280/06 (16/09/97)	355	355	178	50.1%	96.70
Demonstration projects (gas turbines)	C188/15 (17/06/98)	10	9	9	100.0%	5.60
Accompanying measures (open call)	C357/11 (15/12/94)	453	453	244	53.9%	15.50
TRANSPORT						
Air transport, road transport, measures to consolidate the results of transport research under the 4th FP, measures/studies targeted on policy issues, tasks preparing for future activities in the field of transport research	C381/14 (16/12/97)	100	96	25	26.0%	13.93
Joint call for telematics applications and transport (intermodality)	C381/16 (16/12/97)	66	61	14	23.0%	12.18
INTERNATIONAL COOPERATION (INCO)						
INCO-B Japan/Korea grants	C38/08 (15/02/95)	99	98	76	77.6%	3.95
DISSEMINATION AND OPTIMISATION OF RESULTS (Innovation)						
European networks and services	C280/08 (16/9/97)	74	65	20	30.8%	5.60
Regional measures	C280/07 (16/9/97)	101	94	49	52.1%	11.50
TRAINING AND MOBILITY OF RESEARCHERS						
Accompanying measures (Euroconferences, summer schools, training courses)	C183/13 (17/06/97)	220	215	89	41.4%	4.80
Accompanying measures (Euroconferences, summer schools, training courses)	C381/11 (16/12/97)	270	255	76	29.8%	4.80
Training grants	C280/05 (16/09/97)	2 250	2 163	618	28.6%	53.10

(1) Including the reserve list, where appropriate.

Table 5A: Specific programmes under EC FP4 + Euratom FP : new projects (contracts signed (1) in 1998) Shared-cost actions (SCA) (2) Breakdown of the Community contribution (in ECU million) and number of participations by type of organisation

	European Union															
Type of organisation	LE(3)		SME(4)		REC (5)		EDU(6)		Other (7)		Int. Org. (8)		Third countries (9)		Total	
Names of specific programmes (EC FP4 + Euratom FP)	Comm. contrib. (M ECU)	Number of participations	Comm. contrib. (M ECU)	Number of participations	Comm. contrib. (M ECU)	Number of participations	Comm. contrib. (M ECU)	Number of participations	Comm. contrib. (M ECU)	Number of participations	Comm. contrib. (M ECU)	Number of participations	Comm. contrib. (M ECU)	Number of participations	Comm. contrib. (M ECU)	Number of participations
Telematics applications	16.37	139	31.06	313	20.96	178	43.36	392	30.84	364	2.12	26	7.03	132	151.74	1 544
Communication technologies	34.44	181	9.37	72	12.56	77	11.95	83	4.34	38	0.00	0	3.93	60	76.59	511
Information technologies	154.44	683	57.95	324	53.64	190	63.44	299	11.94	107	0.32	1	6.23	115	347.96	1 719
Industrial and materials technologies	128.79	1 059	149.66	2 349	109.30	931	93.17	774	6.91	127	0.83	3	4.42	148	493.08	5 391
Standards, measurements and testing	3.69	90	6.26	174	18.15	291	8.95	176	1.40	35	0.07	3	0.66	44	39.18	813
Environment and climate	8.31	48	11.95	182	55.07	449	54.37	435	3.55	73	1.17	8	5.16	114	139.58	1 309
Marine science and technology	0.35	2	3.37	43	18.36	106	22.51	111	0.52	5	0.00	0	3.86	33	48.97	300
Biotechnology	4.34	41	11.37	79	50.86	284	62.72	364	3.40	24	5.57	15	3.36	40	141.62	847
Biomedicine and health	0.69	13	7.02	130	19.43	140	34.09	245	1.74	24	0.21	4	2.63	50	65.81	606
Agriculture and fisheries	5.39	77	16.28	419	57.44	376	52.67	328	2.81	74	0.18	1	6.96	100	141.73	1 375
Non-nuclear energy	59.84	332	54.30	583	46.48	340	39.15	270	23.74	114	0.00	0	6.98	80	230.49	1 719
Transport	2.12	37	3.95	50	0.91	16	1.40	20	2.02	22	0.00	1	0.08	8	10.48	154
Targeted socio-economic research	0.00	0	0.29	4	6.62	76	18.58	223	2.89	28	0.04	1	1.23	20	29.65	352
International cooperation	1.38	27	2.81	45	16.97	240	27.95	391	2.06	35	0.10	1	53.10	920	104.37	1 659
Dissemination and utilization of the results	14.17	121	38.15	440	14.85	177	8.60	129	30.12	371	1.24	28	3.51	59	110.64	1 325
Training and mobility of researchers	2.91	23	4.14	23	60.94	397	119.52	907	1.36	9	4.60	30	9.45	86	202.92	1 475
Nuclear fission safety	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Controlled thermonuclear fusion	10.50	9	0.66	4	71.84	86	1.06	11	4.60	22	70.59	2	3.57	6	162.82	140
TOTAL	447.73	2 882	408.59	5 234	634.38	4 354	663.49	5 158	134.24	1 472	87.04	124	122.16	2 015	2 497.63	21 239

(1) Contracts signed in 1998, whether or not amended by supplementary contracts signed in 1998: contracts signed in 1995, 1996 and 1997 which have been amended by supplementary contracts signed in 1998 are not included.

(2) On account of their nature, some special measures are attached to the shared-cost actions.

(3) LE: Large enterprises.

(4) SME: enterprises which have fewer than 500 employees, not more than a third of whose capital is controlled by a large enterprise and with a turnover not exceeding ECU 38 million (ECU 50 million for information technologies).

(5) REC: Research bodies (private/public/mixed), including the JRC.

(6) EDU: Higher education institutes.

(7) Other: EIG, EEIG, non-profit-making bodies, etc

(8) Int. Org.: International organizations.

(9) Third countries: countries not belonging to the European Union.

Table 5B: Specific programmes under EC FP4 + Euratom FP: new projects (contracts signed (1) in 1998): shared-cost actions (SCA) (2): Share (%) of the Community contribution and of the participations by type of organisations

