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Special report No 6/93 concerning the European research and development programmes in the field of information technology (the ESPRIT programmes) together with the Commission's replies

1

I

(Information)

COURT OF AUDITORS

SPECIAL REPORT No 6/93

concerning

the European research and development programmes in the field of information technology
(the ESPRIT programmes) together with the Commission's replies
(94/C 45/01)

(Observations pursuant to the second subparagraph of Article 188c (4) of the EC Treaty)

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GENERAL INTRODUCTION

The extent of the ESPRIT programme

0.1. The ESPRIT ('European Strategic Programme for Research in Information Technologies') programmes are shared-cost specific research programmes which fall under successive framework programmes. They are concerned with information technology ('IT'), which is to say that they cover all the technologies employed in the following areas:

- microelectronics, or the manufacture of semi-conductors;
- the manufacture of computer equipment (computers and peripherals such as printers, VDUs, etc);
- software and systems design.

0.2. *Table 1* lists the Community research and development programmes which are concerned with information technology ⁽¹⁾ ⁽²⁾ ⁽³⁾ ⁽⁴⁾. The 1984-88 and 1987-92 programmes were the only ones to be given the formal title of 'ESPRIT' programmes. For simplicity's sake, the 1990-94 programme will be called 'ESPRIT III' in this report. As each programme follows on from the previous one without a break, the report will refer to the ESPRIT programme in general where there is no risk of ambiguity. The ESPRIT programme was originally managed by Directorate A at Directorate-General (DG) XIII (Telecommunications, information and innovative industries). By a Commission decision, the ESPRIT Directorate was transferred on 12 May 1993 to DG III (Industry). The bulk of this report describes the programme's situation before that date.

⁽¹⁾ Council Decision of 21 December 1982 on a preparatory phase for a Community research and development programme in the field of information technologies. OJ L 369, 29.12.1982, p. 37.

⁽²⁾ Council Decision of 28 February 1984 concerning a European programme for research and development in information technologies (ESPRIT). OJ L 67, 9.3.1984, p. 54.

⁽³⁾ Council Decision of 11 April 1988 concerning the European strategic programme for research and development in information technologies (ESPRIT). OJ L 118, 6.5.1988, p. 32.

⁽⁴⁾ Council Decision of 8 July 1991 adopting a specific research and technological development programme in the field of information technologies (1990 to 1994). OJ L 218, 6.8.1991, p. 22.

0.3. *Table 1* also reveals the considerable funds that have been earmarked for these programmes. At 1 600 Mio ECU, ESPRIT II alone accounts for almost 30 % of the total for the second framework programme. However, in terms of the total funding dedicated to research and development (R & D) in the IT sector in Europe, the proportion accounted for by ESPRIT is of the order of 5 % only. National funding from public and private sources continues to be the predominant method of financing. *Table 2* gives a synopsis of the proposed distribution of funding between the main sectors of research for the three successive programmes.

0.4. The fundamental objectives of the ESPRIT programmes, as defined in the EEC Treaty, the framework programmes and the specific programmes, are as follows:

- (a) 'to strengthen the scientific and technological basis of European industry' in the IT sector ⁽⁵⁾;
- (b) to promote specifically European research by means of transnational cooperation within cost-sharing research consortia, each of which must include at least two industrial undertakings established in different Member States ⁽⁶⁾;
- (c) to involve companies, universities and research centres in the consortia ⁽⁷⁾;
- (d) to secure a high level of participation in the programme by small and medium-sized undertakings (SMUs) ⁽⁸⁾;
- (e) to strengthen the economic and social cohesion of the Community by strengthening scientific and tech-

⁽⁵⁾ Article 130f(1) of the EEC Treaty; second recital of the second framework programme Decision; first recital of the third framework programme Decision; ninth recital of the ESPRIT II decision; fifth recital of the ESPRIT III.

⁽⁶⁾ Article 1(3) of the ESPRIT I Decision; Article 3 (1) of the ESPRIT II Decision; Annex III, paragraph 2, first indent of the ESPRIT III Decision.

⁽⁷⁾ Article 130f(2), of the EEC Treaty; third recital of the second framework programme Decision; second recital of the third framework programme decision; eighth recital of the ESPRIT II Decision; seventh recital of the ESPRIT III Decision.

⁽⁸⁾ Article 130f(2) of the EEC Treaty; fourth recital of the second framework programme decision; third recital of the third framework programme decision; eleventh recital of the ESPRIT II Decision; sixth recital of the ESPRIT III Decision.

Table 1 — Community R & D programmes in the field of information technology

Title	Period	Funding Mio ECU
Preparatory phase for a Community research and development programme in the field of information technologies ⁽¹⁾	1.1.1983 31.12.1984	11,5
European programme for research and development in information technologies (Esprit) (ESPRIT I) ⁽²⁾ (1st framework programme)	1.1.1984 31.12.1988	750
European strategic programme for research and development in information technologies (Esprit) (ESPRIT II) ⁽³⁾ (2nd framework programme)	1.12.1987 30.11.1992	1 600
Specific research and technological development programme in the field of information technologies (1990-1994) ⁽⁴⁾ (3rd framework programme)	8.7.1991 31.12.1994	1 532 ⁽⁵⁾

⁽¹⁾ See note ⁽¹⁾ of the report.⁽²⁾ See note ⁽²⁾ of the report.⁽³⁾ See note ⁽³⁾ of the report.⁽⁴⁾ See note ⁽⁴⁾ of the report.⁽⁵⁾ Including 1 % of this amount for the centralized dissemination and exploitation measure.Table 2 — Proposed allocation of Esprit programme resources ⁽¹⁾ between the fields of IT-related research

(%)

Research field	ESPRIT I	ESPRIT II	ESPRIT III
Microelectronics	23	} 32	29
Peripherals			} 17
Business and home systems	20	} 36	
IT application support systems			
Computer-assisted manufacture	13	} 19	
Engineering			
Software	20		} 25
Advance information processing systems	24	32	
Basic research			10
TOTAL	100	100	100

⁽¹⁾ For ESPRIT I, man/years; according to the Council Decision of 28 February 1984 adopting the 1984 work programme, OJ L 81, 24.3.84, p. 6.
For ESPRIT II and III, funding; according to the Council Decisions adopting the two programmes: see notes ⁽³⁾ and ⁽⁴⁾ of the report.

nological infrastructure and potential throughout the Community and involving participants from the so-called 'peripheral' countries and the least-developed regions ⁽¹⁾;

- (f) 'to encourage the industry to become more competitive in the IT sector at international level' ⁽²⁾.

Outline of the system

0.5. The implementation of the ESPRIT programmes comprises the formulation of the specific programme, including the definition of the technical areas to be covered and an estimate of the amount of funding deemed necessary for carrying out the work in question. These areas are then taken as the basis for the formulation of successive instalments, or 'work programmes', each of which is the subject of a call for project proposals published in the Official Journal of the European Communities.

0.6. The candidates group themselves in consortia comprising industrial undertakings, research centres and universities. The Commission submits the consortia's proposals to independent consultants for evaluation and forwards its own assessment to the programme management committee for an opinion (see paragraph 0.10). Once the list of successful proposals has been adopted, the Commission negotiates the relevant contracts with the consortia and signs them.

0.7. The partners share out the work and pool information on progress achieved at a series of meetings of various kinds, which are held at varying intervals. The Commission monitors current projects in two ways: it examines the many reports which the consortia are required to provide and it conducts technical reviews, in which independent assessors evaluate the work done by the consortia and make binding recommendations.

0.8. The contractors are required to exploit the results of their research and the Commission requires the proposers to state what their intentions are in this respect. However, as Community research remains, in principle, precompetitive, exploitation of the results is not included in the funding for ESPRIT projects.

0.9. The Commission conducts financial audits of some participants and carries out concurrent or *ex post facto* assessments of programmes.

0.10. It is assisted by a number of committees, whose roles may usefully be clarified at the outset:

- the Commission is required to submit a draft of the measures which it wishes to adopt to a Committee of representatives of the Member States, commonly known as 'the management committee' (ESPRIT I and II), and subsequently as 'the information technology committee' (ESPRIT III). For the sake of convenience this Committee will be called '*the management committee*' in this report;
- the '*ESPRIT consultative committee*' comprises scientific experts and industrialists from the IT sector. It is consulted on the scientific aspects of the programme and is particularly involved in the project selection procedure;
- the '*ESPRIT review board*' carries out a concurrent and *ex post facto* assessment of the programmes.

It is also important not to underestimate the role of the '*Steering Committee*', which is composed of representatives of the 12 major groups that make up the European computer and microelectronics industry. It was the Steering Committee which planned and led the execution of the ESPRIT programme. It is unofficial in nature and there is no basis in the decision adopting the programme for the creation of such a Committee, which in practice functioned like a Working Party.

The methodology of the Court's enquiry

0.11. The Court's enquiry was carried out on the premises of the relevant Commission departments and on the spot during visits to four Member States: Germany, Spain, France and Ireland. In the course of these visits the Court interviewed a large number of contractors and members of the national administrations with responsibility for this area.

0.12. The Court's aim was not only to audit the quality of the administrations' management of the ESPRIT programmes, but also to assess the extent to which these programmes are, in fact, a 'strategic' instrument which may be used to achieve the objectives assigned to them by the Treaty, the framework programmes and the Council Decisions in which the specific programmes were adopted. The Court did not, however, attempt to evaluate itself any results which are purely scientific or technical ⁽³⁾.

⁽¹⁾ Article 130a of the EEC Treaty; fifth recital of the second framework programme Decision; eleventh recital of the third framework programme Decision; ninth recital of the ESPRIT II Decision; fourth recital of the ESPRIT III Decision.

⁽²⁾ Article 130f(1) of the EEC Treaty; second recital of the second framework programme Decision; first recital of the third framework programme Decision; ninth recital of the ESPRIT II decision; fifth recital of the ESPRIT III.

⁽³⁾ Where the Court refers to scientific or technical results in the Report it is relying on expert opinions.

