RESEARCH AND THE EUROPEAN UNION

- *Why carry out research via the EU?*
- *Pros and cons and future developments*

POST **83**
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This is a summary of a 75-page report available from the PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY (extension 2840).

The European Commission (EC) spends around £2B (current UK contribution of ~£380M) each year on research and development (R&D) under a series of 'Framework Programmes (FP)'. The latest programme (FPIV) runs to 1998, but discussions are already underway on its successor. The next 3 months will see the Commission put forward its proposals on FPV, and this period will be critical to influencing the form it takes. For instance, should the historical expansion in both budget and scope be reversed, should there be an increased focus on industrial applications (e.g. towards a car or train of the future), and what value for money is obtained by R&D via the EU rather than through national Governments?

To assist Parliament to join in the debate over the future direction of FPV, POST has reviewed the history and key policy issues involved. This note summarises the full 75-page report[1].

HISTORICAL BACKGROUND

The current Framework Programme (FP IV) allocates a total of 12.3 Billion ECU (BECU) over five years to a range of activities covering most areas where science and technology can conceivably be applied in today's complex industrial society. Thus, support for 'pre-competitive research' is available for information and communication technologies, industrial technologies, in environmental protection, in life sciences, in non-nuclear energy, in relation to transport, agriculture, fisheries etc., and also to look at the ethical and socio-economic impacts of technological advance. In addition, there are activities to promote cooperation and technological development with non-EU countries, dissemination of results and for training and mobility.

Although the FPs did not start until 1984, it is possible to trace the evolution of European research programmes as far back as the 1950s, when the **European Coal and Steel Community (ECSC)** was formed. The next major collaboration was the **European Atomic Energy Community (EURATOM)**, which started in 1957 and encouraged research into nuclear energy. When the European Community was first formed in 1967 by combining the three European communities (EEC, ECSC, EURATOM), attempts were made to formulate a European research policy, and the full report traces these moves from then to the formation of the FPs proper in 1984. The history is useful because it is necessary to recognise that in the European context, **research has never been just research**. It has always served some other, extra purpose, usually related to the cause of increasing European unity. This manifests itself in the importance given to 'cohesion' whereby priority is given to projects involving the less developed countries of the EU. Industrial competitiveness has been the other prime motivation behind European research.

THE FRAMEWORK PROGRAMMES

It is not immediately obvious why Member States should wish to collaborate in research - especially when aimed at improving competitiveness - and thus some rationale to justify R&D at the European level was needed from the start. The first was agreed in 1983 in the so-called "Reisenhuber Criteria" in **Box 1**. These were subsequently extended in FPIII (also in Box 1).

The details of how these principles were applied and the priorities decided in the First, Second, Third and Fourth FPs are given in the full report. As regards the current programme (FPIV), this is the first to have followed the Maastricht Treaty of February 1992, which had a significant effect on European research - notably the addition to Article 130f, which expanded Community research from the *"scientific and technological bases of Community industry"* to include *"all the research activities deemed necessary by virtue of other Chapters of the Treaty"*. FPIV's budget was settled in 1994 at 12.3 BECU for 1994-8 (with a possible 700 MECU set aside for addition in 1996). This represents a 50% real increase over its predecessors, and covers the technical areas in **Table 1**.

The full report describes some of the **themes and trends through FPI-IV**, the most obvious change being the steady increase in areas to which funds are distributed. This is especially so in FPIV, where the addition of two areas stand out; **targeted socio-economic research and transport**. The backdrop to the discussion of FPV is thus one of steady expansion, and rarely have specific programmes been removed from one FP to another. A major question on the debate over FPV is whether historical precedent will be a source of significant pressure against dropping some current areas of research.

The report also asks the question **how successful are the Framework Programmes**? In this context, the report looks at indicators of European competitiveness and the science base, to help assess whether the Frame-

1. "The European Union and Research - EU Framework Programmes and National Priorities" is available from POST at 7, Millbank, London, SW1P 3JA (tel 0171-219-2840). Free to Parliamentarians; £15 otherwise.