	European Union															
Type of organisation	LE(3)		SME(4)		REC (5)		EDU(6)		Other (7)		Int. Org. (8)		Third countries (9)		Total	
Names of specific programmes (EC FP4 + Euratom FP)	Comm. contrib.	Participations	Comm. contrib.	Participations	Comm. contrib.	Participations	Comm. contrib.	Participations	Comm. contrib.	Participations	Comm. contrib.	Participations	Comm. contrib.	Participations	Comm. contrib.	Participations
Telematics applications	10 79	9 00	20 47	20 27	13 81	11 53	28 58	25 39	20 32	23 58	1 40	1 68	4 63	8 55	100 00	100 00
Communication technologies	44 97	35 42	12 23	14 09	16 40	15 07	15 60	16 24	5 67	7 44	0 00	0 00	5 13	11 74	100 00	100 00
Information technologies	44 38	39 73	16 65	18 85	15 42	11 05	18 23	17 39	3 43	6 22	0 09	0 06	1 79	6 69	100 00	100 00
Industrial and materials technologies	26 12	19 64	30 35	43 57	22 17	17 27	18 90	14 36	1 40	2 36	0 17	0 06	0 90	2 75	100 00	100 00
Standards, measurements and testing	9 42	11 07	15 98	21 40	46 32	35 79	22 84	21 65	3 57	4 31	0 18	0 37	1 68	5 41	100 00	100 00
Environment and climate	5 95	3 67	8 56	13 90	39 45	34 30	38 95	33 23	2 54	5 58	0 84	0 61	3 70	8 71	100 00	100 00
Marine science and technology	0 71	0 67	6 88	14 33	37 49	35 33	45 97	37 00	1 06	1 67	0 00	0 00	7 88	11 00	100 00	100 00
Biotechnology	3 06	4 84	8 03	9 33	35 91	33 53	44 29	42 98	2 40	2 83	3 93	1 77	2 37	4 72	100 00	100 00
Biomedicine and health	1 05	2 15	10 67	21 45	29 52	23 10	51 80	40 43	2 64	3 96	0 32	0 66	4 00	8 25	100 00	100 00
Agriculture and fisheries	3 80	5 60	11 49	30 47	40 53	27 35	37 16	23 85	1 98	5 38	0 13	0 07	4 91	7 27	100 00	100 00
Non-nuclear energy	25 96	19 31	23 56	33 92	20 17	19 78	16 99	15 71	10 30	6 63	0 00	0 00	3 03	4 65	100 00	100 00
Transport	20 23	24 03	37 69	32 47	8 68	10 39	13 36	12 99	19 27	14 29	0 00	0 65	0 76	5 19	100 00	100 00
Targeted socio-economic research	0 00	0 00	0 98	1 14	22 33	21 59	62 66	63 35	9 75	7 95	0 13	0 28	4 15	5 68	100 00	100 00
International cooperation	1 32	1 63	2 69	2 71	16 26	14 47	26 78	23 57	1 97	2 11	0 10	0 06	50 88	55 46	100 00	100 00
Dissemination and utilization of the results	12 81	9 13	34 48	33 21	13 42	13 36	7 77	9 74	27 22	28 00	1 12	2 11	3 17	4 45	100 00	100 00
Training and mobility of researchers	1 43	1 56	2 04	1 56	30 03	26 92	58 90	61 49	0 67	0 61	2 27	2 03	4 66	5 83	100 00	100 00
Nuclear fission safety	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Controlled thermonuclear fusion	6 45	6 43	0 41	2 86	44 12	61 43	0 65	7 86	2 83	15 71	43 35	1 43	2 19	4 29	100 00	100 00
TOTAL	17 93	13 57	16 36	24 64	25 40	20 50	26 56	24 29	5 37	6 93	3 48	0 58	4 89	9 49	100 00	100 00

(1) Contracts signed in 1998, whether or not amended by supplementary contracts signed in 1998: contracts signed in 1995, 1996 and 1997 which have been amended by supplementary contracts signed in 1998 are not included.

(2) On account of their nature, some special measures are attached to the shared-cost actions.

(3) LE: Large enterprises.

(4) SME: enterprises which have fewer than 500 employees, not more than a third of whose capital is controlled by a large enterprise and with a turnover not exceeding ECU 38 million (ECU 50 million for information technologies).

(5) REC: Research bodies (private/public/mixed), including the JRC.

(6) EDU: Higher education institutes.

(7) Other: EIG, EEIG, non-profit-making bodies, etc.

(8) Int. Org.: International organizations.

(9) Third countries: countries not belonging to the European Union.

Table 6: Specific programmes under EC FP4 + Euratom FP: New Projects (contracts signed (1) in 1998): Shared-cost actions (SCA) (2)

Access to European research for Objective 1 regions

Names of specific programmes (EC FP4 + Euratom FP)	Number of projects		Number of participations		Total Community contribution to the projects (ECU million)	
	Total	Objective 1 (3)	Total	Objective 1 (4)	Total	Objective 1 (5)
Telematics applications	140	91	1 544	274	151.74	106.53
Communication technologies	62	36	511	60	76.59	47.00
Information technologies	299	134	1 719	225	347.96	164.73
Industrial and materials technologies	552	310	5 391	734	493.08	266.95
Standards, measurements and testing	101	53	813	110	39.18	21.14
Environment and climate	211	102	1 309	203	139.58	72.68
Marine science and technology	40	28	300	41	48.97	34.13
Biotechnology	154	54	847	72	141.62	53.91
Biomedicine and health	101	38	606	55	65.81	24.70
Agriculture and fisheries	205	132	1 375	318	141.73	30.58
Non-nuclear energy	305	151	1 719	274	230.49	103.09
Transport	15	10	154	11	10.48	7.71
Targeted socio-economic research	48	35	352	59	29.65	21.72
International cooperation	280	98	1 659	330	104.37	37.81
Dissemination and utilization of the results	337	130	1 325	235	110.64	41.82
Training and mobility of researchers	801	147	1 475	179	202.92	86.39
Nuclear fission safety	0	0	0	0	0.00	0.00
Controlled thermonuclear fusion	122	7	140	7	162.82	0.76
TOTAL	3 773	1 556	21 239	3 187	2 497.63	1 121.65

(1) Contracts signed in 1998, whether or not amended by supplementary contracts signed in 1998:
contracts signed in 1995, 1996 and 1997 which have been amended by supplementary contracts signed in 1998 are not included.
(2) On account of their nature, some special measures are attached to the shared-cost actions.
(3) All projects with at least one participant based in an "Objective 1" region.
(4) All participations by participants based in "Objective 1" regions.
(5) Total Community contribution to all projects, with at least one participant in an "Objective 1" region.

Table 7: Specific programmes under EC FP4 + Euratom FP: New projects (contracts signed in 1998 (1); Shared-cost actions (SCA) (2) Intra-country and inter-country collaboration links (3), excluding international organisations (4))

	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxemb.	Netherlands	Austria	Portugal	Finland	Sweden	United Kingdom	TOTAL EU-15	Liechtens.	Iceland	Norway	Israel	Switzerland	Rest of the world	TOTAL
Belgium	549	185	1 309	318	436	1 344	140	867	41	559	152	187	184	262	1 002	7 535	0	9	78	33	152	220	8 027
Denmark	185	232	677	159	229	499	92	330	33	380	190	114	123	281	664	4 188	0	12	124	16	85	142	4 567
Germany	1 309	677	3 065	783	1 562	3 608	339	2 563	52	1 614	822	560	648	1 231	3 668	22 501	2	26	340	106	555	790	24 328
Greece	318	159	783	582	502	711	144	742	70	360	182	158	315	248	948	6 222	0	25	86	33	90	257	6 713
Spain	436	229	1 562	502	1 161	1 556	157	1 372	36	489	284	554	226	383	1 436	10 383	0	10	122	55	115	346	11 031
France	1 344	499	3 608	711	1 556	2 477	333	2 598	122	1 036	505	607	551	791	3 141	19 879	3	30	314	89	429	654	21 398
Ireland	140	92	339	144	157	333	158	233	66	207	87	126	182	132	688	3 084	0	6	51	29	76	103	3 349
Italy	867	330	2 563	742	1 372	2 598	233	1 744	30	811	416	422	455	484	2 447	15 514	0	15	217	84	331	408	16 569
Luxembourg	41	33	52	70	36	122	66	30	75	11	54	31	120	26	124	891	0	3	17	6	15	6	938
Netherlands	559	380	1 614	360	489	1 036	207	811	11	774	166	228	337	490	1 593	9 055	0	13	237	41	195	374	9 915
Austria	152	190	822	182	284	505	87	416	54	166	383	51	136	223	572	4 223	0	3	28	21	79	122	4 476
Portugal	187	114	560	158	554	607	126	422	31	228	51	232	161	113	659	4 203	0	31	74	9	45	137	4 499
Finland	184	123	648	315	226	551	182	455	120	337	136	161	429	353	749	4 969	0	25	108	33	86	140	5 361
Sweden	262	281	1 231	248	383	791	132	484	26	490	223	113	353	534	1 142	6 693	0	15	224	9	120	194	7 255
United Kingdom	1 002	664	3 668	948	1 436	3 141	688	2 447	124	1 593	572	659	749	1 142	3 016	21 849	0	47	480	87	385	687	23 535
Total EU-15	7 535	4 188	22 501	6 222	10 383	19 879	3 084	15 514	891	9 055	4 223	4 203	4 969	6 693	21 849	78 300	5	270	2 500	651	2 758	4 580	89 064
Liechtenstein	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	5	0	0	0	0	1	0	6
Iceland	9	12	26	25	10	30	6	15	3	13	3	31	25	15	47	270	0	41	15	0	4	12	342
Norway	78	124	340	86	122	314	51	217	17	237	28	74	108	224	480	2 500	0	15	220	5	70	97	2 907
Israel	33	16	106	33	55	89	29	84	6	41	21	9	33	9	87	651	0	0	5	24	18	59	757
Switzerland	152	85	555	90	115	429	76	331	15	195	79	45	86	120	385	2 758	1	4	70	18	255	85	3 191
Rest of the world	220	142	790	257	346	654	103	408	6	374	122	137	140	194	687	4 580	0	12	97	59	85	2 281	7 114
GRAND TOTAL	8 027	4 567	24 320	6 713	11 031	21 398	3 349	16 569	938	9 915	4 476	4 499	5 361	7 255	23 535	89 064	6	342	2 907	757	3 191	7 114	92 251