CHAPTER 1

The administration's management of the programme

MANAGEMENT STAGES

Preparation of programmes and calls for proposals

The consultation process

1.1. The ESPRIT programme represented a new concept — a programme drawn up by the people who would be required to participate in it — which was subsequently extended to other high-technology programmes. The programme is, in fact, drawn up by representatives of industry, universities and research centres. Consultation takes place in two stages. Firstly, a draft programme is drawn up by a small number of industrial working parties which specialize in particular areas. The Commission then arranges workshops, which last for two or three days and bring together several hundred experts from a far wider range of backgrounds than those of the industrial working parties. The draft produced by the working parties is discussed at these workshops, but the industrial working parties are the only ones which can influence the contents of the programme directly. During the workshops it is not really possible to modify much more than the details of the plans put forward.

Frequency of calls for proposals

1.2. The ESPRIT I (Article 3(1)) and ESPRIT II (Article 6(3)) programmes state that a work programme is to be drawn up each year. ESPRIT II states that calls for proposals are to be established 'on the basis of the annual work programmes'. Consequently they have to be established on an annual basis as well. In fact, there were no work programmes and no general calls for proposals for the years 1987 and 1988 of ESPRIT I and none for the years 1988, 1990 and 1991 of ESPRIT II.

1.3. Whilst the ESPRIT III programme preserved the link between work programmes and calls for proposals, the annuality obligation disappeared (Article 5(3)). This simplification, which brought the regulations into line with what happens in practice, is a realistic one, in that neither the availability of budgetary resources nor the convenience of breaking up the programme into stages of varying size warranted the previous frequency and regularity.

Information concerning programmes and calls for proposals

1.4. Each proposer receives or can obtain detailed written documentation on the technical areas for the next call — this is the 'work programme' — and the method of submitting proposals — the 'information file'. The Commission has also made a significant effort to increase the number of information channels. In addition to the information seminars which it organizes itself, the Commission has asked each Member State to appoint a national organization to relay Community information to organizations interested in ESPRIT. The Commission has set up electronic contact points: EUROCONTACT is a database of actual or potential proposers, which is intended to facilitate the search for partners and EUROKOM is an electronic mail system. There were, however, a number of organizations which were, or claimed to be, badly informed (in Spain and Germany, for example).

1.5. In their view information had not arrived early enough. Organizations were inundated with brochures, periodicals, leaflets and forms through a number of channels. Instead of increasing total information, this superabundance of information only produced confusion, and the problem of 'information about information' was a frequent occurrence. The rule at the Commission should be to use a large number of channels to disseminate each document individually; it should not allow each Directorate — and in some cases, even individual units — to issue its own publications. EUROKOM and EUROCONTACT could be used more and to better effect: EUROCONTACT provides little more than the names and addresses of the organizations that are in the database. What is also needed is information about their human and technical resources and references to participation in ESPRIT projects.

1.6. Above all, however, there is in practice no equality of access to information. Those who were submitting proposals for the first time, as well as the small and medium undertakings (SMUs) ⁽¹⁾, found it difficult to get their bearings. Those which are already known to the Commission and appear on its mailing lists, or who have already taken part in the groups and workshops which prepare the programmes, are at an advantage.

Selection of projects and negotiation of contracts

Management of the overall funding

1.7. At the time of the first general call for proposals in connection with ESPRIT II (1987-88), the ratio of funding

⁽¹⁾ According to the Community definition, small and medium-sized undertakings (SMU) are undertakings with not more than 500 employees.

awarded to funding requested was 1: 5,4. For the first general call for ESPRIT III (1991), the proportion was 1: 4,8 ⁽¹⁾. The proportion can vary significantly in the case of specialized calls: in the case of the 1989 microelectronics call it was only 1: 2,8. In all cases, however, the total volume of proposals recorded is always far in excess of the resources available. In itself, this situation is normal and even positive: it proves that the programme is successful. The problem lies, however, in determining whether the procedures which the Commission employs in order to keep funding within the limits of the total available budget are, in fact, the best ones.

1.8. The Commission often splits very large projects up into a series of stages. The first, one-year stage is the 'project definition' phase and is the only one which is funded at the initial stage. For example, the proposal for the ITHACA project covered a period of five years and requested 42,7 Mio ECU of funding, but the initial contract was for 12 months and provided funding of only 5,5 Mio ECU. Splitting up the funding in this way also makes it possible to bring projects which appear unlikely to succeed to an immediate halt.

1.9. The programme decisions provided for a 50 % rate of project funding (with the possibility of 100 % for the additional costs in the case of universities and research centres). Although the Commission observes the 50 % rate, it does, sometimes, underestimate the costs which are taken as the basis. In the case of CIM-ALIVE, for example, the Commission allowed a budget of only 4 Mio ECU for the one-year definition phase. The partners were, in fact, unable to avoid making a substantial additional financial contribution.

1.10. Sometimes the Commission 'suggests' merging two or more proposals. The aim is two-fold: technical integration but also husbanding of resources, in that the merged budget is less than the sum of the separate budgets. These 'shotgun marriages' often result in disunited consortia, in which each partner quietly continues with its own initial project. ITHACA resulted from the merger of two projects, each of which was headed by a giant of the European IT industry. During the first year of work the merger was more theoretical than real.

1.11. Essentially, though, there are two ways in which applications for funding may be brought into line with the amount of appropriations available: rejecting proposals and cutting the budgets of the proposals that are accepted.

1.12. For general calls for proposals the acceptance rate, which moreover is very stable, is one proposal in four. This results in a four-fold increase in the cost of preparing

proposals and although it is undoubtedly affordable in the case of large companies, for SMUs it can become prohibitive. Moreover, the acceptance rate for proposals from SMUs is lower than that for proposals from large undertakings, where the rate rises to one proposal in two or three.

1.13. In a very large number of cases, the contract budget is cut back relative to the proposed budget, often very drastically. Out of seven accepted proposals that the Court tested on this point, all had been reduced by between 12 % and 46 %. The ATMOSPHERE project was reduced to one third of the amount the proposers had hoped for. The BASE project was cut by 75 %. As a result, many proposers have adopted the unfortunate habit of inflating their cost estimates in the expectation that reductions will be applied. The Commission cannot avoid rejecting and cutting back proposals. *Table 3* shows how the Commission has combined the two methods in the past and may help it find a better balance between them in future.

Assessment of proposals

1.14. There is too much emphasis on the technical aspect of the assessors' role, to the exclusion of other aspects. The selection criteria are concerned with the eligibility of the proposal, its technical value, the approach and working methods proposed and the organization envisaged. The only aspect outside this strictly technical framework concerns the prospects for industrial exploitation. The assessors are thus not required to take any account of either the proposer's financial and technical status or the question of whether the proposed costs are reasonable in the light of the work envisaged.

1.15. The assessors, however, constitute only the first stage of the screening process. There are others. The assessors break the proposals down into three groups, the first being a short list of excellent proposals which are to be adopted in any case. The other proposals are divided more or less equally between a list of 'to be rejected' proposals and a list 'for further consideration'. The assessors do not, however, apply any kind of grading when they draw up the latter list ⁽²⁾ and, unlike the case of the RACE programme, they do not present it to the management committee themselves. Half the proposals that are to be given further consideration, or a quarter of all proposals, will still be rejected, either at the stage where they are examined by the ESPRIT consultative committee and the management committee or, subsequently, at the Commission decision

⁽¹⁾ At the stage where the management committee adopted its decision (basic research is not included).

⁽²⁾ The basic research proposals 'for further consideration' under the 1991 general Esprit call were graded, however, with a decisive effect on the final selection. The reasons for this unusual course of action were not apparent.

Table 3 — Elimination of the excess of funding requested over resources available.
(Percentages of proposal rejected and funding cutbacks to proposals accepted)

(Mio ECU)

		1988 General call	1989 microelectronics call	1991 general call			
				Excluding basic research		Basic research	
Funding requested all proposals	(a)	9 171 (100 %)	560 (100 %)	6 830 (100 %)		1 092 (100 %)	
of which proposals rejected	(b)	7 093 (77 %)	376 (67 %)	5 482 (80 %)		879 (80 %)	
cutbacks on proposals accepted	(c)	1 232 (14 %)	80 (14 %)	602 (9 %)		115 (11 %)	
funding awarded	(d)	846 ⁽¹⁾ (9 %)	104 ⁽¹⁾ (19 %)	746 ⁽²⁾ (11 %)		98 ⁽²⁾ (9 %)	
Percentage reduction on accepted proposals	(e)	(59 %)	(43 %)	(45 %)		(54 %)	
$(e) = \frac{(c)}{(c) + (d)} \times 100$							

⁽¹⁾ Contracts.⁽²⁾ At Management Committee opinion stage.

stage. Leaving aside the technical qualities, the use of an ungraded list at this stage of the selection allows the Commission to ensure that the SMUs and each country, especially the countries which are the object of the Community's economic and social cohesion measures, are adequately represented (but, see the comments on this point in paragraph 2.19).

Contract signature procedure

1.16. The contract signature procedure is still too long, but it could be speeded up if it were modified slightly. If the Commission were to delete from the contract cover note the section which advises those concerned to wait until they receive the telex with the official offer before they sign the contract, it would be possible for contractors to sign the contracts and return them immediately, thus saving a considerable amount of time. It would also enable the Commission to pay advances more quickly, whereas, at the moment, they are frequently delayed.

Monitoring the work

The system

1.17. Contractors are virtually unanimous in their recognition of the merits of the system designed and used by the Commission to monitor project progress. In addition to the periodic progress reports which consortia are required to send to the scientific officer responsible for monitoring projects at DG XIII, there are various working meetings, which are often attended by the Commission, and a technical review, which is arranged every six or twelve months. At each review the consortium makes an oral report on the progress of the works and expected developments to the scientific officer and two or three independent assessors selected by the Commission. Each assessor then draws up a diagnostic report with recommendations. At the next review, the scientific officer and the assessors check whether the recommendations have been put into effect. If not, penalties are imposed which may, on occasion, even include the suspension of the project.

Role of the managing departments

1.18. The staff of DG XIII play an important part in ensuring that projects progress satisfactorily. Nevertheless, at peak periods, when calls for proposals are being processed, the staff are overwhelmed with work and the quality of the project monitoring suffers. Each scientific officer has to monitor as many as 20 projects. At the rate of two meetings per project and per month — the current rate — the workload becomes almost unsustainable.

