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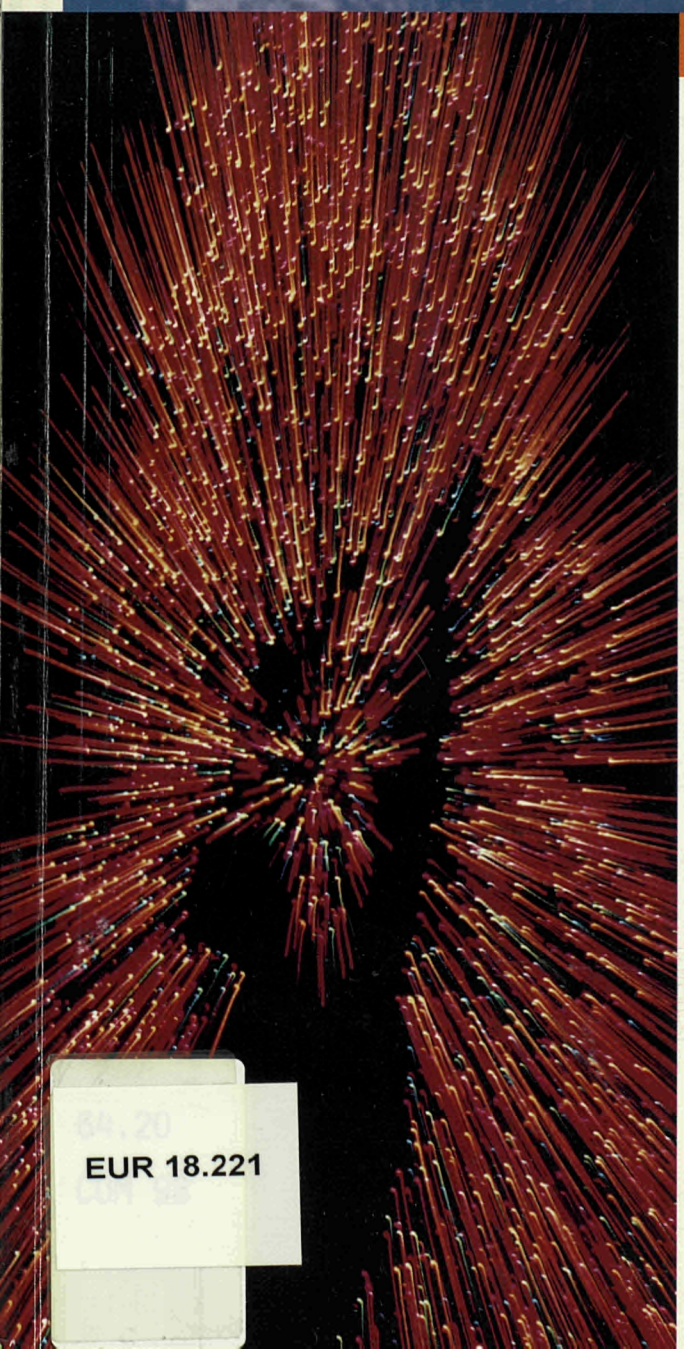

General information

1997 annual monitoring report on the fourth framework programme and the Euratom framework programme

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EUROPEAN COMMISSION
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EUROPEAN COMMISSION

1997 ANNUAL MONITORING REPORT ON THE FOURTH FRAMEWORK PROGRAMME AND THE EURATOM FRAMEWORK PROGRAMME

DIRECTORATE-GENERAL
SCIENCE, RESEARCH AND DEVELOPMENT

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PREFACE

This publication contains the third annual monitoring report on the fourth RTD framework programme and the Euratom framework programme, prepared by a panel of high-level independent experts (Part A). The report presents a brief, strategic assessment of progress during 1997 and a set of recommendations for the continued implementation of the framework programmes. The report is also timely and relevant to the current preparation of the fifth framework programme.

Part B presents the Commission services' response to the recommendations.

J. Routti

Director-General
Directorate-General XII
Science, Research and Development

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PART A

REPORT OF THE 1997 FRAMEWORK PROGRAMME MONITORING PANEL

AN INDEPENDENT PANEL
CHAIRED BY
J. VIANA BAPTISTA

MARCH 1998

1997 FRAMEWORK PROGRAMME MONITORING PANEL

We, the undersigned, the 1997 framework monitoring panel, are pleased to present to the Commission our report on the monitoring of the framework programme.

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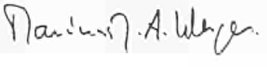

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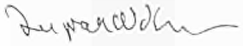

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Mr JORMA ROUTTI
DIRECTOR GENERAL, DG XII
Commission of the European Communities
Rue de la Loi 200
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Dear Prof. ROUTTI,

Attached please find the 1997 Monitoring Panel Report on the Fourth Framework Programme. This report was prepared by a panel of independent experts selected by the Commission.

The report high-lights the progress achieved in 1997, provides recommendations for further improvement and suggestions for the Fifth Framework Programme.

We expect that the commendations, recommendations and suggestions expressed in the Report will contribute for improving the methodology adopted by the Commission concerning research and development activities.

I have appreciated this opportunity to work with Commission, acting as Chairman of the Panel, and I remain at your disposal for further discussions if necessary.

Sincerely yours

José Viana Baptista
Chairman

1. Executive summary and recommendations

This is the third annual monitoring report on the activities carried out under the EU fourth framework programme for research and technological development (1994-98) and the Euratom framework programme (1994-98) (1), prepared by a panel of independent experts acting in their personal capacity and external to the Commission. This report highlights progress achieved in 1997 and provides recommendations for further improvements in the implementation of the programme which, in the panel's opinion, is developing in a positive way. This report also makes recommendations for further improvement of the monitoring system itself. As this is the last but one monitoring exercise for FP4, the panel's recommendations are both relevant to and timely for the fifth framework programme (FP5) given its current status of definition.

Overall, the implementation of FP4 is developing in a positive way. For certain specific programmes, substantial results have been achieved in specific and targeted fields. In other areas results will only be measurable in the longer term.

The panel wishes to express its appreciation of the dedicated efforts made by the Commission services in implementing actions aimed to comply with the recommendations of the previous monitoring exercises.

(1) In the following, these are jointly referred to as 'FP4'.

1.1. Background

In principle, a monitoring exercise is designed to check the consonance of activities with the programme's original aims and objectives together with progress achieved in relation to the recommendations expressed in the previous monitoring report. Notwithstanding this, the panel believes that the political importance implicit in the proposed FP5 cannot be ignored at this stage, since RTD is recognised as a necessary condition not only for increasing competitiveness but also, and most importantly, as an essential element for sustainable growth, preservation of the ecosystem and improved quality of life for European citizens.

In this context, the panel believes that commendations and recommendations concerning the efficacy and efficiency of programme management should be taken together with suggestions for a harmonised transition towards a set of broader considerations with important political implications not only for the RTD community but for all of European society.

These are indeed reflected in the proposed FP5 which moves from specific programmes to a thematic programme basis, linked to major economic and social objectives and addressing key European problems. Thus, the panel's deliberations took particular account of the convergence foreseen for FP5 and actions in 1997 which are precursors to this new approach.

It must also be noted that most FP4 contracts are at this stage fully operational. If impact is to be measured, then a

comprehensive concept of European added value must be developed and appropriate indicators for output/impact measurement must, as far as possible, be provided so that the benefits can be measured across specific programmes and against specific parameters.

In the implementation phase, new management techniques such as benchmarking and output/impact indicators are required. Cognisance must also be taken of the fact that while RTD programmes evolve through their life cycles, they operate in an ever-changing economic, social and political milieu and the pace of that change is accelerating as the EU expands, competes and interacts more intensely on an international basis. The framework programme is operating in an open system, and must be able to respond to a wide range of strategic inputs and remain flexible and sensitive to emerging issues.

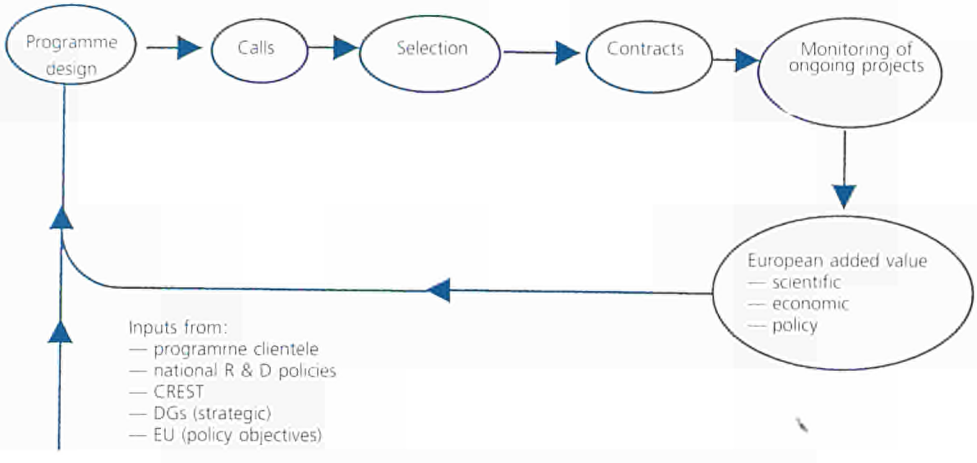

Figure 1: Strategic perspective of the framework programme

Whilst FP4 is essentially pre-competitive, the concept of industrial participation is viewed as central to its success. The panel notes that industrial participation in FP4 is significant and growing, especially in regard to SMEs. Whilst the emphasis on SMEs is justified, both in traditional and high-technology sectors, a stronger focus needs to be placed on high-technology SMEs which, worldwide, have been the engines of growth in emerging technologies. Recent EU reports highlight the very low proportion of small enterprises in high-technology industry in Europe *vis-à-vis* the United States. The acknowledged deficit in high-technology start-ups is not something which can be resolved by increased RTD inputs but rather by more profound structural changes. Major impediments to entrepreneurial activity in Europe include an unfavourable regulatory framework, a complex and costly intellectual property right (IPR) system and a business culture inimical to risk taking.

It is against this background that the panel has carried out the 1997 monitoring exercise.

1.2. Recommendations

The panel commends the impressive improvements already effected by the Commission services in several areas of programme management, notably in proposal evaluation procedures. The panel makes the following recommendations for further overall improvement, many of which are of long-term significance:

(i) A comprehensive concept of **European added value** must be developed to assist programme definition/proposal selection and underpin the derivation of appropriate output measurement and impact assessment methodologies and indicators.

(ii) Specific measures should be undertaken to increase **public awareness** of the benefits of EU-funded research.

(iii) The period from now until the launch of FP5 should be used to promote and advise on the **new, strategic approach and structure of FP5** and thus to prepare potential applicants.

(iv) The panel strongly recommends, as proposed for FP5, that an **element of budgetary flexibility** should be made available within programmes to enable a rapid response to new, important issues which may arise in the lifespan of a programme.

(v) The panel recommends a special focus on the TMR, TSER, INCO and Innovation programmes as these are very important in creating **enabling conditions** for RTD and recommends a closer linkage with the other specific programmes. Proposers, programme managers and future monitoring panels must be fully appraised of the need to address this potential synergy.

(vi) Specific support should be made available for studies within the targeted socioeconomic research and innovation arenas to examine conditions in the **business environment** such as venture capital development, IPR and patent regulatory procedures and the results of such studies should feed back into framework programme policy.

(vii) The special needs of **SMEs** in both the traditional and high-technology sectors must be further addressed. More should be done to adopt an **entrepreneurial** and supportive approach to meet the particular needs of SMEs.

(viii) **National contact points** should be given an expanded role in the provision of information and in assisting proposal preparation, particularly for new applicants and SMEs. The provision of specialised training for contact points should be considered and this should ultimately reduce the workload of the Commission's staff.

(ix) Systematic efforts should be made by programme managers to encourage the **clustering of projects** from different programmes in order to obtain an increased degree of convergence focused on challenges, prefiguring FP5. Coordination between programmes should be intensified through further **joint calls** for proposals as appropriate, in preparation for the convergence embodied in FP5.

(x) **Focused/targeted calls** for proposals should be encouraged in all programmes which will help reduce oversubscription and facilitate the proposal evaluation procedure.

(xi) The specific programmes should establish **best practice** management procedures to further reduce the timespan between submission of proposals and signature of contracts. Practical steps to expedite the process should include the standardised provision of specific evaluation criteria in information packages, trying

out, wherever appropriate, the two-step submission procedure allied to pre-proposal screening and the requirement for proposals to be written in technical annex format to expedite the contract negotiation procedure.

(xii) An urgent review of the **workload of the Commission's scientific officers** should be undertaken as there is a perceived need to release more time for strategic and proactive work.

(xiii) ***Ex post*** evaluation must be addressed on both a project and programme basis. In an effort to continue to improve the efficacy of programme implementation including monitoring and evaluation, the Commission's **management information system** must be fully implemented.

(xiv) The **timing** of the monitoring exercise itself should be improved by setting up specific programme monitoring panels much earlier in the year, e.g. the month of June. All specific programme monitoring panels should be further encouraged to report on a comparable basis to ensure **synchronicity** of information. The **interface** between the monitoring of the fusion programme and the JRC activities with the monitoring of the framework programme requires revision.

2. Introduction

2.1. The European context

Among the problems foreseen as we approach the millennium, sustainable growth together with economic globalisation deserve special attention. Competitiveness can no longer be considered as a stand-alone goal; European politicians and business decision makers have to consider the challenges implicit in quality of life and a more liberalised economic system. The process of development cannot be expressed by a linear model. RTD support measures, although necessary and valuable, are not enough. The capacity of Europe's institutions and industry for the development of scientific knowledge is undisputed and must be complemented by a climate of innovation favouring process and product development.

The panel recognises the natural tension between risk taking and risk avoidance and the public accountability related to the use of EU funds which precludes the adoption of entrepreneurial practices. In addition, certain entrepreneurial practices related to the business environment — such as venture capital development — are at least as important (if not more so at present) as RTD for improving competitiveness.

European RTD has an acknowledged role in helping consolidate economic and social cohesion in the European Union. Framework programme funding, which currently represents 4 % of the total European public RTD spending, is based on the principle of subsidiarity and has a vital catalytic role in addressing issues such as improving the quality of life and the environment for European citizens and in helping underpin sustainable economic policies. The key strength of the EU framework programme is the fostering of a European research culture, facilitating thousands of transnational cooperative research actions which otherwise would not happen, involving all actors in the European RTD community, including the less favoured regions, and drawing together the complementary research efforts of industry (large and small), academia and research institutions. The panel believes that this is a significant element of European added value.

The development of European RTD policy and programmes recognises the need for resources to assist preparation for the accession of new Member States in the context of enlargement of the European Union and the need for increased cooperation on a global scale (as evidenced by the conclusion of RTD cooperation agreements with third countries in recent years, notably and most recently with the United States of America).

The Commission has recently called on the Member States to boost significantly their RTD expenditure in line with global trends and is actively encouraging the more effective sharing of innovation and new technologies between large, medium and small enterprises.

There is broad consensus that Europe's scientific and technological performance has been excellent. However, it is equally recognised that this performance has been less successful in improving the competitiveness of European industry and in meet-

ing broader societal demands (2). These issues were addressed in the five-year assessment of the European Community RTD framework programmes carried out by a panel of independent experts under the chairmanship of Viscount E. Davignon. Their report recommended that — for the future — though the key criterion of scientific excellence should be maintained and enhanced — greater emphasis should be placed on social and economic relevance. The report also stressed that the potential of RTD activities for triggering and creating European added value should be one of the criteria used in the selection process. That important report forms an integral part of the planning process for the fifth framework programme, a process which is currently well-advanced.