(1) Contracts signed in 1998 not amended by supplementary contracts signed in 1998: contracts signed in 1995, 1996 and 1997 which have been amended by supplementary contracts signed in 1998 are not included.

(2) On account of their nature, some special measures are attached to the shared-cost actions.

(3) A collaboration link between 2 participants from the same country is counted once only. A collaboration link between 2 different countries is counted twice, once for each country (the table is symmetric).

For the European Union, counting each link once only, there is a total of 78,300 links between research teams (the boxes between the thick line and the EU-15 line).

For the European Union, counting each link once only, there is a total of 89,064 links, including those between the EU and third countries (all cases under the bold line, except those between third countries).

For the European Economic Area, counting each link once only, there is a total of 81,351 links between research teams (all cases under the bold line concerning EEA countries).

For the European Union and third countries, counting each link once only, there is a total of 92,251 links between research teams (all cases below the bold line).

(4) The JRC (cf.(5), tables 5A and 5B) is included under the address of the centre carrying out the research, as the host Member State benefits indirectly from hosting the JRC centre.

A further 473 collaboration links with international organisations (IO) other than the JRC (links between two IOs or between an IO and a country) are not included in this table.

Table 8:
Funding of the Fourth EC Framework Programme and of the Euratom Framework Programme (ECU million)

(including decisions on enlargement and additional funding)

	Fourth Framework Programme Decisions 1110/94/EC, 616/96/EC 2535/97/EC			Euratom Framework Programme Decisions 94/268, 96/253/Euratom		TOTAL	
	Indirect actions	JRC	Support for DGs	Indirect actions	JRC		
FIRST ACTIVITY Research, technological development and demonstration activities	9 425	639	96				
Information and communication technologies	3 646	11.5	10.5				3 668
1. Telematics applications	913					913	
2. Communications technologies	671					671	
3. Information technologies	2 062	11.5	10.5			2 084	
Industrial technologies	1 921	208.5	10.5				2 140
4. Industrial and materials technologies	1 737	96				1 833	
5. Measurement and testing	184	112.5	10.5			307	
Environment	816.5	313	27.5				1 157
6. Environment and climate	573. 5	313	27.5			914	
7. Marine science and technology	243					243	
Life sciences and technologies	1 627.5	50	31.5				1 709
8. Biotechnology	595. 5					595.5	
9. Biomedicine and health	374					374	
10. Agriculture and fisheries	658	50	31.5			739.5	
Energy	1 039	21	16	1 016.5	319.5		2 412
11. Non-nuclear energy	1 039	21	16			1 076	
12. Nuclear fission safety				170.5	270.5	441	
13. Controlled thermonuclear fusion				846	49	895	
14. Transport	263						263
15. Targeted socio-economic research	112	35					147
SECOND ACTIVITY Cooperation with third countries and international organisations	575						575
THIRD ACTIVITY Dissemination and utilisation of results	312		40				352
FOURTH ACTIVITY Stimulation of the training and mobility of researchers	792						792
TOTAL	11 104	639	136	1 016.5	319.5		
MAXIMUM OVERALL AMOUNT	11 879			1 336			13 215

(6)

Table 9 : Funding of EC FP5 + Euratom FP

(M€)

	Amount 1999-2002(1)	Budget 1999
Fifth Framework Programme EC + Euratom	14960	3450
Fifth Framework Programme - EC	13700	3140
Quality of life and management of living resources	2413	553
Food, nutrition and health	*290*	
Control of infectious diseases	*300*	
The "Cell Factory"	*400*	
Environment and health	*160*	
Sustainable agriculture, fisheries and forestry, and integrated development of rural areas including mountain areas	*520*	
The ageing population and disabilities	*190*	
RTD activities of a generic nature	*483*	
Support for research infrastructures	*70*	
User-friendly information society	3600	857
Systems and services for the citizen	*646*	
New methods of work and electronic commerce	*547*	
Multimedia content and tools	*564*	
Essential technologies and infrastructures	*1363*	
RTD activities of a generic nature	*319*	
Support for research infrastructures	*161*	
Competitive and sustainable growth	2705	646
Innovative products, processes and organisation	*731*	
Sustainable mobility and intermodality	*371*	
Land transport and marine technologies	*320*	
New perspectives for aeronautics	*700*	
RTD activities of a generic nature	*546*	
Support for research infrastructures	*37*	
Energy, environment and sustainable development	2125	446
Environment and sustainable development	*1083*	223
Sustainable management and quality of water	*254*	
Global change, climate and biodiversity	*301*	
Sustainable marine ecosystems	*170*	
The city of tomorrow and cultural heritage	*170*	
RTD activities of a generic nature	*119*	
Support for research infrastructures	*69*	
Energy	*1042*	223
Cleaner energy systems, including renewables	*479*	
Economic and efficient energy for a competitive Europe	*547*	
RTD activities of a generic nature	*16*	

(1) Indicative breakdown in italics; subtotals underlined

Table 9 (continued) : Funding of EC FP5 + Euratom FP

(M€)

	Amount 1999-2002(1)	Budget 1999
Confirming the international role of Community research	475	78
Cooperation with certain categories of third countries :		
- States in the pre-accession phase	*26*	
- NIS and CEECs	*112*	
- Mediterranean partner countries	*55*	
- Developing countries	*210*	
- Emerging economy and industrialised countries	*5*	
Training of researchers	*15*	
Coordination	*52*	
Promotion of innovation and encouragement of SME participation	363	78
Promotion of innovation	*119*	
Encouraging SME participation	*44*	
Joint innovation/SME activities	*200*	
Improving human research potential and the socio-economic knowledge base	1280	293
Supporting training and mobility of researchers	*858*	
Enhancing access to research infrastructures	*182*	
Promoting Scientific and technolocial excellence	*50*	
Improving the socio-economic knowledge base	*165*	
Support for the development of scientific and technology policies in Europe	*25*	
Direct Actions (JRC)	739	189
Serving the Citizen	*292*	
Enhancing Sustainability	*321*	
Underpinning European Competitiveness	*126*	
Fifth Framework Programme - Euratom	1260	310
Indirect Actions	979	238.2
Controlled Thermonuclear Fusion	788	207
Nuclear Fission	191	31.2
Key-action : nuclear fission	*142*	
RTD activities of a generic nature	*39*	
Support for research infrastructures	*10*	
Direct Actions (JRC)	281	71.8
Nuclear fission safety	*122*	
Nuclear safeguards	*138*	
Decommissioning and waste management	*21*	