Selection of assessors

1.19. It is absolutely essential for assessors to be independent of the commercial interests of the partners, and the Commission is aware of this. Contractors also have the right to ask for an assessor to be replaced, which happened in the case of the LSVI project.

1.20. The procedures for selecting both the assessors for the proposals and the technical reviews and the experts who are invited to take part in the groups and workshops which draw up programmes and calls for proposals are lacking in transparency. These experts are invited on a strictly personal basis, without their employers' knowledge.

Results of the monitoring system

1.21. Despite what has been said above, the monitoring system generally provides good results. If there is a crisis on a project, supplementary reviews are sometimes arranged, as, for example, with the DMPC and EWS projects. In the event of misdirection, the consortium is warned that the project could be halted unless the deficiency that has been noted is remedied. After two years' work on the CSIC four-year project, a review in December 1987 concluded that, in the light of technical developments and market trends, the hopes which the consortium and the Commission had placed in a new process for manufacturing integrated circuits were misplaced. The project was shortened by a year and stopped on 31 December 1988. Similar reviews led to the termination of the DASIQ project after three years instead of four. One of the partners had gone into liquidation, another was unable to put in the working time that had been pledged, progress in two other work areas had not yielded useful results and the assessors' recommendations had not been adequately followed up.

1.22. The outcome of the reviews is usually more favourable. In the MINSTREL project, the main contractor withdrew from the project after the first year, but the Commission helped the consortium to restructure itself and thus saved the project. The assessors issued a warning concerning LSVI and a special meeting was arranged in July 1990 to hear the partners' views on how commercial necessity and the needs of final consumers could be taken into account, as these aspects had been too much neglected until then. This omission was rectified following the meeting.

1.23. The few cases of defective technical monitoring that were noted by the Court often resulted in a temporary setback to or the permanent abandonment of projects. A succession of some ten scientific officers had responsibility for the BWN project during the 68 months for which it operated. There was a break of almost two years and there

was no review for 20 months, between March 1987 and November 1988, followed by a further year before the next one took place, in November 1989. This temporary paralysis was due to a disagreement concerning the content of the revised technical annex. Nevertheless, the project did not end in failure. KIWIS, which was started on 1 January 1989, did not undergo its first review until 14 months later, instead of after six months. The review then highlighted an unsatisfactory contribution on the part of one of the partners. The finding was followed up with a warning in April 1990 which proved to be effective, and the project ended with good results. The reviews of TOWARDS THIRD INTEGRATION were too widely spaced out: the first was in February 1986, 14 months after the start of the project; the second was 15 months later; and the last came after a further ten months. The project approved by the management committee was for a term of five years, but it was the subject of a three-year contract, which was not renewed as the technical results had proved inconclusive. A period of six to nine months between reviews appears to be a satisfactory interval.

The responsibilities of beneficiaries

Participation by industrialists at every stage of the procedure

1.24. The categories of organization (industrial companies, universities, research centres) that participate in projects are the same as the ones that are required to play their part at every stage of the development of the programme: during the drafting of the programmes in the working groups and workshops; in the groups which assess proposals; on the ESPRIT consultative committee, which is required, *inter alia*, to give its opinion during the selection of proposals; and on the ESPRIT review board.

1.25. This opening up of the programme to the world of industry is one of the major innovations of the ESPRIT programme and it is a positive achievement. It has, nevertheless, produced some perverse effects. According to the official scheme, the industrial working groups propose areas of research and, *at a later stage*, the Commission canvasses ideas for projects by calling for proposals on the basis of the research areas that have been adopted. In fact, many experts come to the working groups with very clear ideas for projects from their own companies and then try to insert suitable themes into the programme. In addition, experts who have already taken part in projects or working groups are better placed to be reselected for other working groups and to influence the themes adopted for subsequent programmes. This is one of the reasons why large companies succeed in obtaining funding for one proposal out of every two or three, instead of the average of one out of four (see paragraph 1.12).

The role of the 'Big Twelve'

1.26. The 'Big Twelve' are the 12 main groups in the European IT sector, which the Commission originally took as the basis for the ESPRIT programme ⁽¹⁾. At the time when ESPRIT was launched, the 'Big Twelve' accounted for around 85 % of the output of the European electronics industry.

1.27. The basic idea, understandably, was to obtain from leading industrialists in the sector a serious commitment to cooperation and participation in the programme. For a long time, the Big Twelve thus played a decisive role in the planning of the main stages of the ESPRIT programme. Between themselves they set up a 'steering committee' to organize their cooperation in the programme. The industrial working groups which prepared the specific and annual programmes were composed exclusively of representatives of the Big Twelve. This still applied in the case of the four industrial panels which drew up ESPRIT II.

1.28. The Big Twelve are still fairly heavily represented at the proposal assessment/selection stage. At the time of the 1989 call for microelectronics proposals, 42 % of the assessors were in this category. Of the 19 members of the ESPRIT consultative committee, there were six representatives from various of the Twelve.

1.29. The Big Twelve are the main manufacturers of hardware. Some very large-scale projects with good commercial prospects and a high level of advanced technological integration (the technology integration projects or 'TIP') were identified and planned in broad outline by the Big Twelve as part of the process of drafting the ESPRIT II programme. They were projects in which the Big Twelve all wanted to participate. In the file on the drawing up of the programme there is a working document dated 18 February 1986 showing, for each TIP project, the share of the work which each of the 'Big' companies wanted. Out of a total of 15 200 man/years, the Big Twelve stated that at that stage they would take 13 300 man/years, thus accounting for 87,5 % of the work and, therefore, of the Community funding.

1.30. As of 16 November 1990, the EPIC database, which contains data on all the ESPRIT projects, showed that at that date the Big Twelve had obtained 44,2 % of the

⁽¹⁾ They are the three German companies 'Allgemeine Elektrizitätsgesellschaft' (AEG), NIXDORF and SIEMENS, the three French companies Bull, Compagnie générale d'électricité (CGE) and Thomson, the two Italian companies Olivetti and Società finanziaria telefonica (STET), the Dutch company Philips and the three British companies General Electric Company (GEC), International Computers Ltd (ICL) and Plessey.

funding authorized by the management committee. The partners in the 'JESSI' projects, which bear the double label of ESPRIT and EUREKA ⁽¹⁾, are predominantly members of this group of twelve. For the first year of the TIP ITHACA II project, 63,5 % of the funding was granted to members of the group. For BICMOS I and II, which are actually two phases of the same project, two of the seven partners were from the 'Twelve' and obtained 98 % of the funding (as of 16 November 1990). It must be admitted that at the time no other European industrial company had mastered the technology involved in this project. In the TIP BASE project the principal and ordinary partners were all members of the Twelve and received 100 % of the funding of 28 675 Mio ECU.

1.31. This high level of participation by large companies cannot always be justified on the grounds that they are more creative or more committed to cooperation than the other partners. ARTIFACTS had to be halted on 15 May 1990, after 15 months' operation, because there was insufficient cooperation between the large companies that were participating. TIP TROPICS was halted on 30 June 1990, after 18 months' work, owing to the slow rate of progress and the loss of interest of some of the partners. Four out of the five members of the consortium were from the group of Twelve. They had received 91 % of the funding.

Participation by user industries

1.32. Hardware manufacturers are over-represented by comparison with the software industries. Users, especially, are under-represented, which has been one of the defects of the ESPRIT programme for a long time. Participation by users is nevertheless very desirable. Whereas involving several competing manufacturers in a project may end in their refusing to collaborate or to communicate viable results, in an association between manufacturers and users each complements the other and the association tends to mean that the results get through to the industrial and

commercial phases. LITE is a good example. Its object is to establish an electronic catalogue of the information flows associated with the production of cutting tools. Within the consortium, a manufacturer features alongside a company specializing in cutting tools and a production rationalization consultancy specializing in SMUs: this is taking account of supplier/customer relations.

Restoring balance

1.33. The above situation, where the Big Twelve are dominant and the level of user participation is low, is gradually correcting itself. The Big Twelve's share of the funding diminished substantially between ESPRIT I and ESPRIT III: users were more involved in the preparation of the ESPRIT III programme.

UNWIELDINESS AND SLOWNESS

Introduction: speed, a vital necessity

1.34. According to the experts, a product generation lasts for two and a half years in the electronics sector. For the past twenty years the process of miniaturizing integrated circuits has progressed exponentially, by a factor of 4 every three years, and this will probably continue for the next fifteen as well. Whereas in 1970 it was possible to put the equivalent of 1000 transistors or bits ⁽²⁾ on an integrated circuit, by 1993 the figure was 16 million and it is expected to reach 1000 million by the year 2000. Consequently products become obsolete very quickly. A delay in launching a new product of as little as six months is enough to turn a profit into a loss. In the field of electronics and computers, research will bear fruit only if it is combined with a strategy of market penetration. In this sort of environment, the time required for designing, executing and exploiting the ESPRIT programme is crucial.

The facts: slowness

Implementing the programmes

1.35. There is a contradiction between this need for speed and the slowness observed by the Court at both the

⁽¹⁾ EUREKA is a research programme which was set up on 17 July 1985 at the Paris conference on European technology by 19 European countries plus the European Community (represented by the Commission). Like the ESPRIT consortia, EUREKA consortia must be transnational, but EUREKA, unlike ESPRIT, is a programme which is concerned with advanced technology in general, rather than a specific sector. Its projects are closer to the market. Participants are free to select their own research topics. They must find their own sources of funding, whether public or private, although many obtain funding from the governments which are party to the programme. The Community contributes to the funding for the Eureka secretariat and may contribute to project funding. Some projects have the double label of EUREKA and ESPRIT (EUREKA projects cofinanced by the Commission from the ESPRIT programme appropriations).

⁽²⁾ A 'bit' is a basic unit of information storage and has the value 1 or 0.

decision-taking and administrative stages and at both the planning and implementation stages of the ESPRIT programme.

Framework programmes

1.36. The second framework programme should have been adopted at the end of 1986. In fact it was adopted nine months after that. The Council did not adopt the third framework programme until 23 April 1990, following a Commission proposal dating from 28 August 1989.