Box 1 THE REISENHUBER CRITERIA

Community involvement is justified with:

- "research conducted on so vast a scale that single Member States either could not provide the necessary financial means and personnel, or could only do so with difficulty;
- research which would obviously benefit financially from being carried out jointly, after taking account of the additional costs inherent in all actions involving international co-operation;
- research which, owing to the complementary nature of work carried out at national level in a given sector, would achieve significant results in the whole of the Community for problems to which solutions call for research conducted on a vast scale, particularly in a geographic sense;
- research which contributes to the cohesion of the common market, and which promotes the unification of European science, and technology; as well as research which leads where necessary to the establishment of uniform laws and standards"

The six concerns that guided Council's choices in FPII were:

- "improve industrial competitiveness while at the same time maintaining the precompetitive nature of Community actions;
- cope with the challenges linked to the Single Market for standards, thus boosting prenormative research;
- modify the attitude of industrial operators, by orienting it towards transnational initiatives;
- instil a European dimension in the training of staff engaged in scientific research and technological development;
- increase economic and social cohesion while ensuring the scientific and technical excellence of research projects;
- take account of safeguarding the environment and the quality of life"

work Programmes have been successful in their stated aims. The overall message from the indicators reviewed is that **there is no obvious association between the growth of the Framework Programmes and measures of EU competitiveness and technological success**. Indeed, many indicators suggest a relative decline since the programmes started. This is more likely to be a reflection of the inappropriateness of the measure than an overall reflection on the success / failure of the FPs, since the amount of money spent through this route is small relative to Member States' research budgets, or even the budgets of some European companies.

If pursuit of general indicators such as those discussed above appears unproductive, how else can we measure the effectiveness of the FPs? This question has taxed many in the UK and other Member States, and a variety of approaches have emerged, described in the full report. Indeed, **the evaluation systems developed over the years have grown into a complex series of procedures which do not mesh well with the management of the programme**, and whose function has also been under scrutiny. As well as the Commission, the other two institutional players in European R&D, the Council and the European Parliament, have both commissioned reports on the Frameworks and reached quite different conclusions. The Commission report is broadly positive, though it pin-points a number of

Table 1 TECHNICAL AREAS OF THE 4TH FRAMEWORK PROGRAMME (1994-1998) AND FUNDING (MECU)

Information and communication technologies	**3405**
Telematics	
Advanced communications technologies	
Information technologies	
Industrial technologies	**1995**
Industrial and materials technologies	
Standardisation, measurement and testing	
Environment	**1080**
Environment and Climate	
Marine science and technologies	
Life sciences and technologies	**1572**
Biotechnology	
Biomedicine and health	
Application of life sciences to agriculture and fisheries	
Energy	**2256**
Non-nuclear energy	
Nuclear fission safety	
Controlled Thermonuclear fusion	
Transport	**240**
Targeted socio-economic research	**138**

weaknesses such as exploitation of results. The Council report, although roughly in the same vein, produced a far more 'action-oriented' set of conclusions, setting out recommendations for change in a range of areas. Finally, the Parliament's report questions the very basis on which earlier evaluations were carried out[2] and produced results heavily related to the Parliament's role in overseeing research and development policy. To hope that evaluation conclusions would be isolated from those who commissioned the work is perhaps naive, but such discrepant results from the same evidence suggest that the **need for a well-developed, objective system of evaluation has not yet been met.**

As described in the full report, recent steps have been taken to rationalise the evaluation system. From this year, it comprises:

- continuous monitoring, the results of which should appear in the *Annual Report on R&D*.
- 5 year assessments; these are more strategic studies, which will assess the long term effects of the research being carried out, and will feed into consideration of future Framework Programmes.
- There will also be 'visiting groups' for the Joint Research Centre (JRC) institutions, which will report back to the JRC's Board of Governors annually.

The full report looks at other aspects of the evaluation process, including national impact studies and also alternative approaches. Some projects funded by FPs which are widely regarded as 'successful' are also described - for instance, the collaboration involving 35 laboratories in 10 EU States which successfully sequenced chromosome III of yeast - the first time that a chromosome from a living organism had been completely deciphered.

2. Some see much of the evaluation as consisting of little more than asking recipients of EU funds if they thought it was right that they received support and if they would like more! It is much more difficult to devise evaluation systems to determine whether the European taxpayer got a good return for his/her investment in R&D.