(1) Indicative breakdown in italics; subtotals underlined

Table 10: Community research commitments: Trend for the period 1984 - 2002

(ECU and € million, current prices)

Situation at 01.02.99

YEARS	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999 (3)	2000 (4)	2001 (4)	2002 (4)	TOTAL
1984-87 FP	593.0	735.0	874.0	701.8	260.8	101.1	4.9													3 270.6
1987-91 FP				188.1	810.6	1 241.3	1 596.9	1 270.7	230.9	14.8	3.9	0.2								5 357.4
1990-94 FP								296.0	2 160.5	2 079.5	2 014.7	1.0								6 551.7
1994-98 FP (1)												2 982.5	3 153.5	3 485.6	3 499.3					13 120.9
1998-2002																3 450.0	3 600.0	3 900.0	4 010.0	14 960.0
RTD PROGRAMMES	593.0	735.0	874.0	889.9	1 071.4	1 342.4	1 601.8	1 566.7	2 391.4	2 094.3	2 018.6	2 983.7	3 153.5	3 485.6	3 499.3	3 450.0	3 600.0	3 900.0	4 010.0	43 260.6
APAS				49.4	56.6	69.8	113.1	168.8	308.4	440.2	571.8	2.1								1 780.2
RTD+APAS	593.0	735.0	874.0	939.3	1 128.0	1 412.2	1 714.9	1 735.5	2 699.8	2 534.5	2 590.4	2 985.8	3 153.5	3 485.6	3 499.3	3 450.0	3 600.0	3 900.0	4 010.0	45 040.8
SPRINT							16.0	16.0	17.0											49.0
ECSC							17.5	17.5	17.5	17.5	17.5									87.5
80% of THERMIE							36.0	118.4	128.9	139.2	145.6									568.1
Total for all research (2)	593.0	735.0	874.0	939.3	1 128.0	1 412.2	1 784.4	1 887.4	2 863.2	2 691.2	2 753.5	2 985.8	3 153.5	3 485.6	3 499.3	3 450.0	3 600.0	3 900.0	4 010.0	45 745.4

4269.0 i.e. 2.42% of the budget

7151 i.e. 3.18% of the budget

11980 i.e. 4.05% of the budget

15878 i.e. 4.00% of the budget

18459 i.e. 3.73 % of the budget

EC budget (current prices)	28 905	29 925	35 842	38 392	43 080	42 569	45 057	56 111	61 232	67 760	65 929	75 355	82 125	85 028	89 003	95 349	99 100	103 500	108 200
RTD programme as % of budget	2.1	2.5	2.4	2.3	2.5	3.2	3.6	2.8	3.9	3.1	3.1	4.0	3.8	4.1	3.9	3.6	3.6	3.8	3.7
Total research as % of budget	2.1	2.5	2.4	2.4	2.6	3.3	4.0	3.4	4.7	4.0	4.2	4.0	3.8	4.1	3.9	3.6	3.6	3.8	3.7

(1) The amounts of the 1994-1998 FP are those adopted following EU enlargement.

(2) RTD + THERMIE + ECSC + SPRINT + APAS.

(3) Budget for 1999

(4) Estimates for 2000-2002

Table 11: Development of Community research commitments:

trend for the period 1984 - 2002

(ECU and € million - 1992 prices)

Situation at 01.02.99

YEARS	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999 (3)	2000 (4)	2001 (4)	2002 (4)	TOTAL
1984-87 FP	834.0	974.8	1 120.5	870.7	312.3	115.1	5.3													4 232.7
1987-91 FP				233.4	970.8	1 413.8	1 739.5	1 315.4	230.9	14.6	3.8	0.2								5 922.4
1990-94 FP								306.4	2 160.5	2 050.8	1 950.3	1.0								6 469.0
1994-98 FP (1)												2 851.3	2 917.2	3 140.2	3 099.5					12 008.2
1998-2002																3 007.8	3 076.9	3 269.1	3 295.0	12 648.8
RTD PROGRAMMES	834.0	974.8	1 120.5	1 104.1	1 283.1	1 528.9	1 744.8	1 621.8	2 391.4	2 065.4	1 954.1	2 852.5	2 917.2	3 140.2	3 099.5	3 007.8	3 076.9	3 269.1	3 295.0	41 281.1
APAS				61.3	67.8	79.5	123.2	174.7	308.4	434.1	553.5	2.0								1 804.5
RTD+APAS	834.0	974.8	1 120.5	1 165.4	1 350.9	1 608.4	1 868.0	1 796.5	2 699.8	2 499.5	2 507.6	2 854.5	2 917.2	3 140.2	3 099.5	3 007.8	3 076.9	3 269.1	3 295.0	43 085.6
SPRINT							17.4	16.6	17.0											51.0
ECSC							19.1	18.1	17.5	17.3	16.9									88.9
80% of THERMIE							39.2	122.6	128.9	137.3	140.9									568.9
Total for all research (2)	834.0	974.8	1 120.5	1 165.4	1 350.9	1 608.4	1 943.7	1 953.8	2 863.2	2 654.1	2 665.4	2 854.5	2 917.2	3 140.2	3 099.5	3 007.8	3 076.9	3 269.1	3 295.0	43 794.4
		5446.0	i.e.	2.41%	of the budget															
				8022	i.e.	3.15%	of the budget													
							12080	i.e.	4.04%	of the budget										
											14677	i.e.	4.00%	of the budget						
																15748	i.e.	3.73 %	of the budget	

EC BUDGET (1992 prices)	40 654	39 688	45 951	47 633	51 593	48 484	49 082	58 086	61 232	66 824	63 823	72 041	75 971	76 602	78 833	83 129	84 701	86 756	88 907
RTD Programme as % of budget	2.1	2.5	2.4	2.3	2.5	3.2	3.6	2.8	3.9	3.1	3.1	4.0	3.8	4.1	3.9	3.6	3.6	3.8	3.7
Total research as % of budget	2.1	2.5	2.4	2.4	2.6	3.3	4.0	3.4	4.7	4.0	4.2	4.0	3.8	4.1	3.9	3.6	3.6	3.8	3.7
Deflation factors (5)	0.711	0.754	0.78	0.806	0.835	0.878	0.918	0.966	1.000	1.014	1.033	1.046	1.081	1.11	1.129	1.147	1.17	1.193	1.217
Annual inflation (%)		6.0	3.5	3.3	3.6	5.1	4.5	5.2	3.5	1.4	1.9	1.3	3.3	2.7	1.7	1.6	2.0	2.0	2.0	

(1) The amounts of the 1994-1998 FP are those adopted following EU enlargement.

(2) RTD + THERMIE + ECSC + SPRINT + APAS

(3) Budget for 1999

(4) Estimates for 2000-2002

(5) The deflation factors used from 1995 take account of the enlargement of the Union from 12 to 15 Member States (COM(96)65). They are estimates from 1999 onwards.