Specific programmes

1.37. Approval of ESPRIT I took around one and a half years. Two years of administrative procedures and nine months of political ones elapsed between the start of the preparatory work for ESPRIT II in July 1985 and the adoption of the programme in April 1988. The text of the Decision set the start of the programme nominally at 1 December 1987, but that did not prevent a delay of more than a year before the first projects started. The Decision concerning ESPRIT III was not taken until 8 July 1991, fourteen and a half months after the adoption of the third framework programme and 18 months too late in terms of the period covered, which ought to have been the same as that of the framework programme, namely 1990-1994. As a result, the duration of ESPRIT III was shortened to three and a half years, instead of five. The Commission had, however, taken the precaution of preparing the specific programme proposal at the same time as the framework programme. But, because the inter-institutional dialogue was particularly difficult, the programme was not adopted until more than 13 months after the Commission had tabled its proposals.

1.38. The conciliation procedure between the Parliament and the Council, as provided by the Single Act, itself pushed back the adoption of ESPRIT II by three and a half months. There is no reason to expect that the inter-institutional dialogue can be speeded up in the near future. In a field like IT, delays of that kind jeopardize the chances of achieving the programme's objective of promoting the development of the Community industry's international competitive capacity.

1.39. Delays in the adoption of a specific programme result in breaks in the continuity of the research work. By mid-1987 the number of researchers mobilized by ESPRIT I had stabilized at between 2 900 and 3 000. The Commission estimated that after that date the number would decline by around 60 research workers per month ⁽¹⁾. ESPRIT II work, which should have started at

around that time, would have taken over, but it was delayed for more than a year, by which time the decline in numbers had accelerated, resulting in the break-up of teams and even dismissals.

The funding decision and the negotiation of contracts

1.40. Although proposals are evaluated quickly (in barely a month), the financing decision and the negotiation and signature of contracts take much longer. It takes several months to negotiate the amount of funding and the duration of the projects and the technical annex often has to be redrafted as well. Budget cuts entail delicate discussions between the parties as to how the reduction is to be spread between them. In the case of BICMOS II, six and a half months elapsed between the drafting of the technical annex and the signing of the contract. A year of difficult negotiations elapsed between the proposal for PROMPT, on 10 June 1988, and the signing of the contract on 26 June 1989.

1.41. In order to avoid postponing the starting date for the work in cases where negotiations take longer than the consortium and the Commission have expected, the Commission often follows a procedure which ensures that the contract applies retrospectively, so that it takes effect on the date expected, even though it is signed substantially later.

1.42. In the case of the contract for the BWN project, the period covered retrospectively was six and a half months; for TAO, almost three months; seven months for ATMOSPHERE, from 1 March to 4 October 1989. In the latter case there were many factors which contributed to the slowness: the proposal was evaluated twice, the management committee's opinion was late, for a long time the composition of the consortium was uncertain, there was uncertainty over the way in which two EUREKA projects were to be associated with the ESPRIT consortium, the official offer was late, the partners were slow to sign it and the commitment procedure was abnormally protracted. It is rare for all these contributory factors to be encountered in a single project. It is less so for them to occur separately. The contract for VLSI Design Action was signed on 11 January 1990 with effect from 1 October 1989, but the consortium had, in fact, started work on 4 April 1989, nine months earlier, although only part of that period was covered by the retrospective effect of the contract.

1.43. Project extensions are often the subject of a late contract endorsement, which then applies retrospectively. In the case of the endorsement to the BICMOS II contract, dated 13 February 1991, it was four and a half months. The first phase of ATMOSPHERE ended on 28 February 1990. The clause extending it was signed on 21 February 1991,

⁽¹⁾ Note dated 22 June 1987, sent on 24 June 1987 by the Director General of DG XIII to the chairman of the European Parliament's energy, research and technology committee, pp. 1 and 3.

almost a year late, but it did ensure that the contract followed on directly from the first phase. During all these periods which were covered retrospectively, after the event, the consortia were working at their own risk.

1.44. A procedural change has produced a further source of hold-ups. For a long time the decisions to fund the selected research projects were taken by the Director General of DG XIII (or DG XII, depending on the programme). Since the beginning of 1992, these decisions have been taken by the Members of the Commission under a written procedure, which has temporarily produced a further slowdown of several weeks to several months in the implementation of the specific programmes. There was, admittedly, a legal basis for the change in procedure (decisions on funding cannot normally be delegated to an official), but the Commission must try to find solutions which combine observance of the rules with speed.

Execution of projects

1.45. Projects are very often for a term of four years. This is a long time when they claim to be in the field of applied research. EUREKA projects are usually shorter. There is a four-year ESPRIT project and a two-year EUREKA one for a system for cleaning aircraft. Many of the undertakings which have projects with a commercial objective cannot afford to wait as long as that.

1.46. In addition, a fair number of projects take longer than expected. Owing to the implementation delays, the scientific staff are accustomed to allow periods of grace: these are without any serious consequences if they are short, but they are an indication of serious difficulties with the project if they are longer. BICMOS II was approved for a term of 34 months, from 15 November 1988 to 14 September 1991. It was the subject of a first, eighteen-month contract, which was thus due to expire on 14 May 1990. As a result of delays on the part of the consortium, the Commission extended the first phase to 30 September 1990. A rider to the contract, which was also signed very late — on 13 February 1991 — subsequently provided funding for the second phase, up till 30 September 1992. The project thus arrived at fruition more than one year later than planned.

Exploitation of results

1.47. All these delays are, in theory, under Community control. In order to arrive at the final effect on the market,

the period of industrial development (transition from prototype to product), for which the partners are entirely responsible and which may take several years, must be added to the above — always assuming that there is industrial exploitation.

Payment deadlines

1.48. Delays in making payment have serious implications. They create cash-flow problems, especially for universities and small firms. The economic survival of the latter may depend on prompt payment. Shortage of cash is a source of financial costs. One consortium had to borrow 1 Mio ECU following a missed payment on 1 October 1990, which was still outstanding at the time of the Court's visit in April 1991. Delays in making payment increase the exchange risk: one university showed a loss of 4 000 ECU for this reason.

1.49. In 1985, the Commission stated that it was confident that the payment delays on ESPRIT work could be reduced from three months to one month in the short term ⁽¹⁾. However, the partners questioned in the Member States some years later quoted examples of much longer delays, in some cases as long as 15 months.

1.50. Examination of the Commission's files led to the same conclusions. Delays of four months (TAO); eight months (ATMOSPHERE), 13 months (same project), 15 months (TAO). In the case of final payments, the delays are even longer: a year for EPSILON and HECTOR; two years and three months for DASIQ; three and a half years for TAO. These delays in making payment are not incompatible with the finding (stated in paragraph 1.80) that the rate of budgetary implementation is satisfactory. Firstly, payment delays do not affect the rate of commitment, and secondly and more importantly, if the forecasting of the requirement for payment appropriations is realistic it will have allowed for the customary delays in making payment.

Statistical measurement of delays

1.51. Two sample checks carried out by the Commission in 1990 and by the Court in 1991 tallied. The Court's check showed that the average time which elapsed between the due date and the payment (the value date shown on the Commission's bank records) was 239 days for an interim payment and 510 days for a final payment. In the case of advances there was an average interval of 37 days between the signing of the contract and the value date.

⁽¹⁾ Minutes of the 32nd meeting of the Steering Committee held in Brussels on 6 September 1985, point III.

1.52. *Table 4*, which was compiled on the basis of the Court survey, shows that the proportion of delays attributable to the Commission was higher than that for delays caused by contractors. Paragraphs 1.53 to 1.60 try to identify the causes of and responsibility for these lengthy delays. The Commission survey shows only a slight acceleration between ESPRIT I and ESPRIT II — for interim payments the overall process was reduced from 283 to 240 days.

Advances

1.53. Article 21.2(a) of Annex II to the model contract, by providing that an advance is to be paid within two months of the signing of the contract, is authorizing a period that is too long. The deadline is usually respected, but in view of the numerous contracts with retrospective effect (see paragraphs 1.41 to 1.43), it is often much longer in relation to the actual start of the works.

Cost statements

1.54. It is a condition of any payment that progress reports and cost statements must be submitted in the month

following the end of the contract period concerned. *Table 4* shows that contractors overrun this deadline substantially. In the case of HECTOR, the main contractor sent the statements for the period 1 May to 31 October 1989 to the Commission on 3 April 1990, five months after the due date. Moreover, they were not complete, because the statements from some of the partners were still missing on 25 October 1990. The half-year reports on the BWN project were sent excessively late: on 24 November 1989 for the 31 August 1988 and 28 February 1989 deadlines and on 15 November 1989 for the 31 August deadline of the previous year.

Internal deadlines at the Commission

1.55. Article 4.2 of the contract does, in fact, provide that payments are to be effected within two months, but reckoned from the date on which the progress reports and cost statements are approved. There is, however, no time limit for approval: the contract should stipulate one.

1.56. Once the statements have been approved, a further eight weeks elapse at the Commission, more than half of this within DG XIII, plus the time required for bank transfers. The Commission's survey put this down to the waiting time between the various procedural stages and slowness in circulating the files, rather than the duration of

Table 4 — Origin of payment delays

	(days)	
	Interim payments	Interim payments
Contractors (from due date to receipt of statement by scientific official)	103	192
Commission (from due date to receipt of statement by scientific official)	136	318
TOTAL	239	510
— (of which DG XIII)	(110)	(290)
— ((of which DG XIII scientific unit for examination and acceptance of statements))	((77))	((261))

Source: Sample check by the Court.

the actual administrative operations. DG XX (financial control) takes only six days and has established faster methods (sending approval by electronic mail in advance of the paper version, approval after sample checks at DG XIII). Going via DG XIX (budget accounts) takes longer. Finally, the time required for bank transfers is abnormally long, especially for those to the more remote countries.