2.2. The fourth framework programme

The operational phase of the fourth framework programme (1994-98) began in December 1994. FP4 represents a significant expansion of the Community's RTD activities both in scope and financial volume in comparison with the third framework programme (1990-94). The original FP4 budget of ECU 12 300 million was increased by 6.5 % (to ECU 13 100 million) following the accession of Austria, Finland and Sweden and by a further ECU 115 million for the programmes of the first activity (to ECU 13 215 million) in 1997.

(2) The report of the 1996 monitoring panel stated that: 'Overall, the attention paid to project results and commercial exploitation, as well as to the effective contribution to Community policies and the distinctive European added value, has been insufficient ... programmes having a more declared industrial orientation have achieved substantial results.'

The stated aim of the policy underpinning FP4 is to strengthen the science and technology base of European industry and thereby improve European competitiveness through: support for the scientific and technological bases of European industry to help it compete with its rivals on world markets in key technological areas; technological support for all EU policy (such as transport, environmental and social policies) in order to boost the technological dimension of the internal market; coordination of research policy between the Member States and the Community; and promotion of the utilisation and dissemination of research results to overcome weaknesses in technology transfer, particularly in the SME sector.

FP4 is implemented through 18 specific programmes under four main activities:

(1) research, technological development and demonstration programmes;

(2) cooperation with third countries and international organisations;

(3) dissemination and optimisation of results;

(4) stimulation of the training and mobility of researchers.

The 18 specific programmes and their budgets are listed in Annex II to this report.

Some new features of FP4 are as follows:

- the introduction of specific programmes dealing with transport research and targeted socioeconomic research;
- all the international cooperation projects are grouped together in a clear sphere of action divided into logical and geographical areas, e.g. central and eastern Europe, developing countries;

- the programme for dissemination and optimisation of results (the Innovation programme) has been expanded with the allocation of a much larger budget, including the development of a new Europe-wide network of innovation relay centres;
- the action for the training and mobility of researchers pays particular attention to the peripheral and disadvantaged regions to assist cohesion and to prevent the 'brain drain' and the technological divide within the Community;
- task forces were established in seven key technological areas to help focus and coordinate research activities which were hitherto fragmented. The role of the task forces within FP4 concentrated mainly on analysis and conceptual work and underpinned the development of the new concept of 'key actions' in FP5.

1997 represents the third full year of operation of FP4, a year which was characterised by the launch of more than 40 calls for proposals across the specific programmes coupled with more than 55 deadlines for calls issued in 1996.

The specific programmes are managed by the Commission services and directly involve eight Directorates-General.

2.3. The 1997 monitoring exercise: mandate and methodology

The legislative requirements for monitoring FP4 activities are contained in Article 4.1 of the decisions establishing the fourth framework programme and Euratom framework programme, respectively.

This third annual monitoring exercise builds on the experience gained in the 1995 and 1996 exercises and from the five-year assessment ([3]). The terms of reference of the members of this monitoring panel for 1997 are given in Annex I to this report. Notably, the framework programme monitoring exercise 'should be considered as a quick response mechanism to programme developments' and should 'give high-level advice on key issues'. The focus of the exercise varies from year to year, depending on the activities then current and on progress achieved.

This year's exercise, covering the third full year of the current framework programme, examined not only the status of calls for proposals, evaluation and selection, contract negotiation and conclusion but also tried to discern the progress achieved, results to date and anticipated results and impact in the specific programmes and the framework programme as a whole, with a particular focus on European added value. The exercise also included an analysis of the Commission's follow-up to the recommendations made in previous monitoring reports as they have been introduced into the system. In addition, the panel took due account of the imminent introduction of the fifth framework programme.

The framework monitoring exercise is substantially based on a synthesis of the reports from the monitoring of the specific programmes, but goes further in emphasising key issues across programmes, and highlighting synergies and/or differences between programmes.

In order to fulfil its mandate, the panel has used the following sources:

The 1995 and 1996 framework monitoring reports; the 1997 annual monitoring

([3]) The chairman of this monitoring panel was a member of the 'Davignon' panel.

reports for the specific programmes; the core indicators for the specific programmes; the 1997 qualitative overviews for the specific programmes; the Commission's documentation relating to the evaluation and selection procedures for proposals and its contract management information system; hearings with the Commission's directors of the specific programmes or their representatives, including the Joint Research Centre (JRC); hearings with representatives of each of the specific programme monitoring panels; meetings with senior management personnel in DG XII; supporting documentation from the Commission services.

The hearings, supplementing the written documentation supplied, constituted an important part of the framework monitoring panel's work and focused on the following key issues:

(1) With the directors of specific programmes, European Commission:

Follow-up to the recommendations of the 1996 monitoring exercise; demonstrable progress in 1997; difficulties encountered in 1997 and action taken to resolve same; quality and effectiveness of the programme's activities; industrial participation and role of SMEs; interface/coordination between the specific programme and other specific programmes in related topics; role of special measures, support activities and dissemination; immediate actions required in order to ensure that the objectives of the specific programme and the overall framework programme are met; recommendations for future monitoring exercises.

(2) With the representatives of specific programme monitoring panels:

Impact of the 1996 monitoring exercise; demonstrable progress in 1997; methodology used by the panel; was the information required by the panel provided from all sources in a comprehensive and timely way; usefulness and sufficiency of the core indicators; timespan allocated for the monitoring exercise and viable alternatives; industrial participation in the programme, including the role of demonstration projects and the participation of SMEs; interface/coordination between this specific programme and other specific programmes in related topics; based on the experience of 1997 monitoring exercise, commendations and recommendations by the panel for future monitoring exercises.

In the period January to March 1998, the panel met on four occasions (three times in Brussels and once in London) over eight days in total, supplemented by ongoing communication between meetings. The panel was assisted throughout by an external rapporteur.

The panel is grateful to the members of the Commission services who have helped them in their work, notably the programme directors who provided key information at the hearings and, in particular, the staff of the programme evaluation unit, DG XII/AP.3, whose diligent support is gratefully acknowledged.

3. Analysis and findings

3.1. General observations

A number of recurrent issues figured very prominently in the hearings and in the deliberations of the panel. These will be highlighted below before proceeding to an overview of progress.

A strategic and systemic understanding of the RTD framework programme

The panel believes that there is now a need to emphasise the strategic and systemic dimension of the Community's research programmes including the following: better understanding of and complementarity with national RTD programmes; development of the capacity and contribution of national contact points; monitoring of emerging issues and challenges.

European added value

The panel believes that European added value is a most important concept and is well recognised as such. The panel learnt in the course of its hearings that the criteria related to the Community 'value added' and the subsidiarity principle are perceived as largely qualitative and are not uniformly understood or applied. The panel believes that in order for the concept to be used in a meaningful way by the proposers, managers and evaluators of projects and programmes, clearly defined elements and, as far as possible, measurable criteria, which are appropriate to each of the specific programme areas, should be identified.

New management techniques and measurements to monitor outputs and impact

Most of the specific programmes which constitute FP4 are now reaching an output/impact assessment phase. This places significant new demands on Commission personnel and requires management and communications skills that are very different from those required at the programme design and proposal evaluation phases.

More specifically, indicators of research output and impact are becoming vital to this stage of the process. Consequently, new management techniques and metrics are necessary if programme management is to be better facilitated in achieving tangible outputs and impact.

Core indicators

The panel regards the use of appropriate indicators as essential for evaluation and monitoring exercises, and commends the use of the existing core indicators in providing important quantitative information. It has noted their evolution over time, notably the provision of qualitative overviews.

Nevertheless, this set of information is not sufficient to assist proper interpretation as programme implementation proceeds and results are achieved. There is therefore an

urgent need to determine indicators which address programme-specific outputs and impact.

A timely and coordinated response to the monitoring exercise

The panel fully endorses the Commission's commitment to monitoring as part of a positive culture of evaluation and improvement. The panel was, however, concerned at the late delivery of the specific programme reports which — with a few notable exceptions — were not received until midway through the panel's work, despite the clear terms of reference and best efforts of the Commission services. This problem has previously been highlighted in recommendation 9 of the 1995 monitoring report and in Section 3.3.12 of the 1996 monitoring report.

In addition, the panel reiterates the final recommendation of the 1995 monitoring panel, i.e. 'that the Commission take steps ... to ensure that all of the programme monitoring panels operate on a comparable basis', to ensure synchronicity of information. This would facilitate effective monitoring along the FP life cycle.

While specific proposals on this issue are made elsewhere in this report, significant progress could be achieved if the Commission services further exploited the potential for learning offered by successive monitoring exercises. **The individual programmes should prepare an annual statement which deals specifically and in a structured way with the recurring issues of all monitoring exercises for that programme.**

3.2. Overview of progress

The 1996 monitoring panel made several recommendations 'with the intention of contributing to smoothing the transition to the next framework programme'. This panel is pleased to note that the major recommendations have been implemented.

This section of the report synthesises and comments on the action taken and progress made in response to those recommendations, and raises important issues which have emerged in the 1997 monitoring exercise.

Strategic focusing, operational flexibility and synergies between programmes

There has been marked evidence of increased strategic focusing in terms of targeted/focused calls for proposals and, in the case of the targeted socioeconomic research programme, a complete reworking of the content of the third call. Cooperation and synergies between programmes have greatly increased as evidenced by the number of joint calls for proposals (this augurs well for the increased convergence foreseen in the structure of FP5). These include the calls 'relating to: transmissible spongiform encephalopathies (TSE) (jointly initiated and managed by the FAIR, biotechnology and biomedicine and health programmes as a swift and concerted response to the European TSE crisis); educational multimedia; IMT/Esprit and IMT/environment and climate programmes.

The JOULE and Thermie elements of the non-nuclear energy programme remain 'separate' and this will hopefully be rectified in FP5.

Proposal evaluation and related procedures

The Commission services have streamlined the proposal evaluation and related procedures with regard to transparency and efficiency. The panel notes that an overall project evaluation manual will not be formally adopted until FP5, but equally notes that many key elements have already been incorporated into the information packages for several specific programmes, and that this has led to better quality proposals.

Proposal evaluation panels, overall, reflect the appropriate balance of independent expertise required, although inherent difficulties remain in ensuring adequate industrial representation since the nature of the process requires evaluators to be available at relatively short notice. Certain aspects of the evaluation process which lead to delays are outside the scope of the individual programmes, e.g. the legal processes including inter-service consultation on shortlists. Whilst the Commission services have made major efforts to streamline procedures, the lead-time between submission of proposals and feedback to applicants remains too long. In particular, there is a need to provide early feedback to unsuccessful applicants. The two-step application procedure introduced in certain programmes, such as Esprit and telematics, can facilitate quicker feedback for some proposers and may reduce oversubscription. The panel notes that contract negotiation procedures could be further shortened by asking proposers to present applications already in 'technical annex' format.

Ex post evaluation and indicators

In this area, some evolution has taken place in 1997 but more work is required as the implementation of FP4 proceeds. In Section 4.1 of this report, the panel has emphasised the need to continue to address these issues as a priority. **It is imperative to address assessment of downstream results of projects even after the 'financing period' has been concluded**. It is equally important to further refine programme-specific indicators with a shift towards establishing benchmarks and output indicators.

Progress of specific programmes

Many issues militating against progress are of a management nature, broadly relevant to all programmes, and are dealt with in Section 4.3 of this report. This section refers to aspects of the specific programmes which the panel wishes to highlight.

- The **information technologies** (Esprit) programme introduced a number of innovative mechanisms including the piloting of 'rolling work plans', which were very successful. Regular and focused calls, inclusion of explicit evaluation criteria and the two-step submission process elicited a good, targeted response with success rates of 1 in 4 (compared with 1 in 13 in FP3). Joint calls worked, but simplifications in procedure are necessary (particularly with a view to the convergence foreseen by the thematic calls of FP5). Efforts have been made to carry out post-project follow-up (the OMI industrial impact study is a first step). Large companies represent 33 % of participants, and specific SME-friendly actions such as FUSE and ESSI attract more than 80 % SME participation. Collaboration with other programmes was good, particularly given the joint calls.

- The **telematics applications** programme successfully completed the proposal-to-contract process in five months (formerly eight months), in particular for the cross-sector call on 'integrated applications for digital sites' and the joint call on educational multimedia. The two-stage submission process has dramatically reduced over-subscription. Telematics has a mix of RTD suppliers (41 % of participants are from industry, among which 25 % are SMEs) and users (26 % of participants) and has a culture of 'continuous evaluation'. The joint call for educational multimedia, which involved three RTD programmes (Esprit, telematics applications, targeted socio-economic research) and three non-RTD programmes (TEN-Telecom, Leonardo da Vinci, Socrates), four Directorates-General and related management cultures, worked well.

- The **advanced communications technologies and services** (ACTS) programme is characterised by the need for rapid change/market responsiveness and projects are regularly assessed in this regard, for example, through change in the balance of effort between partners (overall budgets do not change). This annual technical audit is viewed as safeguarding the standards and integrity of the programme; 85 % of participants are from industry (23 to 24 % are SMEs) and 15 % from universities. ACTS is, effectively, a global cooperation programme, the agenda for which is set in Europe. Thirty-eight non-EU countries participate. More patents have been registered under ACTS to date than in its two predecessor (RACE) programmes. Dissemination of results is of particular importance. In common with Esprit, a high proportion of projects are submitted electronically. This allows ACTS to complete proposal to contract in four months.

- The **industrial and materials technologies** (IMT) programme has evolved from FP1 into a systems and society-oriented programme with a clear set of targeted initiatives (thematic networks, basic research projects, industrial research projects, and the CRAFT technology stimulation measure). SMEs are involved in 50 % of the programme. It should be noted, however, that 20 % of SMEs are in one Member State — probably due to the effectiveness of the national contact point. Another imbalance concerning proposal submission is found in the aeronautics sector: the results of the call for proposals in this area show that two Member States account for 83 % of funded projects — a situation which merits examination. IMT is strong on measurement of impact, for which a methodology has been developed. Completed projects are assessed by external consultants and results to date (back to 1992/93) show that the measures are very cost-effective.

- The **standards, measurement and testing** (SMT) programme provides support to legal and standardisation issues and, per se, supports and serves other Community policies, industry and national accreditation bodies. It has very strong links with the other specific programmes and, in FP5, this generic support role will be intensified. The year 1997 saw a huge growth in SME participation mainly due to the nature of the main call which was in a sector characterised by SMEs. SMT has close links with the JRC which distributes the reference materials.

- The **environment and climate** programme aims to improve the scientific base of EU environment policy. Demonstrable progress has been made during 1997 in the quality and transparency of the evaluation process and there have

been some major scientific successes. There are heavy demands on the resources and the scientific output of this programme because of horizontal activities with non-member countries and international organisations and frequent intra-Commission consultations initiated by other DGs. There is also a pressing demand to disseminate information to policy-making end-users, to the industrial community and to the general public. Other factors which have been identified as adding to the administrative burden on this programme include calls several times a year and, in some areas, open calls and new project evaluation procedures which increase transparency but add complexity. In these circumstances it is not surprising that efforts to reduce the time taken to process successful applications has achieved only qualified success. The present challenge is to enhance the programme by widening the stakeholder involvement and by continuing the recent trend of the programme through focusing more on priorities linked to problem-solving. It is necessary to focus on issues of European added value and to differentiate these from topics which are of mainly national interest. Stronger involvement of end-users and outside competency in policy formulation are required, as is an operational strategy for the dissemination and utilisation of results.

- The **marine science and technology** (MAST) programme is a long-term strategic programme (now in its third phase) designed to investigate how marine systems work and to underpin the sustainable use of the oceans. During the course of MAST III about 130 projects have been funded involving more than 1 200 contractors, both European and non-European, and this supports the contention that an internationally recognised EU marine science community has now evolved, in part at least under the auspices of this programme. Industrial participation in the programme remains limited and there is a view that basic science is over-represented relative to applied science when the latter is taken to include technology and management. Some progress has been made, through support activities (for example, for SMEs, dissemination of results, participation of technical experts in evaluation, etc.) to get a broader involvement of EU marine scientific and technological communities but the 'industrial' market for the programme has not been well defined. There is scope for some institutional mechanism to link MAST and regional authorities to exploit more fruitfully the knowledge acquired from research and above all to provide guidance on the management and development of the coastal system in a wider sense.