ANNEX 3

COMMUNITY RESEARCH IN 1999

This annex provides an overview of the Community research actions which will be launched under the 5th Framework Programme during 1999.

Summaries are provided of the structure and content of each of the thematic and horizontal programmes under FP5, along with the main calls for proposals to be published in 1999.

The 5th Framework Programme consists of a relatively small of number specific programmes to be implemented, in the case of indirect actions, through a limited number of calls covering, in the first instance, large parts of the programme. Whilst this Annex provides basic information of interest to the general reader, prospective applicants to each of these programmes should consult the Commission's research web server (www.cordis.lu) and the Official Journal for full information on work programmes, calls for proposals and guidance on how to make applications.

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QUALITY OF LIFE AND MANAGEMENT OF LIVING RESOURCES

(more information: www.cordis.lu/life)

1. STRUCTURE AND CONTENT

Key Actions

i) Food, nutrition and health: improving health through safe, balanced and varied food supply for consumers covering the whole food chain.

ii) Control of infectious diseases: the fight against infectious diseases, based on new and improved vaccines, a better understanding of the immune system, and public health aspects.

iii) The "cell factory": exploiting advances in understanding the cellular and sub-cellular properties of micro-organisms, plants and animals, for health, environment, agriculture, chemicals etc.

iv) Environment and health: reducing the adverse impact on health of changes to the environment.

v) Sustainable agriculture, fisheries and forestry, and integrated development of rural areas including mountain areas: developing the knowledge and technologies needed for the production and exploitation of living resources, covering the whole production chain.

vi) The ageing population and disabilities: promoting the health and autonomy of older people by prevention and treatment of age-related illnesses and disabilities and their social consequences.

Research and technological development activities of a generic nature

- Chronic and degenerative diseases, cancer, diabetes, cardio-vascular diseases and rare diseases.
- Research into genomes and diseases of genetic origin.
- Neurosciences.
- Public health and health services research.
- Research relating to persons with disabilities.
- Biomedical ethics and bioethics in the context of respect for fundamental human values.
- Socio-economic aspects of life sciences and technologies.

Support for research infrastructures: biological collections and information resources, clinical and pre-clinical research facilities, facilities for fishery and aquaculture research.

2. PRIORITIES IN 1999 AND MAIN CALLS FOR PROPOSALS

The Quality of Life programme makes a break with the past, having combined biomedical, agricultural and other biological subjects into a coherent set of actions, directed towards societal objectives. Meeting the challenges of healthy food, preventive medicine, care for the elderly, bioentrepreneurship or bio-resource management, will depend on very diverse and demanding partnerships. Each key action in particular promotes convergence of effort of the research communities and of the programme management to function as an integrative endeavour.

For this reason, the programme has set out from the start a clear and comprehensive strategy of all future calls. With the help of detailed suggestions from consultation of External Advisory Groups, the first call focuses on a number of high priority intermediary steps which need to be taken in order for the longer term objectives of the various actions and components of the work programme to be met. These steps have to do with creating sufficient critical mass, filling-in technology gaps, exploiting available data from previous programmes, responding to urgent societal problems (e.g. food poisoning) and have been identified in the 1999 edition of the workprogramme through the "roadmap".

One major call has been launched in 1999, which has been restricted to these priorities, and invites proposals for a series of different submission dates depending on the subject matter.

Publication date: 06.03.1999, OJ C 64
Deadlines: June and October 1999 (specific dates differ by subject area)
Budget*: 769 M€

* Indicative budget for the call

USER-FRIENDLY INFORMATION SOCIETY

(more information: www.cordis.lu/ist)

1. STRUCTURE AND CONTENT

Key Actions

i) Systems and services for the citizen: fostering the creation of next-generation general interest digital services (health, disabled, public administrations, environment, transport) for flexible access to all citizens.

ii) New methods of work and electronic commerce: developing technologies to help companies operate and trade more efficiently, and facilitating improvements in working conditions.

iii) Multimedia content and tools: future information products and services, enabling linguistic and cultural diversity, for electronic publishing and education and training, including innovative forms of multimedia content, and tools for structuring and processing them.

iv) Essential technologies and infrastructures: promoting technologies for the Information Society (communications, networks, software, microelectronics, etc.), speeding up their introduction and broadening their field of application.

Research and technological development activities of a generic nature

- Future and emerging technologies

Support for research infrastructures: support for broadband interconnection of national research and education networks, and advanced European testbeds to assist in development of standards, results and applications, to facilitate implementation and inter-operability of advanced computer and communication systems for research.

2. PRIORITIES IN 1999 AND MAIN CALLS FOR PROPOSALS

The priorities for 1999 will be to:

- Expand the technological basis of convergence: e.g. innovative communication and open service platforms.
- Remove and overcome the bottlenecks that prevent the development of ubiquitous and scalable access networks and interoperation of heterogeneous systems: e.g. technologies for personal and mobile communications and standards for data, software service and system building blocks.
- Build key, user-friendly applications that enable the potential of the Information Society: e.g. develop integrated management and personalised access to content, knowledge and information.
- Support new organisational schemes to enable businesses, organisations and individuals to take advantage of their new environment: e.g. enhance efficiency and friendliness of administrations, build trust and confidence, create new working environments, establish new supplier/consumer relationships.

In addition, these priorities are complemented by policy-oriented objectives, essentially:

- Support to European policy objectives through technological developments, for example in areas such as: data security, data protection and privacy, next generation mobile voice and data services, control of illegal and harmful content.
- Anticipating market needs and nurturing emerging technologies: where public funding can make a substantial impact in terms of helping to aggregate fragmented research and build critical mass in anticipation of market maturity.

Two calls will be launched in 1999, together covering all areas of the programme in a complementary fashion:

First call		Second call	
Publication date:	16.03.1999, OJ C 76	Publication date:	15.09.1999
Deadline:	16.06.1999	Deadline:	15.12.1999
Budget*:	800 M€	Budget*:	400 M€

* Indicative budget for the call

COMPETITIVE AND SUSTAINABLE GROWTH

(more information: www.cordis.lu/growth)

1. STRUCTURE AND CONTENT

Key Actions

i) Innovative products, processes, and organisation: facilitating the development of high-quality innovative products and services, and new methods of sustainable production and manufacture.

ii) Sustainable mobility and intermodality: developing integrated options for the mobility of people and goods, improving transport efficiency, safety and reliability, reducing congestion and environmental disbenefits.

iii) Land transport and marine technologies: developing innovative materials, technologies, and systems for sustainable and efficient land transport, and for sustainable exploitation of the sea's potential.

iv) New perspectives in aeronautics: helping the development of aircraft, systems and components to improve European competitiveness whilst assuring rational management of air traffic.

Research and technological development activities of a generic nature

- New and improved materials and their production and transformation.
- New and improved materials and production technologies in the steel field.
- Measurements and testing.

Support for research infrastructures: support for large infrastructures through networking ("virtual institutes"), laboratories and facilities for measurements and tests, and specialised databases.

2. PRIORITIES IN 1999 AND MAIN CALLS FOR PROPOSALS

Research will focus on a small number of integrated activities: **Innovative products, processes and organisation** (customer-oriented and high-tech production; towards new and miniaturised products and processes; machinery, production equipment and systems for manufacturing; towards zero-waste in manufacturing and processing); **Sustainable mobility and intermodality** (socio-economic scenarios for mobility of people and goods; infrastructure and their interfaces with transport means and systems; modal and intermodal transport management systems); **Land transport and marine technologies** (new land transport vehicle concepts; enhanced systems efficiency and advanced concepts for ships and vessels; competitive shipbuilding); **New perspectives in aeronautics** (low cost, low weight primary structures; efficient and environmentally friendly aero-energies; novel rotary-wing aircraft configuration; more autonomous aircraft in the future air traffic management system).