Final payments

1.57. The draft of the final payment is sent to the partners so that it can be agreed. Agreement and execution of the payment are frequently delayed by unforeseen occurrences. Sometimes the delay is due to individual contractors. If one partner is in debt to the Commission, it blocks payment for all the others (TOWARDS THIRD INTEGRATION). The principal partner may be in liquidation, which deprives the Commission of its customary interlocutor at a time when there are a large number of disputes to be settled (TAO). Sometimes the Commission is also involved. Disputes may arise between the Commission and the partners (the BWN and DASIQ projects). An audit in progress of a contractor who is in debt over other projects delays the final payment (HECTOR). One department queried the final statement after it had been agreed by all the parties (ITHACA I). As far as possible, two phases of the same project should not be treated as two successive projects, because the last payment on the first phase will be affected by all the delays to which real final payments are subject (ITHACA I and II). This inconvenience could however be eliminated, if the Commission adopted some of the suggested ways of simplifying payment procedures (see paragraph 1.95, for example).

Interdependence of project partners

1.58. The slowest partner determines the timetable for all the others. If appropriations are insufficient, the entire payment is held up. In fact, the Commission in principle makes a single payment to all the partners for a given period. In the case of the PCTE project, which was concluded on 30 June 1988, the disputed allocation of 30 000 ECU to one partner and 10 616 ECU to another, combined with large-scale unwarranted payments to two other partners totalling 457 953 ECU, was enough to hold up the payment of sums owing to the other partners which amounted to 1 330 7000 ECU. The final payment was not made until March 1992.

1.59. Where some amounts are in dispute, the Commission could pay the amounts that are not disputed without waiting; if one partner is excessively slow in submitting its cost statement, the Commission could make payment to the rest of the consortium. On 2 October 1989, the Commission did adopt procedures along these lines for

cases where one or more partners are indebted to the Commission at the final payment stage. Now, instead of waiting for the recoveries to be implemented before it proceeds to the final payment, the Commission pays the creditor partners without waiting, but charges the debts of the debtor partners to them. The Commission then makes an additional payment, after it has recovered the amounts owing to it.

1.60. EPSILON illustrates both the comments made in paragraph 1.58 (possible part-payment blocked for all) and paragraph 1.57 (delays to final payments). The last payment on the first phase of the project should have been for 508 239 ECU. However, pending the (delayed) signing of the additional clause prolonging the contract, the payment due had provisionally to be regarded as a final payment, from which an amount corresponding to 20 % of the total funding (i.e. 400 000 ECU) had been deducted by way of guarantee. Moreover, the payment of the 508 239 ECU would have increased the cumulative total expenditure on the project to 2 036 113 ECU, compared with a commitment of 2 Mio ECU, or, in other words, a limited overspend of 36 113 ECU. The Commission waited for the signature of the additional clause and the additional commitment associated with it before paying the amount in question all at once, seven months after the end of the first phase.

The causes: unwieldiness and complexity

Technical management

Difficulty of preparing proposals

1.61. Preparing proposals is a costly investment of time and money. The documentation sent to proposers is very well-produced, but very complicated. Some undertakings, once they have compared the cost involved against their chances of selection, decide to withdraw. The time allowed for submitting proposals varies a great deal. Since ESPRIT I, the shortest has been 47 days and the longest 126 days, the average being 80 days. Most proposers stated that it takes at least six months, and sometimes more, to prepare a proposal.

The unwieldy nature of some projects

1.62. The most widespread view in Community circles is that the number of partners in the consortia should be reduced and, alongside this, that the finance should be concentrated on a smaller number of larger projects. These two suggestions were put forward in the report produced in

May 1989 by the ESPRIT review board ⁽¹⁾ ⁽²⁾. In a Resolution of 8 April 1986, the Council had already recommended that 'a concentration of efforts and resources should be sought by greater recourse to more ambitious projects' ⁽³⁾. The two suggestions must be treated separately.

a) The number of partners

1.63. Contractors are unanimous in their view that the number of partners is generally too high and that the optimum number is between three and five (the only exception being the standardization projects, where, on the contrary, it is advisable to have a large number of partners from many countries). The complement of ESPRIT projects is generally in excess of this ideal number: the average for ESPRIT I was 5,8 and was as high as 9,5 in the first general call for ESPRIT II⁽⁴⁾. In the first ESPRIT III call the average dropped back markedly. These averages conceal significant variations, however. There are projects with nine (KIWIS), 12 (GENESIS), 14 (CNMA), and 21 (EOC) partners. Coordination of such projects is very difficult, which is why the number of partners in some projects was reduced in the course of their work: from ten to seven in FCPN; from seven partners and 31 associates and subcontractors ⁽⁴⁾ in the first phase to five and 14 in the second phase of ATMOSPHERE.

b) The size of the budget

1.64. The objective of financial concentration resulted in the introduction of the TIP projects (see paragraph 1.29), and limitations on the funding awarded to projects costing less than 5 Mio ECU (under ESPRIT I they could not be allocated more than 25 % of the annual funding; for ESPRIT II the corresponding figure is 30 %). In fact, during ESPRIT II the average size of projects increased. A relatively small number of large projects absorbed a substantial proportion of the finance. According to the Commission, as of 2 August 1991, for the 648 projects in the ESPRIT I and II programmes ⁽⁵⁾, almost half the finance had been allocated to around one hundred projects,

each of which received 6 Mio ECU or more. As for the 15 or so TIP projects, at 16 November 1990 they had absorbed 215,2 Mio ECU out of the 1 455 Mio ECU awarded under ESPRIT II — 14,8 % of the total.

1.65. However, with the exception of some technologies which are not viable below a certain critical threshold, the volume of funding alone is not an indicator of which projects are more worthwhile. Some of the TIP projects have suffered setbacks and some, such as CIM ALIVE and TROPICS, have even been halted. The duration of two large-scale projects, CSIC (budget of 20,4 Mio ECU) and ARTIFACTS (11,6 Mio ECU) has been shortened. The technical aspirations of ATMOSPHERE (18,0 Mio ECU) have been curtailed. Even if they have not failed, most of the TIP projects have split up into a series of smaller projects along the way, such as GENESIS, because it was doubtful whether they were in the common interest of the partners.

1.66. In principle there are no longer any TIP projects in the ESPRIT III programme. They have given way to the far more promising concept of the 'targeted project' (see paragraph 2.65). It could, perhaps, be argued that the latter are, in fact, now re-emerging in the guise of 'priority technology projects' (PTP), which was the novelty presented at the 1992 ESPRIT conference (23 to 27 November). These projects are small in number (22 proposals, of which three have been financed), but large in size, and were defined directly by the large industrial groups which will be the main partners in them — all characteristics of the TIP. The only true criteria are the intrinsic value of the technology under investigation and the cost/result and cost/exploitation of results ratios.

Number of reports required

1.67. Whilst it is reasonable for the Commission to require a consortium to produce a progress report every six or twelve months, plus a final report, it is arguable that to require monthly management reports (which is not uncommon) is frankly excessive. All these reports require a lot of work by the consortia and one wonders how the scientific staff find the time to read them. For example, the number of reports of all kinds required for the second phase of the TIP ATMOSPHERE project was 106 in two years — the equivalent of one report per week. In the case of management reports the quarterly interval which is imposed on other projects appears more reasonable.

Staff management

1.68. The ESPRIT measures were conceived and launched within the framework of a 'task force', which grew

⁽¹⁾ The Review of ESPRIT (1984-1988). The report of the ESPRIT Review Board. June 1989 (Extended version), p. 39.

⁽²⁾ Ibid, p. 104.

⁽³⁾ Council Resolution of 8 April 1986 concerning the mid-term review of the ESPRIT programme. Annex, third indent. OJ C 102, 29.4.1986, p. 2.

⁽⁴⁾ In addition to ordinary partners, consortia may include associate partners and subcontractors which are subcontracted to carry out works which are the responsibility of an ordinary partner. Associate partners have a share in the funding of the works, but subcontractors do not.

⁽⁵⁾ HMC 108 x LS. Esprit distribution of funding (Mio ECU) per project, 2.8.91.

with the programme, becoming Directorate A of DG XIII along the way, and then taking first place within the Directorate-General in terms of the number of staff employed.

Variable requirements, inflexible resources

1.69. Today the personnel department of DG XIII is facing a virtually insoluble dilemma. The requirements which it is required to meet are extremely variable in terms of qualifications and staff, as the research aspect of its activity involves the launch of specific programmes, split up into calls for specialized proposals, which last for a limited time. In order to cope with these varying requirements, the personnel department has assembled a mass of staff, who are employed on no fewer than fifteen different terms of employment, most of them strictly demarcated, which means that the possibility of transferring an employee from one system to another is unpredictable, or simply non-existent. There are salaried staff, service staff, contract staff (temporary or auxiliary) and officials; for some staff the employment costs are charged to Part A of the budget (administrative expenditure) and for others to part B (operating appropriations). The officials and temporary staff in part B are administrative or scientific staff. There are also sub-categories resulting from subdivisions or crossings of the above categories.

Origin of these piecemeal arrangements

1.70. This piecemeal approach is due to a process of budgetary or regulatory 'sedimentation', each stratum of which has a clear idea behind it.

1.71. The first of these is the idea that since research is subject to a system of management by objectives, i.e. programmes, the staff working for the research divisions should be funded from the operating appropriations.

1.72. The second idea is that since research work is carried out by means of specialized programmes with a specified duration, the scientific staff attached to them should be recruited for the same period of time and it should be possible to dismiss them at the end of the programme.

1.73. The third idea is that owing to the demand for particular services (specific or short-term assignments involving case studies or consultancy work, appointment of scientific visitors) the division has very specialized requirements as regards recruitment, duration of service and pay.

Present state of the system

1.74. The first of these ideas is only partially applied, in that, alongside the posts funded from part B of the budget

and mentioned in the remarks against the various headings, DG XIII has posts which are charged to part A of the budget (323 posts in December 1991, of which 213 were posts in categories A and B). This solution is certainly justified where the posts involve administrative duties (or are concerned with activities other than research), but in that case it should be extended to all posts of that type. Of the posts that are charged to part B it was, in fact, possible to identify both scientific and technical posts and administrative posts (279 posts in December 1991).