- The **biotechnology** programme experienced a peak of activity in 1997 with the launch of the highest ever number of projects. Unplanned events (transmissible spongiform encephalopathies, Dolly the sheep, genetically modified plants, etc.) served to emphasise the ethical and socioeconomic dimension of biotechnology while the publication of the 1997 Eurobarometer report raised concerns about the public perception and understanding of developments in the life sciences. The biotechnology programme made significant progress in key objectives such as increasing industrial participation, greater involvement of SMEs and improving coordination with other Commission activities. Industrial participation achieved an average penetration of 70 % and there were outstanding examples of cooperation with the other life sciences programmes (such as TSE and vaccines) as well as continued cooperation on the international plane. These successes can be explained, in part at

least, by the energy with which the programme administration responded to the recommendations of earlier monitoring exercises. The questions about the biotechnology programme which remain are mainly strategic in nature: how can the programme be coordinated with national biotechnology programmes; how can the programme attract the type of biotech SMEs that, worldwide, have been instrumental in converting scientific discovery into products and commercial potential; in summary, how can a distinctive European biotechnology industry be created with a few priority directions of strategic importance?

- The **biomedicine and health** programme aims to contribute to the improvement of the health of European citizens as well as enhancing the competitiveness and scientific base of the European health industry. Research proposals funded during 1997, however, were concentrated in a small number of scientific sub-areas (with inevitable oversubscription) to the exclusion of the subarea dealing with quality of life issues. Efforts to orient the call towards concerted action projects were not successful. The factors underlying this shift from previous Biomed programmes where the concerted action was the key mechanism are complex and need to be highlighted and addressed. Efficient and transparent management are a characteristic of this programme where the time between receipt of application and notification of applicants is less than that of many national funding agencies. This efficiency is also reflected in revised reporting guidelines and a strengthened Project Review Board which result in better monitoring of project progress and output. Industry participation is inhibited by the inability of the EU to offer firms meaningful financial incentives and proposals continue to emanate mainly from universities and research institutes. Coordination and cooperation is strong with other life sciences programmes and with public health (DG V). The main concerns for this programme are the need to identify emerging scientific/clinical events before they become public health issues, coordinating actions among Member States and clarifying the distinctions between national and EC research policies.

- The **agriculture and fisheries** (FAIR) programme in its present form is sponsored by three DGs and has 27 % industrial participation. This large and diverse programme, including strategic and applied projects, was very active in 1997, issuing three calls for proposals. More emphasis is now placed on policy-relevant projects such as those related to the common agricultural policy. Priorities identified in earlier monitoring exercises have been emphasised in recent calls and this has significantly reduced oversubscription. Management can point to the first joint call relating to TSE and involving the biotechnology and biomedicine and health programmes as evidence of flexibility and cooperation between DGs but a more proactive approach to collaboration with other programmes in the EU is still desirable. There is a need to link up with some national programmes in areas such as TSE, food and health. Big food companies have a large participation in the programme but continued efforts are needed to improve the participation of SMEs notwithstanding the fact that they are very active in exploratory awards. Dissemination of information about the programme has been enhanced by network building, SME Technology Days, a FAIR Web page and other supporting measures.

- The **non-nuclear energy** programme emerged from two different historical contexts, management practices and constituencies. In spite of the improved links at programme management level, there is still scope for further integration between the JOULE and Thermie elements of the programme and this should be properly explored in the context of plans for the fifth framework programme. Attempts at eliciting truly 'joint' proposals have failed and the reasons associated with this should be analysed in the frame of the thematic activities which are foreseen. Pre-proposal checking worked well for both elements of the programme and helped the Commission ascertain 'the market' and set up appropriate evaluation panels. SME involvement is high in both elements of the programme.

- The **nuclear fission safety (NFS)** programme is part of the Euratom framework programme and has Europe-wide importance. It has performed well in the context of its objectives. This effort must be maintained and even enhanced in the light of the growing importance of environmental issues such as ageing of reactors, waste management and new fuel fabrication. Furthermore, the NFS programme has impact and relevance well beyond electricity generation because of the widespread use of nuclear techniques for medical and industrial purposes. To this extent, the results of fission safety research have relevance not only for the non-nuclear programmes of DG XII but also for other Commission services. A feature of this programme is the use of concerted actions and project clusters to generate cohesion and synergy; education and training courses are organised on major topics, e.g. reactor accident, emergency planning. In several research areas, mid-term reports and external evaluation were successfully used to monitor and reorient ongoing projects. There is serious concern about maintaining continuity of European scientific and technological capabilities in the nuclear fission field at this time of enlargement for the EU and the assumption of added responsibility for the environmental safety and restoration problems of several candidate countries.

- The **fusion** programme operated within the Euratom framework programme aims at the utilisation of controlled thermonuclear fusion for the production of electricity. This programme is expected to produce major results only in the very long term. All relevant European actors, which are few, are integrated in the programme. The programme's scientific and technical capabilities are leading worldwide. In 1997, a major achievement was produced within the frame of the JET part of the programme, in that sustained power of a few megawatts was produced for several seconds. Notwithstanding the recommendation of the fusion programme evaluation board to build the ITER experimental reactor, the Council adopted a 'scenario' which effectively delayed its construction. At the same time and for different reasons, the US and Japanese partners in ITER came to a similar position. This panel recognises that the progress of the fusion programme is conditioned by political considerations. The structure and management of the fusion programme, being entirely different from other specific programmes, deserves particular attention concerning the appropriateness of the established annual monitoring system. In addition, the panel recommends that every effort should be made to increase the cross-fertilisation of knowledge and appropriate technology transfer with other relevant programmes. Finally, the panel notes that

the public acceptance of fusion is an issue of major concern to the programme actors. In this context, the panel observes that techniques used in other areas and programmes to increase public awareness could be beneficial.

- The **transport** programme, new to FP4, built a comprehensive administrative and research capacity in a very short time with a remarkable degree of success, despite severe staff shortages (a problem common to many programmes which will be commented on in Section 3.3 of this report). Attention is focusing on the benchmarking of project progress and on the dissemination and exploitation of project outputs. The programme is unique in that the monitoring panel was appointed early in 1997 and was able to monitor at first hand the management processes as well as year-end outputs and results. Industrial participation in proposals submitted under the third call has grown to 45 % and SME participation to 42 %. The programme has good links with telematics (recent joint call) and good potential links with IMT.

The so-called 'horizontal' programmes, **TSER** (targeted socioeconomic research), **INCO** (cooperation with third countries and international organisations), **Innovation** (dissemination and optimisation of results), and **TMR** (training and mobility of researchers) merit separate consideration. The panel recognises the importance of these programmes and the particular issues pertaining to them.

- **TSER,** a new programme in FP4, suffered from a lack of focus which led to a complete reorientation for the third call. It has an important policy role and seeks to encourage a two-way interaction between policy-makers and the research community. TSER is potentially a very important and innovative programme and FP5 should provide a better focus. Science and technology policy options leading to better integration and reducing social exclusion are fundamental for Europe at this time. If a European research community in the social sciences can be established, it would be a major achievement and embody real European added value. The current monitoring exercise is not well suited to TSER, particularly given the reassessment and refocusing of the third call. It is noted that the programme's management is currently deliberating on valorisation of the research outputs and that proposers to the third call have been asked to pay particular attention to this.

- The **INCO** programme spans a wide remit and integrates for the first time in one programme all Community RTD activities directed towards non-EU countries. It formulates a coherent policy for international cooperation in the FP as a whole. INCO has close links with complementary EU policies and plays a genuinely 'horizontal' role in cross-programme cooperation and coordination. The existing core indicators are not well suited to this programme, except for areas A.2 and C which run on traditional 'call for proposals' lines. In its policy capacity, a highlight of 1997 was the signing of an S & T cooperation agreement with the United States. It should be noted that INCO has acute staff shortages and averages 60 projects per officer. This is coupled with a huge volume of proposals (1 300 to area A.2, 1 000 to area C) which militates against detailed project monitoring, assessment and dissemination of results. It is positive to note that PHARE funds might be used to finance participation in FP5 and that support for RTD in ACP countries may be enhanced in the Lomé system. COST, which currently has 155 actions, has been evaluated indepen-

dently and an attempt is being made to rationalise procedures. In area A.2, industry is involved in 50 % of projects, with SMEs emerging slowly. Area C is more in the public domain. Annual monitoring may not be appropriate for INCO.

- The **Innovation** programme is not in fact a research programme per se, but creates enabling conditions. Its scope is wide and the calls for proposals closest to the traditional specific programmes are those for technology validation and technology transfer; 60 % of these are coordinated by SMEs and 90 % have SME participation. This programme focuses on exploitation and dissemination and covers the CORDIS database system, the newly-introduced Rapidus system, the IPR help desk and QuickScan. It also funds the European network of innovation relay centres located in the Member States. Impact and European added value are defined in this programme's context as 'practical company development'. Specific core indicators have been developed for this programme.

- **TMR** is a bottom-up programme focused on human capital and its mobility. Its European added value is undisputed in terms of the European dimension embodied in the networks' element of the programme, and the opportunities afforded under the Marie Curie research training grants, access to large-scale facilities and accompanying measures (particularly Euroconferences). Moreover, the TMR programme explicitly includes cohesion as an objective and embodies this in its activities (notably return grants, which help prevent the brain drain and which have also been adopted by certain other specific programmes). It is also a truly multidisciplinary programme. Due to its focus on basic science, industrial impact is difficult toassess, but benefits accrue to companies participating in networks or hosting Marie Curie training grant holders. The additionality aspects of TMR are embodied in its truly transnational character. As few major calls for proposals are anticipated in 1998, and as 1998 is also the mid-term review for many networks, the programme will focus on implementing an impact analysis. Numbers of researchers involved is already one form of measurement. The multiplier effects of fellowships and the explicit inclusion of the less favoured regions are also tangible outputs of this programme. It is anticipated that FP5 will increase 'industry-friendliness' through the introduction of industry host fellowships but the success of such an initiative would greatly depend on the benefits for participating industries being explicitly demonstrated. Otherwise this could inhibit industrial participation. It should be noted that one third of networks currently have industrial partners. This does not change the emphasis of the programme which is 'curiosity-driven' basic research. The annual monitoring exercise is not wholly suited to the qualitative nature of the programme; specific core indicators must be developed.

The Joint Research Centre (JRC)

The panel recognises that the JRC has a separate evaluation and monitoring system, as established in Council Decisions 94/918/EC and 94/919/Euratom, and notes the Commission's decision of 10 April 1996 on the reorganisation of the JRC, including the role of the JRC Board of Governors in those monitoring and evaluation procedures. The panel did not duplicate the JRC's monitoring procedures. The panel received factual information on JRC activities and thereafter the panel's chairman held a detailed discussion with JRC representatives.

The panel recommends that the Commission clarifies how future framework programme monitoring procedures can more effectively encompass the JRC's activities in so far as they constitute an integral part of the framework programme. Mechanisms to generate better synergy between the two separate monitoring systems should be strengthened; to that aim, exchanges of views between the FP monitoring panel and the representative(s) of the JRC Board of Governors should be considered.

Specific information on the mission of JRC institutes, its performance in competitive activities and on the procedures for its evaluation and monitoring, including the implementation of recommendations from evaluators, was provided by the JRC and is attached as Annex IV.

3.3. Specific management issues

Considerable progress was made in 1997 but several management issues remain to be addressed, most of which can only be considered for FP5.

Before referring to these in detail, the panel notes that a factor common to several programmes appears to be **staff shortages** within the Commission services. As a consequence, scientific officers appear to be overburdened with routine work and find it difficult to devote time to the more proactive and strategic elements of their work. This will militate against output/impact analysis and post-contract monitoring which is necessary. Outsourcing discrete elements of work (as has been done for various aspects of some programmes) is not necessarily the appropriate response.

The panel's comments are as follows on key management issues:

- **Rolling work programmes** appear to have worked satisfactorily for the Esprit programme which introduced this system in FP4. It is expected that this will be applied wherever possible in FP5. Fixed quarterly calls as introduced in FP4 have worked well and allow (a) the European scientific community to plan accordingly, and (b) the Commission services to schedule effectively the proposal evaluation process relating to each call. Open calls should have fixed, published dates for evaluation. These experiences should be taken into account for FP5.

- **Electronic submission** of proposals appears to have worked well from the limited experience in the Esprit and ACTS programmes, but careful consideration should be given before adopting this on a pan-programme basis. It is understood that a Commission working group is addressing this issue for FP5.

- **Pre-screening/pre-proposal checking** appear to have worked well for the programmes which have used this system as a first informal filter. Greater use could perhaps be made of national contact points in this regard. The inclusion in information packages of enhanced information on proposal evaluation and guidelines for 'auto-evaluation' have been most helpful and this practice should be intensified for FP5.

- The **two-step submission process** has worked well for programmes which used this concept in FP4 and should be tried out on a pan-programme basis. This management procedure may help reduce oversubscription (as does targeted/focused calls for proposals). It also assists the Commission services in ascertaining

the market for the calls in question and in setting up appropriate proposal evaluation panels.

- Although the evaluation procedures have been streamlined, the **lead time between submission of proposals and conclusion of contracts** is still too long. Feedback to unsuccessful applicants in particular is also too slow and in many cases inadequate. Further refinements in the two-step submission procedure may improve this. Several programmes recommend the greater involvement of end-users in the evaluation process.

- Application forms should be designed in such a way that a proposal, if successful, can be used at the contract negotiation stage as the formal **'technical annex'** for the contract. Much time is currently lost at the contract negotiation stage due to rewriting of technical annexes.

- The panel has noted that the 'near market' programmes need **fast-track budgets and speedier/more flexible start-up** (echoing the 1996 FP monitoring report) to allow participants to move at the pace that the market increasingly requires, and less 'bureaucracy' for start-up firms. The panel equally appreciates the constraints within which the Commission services must operate.

- The panel welcomes the **CRAFT-type measures** specifically introduced for SMEs but there is evidence across programmes that procedures require to be further simplified and speeded up. Targeted information for SMEs should be increased and the role of national contact points should be intensified.

- The panel commends the **flexibility** evidenced, in particular, by the specific joint call in response to the TSE crisis involving three programmes (FAIR, biotechnology, biomedicine and health) and would recommend that all programmes retain an element of budgetary resources to enable flexible response to particular sectoral issues.

- The panel notes the successful use of **project clusters** as a management tool in the biotechnology programme (e.g. 44 plant biotechnology projects/6 clusters, 50 microbial cell factory projects/8 clusters) and a commendable example of European added value in the SMT programme cluster in the area of microbiology relating to the directive on the quality of bathing water. The panel believes that more systematic use could be made to encourage the clustering of projects both within and between programmes. Joint calls for proposals could facilitate this management initiative, prefiguring the convergence foreseen in FP5.

4. Recommendations

4.1. Managerial issues

The panel commends the impressive improvements already effected by the Commission services in several areas of programme management in the context of the existing restrictive regulatory framework and the limited flexibility it offers. However, **the panel believes that further improvements are necessary and can only be obtained if the current regulatory framework is changed, as foreseen for FP5.**

The panel makes the following recommendations:

Indicators and output/impact measurement

The current set of core indicators is useful but limited in scope and not entirely adapted to the features of all specific programmes. The panel recommends continuing analysis of the appropriateness of existing core indicators and regular consultation with programme management regarding the addition of new and programme-specific indicators. This should be done with a view to ensuring the availability of the necessary relevant indicators, without an undue increase in their number. All indicators should be supplemented by concise qualitative information.