Generic research will focus on materials research with medium to long term impact, and on instrumentation, measurement and testing methodologies to support quality and standardisation. **Support for research infrastructures** will focus on setting up on virtual institutes and measurement and quality management infrastructures.

The programme will be implemented through three types of calls for proposals: periodic, dedicated and open:

First periodic call		Second periodic call	
Publication date:	16.03.99, OJ C 72	Publication date:	15.12.1999
Deadline:	15.06.99	Deadline:	15.03.2000
Budget*:	730 M€	Budget*:	670 M€
Areas covered:	all programme elements except support for infrastructure	Areas covered:	focused according to the results of the first call

Included in the first periodic call is an open call, addressing Marie Curie fellowships, SME measures and accompanying measures.

First dedicated call		Second dedicated call	
Publication date:	15.06.1999	Publication date:	15.10.1999
Deadline:	15.09.1999 and 15.11.1999	Deadline:	15.04.2000

* Indicative budget for the call

(more information: www.cordis.lu/eesd)

1. STRUCTURE AND CONTENT

Part A: Environment and Sustainable development

Key Actions

i) Sustainable management and quality of water: producing the knowledge and technologies needed for rational management of water resources for domestic, industrial and agricultural needs.

ii) Global change, climate and biodiversity: developing the scientific and technological understanding and tools and assessing the impact of changes to underpin Community policies.

iii) Sustainable marine ecosystems: promoting sustainable and integrated management of marine resources.

iv) City of tomorrow and cultural heritage: sustainable economic development of the urban environment, improved urban planning and management; protection of quality of life and cultural identity of urban inhabitants, restoration of social equilibria and protection of cultural heritage.

Research and technological development activities of a generic nature

- The fight against major natural and technological hazards.
- Development of generic earth observation satellite technologies.
- Socio-economic aspects of environmental change in the perspective of sustainable development

Support for research infrastructures: research installations on climate and global change, marine research and natural risks.

Part B: Energy (This part of the Programme is jointly managed by DG XII and DG XVII)

Key Actions

i) Cleaner energy systems, including renewable energies: minimising the environmental impact of the production and use of energy in Europe, by reducing emissions at local and global levels and by increasing the share of new and renewable energy sources

ii) Economic and efficient energy for a competitive Europe: providing Europe with a reliable, clean, efficient, safe and economic energy supply, through improved efficiency and reduced costs at every stage of the energy cycle.

Research and technological development activities of a generic nature

- Socio-economic aspects of energy within the perspective of sustainable development
- Development of tools for technology assessment and monitoring the socio-economic impact of energy technologies, systems and services
- Methodologies for global systems analysis

2. PRIORITIES IN 1999 AND MAIN CALLS FOR PROPOSALS

- **For environment,** this is implemented through two separate calls in 1999:

First call		Second call	
Publication date:	20.03.1999, OJ C 77	Publication date:	15.10.1999
Deadline:	15.06.1999	Deadline:	17.02.2000
Budget*:	208 M€	Budget*:	233 M€ for commitment in 2000

- **For energy,** this is implemented in 1999 through three calls published simultaneously on 20.03.1999 (OJ C 77):

First call (shared-cost actions, concerted actions and thematic networks)		Second call	
Deadlines:	15.06.1999	Deadlines:	04.10.1999
Budget*:	207.8 M€	Budget*:	226 M€ for commitment in 2000

Open call (generic activities and accompanying measures)
Closing: see text of call for dates according to types of activities

* Indicative budget for the call

(more information: www.cordis.lu/fp5-euratom)

1. STRUCTURE AND CONTENT

Key Actions

i) Controlled themonuclear fusion: the aim is to develop further the necessary basis for the possible construction of an experimental reactor. The long-term objective of the fusion activities, embracing all research activities undertaken in Member States aimed at harnessing fusion, is the joint creation of prototype reactors for power stations to meet the needs of society: operational safety, environmental compatibility, economic viability.

ii) Nuclear Fission: the aim is to help ensure the safety of Europe's nuclear installations, the protection of workers and public, and the safety and security of waste; to improve industrial competitiveness, and explore new concepts.

Research and technological development activities of a generic nature

- Radiation protection and health.
- Environmental transfer of radioactive material.
- Industrial and medical uses and natural sources of radiation.
- Internal and external dosimetry.

Support for research infrastructures: large facilities, networks for collaboration, data bases and biological tissue banks.

2. PRIORITIES IN 1999 AND MAIN CALLS FOR PROPOSALS

For 1999, participation in the key action on fusion is envisaged principally within the framework of: contracts of association with Member States (and Switzerland) or organisations in Member States, the JET Joint Undertaking (expiring at the end of the year), the EFDA (European Fusion Development Agreement) or contracts of limited duration. There are generally no calls for proposals.

Activities in nuclear fission will focus on operational safety of existing installations (plant life extension and management; severe accident management; evolutionary concepts) safety of the fuel cycle (waste and spent fuel management and disposal; partitioning and transmutation; decommissioning of nuclear installations); safety and efficiency of future systems (innovative and revisited concepts) radiation protection (risk assessment and management; monitoring and assessment of occupational exposure; off-site emergency management; restoration and long term management of contaminated environments).

Three calls for proposals in 1999, covering all programme areas other than fusion, have been published simultaneously:

Publication date: 20.03.1999, OJ C 77
Deadlines: 17.06.1999 (severe accident management)
04.10.1999 (other elements of nuclear fission key action)
Budget*: 107 M€

Generic research and support for research infrastructures will be the subject of a continuously open call. Subject to the quality of proposals received, 60 to 65% of the total budget for generic research will be used to fund those evaluated in 1999.

* Indicative budget for the calls

(more information: www.cordis.lu/inco2)

1. STRUCTURE AND CONTENT

Actions specific to the horizontal programme

a) Cooperation with certain categories of third countries: activities would be differentiated by category of country: *States in the pre-accession phase* (eg promotion of centre of excellence, facilitating of participation in the other programmes of the Framework Programme); *NIS and CEECs not in the pre-accession phase*: (support for their research and technological development potential, and cooperation in areas of mutual interest); *Mediterranean partner countries*: (improving their RTD capacities and promoting innovation; cooperation in areas of mutual interest); *research for development*: (sustainable management and use of natural resources, health, nutrition and food security); *emerging economies and industrialised countries*: (exchanges of scientists; organisation of workshops; promotion of partnerships and enhanced mutual access, eg through S&T cooperation agreements).

b) Training of researchers: fellowships for young researchers from developing countries, including Mediterranean and "emerging economy" countries to work in Community laboratories as well as Community fellowships to Japan.

c) Coordination: with COST, EUREKA and international organisations, with other external assistance activities (PHARE, TACIS, MEDA, EDF, ...), and with Member States.

International cooperation pursued through the other Framework Programme activities

Participation by third countries in the specific programmes may take basically two forms:

- Countries which are "fully associated" with the Framework Programme can participate on similar conditions to Member States.
- Otherwise, countries may participate according to a S/T agreement or on a project-by-project basis (generally with no funding).