ISSUES

By one yardstick - the proportion of EU R&D funds spent via Framework - the FPs are not a large influence on UK R&D, since they comprise no more than 4% of academic research budgets. When one looks closer however, they may have an impact well beyond their scale, and the full report describes several ways in which Framework funds may affect UK priorities. Thus in some areas, EC support is the main source of funding for some university department's research. Departments or research groups may thus become dependent upon EC funds.

The FP agenda can also influence the UK national agenda, especially through the process of **attribution** where sums are deducted from departmental budgets to reflect the UK contribution to the EU budget in the area concerned. Thus if FPIV decides to spend in the transport area, a deduction is made from that Department's budget, equally, if a new programme is launched on health, the Department of Health suffers a budget attribution.

While the principle of attribution is clear (i.e. that money spent on science and technology via the EU should not be seen as a 'free' extra), its effect can be to distort national priorities in one of three ways.

- if a department has its budget reduced because of a programme in one subject, it may be less inclined to spend funds on that subject nationally.
- UK representatives may be reluctant to support proposals for work via FP because of fears over the consequences for departmental budgets,.
- the need for clear departmental accountability leads representatives to be wary of interdisciplinary programmes, and may thus run counter to the most effective scientific approach.

The discussion on the next FP is **thus important for the UK** - not just in the narrow monetary terms of whether UK researchers attract support comparable to the UK contribution (they do). Debate also takes place against a different backdrop to that of FPIV. The Maastricht Treaty gives a clearer rationale for EU-organised research than previously was the case, with its emphasis on strengthening the scientific and technological bases of Community industry, while the Edinburgh summit has increased the emphasis on subsidiarity. This period has also seen continued efforts in the UK, USA, Japan, France, Germany, Netherlands and other European states to identify critical and generic technologies and use technology foresight. These considerations suggest that the debate over Framework V may well be much more fundamental than that between previous programmes.

The full report thus examines some of the questions and issues that may arise, and which have been addressed by a number of UK and EU organisations. In particular:-

Can the FPs continue to grow in their scale and coverage? At the first level of analysis, there is always the question of **whether the Framework programmes should be continued at all** (one 'radical' option would be to redeploy framework funds into a corporate R&D tax credit scheme on the grounds that the increase in corporate R&D could have more impact on innovation and competitiveness than funds mediated through the Commission[3]. In the increasingly global marketplace and with increasingly global companies, **the very concept of European collaboration may also be questioned** since to many 'European' companies, what matters is collaboration with companies in the USA, Japan or Pacific Rim countries. However, no Member States or organisations consulted have so far suggested drastic measures and most envisage FPV more as an 'evolutionary' development of FPIV. The expectation is however that FPV will have to be more focused, and that some areas of FPIV will have to be reduced if there is to be an impact on the areas covered in FPV.

What is the real purpose of the FPs? In principle, research could be aimed at any of the following:-

- strengthening basic research in the EU,
- helping a more even distribution of scientific skills throughout the Community,
- encouraging the industrial development and application of technology,
- developing prototypes or technology demonstrators in key market sectors,
- encouraging a 'European' dimension to industry, through collaboration between national companies,
- research to inform European policy,
- improving the quality of life.

At present, FPIV is characterised by the Commission as supporting 'pre-competitive' research, but **many conclude that this term has limited utility**. Rather there is support for more emphasis on **industrial processes, manufacturing capabilities**, the **importance of basic research, and for large trans-national projects** related to European infrastructure.

Overall, **economic competitiveness** will remain a dominant rationale, but other objectives such as **quality of life** and **underpinning EU policy** are likely to feature more strongly than in the past. There may be a move from supporting supplier industries to more user-driven programmes. In particular the concept of task forces has attracted some support (**Box 2**).