In order to achieve a meaningful impact assessment for EU-funded research activity, the derivation of appropriate output measurement and impact assessment methodologies must be urgently addressed. In this context, the panel commends the Commission's initiative in organising a specialist round-table meeting in May 1998 to promote a reflection on the best methods for impact assessment. This should be followed up by a focused effort to derive appropriate indicators, involving scientific experts, evaluators and end-users.

Goals and progress assessment

The panel recommends that specific programmes should, in a more determined manner, adopt the practice of setting up at the beginning of the year a number of verifiable goals to be reached during the year and assess whether these have been reached at the year-end. The panel recommends that, whenever possible, specific programmes should measure their yearly progress through such verifiable goals.

The Commission's management information system

The panel recommends that the management information system be fully used by all specific programmes in order to realise its potential and ultimately to diminish the workload of the programme managers.

Ex post evaluation

The Commission could consider the introduction of a contractual obligation on the

provision of *ex post* information even after the 'financial period' has been concluded.

Timescale from proposal to contract

The panel recommends that all specific programmes try to establish, wherever possible, best practice (as already in use in some programmes) in their management procedures, and make additional efforts to diminish the timespan between submission of proposals and signature of contracts, even by imposing formal deadlines on project consortia within which contract negotiation must be concluded. In this context, practical steps to speed up the process should include the standardised provision of specific proposal evaluation criteria in information packages, the general introduction of the two-step submission process allied to proposal prescreening and the requirement for proposals to be written in technical annex format to expedite the contract negotiation procedure.

Role of national contact points

The national contact points, including innovation relay centres, can play an important role in provision of information in the Member States and in assisting with proposal preparation. Special efforts are required for new member countries (and third countries participating in the INCO programme) and for SMEs. The Commission should consider the provision of specialised training for the personnel of national contact points.

SMEs

The panel commends initiatives such as CRAFT, the specific reference to inclusion of SMEs in all programmes as appropriate and the role of the Innovation programme, all of which are designed to facilitate SME participation. However, a stronger link should be overtly forged between CRAFT measures and the Innovation programme; there should be a greater emphasis on the role of SMEs in demonstration projects; SMEs should be integrally involved in evaluation panels and — across programmes — there should be increased efforts to encourage commercial/marketing perspectives. Some specialised training measures should be considered for SMEs to help facilitate their participation.

European added value

The Commission services must initiate the development of a comprehensive concept of European added value, as only then can it be used as a key criterion in programme definition/selection of proposals. This question underpins the evolution of appropriate core indicators especially those relating to impact assessment.

The panel considers that it is necessary to conduct, as far as possible, quantified measurements of achievement against targets or benchmarks. These can only be made at the level of detail found within each of the individual programmes and projects.

Flexibility and focused calls for proposals

These were two important elements within the system in 1997 and should be extended to all programmes to allow quick response to new, important issues, to help avoid oversubscription and to improve European competitiveness.

Coordination between programmes

This was a feature of 1997, given the number of joint calls for proposals, and should continue to be a priority. The panel notes that the 'thematic' nature of FP5 should, per se, embody enhanced coordination of previously 'vertical' programmes. This will also contribute to one dimension, at least, of European added value.

Public awareness

The panel commends the increased level of dissemination activities and would recommend specific measures to increase public awareness of the benefits of the research, as well as awareness among policy-makers. This is particularly important for the overall strategic objectives and for sensitive sectors such as public health, environment, fission and fusion. Effective communication will serve to identify clearly the strengths of European research.

Staffing

The panel recognises the workload of the Commission services, particularly the scientific officers and, whilst realising the resources available to the Commission, would recommend an urgent review of this matter so as to release the time of these officers for more strategic and proactive work. (This will be of major importance for *ex post* evaluation and for the effective management of FP5 in general.)

4.2. Strategic issues

Already in FP4 there has been a gradual shift from a primary focus on competitiveness to addressing other major European challenges concerning sustainable growth to create employment opportunities while ensuring human health, environmental quality and protection of natural resources. The move from the vertical nature of FP4 to the thematic basis of FP5 is therefore welcomed. Within the remaining lifespan of FP4, strategic foresight exercises should be carried out in order to focus future investment in projects from the perspective of the European added value.

The panel recommends that systematic efforts be made by programme managers to encourage the clustering of projects from different programmes, in order to obtain an increased degree of convergence focused on challenges, prefiguring FP5, (e.g. projects from FP4 joint calls).

Greater synergies are needed not only between the 'horizontal' and 'vertical' programmes of FP4 but between EU framework programme research and the national programmes of the Member States, and relevant international programmes and policies.

The TMR, TSER, INCO and Innovation programmes of FP4 can significantly enhance the impact of the other specific programmes, provided that the potential synergy is systematically exploited. The panel recommends that proposers, programme managers and future monitoring panels be fully appraised of these possibilities and asked to make clear statements on how this has been addressed.

Linear models are not appropriate to describe the effects of RTD on wealth and employment. These effects are more complex and can only be evaluated on a

medium- to long-term basis. **In consequence, the panel recommends that consideration should be given to monitoring economic and social impact on both a project and programme basis, which requires *ex post* evaluation.**

The special needs of SMEs in both the traditional and high-technology sectors must be further addressed. EU programmes should play an active supporting role and EU policy efforts must continue to bring about a more competitive and coherent regulatory structure regarding IPRs and patents. Cooperation with the Member States should be intensified, recognising the fragility of SMEs in terms of lack of financial and managerial skills, so that national support could be secured to match any EU award.

The panel believes that some conditions relating to the business environment, such as venture capital development, are as (if not more) important as RTD for improving competitiveness and recommends support to projects dealing with such aspects under the appropriate programme (eventually the TSER and Innovation elements of FP5).

The results and impact of programmes such as fusion will only be appreciated over a very long time period and success or failure will reflect on all of humanity, not only the EU citizens' quality of life. The direction of such programmes is necessarily subject to high-level policy considerations and implies international cooperation agreements.

4.3. Improving monitoring

As mentioned in Section 3.1 of this report, the panel fully endorses the Commission's commitment to monitoring as part of a positive culture of evaluation and improvement. It is, however, concerned at the timescale for and time-frame of the exercise.

The panel recognises the time constraints within which the Commission services operate (including delivery of the annual activity/Article 130p report) and recommends that, at minimum, the specific programme panels should be set up much earlier, e.g. June in any given year, to allow a better timescale, to result in condensed and timely information on which the overall framework monitoring panel could operate. Consideration should, in fact, be given to 'ongoing' monitoring of the specific programmes (as successfully evidenced in 1997 by the transport programme) or to monitoring on the basis of calls for proposals. There should be some continuity in membership of panels from year to year.

A really comprehensive monitoring system should be based on appropriate indicators, supplemented by qualitative information and should develop a proper system of output/impact measurement. Mid-term 'output' control measures should be instituted in individual projects. Consideration should be given to the fact that the minimum meaningful timespan for impact assessment could be five years after completion of projects, the length of time required to measure effectively real impact on policy and markets.

4.4. Towards the fifth framework programme

It is expected that the work of this panel will not only influence work to be per-

formed in 1998, but beyond, in terms of contracts to be concluded under FP4 in 1998 which will run for two to three years after that. It is also expected that the panel's deliberations and recommendations will form part of the consultative process in defining FP5. **Due to the timing of this monitoring exercise, many of the panel's recommendations are of long-term significance.**

The panel notes the new strategic approach as proposed for FP5 but would advise against discontinuity with FP4. Results from the excellent innovative partnerships established between science and industry should be capitalised upon. **The period between now and the launch of FP5 should be used to promote and advise on the new strategic approach and structure of FP5, and thus to prepare potential applicants.** The panel recognises the need to allocate resources to assist the preparation of the scientific communities in new accession countries in the culture of evaluation and monitoring.

This report has emphasised the panel's view that a comprehensive concept of European added value is required and FP5 should be based on a clear strategic plan embodying this. Based on such a strategy, projects should have a long-term focus capable of genuine impact measurement and should capitalise on existing European strengths, rather than attempt to compensate for those that are already lost.

Finally, the panel recognises that the thematic programmes of FP5 continue to include a balance between basic research, development, demonstration and industrial participation. Industrial high-technology development requires clear access to basic research and it is hoped that this will be further facilitated through the systems approach foreseen for FP5.

5. Concluding remarks

Overall, the implementation of FP4 is developing in a positive way. For certain programmes, substantial results have been achieved in specific and targeted fields. In other areas, results will only be measurable in the longer term.

The panel commends the monitoring process as an essential contribution to overall good management practice and notes that most recommendations of the 1996 monitoring exercise have been adequately implemented.

This report has recommended ways in which the critical issue of impact measurement can be addressed, as indeed how an overall improvement in the monitoring system itself can be achieved as the implementation of programmes proceeds.

Finally, the panel recognises that for RTD to remain an important factor for European competitiveness, the appropriate financial resources must be available. In addition, enabling conditions pertaining to international cooperation, the general business environment, access to markets and investment on a global scale must be equally supported.

ANNEX I

TERMS OF REFERENCE FOR THE 1997 FRAMEWORK PROGRAMME MONITORING PANEL

Definitions and references regarding tasks

1. Background

Article 4.1 of Decision No 1110/94/EC on the fourth framework programme of the EC activities in the field of research and technological development and demonstration stipulates that:

'The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress of the fourth framework programme as regards the criteria set out in Annex II, which include that of contributing to the economic and social cohesion of the Community and the scientific and technical objectives set out in Annex III. It shall examine in particular whether the objectives, priorities and financial resources are still appropriate to the changing situation. If necessary, it shall make proposals to adapt or supplement the framework programme according to the results of this assessment.'

Similarly, Article 4.1 of Decision 94/268/Euratom concerning the framework programme of Community activities in the field of research and training for the European Atomic Energy Community stipulates:

'The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress of the framework programme as regards the criteria and objectives set out in Annexes II and III. It shall examine in particular whether the objectives, priorities and financial resources are still appropriate to the changing situation. If necessary, it shall make proposals to adapt or supplement the framework programme according to the results of such monitoring.'

2. Issues to be addressed by the contractors (experts)

The framework programme monitoring exercise should be considered as a quick response mechanism to programme developments and give high-level advice on key issues. The exercise shall produce an overall annual report on progress across the framework programmes [4] which should consider the framework programmes as a whole, as an overall planning and financial tool, and not each of its components separately.

The exercise shall mainly be a synthesis of the specific programme monitoring (including core indicators), summarising progress and giving emphasis to the main issues which have emerged from the analysis. However, the experts' report shall cover more than the sum of the specific programme monitoring reports [5]. As appropriate, it shall highlight significant differences between programmes and include consideration of Community RTD objectives as described in Article 130f of the Treaty, as well as synergies between programmes and/or activities.

[4] The focus of the report will vary from year to year reflecting the state of implementation of the specific programmes.

[5] The monitoring reports of the specific programmes are based on a set of programme indicators following CREST recommendations and they primarily relate to shared-cost programmes under Activity 1 of the fourth framework programme. The implementation of other activities (such as the dissemination and optimisation of results, and thermonuclear fusion) follows different implementation procedures for which complementary indicators are appropriate. Moreover, JRC participation in specific programmes is considered like any other participant, while the JRC direct action activities are reported on through the 'Observations of the Board of Governors on the JRC annual report' which will constitute directly an input to the overall framework programme exercise.

Within the context above, the issues to be addressed will include, as appropriate:

- the efficiency and transparency of the programme management (including calls for proposal, information to applicants, assessment and selection process, contract negotiation, and disbursement of funds), and internal Commission coordination;

- consistency of the selection of projects with the initial objectives and the work programme, and extent to which selected projects or clusters of projects are fulfilling the wider policy objectives of the EU (in particular in areas of relevance to the programme concerned);

- use of specific measures and support activities (e.g. to support SMEs, improve dissemination, etc.), and participation in the programme of firms and institutions from less favoured regions;

- appropriate follow-up of previous evaluation/monitoring recommendations;

- important progress, main output of projects against the original targets set and major achievements in 1997; in this context particular attention should be paid to European added value; and

- as appropriate, aspects of flexibility to respond to the needs of society in the light of changing circumstances.

An important aspect of the framework programme monitoring exercise is to advise the Commission services of the changes that may be needed to the balance of the programmes or to the strategy for implementation in the light of experience and changes in the wider environment. Moreover, cases where the results could have a significant impact should be highlighted.

The experts are invited to recommend additional framework programme level performance indicators which could be useful for future monitoring.

3. Performance of the task

The monitoring work will be carried out by a panel of high-level experts under the leadership of a chairman (all being external to the Commission services), known as the 1997 framework programme monitoring panel. The contractor will work as part of the panel who will collectively endeavour to provide a monitoring report through an analysis of factual information. This report will follow a format provided by the Commission services. The contractor is expected to work in close liaison with the Commission's Evaluation Unit, DG XII/AP.3, who will provide programme information and specific programme monitoring reports.

At their meetings, the panel members are expected to discuss and compare their individual analysis of the data, interview programme managers (as required), agree on their conclusions and recommendations, and contribute to the preparation of the panel's report.

The panel will be supported by an independent external rapporteur who will be under contract to the Commission to assist with the analysis of information provided, summarise the panel meetings, provide drafts of the panel's report, etc. The rapporteur will at all times work under the instruction of the chairman.

ANNEX II

SPECIFIC PROGRAMMES OF THE FOURTH FRAMEWORK PROGRAMME

Budget for the various specific programmes under the fourth framework programme (million ECU)

Activity 1:	**Research, technological development and demonstration programmes**	
1.	Information technologies	2 072.5
2.	Telematics applications	913
3.	Advanced communications technologies and services	671
4.	Industrial and materials technologies	1 737
5.	Standards, measurement and testing	194.5
6.	Environment and climate	601
7.	Marine science and technology	243
8.	Biotechnology	595.5
9.	Biomedicine and health	374
10.	Agriculture and fisheries	689.5
11.	Non-nuclear energy	1 055
12.	Nuclear fission safety	170.5
13.	Controlled thermonuclear fusion	846
14.	Transport	263
15.	Targeted socioeconomic research	112
16.	JRC direct actions and support activities	958.5
Activity 2:	**Cooperation with third countries and international organisations**	**575**
Activity 3:	**Dissemination and optimisation of research results**	**352**
Activity 4:	**Stimulation of the training and mobility of researchers**	**792**
	Total	**13 215**

ANNEX III

SUMMARY OF 1997 MONITORING REPORTS FOR EACH SPECIFIC PROGRAMME

The following summaries have been prepared by the specific programme monitoring panels. The fusion programme summary has been prepared by the programme staff.

Information technologies (Esprit)

The Esprit programme runs 859 shared-cost action projects, 707 take-up actions and trial applications and 155 additional general preparatory, support and technology transfer actions. The approximate number of concerted actions and subventions and studies is 80. These represent about 3 300 participants in Esprit. The percentage of budget committed to the end of 1997 is 77 %.

The participation to Esprit can be summarised as follows: about one third of the participants are big industries, one third are SMEs and one third are universities and research centres. In 1997 the IT programme launched various initiatives aimed at attracting new participants, in particular SMEs, and at developing cooperation with other programmes. On the advice of IT users, through the industrial advisory panels, Esprit has launched four 'thematic calls' as a flexible means to respond quickly to emerging market needs. The chosen themes (IT for mobility, electronic commerce, learning and training in industry, interfaces and access to information) cut across the domains of the programme, and even across programmes. Their definition and evaluation were performed in close coordination with other programmes and DGs. In addition, two joint calls were launched with the IMT programme (intelligent manufacturing systems and aeronautics).