2. PRIORITIES IN 1999 AND MAIN CALLS FOR PROPOSALS

Regarding cooperation with third countries, the focus in 1999 will be:

- *Pre-accession states*: support for approximately 20 centres of excellence.
- *Non pre-accession NIS and CEEC states*: research leading to management systems and technologies to prevent and remediate environmental problems and improve environmental standards in industry, on health consequences of the changing socio-economic situation of these countries, and the development of rational health care systems.
- *Mediterranean countries*: socio-economic modernisation, management of scarce regional water resources, preserving and using the cultural heritage, promotion of health, and regional environmental sustainability.
- *Research for development*: policy and systems research on the conditions for sustainable development, and tools for sustainable development in the area of health and plant and animal production.
- *Emerging economy and industrialised countries*: closer cooperation between the Community and International organisations involved in research and S/T policy development, as well as accompanying measures to enhance cooperation.

Seven calls for proposals have been published simultaneously on 27.03.1999 (OJ C 85) for a total budget* of 105.1 M€.

* Indicative budget for the calls

PROMOTION OF INNOVATION AND ENCOURAGEMENT OF SME PARTICIPATION

(more information: www.cordis.lu/innovation-smes)

1. STRUCTURE AND CONTENT

Coordination activities relating to innovation and SME participation

a) Activities in the field of innovation: assuring synergy and coordination of the activities of "innovation units" to be set up in the thematic programmes; definition of methods and mechanisms to improve the exploitation of results.

b) Activities to increase the participation of SMEs: support for SME participation in RTD and demonstration activities to be carried out in the programmes; including "cooperative research" activities and "exploratory awards".

Actions specific to the horizontal programme

a) Promotion of innovation: activities to improve the level of uptake of technologies and results; new approaches to technology transfer, integrating the technological, economic and social aspects of innovation, coordination of studies and analyses on innovation policy.

b) Encouraging SME participation: a special entry point for SMEs, providing help and assistance on research programmes; common instruments to harmonise and simplify SME access; "economic intelligence" to help SMEs identify and meet their current and future technological needs.

c) Joint innovation/SME activities: rationalisation, coordination and management of networks for promoting research and innovation, electronic and other information services, providing information and assistance on the Community's research and innovation activities; provision of information and pilot activities on intellectual property rights; access to private finance; and assistance for the creation and development of innovative start-ups.

2. PRIORITIES IN 1999 AND MAIN CALLS FOR PROPOSALS

- As regards **promotion of innovation**, the focus in 1999 will be on projects to promote technology transfer, including those not stemming from the thematic programmes, as well as accompanying studies and analysis (such as the development of a "trend chart" for innovation in Europe) to draw out lessons and good practice in order to build showcases for the promotion of an innovation culture in Europe.

  The first call has been launched:

  Publication date: 23.03.1999, OJ C 80
  Deadlines: 24.06.1999
  Budget*: 30 M€
  Areas covered: Innovation projects and accompanying measures

  A European Support Network for the Promotion of Research, Technology Transfer and Innovation will be set up to provide information on the innovation actions of FP5, promote the trans-national technology transfer, dissemination and exploitation; stimulate the capacity of firms to adopt new technologies, promote common trans-national innovation initiatives of European regions, and provide support schemes in priority areas, including innovation finance, and start-up companies. Pilot actions will also be undertaken to support activities by the National Patent Offices to promote innovation, and to develop and assess schemes to facilitate the setting-up and development of innovative firms.

- As regards **encouragement of SME participation**, a single complementary entry point for SMEs and an SME "help-line" will be set up and accompanying measures (eg subventions) will be launched related to: information and assistance to SMEs; the preparation of documents which may help SMEs in the preparation and management of projects under the Community RTD programmes; and economic and technological intelligence, aimed at identifying SME needs and anticipating market and technological trends.

  An open call for proposals has been launched on 01.04.1999 (OJ C 92) for exploratory awards and cooperative research projects for SMEs, funded in both cases under the budgets of the thematic programmes.

* Indicative budget for the call

(more information: www.cordis.lu/improving)

1. STRUCTURE AND CONTENT

Actions specific to the horizontal programme

Supporting training and mobility of researchers: research training networks focusing on young researchers at pre-doctoral and at post-doctoral level; a system of "Marie Curie" fellowships, including fellowships for young high-quality researchers; fellowships awarded to young researchers and hosted by enterprises (including SMEs); fellowships in the less favoured regions of the Community; fellowships for experienced researchers to promote mobility between industry and academia; and support for short stays by doctoral students in training sites.

Enhancing access to research infrastructures: enhancing international access to research infrastructures; networks of cooperation between infrastructures; RTD projects orientated towards infrastructure.

Promoting scientific and technological excellence: stimulating through exchange scientific and technological excellence and to making the most of the achievements of research, eg through high-level scientific conferences, prizes for high quality research; actions to improve understanding of science and technology.

Key action: Improving the socio-economic knowledge base: improving understanding of structural changes in Europe to better manage them and help citizens build their future; social trends and structural changes; technology and society; governance and citizenship; new models of development favouring growth and employment. Defining the knowledge base for employment-generating social, economic and cultural development and for building a European knowledge society.

Support for the development of scientific and technology policies in Europe: strategic analysis of key policy questions; development of a common base of science, technology and innovation indicators; supporting the development of the specific knowledge base needed by policy makers and other users on European science and technology policy issues.

Action pursued through other Framework Programme activities

The horizontal programme would provide coordination, support and accompanying actions needed to ensure consistency with action undertaken elsewhere in the Framework Programme on the aspects related to the objectives and activities of this programme.

2. PRIORITIES IN 1999 AND MAIN CALLS FOR PROPOSALS

Many of the activities in the programme, including training and mobility of researchers and enhancing access to research infrastructure, are essentially integrated actions and will not have specific priorities in 1999. The socio-economic research key action will focus on three groups of topics, addressing major changes in European Society, changing conditions affecting economic performance and employment creation, and issues of governance, democracy, identity and culture.

Calls for proposals are to be launched as follows:

First set of calls (8 calls) (all programme areas, except Marie Curie host development fellowships, stays at training sites and distinctions for high-level scientific work)
Publication date: 16.03.1999, OJ C 72
Deadline: various
Budget*: 459M€

Second set of calls (Marie Curie development host fellowships and stays at training sites)
Publication date: 11.06.1999
Deadline: 13.10.1999
Budget*: 59M€

Third call (open call for accompanying measures)
Publication date: 15.05.1999
Deadline: open till 31.07.2002
Budget*: 15 M€

Fourth call (distinctions for high-level scientific work)
Publication date: 30.09.1999
Deadline: Various
Budget*: 4 M€

Fifth set of calls (research infrastructures and "improving the socio-economic knowledge base")
Publication date: 15.11.1999
Deadline: Various
Budget*: 60 M€

* Indicative budget for the calls

JOINT RESEARCH CENTRE

(more information: www.jrc.org)

The JRC is the Community's own research centre, consisting of 8 institutes, each with its own focus of expertise, located in 5 sites across the EU. As such, it is responsible for carrying out *direct actions*, which are not the subject of calls for proposals. The JRC's Work Programme is composed of two specific programmes, concerning respectively the European Community Framework Programme and the Euratom Framework Programme. The Work Programme has been designed to complement the thematic and horizontal programmes of the Fifth Framework Programme. 100 projects will be launched in 1999 and most of them will span the period of the 5th Framework Programme, according to the scheme listed below. The detailed project plans will be adapted annually taking into account the evolution of the Work Programme and the budget for each year.