What are the criteria for carrying out work via the EU rather than nationally? Cohesion is now widely accepted not to be an adequate reason, and such objec-

3. See POSTnote 57 for a discussion of the impacts of R&D tax credits on corporate R&D and wealth creation.

Box 2 TASK FORCES

When Edith Cresson became Commissioner with responsibility for research in 1994, one of her first actions was to set up a series of task forces within the Commission, to help increase the impact of research on the European economy and industrial base. Their mandate is to identify industrial and social needs in the fields covered by EU research, to prepare the launching of individual research actions within FPIV, to study regulatory issues which may improve the exploitation of results, and to coordinate activity across relevant programmes which have operated independently in the past. Task Forces have been set up on:

- The Car of Tomorrow.
- Educational software and multimedia.
- New Generation Aircraft
- Vaccines and viral diseases
- The Railway of the Future
- Intermodality of Transport
- Maritime Systems of the Future
- Environment - Water

tives may be better met through explicit training and mobility and network-encouraging programmes. The debate over what research should be best carried out at the European level is also complicated by the proliferation of national exercises typified by UK Technology Foresight, leading to concern that the priorities in EU Frameworks may fail to mesh with national priorities, and even diverge to a significant extent.

It is being suggested that EU-funded research might focus on:

- support of **European level policy** (e.g. agricultural fraud detection by satellite, sustainable fisheries);
- where there is a **need for a European dimension**, and which have to be trans-national due to size (e.g. the Joint European Torus (JET) at Culham);
- **'pre-normative' research** - i.e. that which underpins the development of European standards in high-tech industry;
- providing a **stronger European foundation for a given industry** (e.g. the car industry);
- encouraging **small and medium enterprises (SMEs)**;
- while improving the relationship with **EUREKA**.

How should future priorities be set? The full report looks at the role of the large number of organisations potentially involved, which creates a considerable challenge if the process is to be inclusive and open.

What should priorities be? Here there is much agreement on the main themes, but room for much disagreement over the emphasis and detail. The fact that so many national programmes have already been conducted leads to a number of options being under discussion on **the role of technology foresight** itself. There are many ideas being put forward which are summarised in the full report.

How should the FPs be evaluated? Previous attempts have left unanswered many questions over the overall effectiveness of Framework Programmes. A new system is in place but needs to meet minimum criteria of effectiveness to ensure that the evaluation process produces objective and useful outcomes, rather than creating an expensive review of output indicators and performance criteria disconnected from the real objectives of the FPs. Even if it is too soon to assess the effectiveness of the new evaluation system, **some problems in implementation are already becoming apparent, particularly over timing and the use of experts**.

What should be the future of the 'internal' R&D funded at the EU's Joint Research Centre? In the UK and some other States the role of publicly-owned laboratories has been under review, formal customer-contractor relationships put in place and research markets opened to competition. Some laboratories have been privatised. In contrast, the JRC is able to operate on 900 MECU (7.3% of the FPIV budget) which is 'top-sliced'. Such funds are non-contestable by other research bodies regardless of scientific quality and cost.

As pointed out in the full report, **there is considerable scope for making the JRC's programme management and related aspects more transparent.** But many observers see the primary issue as **how to remove the special treatment the JRC enjoys** in order ensure quality science at cost-effective prices. Much debate will thus centre on how fast the programme for the JRC can be redirected and awarded on a 'level playing field' with other FP-funded Research.

In summary, the sums involved in Framework are significant at one level - i.e. 12.3 BECU over 5 years for FPIV, but small when compared with the total amount spent on R&D in Member States (some 3%). Consequently, it would be unrealistic for such sums to solve the problems of all Europe. The Commission has recognised that competitiveness and innovation are influenced by far more than the amount of R&D spend, depending also on fiscal matters, legislation, education and training, industrial management, flexibility of labour and capital, organisation and size of markets.

Equally, the innovation-friendliness of other Community policies may be more important than Framework if their effect is to discourage application of the ideas which result. Thus the activities of a regulatory directive in biotechnology could more than outweigh the benefits of framework-funded R&D in that field. In the case of the UK, the adherence by Treasury to attribution brings with it other complications - not only that EU spend will be deducted from national spending plans but also the danger that national priorities will be distorted as a result.

Nevertheless, this report describes many reasons why FPs are important to the UK science and industrial base, and it is hoped that the background on the Framework Programmes and the discussion of issues provided in this report will be helpful to Parliamentarians wishing to participate in the debate over both UK and European policy in this area.