Esprit organised in November 1997 its yearly European information technology conference (EITC). Besides being a channel for dissemination in its own right, it concentrated on the issue of convergence, preparing the ground for the fifth framework programme and attracted more than 2 500 participants. To pave the way to the financial markets for SMEs, an investment forum took place during the conference. It attracted 150 participants and built links between 30 innovative companies and 35 potential investors. EITC was an opportunity to deliver the first outcome of the new Prosoma project, the objective of which is to disseminate the latest information about programme results using text, audio, video and software. Two showcases, one on CD-ROM and one on the Web (www.prosoma.lu) provide efficient and easy access to more than 250 full multimedia presentations of results. These two dissemination channels are complemented by the paper publication *Esprit success stories for the information society*, with a selection of results, special initiatives, company and business stories.

The 1997 continuous monitoring panel has concentrated its activities on strategic topics related to the fifth framework programme preparation. Some of its recommendations address the overall framework programme, in particular the need for: increased flexibility, radically reducing the lead time for project approval and for first payment; and a speedy mechanism to permit the seed funding of research on innovative, high-risk ideas. Others can be implemented at the level of the future IST programme, such as the reinforcement of take-up initiatives such as FUSE (first user actions) or TTNs (technology transfer nodes), and the increased role of the industrial advisory panels.

Telematics applications

The 1997 monitoring exercise of the telematics applications RTD programme under the fourth framework programme (FP) was conducted by a panel of four independent experts. The panel drew on an analysis of core indicators, interviews

with heads of sector, questionnaires completed by heads of sector, and a significant quantity of supporting documentation. At the end of 1997, the telematics applications programme had committed about 75 % of its total budget and had more than 400 contracts running (some 330 shared-cost actions, 10 concerted actions and 70 accompanying measures). The final calls for proposals within the fourth FP were processed during 1997, which brought the total number of retained proposals to more than 560.

The panel is satisfied that the programme is being managed in such a way that: there have been improvements in the efficiency and transparency of programme management during the past year; the selection of projects is consistent with the initial objectives and the work programme; appropriate dissemination activities are being undertaken; consideration is being given to output indicators that are appropriate for individual sectors; the annual project review, with the involvement of independent experts is an effective mechanism for ensuring flexibility in responding to the changing needs of society.

The panel notes that there has been significant progress in the following areas, but suggests that these areas should continue to attract special attention:

Integration: In recognition of the increasing need to present integrated applications to the market place, the panel recommends that intersector research projects launched under the integrated applications for digital sites and educational multimedia calls for proposals receive special attention during subsequent monitoring and evaluation processes.

Dissemination: The panel applauds the work that has already been undertaken in this area at project, sectoral and programme levels. However, with the programme, and thus the projects, coming to an end, the panel would like to see even more emphasis on dissemination and future exploitation of results. It is recommended that the use of national structures (e.g. agencies working for/with SMEs) be further developed.

Output indicators: The panel recommends that in the coming year indicators be further concretised by identifying the essential indicators in each sector, and at programme level. It should be acknowledged, however, that indicators are not to be established once and for all but should be made subject to close scrutiny and adapted to the changing contents and environment of the programme.

However, the following issues, which are largely outside the control of the programme management, remain problematical:

Bureaucracy: The long-term effectiveness and efficiency of a near-to-market programme such as the telematics applications programme may be reduced by the need to respond to bureaucratic requirements. The panel recommends that there be further investigation as to the appropriate level of exposure to risk in this programme, and mechanisms for allowing programme managers more autonomy and scope for the exercise of judgment.

Informatics: The panel is concerned by the numerous and recurrent problems arising from informatics support. Such support is at the heart of monitoring and control. The panel recommends that a significant review of informatics support be undertaken, and that implementation of enhanced support proceed as quickly as possible.

Advanced communications technologies and services (ACTS)

This report reviews the overall progress of the 156 ACTS projects, taken in their totality, and assesses how they collectively meet the objectives of the programme set by the decision of the Council of 27 July 1994. Its purpose is to highlight achievements, point to the need for further action in the ACTS programme, and recommend action on issues to be addressed in FP5. Significant progress has been made in underlying concept and technology developments, in specific developments for commercial products (equipment, services, etc.) and in contributions to standards. However, further concentrated effort is required to complete the work and to disseminate project results in the best possible way. A need for ongoing work has been identified in most areas, but the evolving environment (regulatory, technological, market need, etc.) will have to be duly taken into account. The rapid developments of the Internet and its technology require a constant adaptation of those parts of the ACTS programme that are related to it. In all areas, and as projects come to an end, projects should be encouraged to demonstrate results jointly within and outside the R & D circuit. Special measures aimed at banks and venture capital operations should be taken to increase their awareness of the SMEs' potential in exploiting advanced technologies. Decision-makers in industrial organisations should be involved in the assessment of the impact of project results and more provision should be made (e.g. funded work packages), to assure effective dissemination of results and for technology transfer.

Contacts with the east European countries should be maintained and intensified so as to help the creation of national hosts and to increase in this way the possibility of participation in EU research. Commission services should continue to expand their support as enablers in the technology transfer and promoters of Europe-wide, voluntary actions.

A smooth transition from ACTS to the IST programme in FP5 must be ensured. In this, high priority should be given to a fast and simple project initiation process for FP5, in order optimally to meet the emerging requirements. The task descriptions should allow sufficient flexibility to reflect the state of technological development at the time of project initiation. A process should now be established to allow the fast changing technology environment to be reflected by the industrial players in FP5 calls, shortly before they are published. An early first analysis should be made of the advanced networking technologies that might be required by FP5 projects for platforms for experiments, validation and trials, including demonstration of new services and especially how they could be provided Europe-wide. A clear focus should be given to all work contributing to standards to assure that there is a recognised need for them. Guidelines should also be considered in FP5 as an attractive instrument of technology transfer. The needs for further evolution of network architectures and technologies should be taken into account in FP5, based on a clear business focus.

The information society part of FP5 should be more focused on areas that build on Europe's leading R & D domains, and in areas where that leadership can be achieved. Strategic pre-studies of general trends should be carried out to focus work in FP5. In a converging environment of liberalisation, competition and technical heterogeneity, R & D should focus on open systems and interfaces for seamless end-

to-end service interoperation. RTD with a longer-term focus (e.g. five to seven years) must also have high priority in FP5 to enable Europe to build up and defend a leading role in telecommunications. On-going, close and constructive cooperation between regulatory and political bodies and those responsible for RTD must be assured in the years to come. Political and regulatory decision-makers need to be informed and briefed of the technological evolution at an early stage.

Industrial and materials technologies (IMT)

The IMT programme is now operating more than 1 150 projects, of which 400 RTD projects, 86 thematic networks, 67 accompanying measures, 316 exploratory awards for SMEs and 120 CRAFT projects were new in 1997. These projects represent more than 4 500 participants of which 63 % are industries (of which more than 60 % are SMEs). It should also be noted that 35 % of these participants are newcomers to IMT and 13 % come from Objective 1 or 6 regions. The total budget committed in 1997 for these projects amounted to ECU 837 million.

The main findings of the 1997 monitoring analysis are that, in general, improvements have been noticed compared with the situation in previous years. For example, the evaluation of proposals received, both for industrial RTD projects and for the CRAFT activity favouring SMEs, shows a higher rate of success in the selection process (30 % compared with 18.5 % and 28 % in 1995 and 1996) largely due to better awareness among proposers and through efficient pre-screening by the Commission. The evaluation process itself was found to be transparent, clear and well documented with pre-screening particularly appreciated. The CRAFT procedures, however, remain complex for much of the SME population.

With regard to the follow-up of projects, the work achieved by the programme's project officers is found to be of high standard, although more resources must be devoted to this so that more thorough management linking to the consortia can be achieved. The quality indicators, used among other mechanisms such as on-site meetings with project partners, to monitor the performance and impact of the projects, are found to be a useful tool.

Concerning the exploitation and dissemination of results, the pilot actions carried out to bring sources of venture capital into the technology process are found to be relevant and useful. The annual evaluation of finished projects and, for the first time, the assessment of the socioeconomic impacts of projects which came to an end four to five years ago were found to be of excellent value, bringing useful information enabling the programme to improve its management and orientation even more.

Publications within the IMT programme substantially increased in 1997, including a first multimedia CD-ROM for results' dissemination. A major conference was organised too in Toulouse, France, during October 1997, with the significant participation of around 1 000 attendees. The conference served largely to build on the achievements of the IMT (and SMT) programmes with a view towards the next framework programmes.

The panel members suggested various recommendations. Although improvements have been recognised concerning the proposal evaluation process, a decrease in the delays between the end of the call and the date of signature is still recommended. The scientific and technological part of the evaluation cannot be

shortened for reasons of quality, but the subsequent administrative stages should be improved. A possible change suggested is to apply the two-step procedures used in CRAFT more widely, so that the partners of a rejected project could be informed quickly. Also, the procedure for selecting and implementing training grants should be shortened, since the current process requires all programmes operating training grants to be treated together. The actions for stimulation of SME participation in research projects, with the help of local qualified entities should be continued as well as the CRAFT initiative as a whole. The panel was generally in favour of open calls under FP5.

Concerning the exploitation of results, more emphasis should be put on quantifying exploitation plans and economic forecasts in the proposal and during the research phase. Also, new measures aimed at easing the access of project partners to third party financing should be encouraged.

Standards, measurement and testing (SMT)

The standards, measurement and testing programme had about 401 running contracts at the end of 1997. Of these, about 228 are shared-cost RTD projects, 37 are thematic networks, 66 are accompanying measures, 61 are exploratory awards for SMEs, 8 are CRAFT projects and 1 is a concerted action. Not including the many participants in intercomparison and reference material certification exercises, the total number of organisations participating in these projects is more than 780. About half of the participants are participating in the SMT programme for the first time. The total budget committed for the projects is about ECU 132 million, representing more than 77 % of the total budget for the programme.

The SMT programme has a very wide scope, covering nearly all technical areas related to industry and the functioning of a modern society. It is implemented partly by open calls for proposals structured around three broad themes and partly by dedicated calls answering specific research needs in relation to European standardisation and the implementation of Community policies. The monitoring panel considered that the programme has a very high European added value as it addresses research needs that are essential for the competitiveness of industry, for the well-being of citizens and for the implementation of a wide range of Community policies. The dedicated call system has proved itself as being without question an effective means of providing support to the activities of the European standardisation bodies, notably CEN and Cenelec. Continuing support to the development of the European measurement infrastructure has been provided by the production of 39 new certified reference materials (CRMs) in 1997 and by the undertaking of collaborative activities, such as intercomparisons and the development of transfer standards, which will help to ensure the traceability and comparability of measurements. Specific technology stimulation measures for SMEs through CRAFT are helping SMEs to develop the measurement and testing techniques that they need in order to be able to produce high-quality and competitive products.

A number of important recommendations were made by the monitoring panel with respect to the fifth framework programme. In view of the strategic importance of standards, measurement and testing for Europe, it was recommended that the generic action dealing with these issues

should have a reinforced role, in particular with respect to the coordination of activities in support of standardisation. The use of the dedicated call system was strongly supported and it was recommended that its use should be extended so that a wider range of European organisations can submit topics for inclusion in the calls, covering not only support to standardisation but also support to the measurement infrastructure. It was pointed out that certified reference materials will continue to be an essential element in the measurement and testing infrastructure in Europe and it was suggested that the services of the Commission should play a strategic role in defining the priority list of key CRMs to be developed. The importance of consulting existing European laboratory networks about the strategy for the development of the measurement and testing infrastructure in Europe was underlined. Finally, it was stated that even if the management of the programme works reasonably well, further efforts should be made to develop the role of scientific officers, to improve administrative aspects and to soften the complicated procedures inherent in the current framework programme.

Environment and climate

With one year remaining of the current programme under the fourth framework programme, about 870 main RTD activities have been evaluated positively for funding, including projects which are only scheduled for funding in 1998 for the second phase of the programme (1997-98). The main categories of activities covered are around 660 shared-cost RTD projects, 50 concerted actions, 60 technology stimulation measures for SMEs, and 95 training measures (grants and advanced study courses). Almost 95 % of the budget has been attributed for the funding of these activities and over 18 300 links established between participants in successful consortia. The calls still remaining open for funding decisions to be taken in 1998 relate to the supplementary funding of ECU 7 million decided by the Council and the European Parliament on 1 December 1997 for activities concerning water and the final 'tranches' for CRAFT awards for SMEs and training measures.

The monitoring panel reviewed features of the programme management that had been looked at in previous monitoring exercises and the five-year assessment and evaluation of environment activities. Whilst it tried to consider issues not previously touched, the panel concluded that the major problems are not easy to solve. They take time so the monitoring exercises inevitably show some repetitiveness. New management features introduced in 1997 were considered to be successful, fair and objective, particularly a new evaluation manual (made available in advance to proposers and aiming at greater transparency and objectivity), a prechecking service for potential proposers, as well as the scrutiny by independent observers of the new procedures. However, the panel recognised that these procedures also add to the complexity of the process for proposers and to the workload of the staff, and made a number of recommendations for improving the process, including better infrastructure support, the frequency of calls for proposals, carrying out strategic evaluations concurrently with the scientific and technical evaluation of proposals, rather than consecutively, and reviewing the contract negotiation phase.

Overall, the panel concluded that the main objectives of the programme have been well covered, with good progress in global climate prediction, an active lead in providing information for the Commission for the

Kyoto Conference in December 1997, as well as utilisation of international networking and of space technology for monitoring global change. Concerted actions on rehabilitation and risk assessment of contaminated sites, and on the monitoring of ecosystems, have been carried out with remarkable results.

Programme management is widely acknowledged as being balanced and flexible, and the implementation of the programme is perceived as efficient. Nevertheless, the panel endorsed the programme managers' conclusions that further efforts need to be made on the utilisation of results. It is this, rather than the quality and quantity of results, which is a problem area, and the panel recommended that a system should be devised and set up for regular accounting of usability and utilisation of results, as well as an operation strategy and plan for information dissemination including the allocation of the necessary resources and use of outside expertise.

A number of recommendations were made by the panel on how to deal with the very heavy workload imposed on staff, with the consequent loss of flexibility, morale and motivation due to workloads being close to saturation. Included in this perspective was the issue of how to continue implementing the current programme whilst still developing, and being well prepared for the changes and demands of, the fifth framework programme.

As to the monitoring process, the panel considered that too much is expected in a short time and with limited resources. Suggestions for changes were made, in particular a requirement that an annual report should already be prepared by the Commission services prior to the first panel meeting, and the information and data provided should be drastically reduced.

Marine science and technology (MAST)

By the end of 1997, almost 150 projects were under way: about 100 shared-cost contracts, 5 concerted actions, and the rest as accompanying measures. There were about 2 200 interlinkages between participants and about 75 % of the total programme budget had been committed.

Having reviewed the distribution of MAST projects by area and topic, the panel noted a fair agreement between the funding breakdown initially proposed and that which was achieved. Given the very detailed contents of the technical annexes of contracts and the competence of the MAST officers, the panel felt that the projects which have been supported are adequately monitored and concluded that progress was good. With regard to the involvement of industry, some progress over previous years was noted, although much remains to be done under FP5 (currently, industry as a whole receives about 10 % of the programme funds).

The panel recommended improvements to the transparency and objectiveness of the programme management. Despite clear improvements in the procedures for proposal evaluation, more can be done, for example, by increasing as far as possible the information to applicants and by using multistep evaluations. Furthermore, the panel felt that it would be valuable to involve external experts in reviewing the progress of projects.

As there has been little tracking of project outputs in the longer term, the panel recommended that the Commission should prepare a list of objective indicators to assist dissemination of results and make surveys at adequate time intervals after the completion of the projects. It was also felt to be important to identify end-users of

MAST results among regional authorities and for the Commission to dedicate resources to this matter. A 'linking committee' was proposed with these regional authorities to ensure an effective transfer of results from MAST in a manner which is open to easy exploitation.