1.75. The second idea is not being consistently applied either, as some of the posts for officials are occupied by staff who are working for the scientific departments. Furthermore, a large number of the temporary posts charged to part A and, more particularly part B, of the budget are for administrative tasks (almost 300 for the 1991 financial year). Admittedly, the posts charged to part B became permanent posts in 1991, but that does not really affect the question that is raised above, because the majority of these posts are still occupied by temporary staff. For reasons of social policy, however, the Commission wanted to give temporary staff who had been working on contract for a certain length of time, whether or not they were scientific staff, the possibility of becoming established officials. It is not possible for the staff concerned to be appointed to their own posts, however, and they are usually transferred to other DGs, with a flow of officials from other DGs moving in the reverse direction to fill the posts that have thus become vacant. Insofar as the Community allows temporary staff to be established, it ought to be possible for the Commission to establish them without transferring them to other posts.

1.76. DG XIII does not always abide by the budget remarks concerning the attribution of the posts in Part B. For example, an internal note dated 10 April 1989 on the administrative and financial management of the RTD programmes openly admitted that owing to the lack of established posts for activities other than research, some of the temporary research posts (in part B of the budget) had been taken from research and assigned to these other activities. For example, 21 of the posts were assigned to Directorate XIII-D (telecommunications policy).

1.77. There is also a drift away from the third idea, which was described in paragraph 1.73 above. Use of the various terms of employment mentioned in that paragraph is not confined to the particular types of services which provided the justification for them. In practice DG XIII uses some of the 'suppliers of services' formulae to circumvent the budgetary and regulatory limitations on manpower and staff expenditure associated with research.

1.78. As expenditure relating to the provision of services is charged to Part B of the budget, the result of the above practices is that amounts earmarked by the budget and the programme for research work are siphoned off for

administrative tasks. They also illustrate a tendency, which has become increasingly widespread at the Commission, to draw on operating appropriations to finance administrative expenditure (mini-budgets). For example, by issuing a call for proposals in August 1991, DG XIII attempted to subcontract the entire administration of the European Software and Systems Initiative ('ESSI') ⁽¹⁾, one of the vast 'targeted projects' of the ESPRIT III programme. On the other hand, it is because the regulatory and budgetary limits are unrealistic that DG XIII resorts to such expedients. Although DG XIII's establishment has increased, the volume of appropriations it is required to manage and the number of projects to be monitored have increased even more rapidly.

1.79. The way to achieve a healthier, and above all more flexible, system of personnel management is to go back to the underlying ideas set out in paragraphs 1.71 to 1.73 and thus reduce the number of employment categories. According to this line of thought, the posts which may be filled by temporary staff should be reserved for scientific and technical staff, and no-one else, should be authorized in Part B of the budget and should be identified by programme. All other unestablished staff, i.e. all unestablished category A staff who are employed on non-scientific administrative and cross-boundary duties, on the one hand, and, on the other, all the unestablished B, C and D employees (because their duties do not require special scientific skills), should be covered by Part A of the budget and be able to occupy established posts in any Directorate-General on identical terms (there are at present around 120 C category 'research' posts which will usually be filled by temporary staff and for the most part are, in fact, occupied by such staff).

Financial management

Satisfactory follow-up of the utilization of commitments

1.80. The rate of utilization of final commitment appropriations has always been above 90 %, with the exception of 1984, 1985 and 1987. For final payment appropriations the rate has always been higher than this (except in 1984 and 1985) and has even been as high as 98 % if the years 1986 and 1987 are added to the above exceptions. These are satisfactory results.

1.81. Nevertheless, there are some contradictions in the final out-turn figures quoted in the most recent budgets. Thus total payments for ESPRIT I up till 1989 amounted to 663 887 035 ECU according to the 1991 budget and 659 577 403 ECU according to the 1992 budget. The total amount of ESPRIT II payments up till 1990 was 711 456 814 ECU according to the 1992 budget, but

711 499 712 ECU according to the 1993 budget. It is not possible to refer to the revenue and expenditure accounts in order to ascertain the exact amount, because they do not always distinguish between successive programmes and sometimes merge them under the same budget heading.

Identifying eligible costs

a) Redundant calculations

1.82. The amount of each interim payment is established four times over, as follows. Once by the responsible scientific unit; once by financial unit XIII-E-1. In addition, when the final payment is to be made, all the payments since the start of the project are included in a general review, again with successive action by the two units referred to above. Should there be an external audit, the same expenditure will have been checked five times. Reconstructing the expenditure from the beginning in this way obviously represents a considerable amount of work, for both the contractors and the Commission.

b) Actual costs and estimated costs

1.83. As the present system is based on actual costs, the Commission pays very little attention to the cost estimates given in the proposals. The Commission asks proposers for forecasts of labour costs and a breakdown of overheads only after selection and does not evaluate them until after the contract has been signed. Thus, in the case of EPSILON, the Commission did not become concerned about the excessive level of overheads stated by one partner until after the contract had been signed.

1.84. Sometimes when contractors are drawing up their cost statements they do not know what the true costs are, because the accounts for that year have not been drawn up. They provisionally base their statements on cost forecasts and are then obliged to correct them subsequently (this was established during an external audit of a COSMOS partner).

c) Labour costs

1.85. Contractors found that the rules for calculating labour costs were not clear and called for them to be simplified. Misunderstandings are a source of protracted to-ing and fro-ing between the Commission and the contractor.

1.86. The accuracy of these meticulous checks is illusory, to judge by the great disparity in the hourly costs declared

⁽¹⁾ OJ C 206, 7.8.1991, p. 11.

by partners. No doubt the variations of more than 50 % between countries do reflect objective economic differences. But there are significant variations between contractors within the same country. One contractor declared different labour costs for his participation in three research projects, which was why the Commission ordered an audit (ATMOSPHERE). In the case of the universities and some research centres, the Commission carefully takes into account 'actual' costs which are, in fact, calculated by the contractors on the basis of a scale of man/month charges sent to them by the administration of the university or research centre.

d) Overheads

1.87. The accuracy with which overheads for reimbursement are calculated is just as illusory. Except where the marginal cost is financed in full — which is a very small minority of cases — the contracts allow overheads to be declared as a further percentage of labour costs. If this percentage were to be calculated accurately, it would require a thorough investigation of the contractor's analytical accounts, which is ground onto which DG XIII's scientific staff do not venture. Moreover, the Commission accepts the percentage declared by the contractor, if it appears reasonable and, if not, the matter is discussed again. Thus, despite the principle that the actual costs are to be taken into account, the situation with regard to overheads tends to be one of negotiated flat charges. The level of general expenses that is accepted may be as much as 80 % or 100 % of the staff costs. The inaccuracy thus affects some very substantial amounts.

Improvements and simplifications to be studied

a) Intervals between payments

1.88. Payments are sometimes made at six-monthly intervals, sometimes yearly. In the case of short-term projects (between one and two years), and especially for the definition stage, which is often decisive in terms of the continuation of the project, a six-monthly interval for reports and payments is justifiable in the interests of careful monitoring. On the whole, this is what the contracts specify. Nevertheless, a fair number of long-term projects are also divided up into six-monthly periods. In this instance, yearly intervals would suffice, once the definition stage is over.

b) Indirect payments

1.89. Whilst the Commission has gone over from a sequential system of signing contracts to one in which all

the parties sign simultaneously and in parallel, it has done the reverse in the case of payments. At the time of ESPRIT I, it paid the partners separately. With ESPRIT II, it pays the whole consortium via the main partner, who is then responsible for dividing the payment up between the partners.

1.90. The new procedure simplifies the Commission's task, but sometimes complicates that of the principal contractor. The fact is that, when making transfers to the latter, the Commission does not always quote the references by which the project and the reason for the payment can be identified and does not state how the payment is to be allocated between the partners. This results in a waste of the principal partner's time, which subsequently rebounds on the other partners.

1.91. The Commission could easily rectify this. Whilst retaining the indirect system in the direction partners-DG XIII for the collection of reports and cost statements, the Commission could pay each partner directly, since it calculates the amount due to each of them in any case. By speeding up the payments to the ordinary partners, this reform would also benefit the associated partners and subcontractors who are paid, by sub-allocation, after the ordinary partners and are thus most affected by the delays.

1.92. This system may, in certain cases, result in the inequitable treatment of the partners. As paying agent, the principal contractor in the TAO project was both judge and defendant in the disputes between them and several of their subcontractors. If the principal contractor goes into liquidation (as occurred with TAO and SUPERDOC) or withdraws, the partners which have not been paid are in difficulty. Such cases are not unusual.

c) Application of flat rates

1.93. This can take a variety of forms, but the common feature is that a rate for one or more cost factors (price, quantity, or both) is fixed by contract in advance at a level that is deemed to be reasonable and that rate is then referred to when the amount for payment is being determined. As a result payments cease to be a function of the actual costs. The use of fixed rates was advocated as the panacea which would, at last, genuinely simplify payment procedures. One Commission consultant recommended it in a report in 1990 ⁽¹⁾. The Court itself encouraged this move in its 1990 annual report ⁽²⁾. The Commission then began to study possible procedures for applying the concept but has not, so far, reached any conclusion.

⁽¹⁾ Study of the administration of the research activities. 7 December 1990.

⁽²⁾ 1990 Annual Report, paragraph 11.6. OJ C 324, 13.12.1991, p. 160.

d) Other simplifications

1.94. The Commission should nevertheless continue to study ways of simplifying the present system. Two possible alternatives in particular could be studied. The first would be to defer the problem of the cost calculation to the end of the project, the second would be the reverse — to simplify the final phase, which is too cumbersome at present.

1.95. The first alternative would follow through to its logical conclusion the fact that periodic payments are merely instalments and so eliminate precise calculation of eligible costs from these interim stages. The final period would thus be the only occasion on which the eligible costs would be calculated precisely in full. The second way would be for the Commission periodically (e.g. annually) to grant the contractors discharge, which would be final. In this case, the final payment would simply be the last periodic payment and no more complicated to calculate than any other. In order not to prolong the uncertainty surrounding the project's eligible costs, the Court's preference is for this second way. It would also be necessary to rationalize the ex post facto checks by the scientific unit and financial unit XIII.E.1.

1.96. The execution of the project has very little impact on the amount of overheads. Under these circumstances, funding overheads is tantamount to awarding an arbitrary, open-ended operating subsidy in addition to the funding for the costs that are actually attributable to the project. It might, therefore, be possible to move in the direction of abolishing the funding for overheads, or at least, restricting it to a limited fixed percentage of the recognized direct costs.