In addition, the JRC participates in *indirect actions*, with the same rights and obligations as other participants. Its priorities for 1999 will be to participate in project consortia that complement its direct actions and where its independent status is an asset.

EC SPECIFIC PROGRAMME

The EC Specific Programme comprises 85 projects in the first three lines of the work programme:

Main line I: SERVING THE CITIZEN

Section I.1	Consumer protection	(9 projects)
Section I.2	Medical and Health applications	(9 projects)
Section I.3	Benefiting from the Information Society	(7 projects)
Section I.4	Safety of the citizen; man-made hazards and natural hazards	(11 projects)

Main line II: ENHANCING SUSTAINABILITY

Section II.1	Integration of environmental protection in other EU policies	(3 projects)
Section II.2	Pollution	(8 projects)
Section II.3	Global change	(3 projects)
Section II.4	Energy and transport	(15 projects)
Section II.5	Agriculture, rural development and fisheries	(3 projects)

Main line III: UNDERPINNING EUROPEAN COMPETITIVENESS

Section III.1	Employment, technology and industrial competitiveness	(3 projects)
Section III.2	Normative support to international trading system	(4 projects)
Section III.3	Innovation and technology transfer	(5 projects)
Section III.4	Enlargement, pre-accession and international co-operation	(5 projects)

EURATOM SPECIFIC PROGRAMME

The EURATOM Specific Programme consists of 15 projects in the final section of the work programme:

Section IV.1	Nuclear fission safety	(9 projects)
Section IV.2	Control of nuclear materials and nuclear safeguards	(6 projects)
Section IV.3	Decommissioning and waste management*	

* Decommissioning projects will be the subject of a specific plan.

ANNEX 4

MAIN REPORTS RELATING TO COMMUNITY RESEARCH ACTIVITIES

1. MAIN DOCUMENTS OF RELEVANCE TO COMMUNITY RTD ACTIVITIES PUBLISHED BY THE EUROPEAN COMMISSION

- Five-Year Assessment Reports on:
  - (i) *The 4th RTD Framework Programme/Euratom Framework Programme (1994 to 1998)*, EUR 17644 (1997); and
  - (ii) Specific Programmes:
    Telematics Applications, EUR 17603 (1997)
    Advanced Communication Technologies and Services, EUR 17602 (1997)
    Information Technologies (ESPRIT), EUR 17601 (1997)
    Industrial and Materials Technologies, EUR 17587 (1997)
    Measurements and Testing, EUR 17588 (1997)
    Environment and Climate, EUR 17589 (1997)
    Marine Sciences and Technologies, EUR 17590 (1997)
    Biotechnology, EUR 17591 (1997)
    Biomedicine and Health, EUR 17592 (1997)
    Agriculture and Fisheries, including Agro-Industry, Food Technologies, Forestry, Aquaculture and Rural Development, EUR 17593 (1997)
    Non-Nuclear Energy, EUR 17594 (1997)
    Transport, EUR 17595 (1997)
    Targeted Socio-Economic Research, EUR 17596 (1997)
    Cooperation with Third Countries and International Organisations, EUR 17597 (1997)
    Dissemination and Optimisation of Results (Innovation), EUR 17600 (1997)
    Stimulation of Training and Mobility of Researchers, EUR 17598 (1997)
    Nuclear Fission Safety, EUR 17599 (1997)
    Controlled Thermonuclear Fusion, EUR 17521 (1996)

  In addition, annual monitoring reports (continual and systematic monitoring) have been produced on the EC Framework Programme, the Euratom Framework Programme and all the specific programmes for the years 1995, 1996, 1997 and 1998.
- *Joint Research Centre: 1998 Annual Report* (forthcoming).
- *Evaluation of the Joint Research Centre 1992-1996*, Communication from the Commission, COM(97) 164 final.
- *Commission's responses to the recommendations of the independent external assessments of the last five years of activities in the domains covered by the specific programmes and the JRC Institutes under the Fourth Framework Programme and the Euratom Framework Programme, Communication from the Commission*, COM(97) 149 final.
- *Second European Report on S&T Indicators 1997*, EUR 17639 (1997) and *Key figures* (1998).
- *Research and development : annual statistics 1998* – Eurostat, European Commission (1998).

2. MAIN ANNUAL BUDGETARY DOCUMENTS OF RELEVANCE TO COMMUNITY RTD ACTIVITIES

- *Preliminary draft general EC budget for the financial year 1999*, COM(1998) 300.
- *General EC budget for the financial year 1999*, OJ L 39 (12 February 1999).
- *Revenue and expenditure account and balance sheet, relating to operations under the 1998 budget* (forthcoming).
- *The Community budget: the facts in figures,* which provides a time series of research payments from the year 1958, SEC(98) 1100.

MAIN ACRONYMS AND ABBREVIATIONS USED

ACTS	Advanced communications technologies and services (specific RTD programme)
AIDS	Acquired immuno-deficiency syndrome
APAS	Accompanying, preparatory and support measures
ATM	Asynchronous transfer mode
BIOMED	Biomedicine and health (specific RTD programme)
BRITE-EURAM	Basic research in industrial technologies for Europe - European research in advanced materials (3rd Framework Programme)
BSE	Bovine spongiform encephalopathy
CAP	Common agricultural policy
CEECs	Central and Eastern European countries
CEN	European Committee for Standardisation
CERN	European Centre for Nuclear Research
CIS	Commonwealth of Independent States of the former Soviet Union
COPERNICUS	Cooperation in science and technology with Central and Eastern Europe (part of the INCO programme)
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)
DC	Developing country
DG	Directorate-General
EC	European Community
ECSC	European Coal and Steel Community
EEA	European Economic Area
ERF	European Research Forum
ESPRIT	European strategic programme for research and development in information technologies (specific RTD programme)
ESSI	European systems and software initiative
ESTA	European Science and Technology Assembly
ETAN	European technology assessment network
EU	European Union
EURATOM	European Atomic Energy Community
EUREKA	Framework for European technological cooperation
FP	Framework (RTD) Programme
FUSE	First user experiments
HPCN	High performance computing and networking
IMS	Intelligent manufacturing systems
IMT	Industrial and materials technologies
INCO	Cooperation with third countries and international organisations in the field of RTD (second activity under 4th Framework Programme)
INTAS	International Association for the Promotion of Cooperation with Scientists from the Independent States of the former Soviet Union
IPTS	Institute for Prospective Technological Studies (JRC, Seville)
IRDAC	Industrial Research and Development Advisory Committee
IST	Information society technologies
ISTC	International Science and Technology Centre (Moscow)
IT	Information technologies
ITEA	Information technologies European awards
ITER	International thermonuclear experimental reactor
JET	Joint European Torus

JOULE	Joint opportunities for unconventional or long-term energy supply (specific RTD programme on non-nuclear energy)
JRC	Joint Research Centre
MAST	Marine science and technology (specific RTD programme)
OECD	Organisation for Economic Cooperation and Development
OJ	Official Journal
R&D	Research and development
RTD	Research and technological development (including demonstration)
SCA	Shared cost actions
SME	Small and medium-sized enterprise
SPRINT	Strategic programme for innovation and technology transfer (3rd Framework Programme)
THERMIE	Demonstration programme in the field of non-nuclear energy
TMR	Training and mobility of researchers (specific RTD programme)
TSE	Transmissible spongiform encephalopathy
TSER	Targeted socio-economic research (specific RTD programme)
TSME	Technology stimulation measures for SMEs
UMTS	Universal mobile telecommunications system
WTO	World Trade Organisation