In order to increase the participation of industry, it was also recommended that an investigation of the numbers of companies which could benefit from the programme should be undertaken, together with an effort to focus on this group in order to provide the best European added value. To enhance the management of funded research, project managers with industrial experience should be employed, especially in big projects, to ensure the efficient use of funds. Furthermore, greater use should be made of prototypes to demonstrate research results in a manner which would enhance industrial interest.

With regard to advanced training activities, the panel would like to see them clearly targeted on certain groups or certain geographical areas, thus ensuring an equally clear expected impact.

Finally, the panel recommends enhancements to the process of external monitoring by complementing the information already made available to the panel with extra objective data, such as answers to questionnaires sent to a small random sample of project coordinators.

Biotechnology

The year 1997 can be considered as a 'milestone year' for the Commission's Biotechnology Unit and biotechnology programme. Two new calls for proposals (the fourth and an additional one on transmissible spongiform encephalopathies were launched; the proposals submitted were evaluated, whereas those from the 1996 (third) call were selected. A very high number of new contracts have been established, 715, representing a total commitment of ECU 227 million, or 37.7 % of the FP4 budget for biotechnology research in one year. Although the information material for prospective applicants has remained the same as in 1996, the use of the World Wide Web has grown considerably; Web users could find in the programme home page complete information, including the proposals' evaluation procedures. With respect to the latter, the percentage of evaluators from industry was — as targeted — quite high, 30 % overall and 50 % for demonstration proposals.

Out of the 391 proposals submitted in response to the third call, 96 projects were selected (overall success rate 25 %), with a total request of ECU 114 million. We note that, although the percentage of proposals submitted for concerted actions remains low (10 or 2.5 % of all proposals), as in 1996, their selection rate has increased, thus indicating a possible improvement in their scientific quality. The evolution in the number of proposals for demonstration projects — a new project modality in the biotechnology programme — has been even more spectacular: starting with only four (1.3 % of all proposals) and nine (1.1 %) submissions in response to the first two calls, the number grew to 37 (9.5 %) after the third call, to jump finally to 75 proposals (13 %) after the fourth call.

Programme management was found to be efficient. Management by project *'clusters'*, in combination with other methods, has been effectively applied to programme areas with many projects. Programme flexibility was successfully tested in 1997 by a number of unplanned, crisis-like events ('mad cow disease', 'Dolly the

sheep'). Programme visibility has reached a fair level; on 18 July 1997, a major breakthrough was announced: the completion of the *Bacillus subtilis* genome sequencing work. Other significant outputs include the publication of the book on molecular tools for biodiversity.

The panel also notes a handsome growth of industrial participation from the first through to the fourth call, reaching an average penetration rate of 70 % (higher in certain programme areas). The same also goes — at a lower level — for the involvement of SMEs, from a statistical view; future efforts should be targeted to attract more high-technology SMEs in biotechnology projects. Promoting industrial biotechnology in Europe is a yet harder task, depending, among other things, upon the improvement of the legal situation regarding intellectual property rights, harmonisation of the regulatory framework, enhancing the presently weak 'risk culture' among European entrepreneurs, and increasing the understanding of potential benefits (and not just the risks) among the public, as low public perception still hampers commercial developments in EU biotechnology.

Biomedicine and health

An increasing proportion of proposals in response to the third call was of the shared-cost type. In line with EC objectives, they continue to establish new links between organisations and participants as well as strengthening the links between existing collaborations. At the same time there is a movement from 'molecule to medicine', consistent with the EC objectives. Thus, Biomed 2 is continuing to sponsor highly ranked trans-European research projects of apparently increasing quality. The third call generated a high level of industrial participation (10 % of the proposals), particularly in the areas with immediate potential for commercial development (cancer research, cardiovascular disease, chronic disease). These clear trends have continued to enhance the reputation of Biomed 2 as a successful and highly visible instrument for developing a European science culture. The EC sponsored further development of areas with a strong industrial participation which is likely to stimulate even closer cooperation between EC Member States and will be of great benefit to the European citizen.

The programme management has succeeded in ensuring efficient and transparent administration of the programme, in spite of the limited personnel. The rapid turn around of proposals (less than six months between the closure of the call and the notification of applicants) is in general much shorter than that of many national funding agencies and close to that required by the US national institutes of health (NIH). The programme management should be highly commended for the efficient processing of the large number of proposals in such a short time.

Rapporteurs of the panels for proposals rate the process of evaluation as 'painstaking and vigorous; carried out in a democratic and transparent manner in the best tradition of European science and culture'. The conduct of the assessment was rated as 'professional'. The monitoring panel is in unanimous agreement with the rapporteurs that the task of evaluation was undertaken fairly and transparently. The European added value (EAV) of all proposals ranked for funding was clearly evident, with the judgment of EAV being soundly based on scientific and social needs.

The monitoring panel was also highly impressed by the joint call for proposals on TSE of life sciences and technologies of

July 1997. This call testifies that the EC is well equipped and capable to flexibly launch a swift and determined response to acutely emerging scientific and health issues.

Agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development) (FAIR)

Over the period 1994 to 1998, FAIR incurred a budget of approximately ECU 646.5 million (excluding the JRC). In addition, ECU 35 million was provided recently by a Council and European Parliament decision for TSE research across the FAIR, Biomed and Biotech programmes. Over 800 projects, corresponding to a budget of ECU 465 million, are now operational following all the calls since the programme began. Shared-cost and concerted actions represent the largest part: 485 projects costing ECU 420 million. Accompanying measures (training grants, workshops and technology stimulation measures for SMEs) span 326 initiatives costing ECU 26 million. ELSA comprises six projects, totalling ECU 3.3 million and 14 demonstration projects were funded with ECU 16.4 million. The year 1997 was very active, with three calls for proposals being open at various times together with additional calls inviting applications from SMEs and those seeking training grants. Most of the 59 projects approved under FAIR 4 have now been signed. Some 138 proposals including 128 shared-cost and concerted actions, three ELSA, six demonstrations and one thematic network have been selected from FAIR 5 submissions. FAIR 6 has now been closed since 16 January 1998. Two TSE calls have generated 90 proposals. The CRAFT scheme has led to 90 exploratory awards and 16 cooperative research proposals being selected from two calls. Some 99 training grants have been accepted.

Overall the panel see FAIR as an exciting and high-quality research programme with much to commend it. However, they address a series of recommendations for future management of FAIR.

Facilitate the implementation of FAIR: With most of the funds now committed, project officers responsible for this important applied programme should take a highly proactive approach to their role focusing on the potential for output and achievements in line with the objectives. It is important that time be made available for this task. If necessary, more external staff with relevant experience should be seconded into the Commission. Project officers should initiate regular reviews and workshops on important topics which relate to groups of projects under their supervision. Systematic and structured discussions between project officers should take place under the chairmanship of a senior experienced person. Relevant user groups should be invited as observers to some of these meetings. When reviewing projects concerned with biotechnology, animal welfare and the environment, the value of involving consumer groups should not be overlooked.

To facilitate analysis and quick answers to any request, a single unified programme database showing the details of projects, budgets, progress and achievements should be built and maintained.

Reinforce specific measures and support activities: The European Master's degree in food science should be extended and broadened into other areas. Procedures surrounding budget allocation to workshops should be relaxed further. Patents involve expensive ongoing costs ahead of any return; a budget to help the academic community with these costs would be welcomed.

A review of the operating practices of national centres in Member States providing support to SMEs should be undertaken to further optimise SME involvement in the future. We also recommend to take a more relaxed approach in regard to the constraints imposed in the CRAFT scheme.

Other recommendations (on dissemination, flexibility, collaboration): Documents covering all policy areas relevant to FAIR should be prepared and disseminated widely. All project leaders should be encouraged to set up links with potential customers and those within the 'extended audience'. This will help isolate important technical and market issues together with legal and regulatory hurdles. In addition, to facilitate further dissemination, all project leaders should establish a Web home page. Flexibility became an important issue as a result of the BSE crisis. Future programmes need built-in flexibility from the outset to permit important initiatives to be undertaken without undue delay.

Non-nuclear energy (JOULE-Thermie)

The JOULE-Thermie programme addresses research and development (JOULE: DG XII), and demonstration projects (Thermie: DG XVII). The panel feels there has been very positive collaboration between the two services in 1997, both in the development of long-term strategic thinking and at an operational level between officers. However, the panel is concerned at the lack of flexibility caused by the use of different calls, schedules and selection procedures, and separate information channels.

Programme outputs — projects, studies and models — appear to have made a significant contribution during 1997 towards both the broader work of the Commission and European added value. The added value dimension includes not simply the development of energy technologies, but also a contribution towards European policy, competitiveness and trade, and the environment.

Procedures for calls and for evaluation are clear and transparent, although the panel feels that more can be done to achieve even greater clarity, especially for those without intimate knowledge of the Commission or of the programme itself.

Project selection in 1997 has helped to ensure that resource allocation will be broadly in line with the programme budgets. An emphasis on renewables has increased the allocation to this sector. The exception is the involvement of SMEs, although the panel notes the major steps in 1997 towards increasing their participation, in both the JOULE and Thermie elements of the programme.

Work on quality management and on computerised MIS has progressed well during 1997, and is ongoing. However, the panel notes the increase in 'live' projects, and is concerned at what seems to be a sharply increasing workload. Although further external resources were obtained during 1997, this in itself poses problems for the staff. There is a need for

closer examination of how to cope with this in the future.

Special attention was paid to information dissemination in 1997. There is a need to strengthen this emphasis, and to develop an information strategy.

The 1997 monitoring panel recommends: closer alignment of calls 'made by both programme elements, and an investigation of the feasibility of introducing some combined calls'; a 1998 call (Thermie) aimed at SMEs and building on the success in 1997; more extensive and publicised use of the successful pre-proposal check process; steps to ensure the use of shorter, simpler information promoting the programme; further reduction in the time taken to bring projects to the contract stage; work on clarifying and defining the changing role of the scientific officer; detailed study of the projected workload incurred in managing running contracts; development of a clear information strategy/plan for the combined programme; further harmonisation of the monitoring data for both elements of the programme.

Nuclear fission safety (NFS)

Virtually all projects and groups of projects ('clusters') were at 'cruising speed' at the end of 1997. The programme management succeeded in organising this complex programme properly although it involves many (approximately 200) parties. In 1997, there were no new calls for proposals for shared-cost actions and only concerted action proposals (66 until the closing date of 1 November) were submitted. This is in line with the schedule for the submission of the proposals.

The panel noted that, in general, the contract subjects are consistent with the objectives of the NFS programme. Many projects have an important European added value, as for example:

The **exploratory** R & D is oriented on long-term objectives which require collaboration of many partners and results are to be used in a European context. This is so for the study of passive safety in nuclear reactors as well as for alternative fuel cycles.

For **licensing authorities,** e.g. the behaviour of molten fuel ('corium') in case of hypothetical accident and the behaviour of off-gases in such an event.

In **waste management**, the accent is placed on impact assessment methodology for repositories, common use of major underground experimental facilities also by partners involved in smaller programmes, and operations.

The studies on **radiological impact** are essential subjects for collaboration among major and smaller partners. While thus encouraging many partners from all over the EU, the Commission also promotes the existence of major centres of excellence in radiobiology and radioecology. The existence of such a network of specialised laboratories also allows the Commission to coordinate some of the **assistance to central and east European countries**. Whereas the European added value of the NFS programme is incontestable, the Commission's system for R & D in DG XII contains potential for the promotion of collaboration among DGs confronted with similar technical problems and with potential partners beyond the EU and the recently added candidate partners.

In each of the five R & D areas interesting achievements are noted, e.g. in the control of an (unlikely) major accident; assessment

of spent fuel performance in disposal conditions and effective cooperation in underground laboratories; new cell growth technologies to replace less effective bone marrow transplantation for overexposed accident victims; completion of the RODOS decision support system for the off-site management of nuclear accidents in the early phase.

The panel took note of the efforts by the NFS programme management to disseminate results among interested parties. It suggests that particular attention be paid to this aspect and also to improving the efficiency of channelling the results of its R & D and studies towards potential users or 'customers'. Furthermore, it appears that enhanced collaboration and consultation among potentially interested DGs (e.g. DG I and DG XI) would be beneficial to all involved.

The panel pleads for a minimum of continuity in the composition of future monitoring panels; such continuity proved essential in the 1997 exercise and it suggests that, without affecting the need for a detailed review of the programme at its end, the 1998 monitoring panel also gives some attention to content, results and European added value of the programme where some partial conclusions may already be expected.

Controlled thermonuclear fusion (6)

The fusion programme is different to other Community research programmes in that it integrates all activities in the field of fusion energy RTD undertaken in Member States (plus Switzerland). International collaboration with other nations plays a key part in the implementation. The coordination of the tasks, the monitoringand peer review are carried out through an established system involving the Consultative Committee for the fusion programme and its subcommittees. In 1997 about 200 contracts were running and 25 accompanying measures were implemented. The programme is principally implemented through 16 contracts of association with organisations in Member States, the JET (Joint European Torus) joint undertaking and multilateral agreements involving 15 to 20 participants each. There were approximately 480 mobility actions. All 100 % of the budget was committed at the end of 1997.

The most significant progress of the fusion programme in 1997 has undoubtedly been the record fusion power generated by JET. These results are the world's first demonstration of quasi-stationary fusion power production; they raise the confidence that the parameters of the ITER (international thermonuclear experimental reactor), the experimental reactor under design in the frame of the quadripartite agreement ITER-EDA (engineering design activities) between the EU, Japan, Russia and the USA, are adequate to reach its objectives. The activities of the programme have been focused on the engineering design of the ITER. The ongoing R & D in the ITER central and EU home teams, in the associations and in industry (in particular the European grouping of industrial firms) has further qualified the technological choices for the ITER systems. Within the foreseen time schedule, the full final design report has been provided to the parties associated in the ITER-EDA agreement for review. Work on the ITER is complemented in the associations by investigations in plasma physics and engineering for a fusion power station. In fusion technology, progress in the three subprojects of the European

(6) This summary of the panel report has been prepared by the programme staff.

blanket project has been good and in line with the overall project schedule. Dissemination of the results was achieved by means of about 2 000 publications and reports in the specialised literature, and in international conferences. A project on socioeconomic research for fusion began. Regarding information to the public, an itinerant exhibition on fusion energy was held in numerous towns across the EU and a website was launched on the Internet. In April 1997, the second International Industry Liaison Meeting, organised by Japan, took place in Tokyo.

Summarising their report, the experts are globally satisfied that, in 1997, the fusion programme has been managed and carried out in full compliance with the directives issued by the Council. The experts also commend the quality of work, the adherence to the agreed targets and the economy of resources devoted to programme coordination. They look forward to timely decisions on the development of fusion power after July 1998, the end of the present ITER-EDA agreement. Considering that public acceptance to fusion energy must be reached to support the collective efforts to develop fusion power as a potential energy source for the next century, that the present resources are limited and that the availability of energy is crucial for a sustainable future of mankind, the experts recommend to take action to properly spread general knowledge on fusion progress. The experts recommend to ensure that the accumulated experience on plasma physics and fusion research is not lost and that interest within the universities shall flourish. In addition, the experts recommend to take increased advantage of fusion technology as a source for new products and processes beyond fusion application, in order to reach more involvement of industry. Since fusion is reaching a turning point, particular attention should be devoted to the development of appropriate materials for fusion devices by timely action.

Transport

The transport RTD programme has a budget of ECU 263 million and is divided into four modal and three multimodal research areas. This budget is an order of magnitude greater than that available to DG VII in previous framework programmes, and this has required them to build up a comprehensive administrative and research capability in a short time period.