CHAPTER 2

The ESPRIT programme as a strategic instrument

INTRODUCTION

2.1. The ESPRIT programme may be deemed to be a good strategic instrument if it achieves the basic objectives discussed in paragraph 0.4. As stated in paragraph 0.12, the Court has not assessed the scientific and technical results of ESPRIT itself (paragraph 0.4 (a)) but, in the opinion of the experts, these results are many and useful. This Chapter will discuss the other objectives listed in paragraph 0.4 and also contains a detailed discussion of the additionality aspect of the ESPRIT programmes, as it is clearly one of the objectives, even though it is not set out in the basic texts.

THE OBJECTIVE OF TRANSNATIONAL COOPERATION

Good internal cooperation: a condition of success

2.2. The principle of transnationality is a mandatory aspect and one which the Commission always observes. Moreover, it is not confined to ESPRIT, but extends to all shared-cost Community research. The contractors and other interested parties interviewed by the Court were unanimous in their praise of transnational cooperation in the form which it takes in the ESPRIT programme. There are many examples which show that the value of a project's results is closely dependent on the degree of motivation within a consortium and on the quality of the cooperation between the partners. The personality of the coordinator nominated by the main contractor is of prime importance. BASE, DMPC, BICMOS II, PROMPT and BASIC GOODS were progressing satisfactorily, and showed signs of promising results: they all had the benefit of being well-managed, with good cooperation between the partners. ATMOSPHERE was poorly coordinated at the outset, but underwent marked improvement in the later stages, mainly due to a change of main contractor, and finally produced work that was increasingly well-targeted and useful.

2.3. Conversely, if the project leadership is weak, the consortium tends to split up into sub-groups and the common objective is forgotten. BWN's objectives had to be reduced following a mid-term crisis, mainly because the project leader, although technically brilliant, proved to be very weak when it came to planning the works. Cooperation between the partners deteriorated, reports were submitted late, or not at all, one partner withdrew and the project effectively split into two ill-connected sub-projects. Similarly, DASIQ's partial lack of success and the sudden termination of the project were the consequences of the fact that one of the partners had gone into liquidation. The situation was aggravated by the attitude of the parent company, which refused to honour its undertaking to take over from the subsidiary in the event of the latter's default. In the case of TAO, the main contractor transferred responsibility for coordination to another contractor. This proved to be an unfortunate choice, because a series of disputes, which have still not been resolved, brought the subcontractors into conflict with the new coordinator and the latter's business was wound up. Another partner subcontracted all the work for which it was responsible. In consequence the project progressed far too slowly. It did achieve its objectives, more or less, but only after a 14-month extension.

Pooling information: a qualified success

Pooling information within the consortium

2.4. The contract requires the partners to pool the information which they have acquired as a result of their work on the project ('foreground information'), but this rule also extends to any other information ('background information') that may become necessary for the execution of the project (Articles 16.1.1 and 16.2.1 of Annex II to the model contract). In the case of foreground information, the information must be made available free of charge. The necessity of pooling information that is needed for the project is indisputable.

2.5. The specimen contract leaves a fairly serious risk of unjustifiable discrimination between the categories of partners ⁽¹⁾. Subcontractors are simply paid by partners to carry out works; they do not make any contribution to the project finance and have no rights as regards the results of the project, which is normal. The Commission wanted to introduce the possibility of an intermediate position with a greater degree of involvement — that of associated partners. The latter also work for a principal, the contractor, and are not signatories to the project contracts. Unlike subcontractors, however, they do contribute to the project funding and, on that score, would normally acquire certain rights in respect of the results. However, the specimen contract gives only a vague definition of their rights of access to information and their obligations regarding the exploitation of results. The specimen contract should specify these rights and obligations more precisely.

2.6. In this respect the protocol signed by the Commission on 17 October 1989 cannot be considered to have settled the question adequately. The protocol does, indeed, clarify the rights of associates as a function of their greater or lesser contribution to the funding and work of the project. Nevertheless, it is still drafted in terms of guidelines rather than specific rights. Moreover, when the Commission was seeking to take action against an unjustifiable situation, the only case in which the protocol had contractual force was that of the ITHACA consortium. For the other consortia it merely has the force of Commission internal rules. The contracts of association are submitted to the Commission for prior approval and, in principle, the latter checks in every case that the proposed terms are equitable, in the spirit of the protocol. The rules contained in the latter must, however, be defined and raised to the status of clauses with real contractual force.

⁽¹⁾ In addition to ordinary partners, consortia may include associate partners and subcontractors which are subcontracted to carry out works which are the responsibility of an ordinary partner. Associate partners have a share in the funding of the works, but subcontractors do not.

Cooperation outside the consortium

2.7. Not only does the specimen contract require contractors to make information available to their partners, but they must also share it with other contractors in the programme and in other Community R & D programmes (Article 16 paragraphs 1.2 and 2.2 of Annex II). Leaving aside the risk that this obligation will remain a purely theoretical one, especially where large organizations are concerned, many contractors deem it to be excessive, and one can understand why. In their view, any inventions which result from a project must, on the contrary, be protected against third parties, and contractors of any other project or programme are deemed to be third parties in that respect. With the Commission's agreement, the specimen consortium agreement, which is used by the 'big' electronics companies for the projects in which they participate, includes a clause which specifically gives partners preference over third parties to exploit the information generated by the project (Article 8(1)). In the matter of intellectual property rights, the specimen contract is so complex that, paradoxically, it tends to lead to the adoption of provisions which depart from it, to a greater or lesser extent, in favour of consortium agreements.

2.8. The Commission sometimes recommends that an ESPRIT project consortium should cooperate with another, similar, ESPRIT programme, another Community programme or the EUREKA programme. Not infrequently the suggestion is, in fact, ignored. The Commission considered cooperation between the EPSILON project and LOKI and other projects in the field of 'information and knowledge storage' to be highly desirable. There is nothing on the project file which would indicate that such cooperation ever occurred. The TAO project consortium ignored the Commission's repeated suggestions that it should look at Stanford (USA) University's ONCOCIN project. It was proposed that the same project (TAO) should be combined with Eureka project No 150, as there were areas of considerable overlap between the two projects. There is nothing in the file to indicate that this complementarity was followed up.

THE OBJECTIVE OF COOPERATION BETWEEN INDUSTRY, UNIVERSITIES AND RESEARCH CENTRES

Participation by universities and research centres

2.9. As of 1 April 1992, the EPIC database showed that although universities and research centres were in the

minority as far as participation in ESPRIT projects was concerned, their contribution was, nevertheless, significant and was also increasing. The level of university participation represented 30 % of the overall level of participation, with 13,6 % of ESPRIT II funding, compared with 19,4 % and 9,1 % of funding in ESPRIT I. The number of research centres participating was 16,0 % of the total, with 11,5 % of ESPRIT II fundings, as against 12,0 % with 8,3 % of ESPRIT I fundings (the rest of the participation being by companies).

2.10. Universities often set themselves up as centres for the collection and dissemination of information on programmes and calls for proposals. Some of the large research centres do the same. On occasion they do more than just provide information, by helping small undertakings to prepare proposals. One university research centre in Ireland organized courses for its partners in ESPRIT projects, thus helping to increase the number of electronics graduates. VLSI Design Action is itself a vast mechanism for disseminating information on leading-edge micro-electronics through the medium of some 120 universities and technical colleges and is a valuable project, given the desperate shortage of electronics engineers in Europe.

The role of the universities in transferring technology

2.11. The fact that many universities have developed a commercial research business by means of contracts with industry is clear evidence that the know-how which they have accumulated, partly as a result of ESPRIT projects, is being taken seriously. A large number of them have established independent institutes, or even commercial companies, for this purpose. In Ireland one such university established a national centre for software engineering; another university institute set up a complex of satellite companies to develop and market the accumulated know-how. Virtually all the Spanish universities have a technology transfer centre. The same phenomenon can also be observed in Germany and France. A fair number of research centres have developed similar ways of exploiting their results.

A similar role for contract research companies

2.12. The part played by contract research companies in the ESPRIT programme is very important. These com-

panies occupy a position between the needs of industry on the one hand and the supply of leading-edge technology on the other. They maintain up-to-date information on the state of the art, particularly within the framework of ESPRIT projects, and by concluding commercial contracts outside the Community research framework they facilitate user-manufacturer collaboration, thereby compensating for one of the traditional weaknesses of the ESPRIT programme. Their cross-boundary skills are a rich soil for technological cross-fertilization. Their particular contribution lies in the way in which they bridge the pre-competitive boundary, which is theoretically outside the scope of the ESPRIT programme. These companies are, therefore, natural agencies for the exploitation of the results of Community research and make no calls on the Community budget at this stage, thus providing a positive example of subsidiarity, where national enterprise takes precedence over Community-funded exploitation of results under programmes such as VALUE. For all these reasons, the Commission should examine ways of involving these companies more, firstly in ESPRIT projects and then in the exploitation of the results which they produce.

THE OBJECTIVE OF SMU PARTICIPATION

Scope

2.13. The dynamism of the SMUs justifies the reliance placed on them. Since their resources are limited, any research work carried out by them must produce commercially viable results quickly, thus ensuring that they are reliable agents for the exploitation of results. Two projects in the same area (work stations) were launched simultaneously: SPIRIT, with a consortium of small undertakings, and EWS, where the consortium was made up of large undertakings. The small undertakings were far more dynamic and their project continued, whereas the EWS project, although not a failure, was not extended. And if the latter project appears at last to be offering some prospect of added value, it is due to the SMUs which are forming an industrial consortium to follow up the results that have been ignored by larger undertakings. In conclusion, the establishment of a dense substrate of technologically advanced SMUs is essential as a basis for the development of larger-scale industries.

Increased SMU participation

2.14. The level of SMU participation in projects is substantial and has increased with time. As of 1 April 1992

the EPIC database showed 653 projects (ESPRIT I and II). At least one SMU was involved in 68,1 % of cases. In 22,8 % of cases the main contractor was an SMU. Between ESPRIT I and ESPRIT II, SMU participation as a percentage of total participation by all contractors in all projects rose from 18,2 % to 23,1 %, and the percentage of total funding obtained by SMUs rose from 15,2 % to 20,1 %. This percentage was even higher in the most recent calls for proposals.