The panel concludes that the programme is being well managed in a professional and transparent way. Looking back to the start of the FP4 programme, DG VII has made great strides in improving its administrative and management systems and now operates state-of-the-art procedures. As a result, the time taken to negotiate and sign contracts has been greatly reduced, and many of the quality assurance procedures are now automated. At this stage in FP4 it is now appropriate to focus more on the dissemination and exploitation of results, and the preparation of migration paths to activities proposed under future transport RTD programmes. These issues are being addressed by DG VII.

The panel is concerned about the continuing staff shortages in some areas of the programme; while steps have been taken to mitigate this (e.g. by contracting out), it means that staff are unable to keep as 'hands-on' a role as is desirable in this strongly policy-oriented research programme.

While it is too early to provide an overall assessment of the success of the transport RTD programme, we are encouraged by

the results emerging so far, recognising that some research areas are more mature than others. These results are demonstrating high levels of European added value, and will be of direct benefit to industrial competitiveness, businesses and governments across the Union, and will provide a good foundation for future transport RTD activities.

In particular, the panel has noted the potential benefits to European industry of the European rail traffic management system (ERTMS) programme and initiatives in the waterborne area. Examples of ways in which the transport RTD programme is providing European added value at a policy level have been noted, for example, in the strategic and urban areas, with inputs to Commission papers on pricing, urban public transport, and the implementation of trans-European transport networks. The programmes of air, road and integrated transport chains (ITC) research are also contributing to the increased efficiency of European transport operations.

The panel make seven recommendations for the future management of the transport RTD programme to further strengthen its delivery. These recommendations are described in detail in the main report. They are mainly focused on the dissemination and exploitation of results and future elements of transport RTD activities.

Targeted socioeconomic research (TSER)

Introduced in 1994 as a new element to the framework programme, much work had to be done at the early stages of the TSER programme to sensitise researchers and policy-makers to the importance of European-level socioeconomic research in areas of S & T policy, education and training and social integration and exclusion. By the end of 1997, over 100 contracts for research projects and thematic networks, involving more than 750 direct links between teams of researchers from across Europe, had been issued in response to the first two calls for proposals. Some 60 accompanying measures in support of the execution of the programme have also been launched, and as the programme enters its final stage (third call proposals are currently being evaluated) over 70 % of its budget has been committed.

A characteristic of the programme is that all of its research activities are expected to lead to policy-relevant insights. The current portfolio of activities includes work on the European information society, industrial dynamics and employment, economic growth through innovation, new skill needs and the low skilled, and social integration policies. A significant development has been the programme's participation in the educational multimedia task force (a collaboration between six research and research action programmes aimed at developing an understanding of the processes of learning, the effectiveness of the introduction of multimedia technologies, and the attendant socioeconomic consequences).

Now that first call projects are ending attention must turn towards the dissemination and exploitation of the results generated and this is the principal focus of the 1997 report and its recommendations.

On dissemination: while dissemination to the scientific community seems to work reasonably well this seems to be a greater problem in relation to other users. Hence improvements are necessary to enhance the communication between users and experts. To this end there should be regular workshops on policy-relevant TSER topics,

a TSER 'hotline' should be set up, and a regular user-friendly bulletin of TSER results should be published.

On enhancing added value: the formulation of the work programme and the selection of projects has successfully been improved to good quality over time via the introduction of transversality, strategic orientations and increased specificity of the issues. It is recommended that more weight should be given to creativity, innovation, utility and usefulness.

On results assessment: upon project conclusion, results should be assessed by experts against its original aims. The factors that contribute to successes and failures should be identified. This should be done in order to facilitate dissemination, feedback into future project selection and to encourage focused research generally.

On the fifth framework programme: there should be more ongoing dialogue between users and researchers at all stages. The programme should be broadened and thus better funded to include further policy-relevant issues (the city of tomorrow, financial markets, security policy, citizenship, environment, industrial policy). The objective of the research should be medium to long term and towards scientific analysis of fundamental problems and trends.

Cooperation with third countries and international organisations (INCO)

The INCO programme in FP4 was the first attempt to integrate into one programme all Community activities in the area of RTD directed towards third countries and international organisations. Thus, it forms the main gateway and link of EU RTD activities to the science and research base worldwide. RTD very often is the spearhead and pathfinder for building relationships in other areas. INCO also makes a substantial contribution to external development as well as to the other policies of the European Union. In addition, due to its horizontal nature, it plays a pioneering role with respect to cross-programme cooperation and coordination, thus paving the way for an aspect of programme management that will characterise FP5.

As the main conclusion of the present exercise, the panel is able to confirm that in the third year of the implementation of the INCO programme the management has succeeded in achieving a high level of integration, consistency and coherence of the programme. In addition, the panel states that it is impressed by the high quality of the work performed in all the areas of the programme by highly competent and motivated personnel, despite its tight staffing situation that remains an area of concern. In the operational parts of INCO, 1997 was characterised by the follow-up of some 1 000 contracts, and calls for proposals in INCO Copernicus and INCO DC. In accordance with its international role, INCO organised not only about 30 information days in the EU, but also more than 25 events outside the EU in Europe and overseas. The evaluation and selection of some 1 800 proposals had to be organised too. In the area of RTD policy and strategy support, the directorate prepared scientific and technological (S&T) agreements with the signing of the EU/US agreement as one of the highlights. INCO represented the Commission in Eureka, where an initiative has been started to strengthen EU/Eureka synergies. COST remains an important science and research action supported by INCO. The Commission's entry point for international RTD organisations is run by the directorate too.

Most importantly, INCO is instrumental in preparing 10 central and east European countries (CEECs) for accession and enhanced participation in FP5, as well as strengthening the RTD links to the non-accession CEECs and the newly industrialised countries. The RTD policy dialogue with developing countries resulted amongst others in the establishment of the EU/China contact group as well as the EU/China biotechnology node. Finally, INCO is responsible for the further development of RTD cooperation with non-European industrialised countries.

Building on past experience and on the thorough implementation of the recommendations made by previous monitoring and evaluation panels, the programme management continued to improve the quality of activities and procedures in all INCO areas. This holds for all aspects of the information campaigns related to the calls, for the evaluation and selection of proposals, and for the efficient processing of contracts as well as for the S&T and administrative follow-up of running projects.

The panel strongly encourages the Commission to continue improving the materials (in printed and electronic form), the procedures and mechanisms as well as the infrastructure for public relations and information, advice and feedback for the RTD community and policy actors. At the dawn of FP5 with the full participation of organisations from the pre-accession CEECs, further decisive measures must be taken in that area and the infrastructure with well-trained personnel has to be fully operational. The panel sees a strong need for support from PHARE and TACIS in that area. The panel recommends that synergies with other RTD forums in Europe are strengthened. In the Commission's relations with developing countries RTD should get a stronger role. Promising examples of RTD coordination should be followed in other areas of the programme. The management information systems should be implemented urgently, providing harmonised data on proposals and contracts for internal Commission purposes as well as for information of Member States. In the panel's view, monitoring exercises are appropriate management tools and should be continued.

Dissemination and optimisation of research results (Innovation)

Innovation is part of the third activity of framework programme 4 (FP4). It therefore deals with dissemination and optimisation of RTD, including demonstration, results. According to the Council decision which adopted the programme, Innovation 'benefits, in particular, small and medium-sized enterprises (SMEs) in the Member States and regions least involved in the Community's RTD activities and contributes to improve economic and social cohesion in the Community'. The total budget of Innovation amounts to ECU 322 million. Some ECU 233.3 million, about 78 % of the sum available for operating expenditure, had already been earmarked by 17 November 1997. On 31 December 1997, the total number of running contracts added up to 332 (303 shared-cost actions and specific measures, and 29 preparatory, accompanying and support measures). These contracts provide some 5 600 links between participants in Member States, associated countries and Switzerland.

Given its wider mission and scope, Innovation must be judged on specific criteria different from those suitable for the RTD

programmes. An overall judgment on the effectiveness of the programme is not possible yet. At the level of individual projects, the panel is pleased to note a few examples of results delivered by the programme which are both tangible and consistent with its objectives. It should be added that in our view 'tangible' is not synonymous with 'easily and immediately quantifiable'. For instance, we regard the Straus report on patents as a tangible outcome of the programme's activities in the field of intellectual property rights (IPR), although the extent of its impact is still largely potential. In general, we welcome that a lot of work is now being done to give IPR the strategic role it deserves. In the case of the network of innovation relay centres and of the regional actions, initial evidence at project level already suggests a positive judgment on the effectiveness of the initiative as a whole. The European innovation monitoring system is also worthy of a favourable comment. Its efforts, in particular the trend chart exercise and the first steps being taken to put into effect the first action plan for innovation, are fully consistent with the overall objective of a programme such as Innovation, i.e. to promote a comparative approach to innovation policy across the EU. Finally, there already seems to be no doubt about the effectiveness of CORDIS (Community Research and Development Information Service).

Overall, the panel thinks that Innovation is pointing in the right direction for a significant contribution to FP4. The Commission has taken concrete action to give substance to the recommendations put forward by previous monitoring exercises. Concerning programme effectiveness, the panel thinks that Innovation is doing well to promote more active innovation policies in the EU, but notes that each part of Innovation should be monitored through continued development of indicators tracing its European added value down to the ultimate beneficiaries, i.e. SMEs, and through regular surveys of the views of users and peer institutions.

There is a need to underpin the potentially strong influence of the programme across FP5 through writing in adequate responsibilities and the obligation for coordination and collaboration across programmes and services.

There should be a greater effort to understand the strategic linkages of the programme, so that it may increasingly benefit from the leverage of other actions of the Commission and engage with those other institutions across the EU which will determine the socioeconomic environment for Innovation beyond the year 2000.

Stimulation of the training and mobility of researchers (TMR)

The 1997 monitoring panel for the training and mobility of researchers (TMR) programme has oriented its activities to the quality of the implementation of the programme. In addition the panel has looked at two issues in greater detail, the establishment of the programme's impact and European added value and the participation and involvement of industry.

The TMR programme is unique in the fourth framework programme, given its 'bottom-up' approach dealing with projects and grants, from broad fields of research. The programme's four activity lines, research networks, access to large-scale facilities, training through research, and accompanying measures had a very busy year in 1997, with seven calls for proposals and managing more than 1 600 contracts.

Follow-up of the recommendations of the 1996 monitoring exercise was in general satisfactory, except that little progress was made on the issue of industrial participation. Some of the main achievements of 1997 are: an improved efficiency in the proposal-to-contract procedures, in particular the fellowships, research networks and accompanying measures' activities; the time between proposal deadline, informing candidates and signing of contracts has decreased considerably — all units have now set a system of annual targets, relating mainly to the processing of proposals, the management of evaluation panels and efficient handling of contracts; the monitoring of contracts and participants has been stepped up through increased direct contacts and technical audits taking place at the contractor's location; the establishment of the Marie Curie Fellowship Association; the information exchange with the programme's user community has been improved, in which the use of the Internet has contributed a great deal; the evaluation procedures have been upgraded and efforts have been made to deal with some critical issues in the past, such as interdisciplinarity, and transparency in the ranking methods. However, dealing with interdisciplinary proposals appears to be still a problem; the panel appreciates the value of further accompanying measures, especially the study of industrial participation by the industry working group, the organisation of the Marie Curie Fellowship Seminar and the call for proposals on the study on the role of women in research. In addition, the Euroconferences have proved to be a unique opportunity for European scientists to exchange experiences.

Summarising, the panel considers TMR to be a very well managed programme, particularly given the large number of contracts and national contexts with which it needs to work. Despite these very good developments, the panel has identified three major areas where improvements should be made in the coming year: the programme has not systematically worked towards defining meaningful targets for the assessment of its impact and European added value in the short and long term; the participation of industry in the programme is still unsatisfactory; in 1997 the industry working group was given the task of analysing the low rate of direct industry involvement, which led to some clear conclusions and recommendations. The Commission staff have responded by proposing the 'industrial host fellowships' for the FP5. The panel feels that more initiatives should be launched to improve overall industrial involvement. More effort must be made to develop a programme-wide strategic vision on the role of TMR in the European scientific and industrial communities.

Among the panel's recommendations is that a task force be set up involving the Commission's staff, representatives from the user communities and other experts to define aims for the programme's output, and metrics for its measurement. To increase the participation of small research-intensive firms, the panel recommends to give serious consideration to the development of 'SME-interface fellowships'. Stepping up the programme's marketing activity to potential fellows in an earlier stage of their scientific career is recommended. To improve programme management we suggest that the possibilities be explored of a Technical Assistance Unit to overcome the permanent staffing problems. The panel also recommends increasing the programme's external strategic activities to define its role in the European scientific and industrial communities; and further elaborating accompanying measures to provide a strategic dimension and additional synergies to the overall programme.

ANNEX IV

INFORMATION ON THE JOINT RESEARCH CENTRE

This summary has been prepared by the JRC staff.

1. Mission statements of JRC institutes

Institute for Reference Materials and Measurements

The mission of the IRMM is to promote a common European measurement system in support of science, technology, trade and society by developing and performing specific reference measurements, producing reference materials, providing expertise and advice in support of the implementation of agreed Community policies, performing pre-normative research related to European industrial and commercial norms, standards and codes of practice, and providing special high-level training for the Member States of the European Union.

Institute for Advanced Materials

The mission of the IAM is to contribute to enhancing the technical and scientific infrastructure of Europe and thereby its industrial competitiveness and citizens' welfare, mainly in the energy, transport, environment, life sciences, manufacturing and nuclear sectors, through knowledge and understanding on advanced and conventional materials as well as advanced engineering. The Institute specifically supports European industry by providing state-of-the-art materials research and operating advanced facilities, and supplies neutral scientific support for the preparation of EU directives.

Institute for Transuranium Elements

The mission of the ITU is to serve the citizens of the European Union by providing impartial and independent expertise for the protection of the population against risks associated with the handling and storage of highly radioactive transuranium elements, in particular:

- to carry out customer-driven nuclear research and development work of the highest quality and integrity in support of Community policies;
- to enhance the Institute's role as a recognised centre of European basic actinide research;
- to contribute to the maintenance of an effective nuclear safeguards system in Europe and elsewhere;
- to strengthen the position of the European industry by evaluating and testing the potential for technological and medical applications of transuranium elements.

Institute for Systems, Informatics and Safety

The ISIS is the European Union centre of expertise in the application of emerging technologies for the protection of the individual citizen and of society as a whole. Its primary role is to provide the European Commission and other institutions of the European Union with the impartial advice and technical support needed to formulate and implement Community policies. This advice and support draws on the Institute's technological expertise base which is underpinned by a programme of research carried out in collaboration with European universities, national research organisations and industry.

Environment Institute

The EI's mission is to provide independent scientific support to the European Union's sectoral activities and policies, and to provide, through its research, a visible European contribution to international collaborative programmes.

Space Applications Institute

The SAI's mission is to develop techniques for derivation of relevant timely and accurate information from remotely sensed data. The Institute thus, in its specific areas of competence, contributes to promote and carry out customer-driven research of the highest quality and integrity in support of Community policies.

Institute for Prospective Technological Studies

The IPTS observes, analyses and communicates the implications of technological development in terms of social, economic and political issues in which technology plays a significant role. This is the central brief of the IPTS' mission, defined by Commissioner Édith Cresson in September 1995.

2. Continuous monitoring and evaluation of JRC activities

The detailed monitoring of JRC activities is regularly implemented by the JRC Board of Governors (BoG). The JRC-BoG is composed of senior officials representing the Member States and associated countries. It deals, in particular, with the follow-up of the specific research and technological development programmes of the JRC, their implementation, the formulation of proposals for the JRC annual budget and the regular monitoring of its execution. To these aims, before the end of the preceding year, an annual work programme indicating the objectives of each project for the following year, a summary description of the programme and estimated expenditure is submitted to the BoG; an annual report, upon which the BoG formulates its specific observations, is also published every year including aggregated figures and scientific achievements.

However, as in previous years and in order to provide an overall view of the totality of the framework programme, the JRC has made available to the framework programme monitoring panel (FPMP) relevant documents concerning its activities; these include the 1995, 1996 and 1997 annual reports with the observations of the Board of Governors made upon them, the report of the visiting groups with an evaluation of the JRC during the period 1992-96 (published in 1997 ([7])), various documents relevant to the organisation of the JRC, the JRC contribution on the Commission working paper for FP5 (1998-2002) and a document describing the JRC performance in obtaining external resources on a competitive basis. Finally, the panel chairman held a hearing with JRC staff to discuss the different elements provided.

3. Implementation of recommendations made by the 'visiting groups' evaluating the JRC (1992-96)

The report made by the visiting groups evaluating the seven JRC institutes con-

([7]) Communication from the Commission to the Council, the European Parliament and the Economic and Social Committee, 'Evaluation of the JRC, 1992-96' (COM(97) 164 final).

tained 118 detailed recommendations; as reported to the JRC Board of Governors (document CA (97)10), 100 of those recommendations were accepted and have been implemented or are under implementation. The remaining 18 recommendations, mainly forward looking, are under active consideration while a few call for organisational issues not foreseen in the present rules and regulations governing the JRC. In particular, the Centre has implemented the recommendations of the visiting groups as regards avoiding excessive proliferation of research subjects; instead, the JRC is concentrating on research issues where it either provides the needed impartial and neutral support to Community policies, hosts units of excellence or manages large facilities. This is reflected in the planned JRC programmes for implementation during FP5, as described in the working paper, and signifies an important step in this direction.

The Centre has also made a significant effort to improve the presentation and dissemination of its results. In fact, a description of the main scientific results achieved in 1997 in JRC institutes can be obtained by reviewing the 'highlights' of the 1997 annual report, and, in general, JRC reports now have a stronger emphasis on scientific achievements.

The JRC continues working actively towards the needed streamlining of JRC management procedures and personnel policies, in line with recommendations made by the visiting groups; it is noted in this regard that the JRC has pioneered the change into a more advanced accounting system which will, afterwards, be implemented across the board in the Commission.

4. Significance of JRC revenues obtained on a competitive basis

The Centre has experienced a significant increase in the revenues obtained from contracts gained under competitive funding schemes; in 1997, the objective for the year, in terms of obtained external resources, was fulfilled by about 110 %, clearly signalling that the JRC is on the right path and that the major effort made by the JRC in previous years was in fact intensified by all JRC institutes in 1997.

The table below summarises the results obtained in the three years of FP 4 implementation; (figures in million ECU).

	1995	1996	1997 (2)	1998
JRC EU budget (COM(97) 280)	225.6	222.7	245.1	260.0
Revenues from competitive activities (1)	28.5	38.3	46.8	n.a.
As % of total	13	17	19	n.a.

(1) As external resources, without including the 'matching funds' for participating in shared-cost projects granted by specific programmes under the indirect action.
(2) 1997 figures are provisional, subject to formal closing of accounts.

5. Coordination with the indirect action

The institutional research activities of the JRC specific programme and other activities provided for in the fourth framework programme are coordinated by means of formal exchanges of views between the JRC Board of Governors and the management committees for the relevant specific programmes. To this aim, the JRC has held meetings with the committees of the specific programmes 'Environment and climate', 'Standards, measurement and testing', 'Industrial and materials technologies', 'Nuclear fission safety' and 'Agriculture and fisheries'.

The JRC already participates in over 170 shared-cost contracts, mainly related to energy (both non-nuclear energy and nuclear fission safety), environment and industrial technologies (mainly in relation to standards and measurement), and to a lesser extent, related to the information and communication technologies and the life sciences sectors. In addition the JRC runs a number of networks of excellence in different areas and has established collaborative agreements with many research institutions around Europe.

The JRC serves as a permanent repository of reference materials (coordination with DG XII/C) and runs jointly with DG XII/D the Centre for Earth Observation programme. As regards new proposals for technology transfer activities, on the basis of a detailed feasibility study, the Commission has taken the view that the establishment of a traditional technology park within JRC premises may not be the best approach to achieve the objectives sought; instead, a technology transfer initiative, integrating a flexible set of mechanisms providing users with access to JRC technologies and results, is now under consideration. represents an evolution from previous proposals for a traditional technology park and it implies a search, on the part of the JRC, for higher European added value of the envisaged actions A tight coordination with DG XIII/D services has been implemented all along the process in order to maximise synergies of actions implemented by both parties.

6. Evaluation of JRC performance

The impact of the JRC activities is chiefly found in the tasks assigned to the Centre in support of the formulation and implementation of the Union's policies: environment, energy, agriculture, consumer protection, industry, etc., which in the 1995-98 JRC specific programmes, as institutional support, accounts for one third of the total resources. The JRC institutional research activities are mainly conducted through formalised networks with national research organisations and universities, which both facilitate a wider European impact of the JRC and enable the JRC to maintain its core competencies necessary for the provision of support to Commission policies.

In addition, as requested by the Board of Governors, the JRC has developed for each of its institutes a system for goals and performance indicators: significant scientific achievements, number of publications, patents, scientific seminars, technology transfer projects, etc. These results of the JRC work are summarised in the JRC 1997 annual report, and other JRC publications. They form an integral part of the JRC 1998 work programme approved by the Board of Governors.

PART B

COMMISSION SERVICES' COMMENTS ON THE 1997 FRAMEWORK PROGRAMME MONITORING REPORT

General response

The Commission services would like to thank Mr J. Viana Baptista and the members of the independent framework programme panel for their report, which reflects the broad range of experience of the panel members covering fields ranging from scientific and industrial research to policy-making. The important contribution of the 18 specific programme monitoring panels, whose reports have provided a valuable basis for the 1997 FP monitoring exercise, is also appreciated.

The panel's conclusions are constructive, authoritative and imaginative. They are also timely as they are received at the point of transition to the fifth framework programme (FP5), for which broad political consensus has now been reached. The panel acknowledges that 'the key strength of the framework programmes is the fostering of a European research culture, facilitating thousands of transnational co-operative actions which otherwise would not happen' and observes that 'overall the framework programme is developing in a positive way'. These observations are welcome.

Some of the panel's recommendations can still be addressed during the last phase of FP4, but the majority have a longer-term significance and must be considered in the context of FP5. Their recommendations fall naturally into five areas — moving towards the fifth framework programme; innovation and the business environment; SMEs; programme management; and monitoring and evaluation — on which the Commission services provide an immediate commentary below.

1. Moving towards the fifth framework programme (recommendations i to iv)

European added value is a key principle of Community research, and it is fully accepted that the concept must be elaborated and applied in a coherent fashion in both the development and implementation of the framework programme. The criteria for selection of research themes and objectives are stated in the Commission's proposals for the fifth framework programme. They highlight, amongst other things, aspects of research such as the human and financial 'critical mass' involved (as for example in genome sequencing of model organisms), the contribution to Community policy (as for example in climate change research), and the contribution to standardisation (as for example in development of European traffic management technology). These criteria will be applied during the further development and implementation of the programme, to serve in selecting more detailed topics for inclusion in work programmes, to contribute to evaluating proposals, and to assist in monitoring of impacts. In line with the panel's recommendations, this will be done as comprehensively and consistently as possible, but a number of factors need to be borne in mind, for example:

- the nature of the contribution to European added value is likely to differ between research themes and objectives;
- European added value is likely to be more striking at the overall programme level and that of the key actions rather than at the level of individual projects. Evidently, as far as the framework programme is concerned it is the highest

aggregate added value which should be sought;

- in a programme which is organised around strategic mobilising key actions, added value will be boosted by the engagement of all relevant actors, not just those within the Community framework.

The work programmes corresponding to each of the thematic programmes will provide the link between political objectives and research tasks, and provide detailed information to the research community and other interested parties on the objectives and the activities to be carried out. They will thus be an important instrument in implementing the new strategic approach, which has been set out in the Commission's policy documents, in a very concrete sense, both **promoting** the programme and **advising** researchers on the ways in which to incorporate its principles effectively into their proposals. The work programmes thus will set out a timetable ('road map') for the various components of the programme (in particular the key actions) and indicate, where appropriate, 'milestones' which should be reflected in calls for proposals and project selection, and provide a basis for monitoring the achievements of the programme over time.

One of the roles of the external advisory groups related to key actions might also be to assess the relevance of such verifiable goals, to be fixed whenever possible and verified regularly.

Public awareness of the benefits of EU-funded research must be nurtured with action on several fronts, and on a continuing basis. A programme which clearly responds to the interests and needs of citizens should go some way towards making its benefits more visible to the public. Awareness will also be promoted through more intensive communication on the activities and achievements of the programme, adapted to the needs of users and taking advantage of electronic means, particularly the Internet. Furthermore, awareness actions will be pursued in the programme on 'improving human potential and the socioeconomic research base', including the award of prizes for scientific achievements arising from Community research.

As regards **flexibility**, the Commission's view is that this can be achieved through ensuring that the specific programmes are defined to permit an appropriate margin of manoeuvre and through their flexible implementation, including updating work programmes, drawing on the advice of external advisory groups and generally of the research community, industry and users. This should enable response to new and important issues to arise during the lifespan of the programme, as the panel has recommended.

2. Innovation and the business environment (recommendations v and vi)

Regarding the **enabling conditions** for RTD and the role of the TMR, TSER, INCO, and Innovation programmes, the panel has identified an issue which the Commission believes is of prime importance to the effectiveness of Community research overall. On the basis of experience with these programmes under FP4, a closer link between 'thematic' and 'horizontal' programmes has been built into FP5. Indeed, the rationale underpinning the new horizontal programmes on 'Confirming the international role of Community research', 'Promotion of innovation and participation

of SMEs', and 'Improving human potential and the socioeconomic knowledge base' is intended not only to build on the successes of previous programmes but also to exploit more fully complementarities and synergies with the thematic programmes. The effective operation of this intimate linkage between horizontal and thematic programmes will be assured through appropriate dialogue and linkages. Furthermore, increasing emphasis will be placed on factors which favour the harmonious development of Europe's industrial and commercial base whilst taking full account of the needs and aspirations of the individual.

The **business environment** is acknowledged to have an important influence on the innovation capacity of firms, and a number of Community initiatives have been launched to help overcome the problems faced by European enterprises in this respect. Measures will be included in the new framework programme, particularly in the 'Innovation and participation of SMEs' programme, as well as including a clear mission for each of the thematic programmes, to help firms address issues such as intellectual property protection and access to innovation financing.

3. SME participation (recommendations vii and viii)

The panel underlines the special attention which should be given to the needs of SMEs. For this reason, under FP4 the technology stimulation measures for SMEs were developed. These have proved to be a success. To date, some 6 000 SMEs have benefited from these measures, which address both SMEs active in the high-technology sector and those in more traditional sectors. Given the success of these measures the European Commission has proposed to continue them in FP5. In order to provide SMEs with better information and assistance on the Community RTD programmes, action is foreseen to **rationalise** the existing networks (e.g. CRAFT focal points) and make them more effective. In addition, in agreement with the panel's recommendations, special activities will be developed in FP5 to provide SMEs with **assistance** on innovation-related issues (e.g. exploitation of RTD results, IPR, venture capital).

4. Programme management (recommendations ix to xii)

Concerning the panel's recommendations on the **clustering of projects** and the organisation **of joint calls for proposals**, there is little opportunity to further reinforce such activities in FP4, since most programmes are now issuing only relatively small targeted calls to fill gaps in their coverage. The principle of clustering is, though, accepted for the programmes of FP5 and in the context of its preparations for the launch of the specific programmes of FP5, the Commission is actively considering ways of facilitating project clusters, notably through the encouragement of the submission of such proposals.

The principle of **focusing and targeting calls for proposals** is also now well established in the specific programmes and, indeed, this (together with clearer evaluation manuals and the use of informal pre-proposal checking) has helped to reduce oversubscription rates significantly

in some programmes in the latter part of FP4 — although a degree of oversubscription is both inevitable and desirable. The principle of focused calls will be carried forward into the implementation of FP5.

Concerning the establishment of **best practice** management procedures, the Commission has put in place a number of internal working groups to prepare the implementation of FP5. These include groups devoted to preparing the new evaluation manuals, with a strong emphasis on best practice and developing a coherent policy across all the programmes, as well as a group devoted to examining all the information provided to contractors. The questions of two-step submission procedures, pre-proposal screening and the format for electronic submission of proposals will be dealt with in the context of the discussions of these groups.

The time taken for all the steps in the process is under constant review within the Commission and reductions in the total time are sought wherever these are possible. There are, however, limits to such time reductions that are achievable without compromising the quality or the legal integrity of the process. In addition, it is generally also the case that careful contract negotiation invariably leads to fewer problems in the implementation of projects. Striking the right balance between **rapidity, quality and legal security** means that issues of time reduction in individual steps cannot be regarded in isolation from the whole process. Within this overall framework, the Commission will continue to look at all possibilities for reducing lead times in its project management procedures.

Concerning the panel's recommendation on reviewing the **workload** of the Commission's scientific officers, the Commission is currently looking at ways of extending the use of outsourcing of specific administrative tasks (for example the organisation and housing of evaluation sessions) in order to free staff time for strategic and priority work. However, in the context of the commitment taken by the Commission to continue to reduce administrative costs to the lowest possible level, it is unlikely that major changes can be expected in the overall workload of the Commission's scientific officers.

5. Monitoring and evaluation (recommendations xiii and xiv)

The existing evaluation scheme, being implemented through annual monitoring and five-year assessment, is a **dynamic process,** which is continuously improved on the basis of the experience gained and the objectives at hand. The Commission services ensure that the evaluation process is kept up to date and consistent with **best practice** by consulting widely in the Member States and elsewhere.

Efforts for improvement will be focused, as the panel recommends, on further developing the ***ex post*** activities at the level of the specific programmes, and the establishment of a comprehensive and coherent information management system. The intention is that information concerning programme inputs (e.g. number of projects, number of participants) and outputs (e.g. patents, citation analysis, products and prototypes developed, contribution to standardisation initiatives) will be provided in a manner consistent with the stage of programme implementation which has been reached and the objectives of the exercise. Careful consideration will be

given to the **timing** of the monitoring exercises. In line with the panel's recommendations, the aim will be to launch the exercise earlier in the year whilst still covering the whole year's research effort and ensuring that the monitoring work for the framework programme and the specific programmes is fully in step.

Following the panel's recommendations, efforts will be made to improve the interface between the monitoring of the framework programme and the separate monitoring of the JRC activities, where the role of the JRC's Board of Governors should be taken into account, as the panel has recommended. The fusion programme has particular characteristics, embracing as it does the whole of the European effort in addressing certain specific medium-term goals. These too need to be taken into account in presenting the programme as the monitoring panel has noted.

The Commission services are confident that by building on the considerable experience of evaluation which has been accumulated over the years, and by continuously reviewing best practice, the evaluation procedure will be effectively adapted to the context of FP5.

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European Commission

EUR 18221 — 1997 annual monitoring report on the fourth framework programme and the Euratom framework programme

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1998 – 79 pp. – 17.6 x 25.0 cm

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The decisions for the fourth RTD framework programme (1) and the Euratom framework programme (2) (both covering the period 1994-98) require 'that the Commission shall continually and systematically monitor, with appropriate assistance from independent external experts, the progress' of the programmes.

This publication contains the third annual monitoring report on the programmes, prepared by a panel of high-level independent experts (Part A). The report presents a brief, strategic assessment of progress during 1997 and a set of recommendations for the continued implementation of the framework programmes. Part B presents the Commission services' response to the recommendations.

(1) Decision No 1110/94/EC.

(2) Decision 94/268/Euratom

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