2.15. Nevertheless, this increase is primarily a reflection of the fact that the number of SMUs in the IT sector in Europe is rising steadily. The proportion of SMUs in the sector which take part in the programme is, however, still very low (approximately one in ten).

2.16. The above statement must itself be qualified, in that a fair number of the companies are apparently SMUs, but are in actual fact subsidiaries of large companies (or, even, of the 'Big Twelve'), or they emanate from large organizations of various types, such as higher education establishments and research centres. Some SMUs were created on the initiative of a particular Ministry, which in some cases then constituted their main client. Such occurrences give a false impression of the extent of real SMU participation in the programme. From this viewpoint, it is apparent that the objective of substantial SMU involvement in the ESPRIT programme requires further attention.

The problems of participation for SMUs

2.17. SMUs experience practical difficulties in gaining access to the international level, because they are generally operating within a purely regional framework. They are overwhelmed by the size of the projects, the excessive number of partners and the might of some of the latter. At meetings where one of these partners has sent five representatives the SMUs may be able to send only one and are thus at a disadvantage. The time and money required for travelling and preparing proposals, the waiting period while contracts are being negotiated, the duration of projects and the burden of coordination and administrative work are often beyond their means. For them, a project is big business and a big risk. The chances of proposals succeeding are slim. It is often necessary for work to start before the contract is signed and late payments are a burden on their cash flow. However promising the results may be, exploiting them is expensive and a SMU may be obliged to share the exploitation with larger undertakings. These are all risks which may cause SMUs to elect not to become involved.

THE OBJECTIVE OF ECONOMIC AND SOCIAL COHESION

Scope

2.18. Article 130b of the EEC Treaty states that the objective of economic and social cohesion is to be pursued not only through the Structural Funds, but also through the other existing financial instruments. The ESPRIT programme is thus required to make its contribution towards this objective. It would in fact be dangerous to promote leading-edge technology whilst neglecting the less advanced countries and regions, with the risk of their being put out of the race definitively in this area where competition is so fierce.

2.19. In the context of ESPRIT, the countries to which the Commission has been devoting particular attention in this respect are Spain, Greece, Ireland, Italy and Portugal. The list makes no other distinction (for the sake of convenience, these countries will be referred to as 'the countries of ESPRIT cohesion' in the remainder of the chapter). The Commission, in fact, intervenes on grounds of economic and social cohesion only in favour of entire Member States, despite the invitation contained in the basic texts, specifically to favour participation by *regions* whose development is lagging behind. The Commission does not make use of maps defining the regions whose development is lagging behind (Objective No 1 of the Structural Funds) and the declining industrial regions (Objective No 2), nor does it use any comparable map. The R & D expenditure and activities of the countries of ESPRIT cohesion are highly concentrated in capital cities and regions which are outside the scope of Objective No 1. To fund research in Barcelona or Milan on the grounds that, for example, Spain is to benefit from the effort towards social and economic cohesion in Andalusia, or Italy in the Mezzogiorno, is to miss the purpose of the objective. The cohesion effort must be better targeted.

Strengthening economic and social cohesion

2.20. As of 1 April 1992, the EPIC database supplied the following data. Between ESPRIT I and ESPRIT II the level of participation by the countries of ESPRIT cohesion as a percentage of total participation by all organizations in all projects rose from 21,5 % to 28,2 % and the proportion of total funding awarded to those countries increased from 17,5 % to 19,7 %. In 16,3 % of cases the principal contractor was from one of these countries. Although the figures are higher, these percentages are substantially lower than the percentage of the Community population and Community gross domestic product represented by these countries (37,0 % and 31,4 % respectively).

The problem for beneficiary countries of participating in the effort towards economic and social cohesion

2.21. Most of the computer and microelectronics undertakings in the countries of ESPRIT cohesion are small or medium-sized undertakings. Thus, all the problems which SMUs experience in taking part in ESPRIT are also problems for these countries. The technological level of existing industries is not always up to the level which projects require. The reduced dimensions of these companies prevents them from taking part in large projects. Spain has participated in only one TIP. The range of research areas which appears in the programme is very wide for an industry which does not cover all the fields. The countries in question will generally be able to participate in software projects, but few or none in projects concerned with microelectronics. For candidates from the South, it is much easier to participate in ESPRIT by agreeing to collaborate on projects designed in the North than to gain acceptance for an idea of their own.

COMMUNITY EFFORTS TO IMPROVE SMU PARTICIPATION AS WELL AS IMPROVING ECONOMIC AND SOCIAL COHESION

Variety of intervention modes

2.22. The Commission set up the EPIC database in order to be able to track participation by SMUs and the countries of ESPRIT cohesion separately. This type of analysis is not possible in most of the other Community research programmes. On the other hand, the objectives of economic and social cohesion and SMU participation are neither quantified nor monitored specifically in the course of the procedures for implementing the programme.

2.23. The Commission seeks to maintain a certain geographical balance in the composition of the industrial working groups. The choice of subject area is modulated slightly, so as to avoid excluding certain countries. During the preparatory work on ESPRIT II, DG XIII worked with the Commission's SMU Task Force to improve the flow of information on the programme to the SMUs and to facilitate contacts which might be useful in forming consortia. The best advocate for a beneficiary country's participation in projects is that country's representative in the programme management committee. The Commission tried to develop Greek participation in the advanced data-processing programme. When the consortium decided to cut back the number of participants in ATMOSPHERE, the Commission intervened to protect the interests and

participation of the Spanish, Greek and Irish SMUs. It took advantage of the 62 Mio ECU transfer to ESPRIT in 1990 mainly to increase the sums awarded to the SMUs and universities.

Suggested partners

2.24. The Commission exerts pressure on the consortia to include one or more additional partners in order to increase the level of participation by SMUs and the countries of ESPRIT cohesion. Sometimes the pressure is applied in generic terms, sometimes an undertaking is nominated for inclusion in the consortium. The Commission gained admittance to the LIGHTING APPLICATIONS project for a Spanish research centre and, similarly, for two partners in the FLEXPLAN project, one of which was nominated specifically. The Commission itself came under pressure from various sides (and also brought pressure to bear) to include Irish, Greek and even British partners in the ITHACA I consortium, with varying degrees of success. It won admission to EWS for a partner which was both an SMU and a national of a country of ESPRIT cohesion, with negative consequences for the initial stages of the project's development but, fortunately, it was possible to rectify this at a later stage.

2.25. When a partner is nominated specifically and the consortium has reservations, the method employed is not very satisfactory. It prolongs the contract negotiations, which are already very protracted. It increases the number of partners, which on average is already too high. It reduces the funding for the initial partners, as the partners are usually 'grafted on' without any increase in the overall funding.

Desirable improvements

2.26. One possible way of benefiting the less-developed regions would be to provide for measures which, whilst being of interest to the Community from the technological point of view, are adapted to the needs of those regions and, in some respects, are virtually pilot projects. 'Special measures' along these lines already exist (see paragraph 2.54). One programme which could provide a useful model is the BRITE-EURAM programme (advanced material research), under which it is possible to grant aid for the preparation of proposals, but to reserve the grant for SMUs, undertakings in the less-developed regions and organizations which are applying for the first time. It should be possible to find some method of preventing an excessive drain on the programme resources. It would also be a good idea if the SMUs could be helped to transfer their results to the industrial development stage. The structure for coordinating research departments and the depart-

ments which are responsible for the management of the structural funds exists. That structure could usefully be reinforced, as some structural measures are directly concerned with research. For example, the objectives of STRIDE (European Development Fund) (400 Mio ECU, 1990-93) ⁽¹⁾ are to strengthen the research and innovative capacity of less-developed regions and to encourage these regions to join Community R&D programmes.

ESPRIT AND THE INTERNATIONAL
COMPETITIVENESS OF THE EUROPEAN
ELECTRONICS AND COMPUTER
INDUSTRIES

Changes in the industrial groups which were the
mainstays of the programme

2.27. Since 1986 almost half the 'Big Twelve' groups, which were all independent when the Commission used them as the initial basis for the ESPRIT programme, have been taken over by a dominant European or even, in one case, Asian, group. Other groups outside Europe have acquired minority shareholdings in several others. Moreover, most of the 'Big Twelve' have suffered substantial financial losses in recent years, either at group level or in IT-related activities, so that some have been obliged to look to the private or even, in some cases, public sector for injections of capital. These restructurings have also been accompanied by substantial job losses.

⁽¹⁾ Communication C(90) 1562/2 to the Member States laying down guidelines for operational programmes which Member States are invited to establish, in the framework of a Community initiative concerning regional capacities for research, technology and innovation — *Stride*. OJ C 196, 4.8.1990, p. 18.

Macroeconomic changes

2.28. Progress in the world market for electronic products in the wider sense (including telecommunications) is very rapid (see *Table 5*), and in the European market progress is even more rapid than on the world market. European production has not, however, followed at the same rate as the change in demand on the European market. This inability to meet European demand from local production can be seen more clearly in the pattern of changes in the balance of inter-regional trade (*Table 6*). Even in software, Europe is in deficit ⁽²⁾. Furthermore, an increasing percentage of European production has come under the control of groups which are predominantly non-European. Finally, Europe's share of world production is particularly low in the case of state-of-the-art products. Whereas Europe accounts for 34 % of the world market for integrated circuits, it has only a 9 % share of production of such products ⁽³⁾.

Exploitation of results still inadequate

Two positive aspects: dissemination of information and
standardization

Results

2.29. The Commission makes a considerable effort to ensure that information on programmes, projects and their

⁽²⁾ Sources for paragraph 2.28:
— G. Fahrenkrog and F. Caballero-Sanz. *Europe and the World IT&T Markets*. Commission;
— E.I.C. *L'électronique dans le monde*. 1991 and 1992 editions.
⁽³⁾ Source: JESSI. *European microelectronics on its way*. Public presentation of the JESSI programme at the CEBIT in Hannover on 16 March 1992.

Table 5 — Evolution of the world electronics market

	(000 Mio USD at current prices)					
	1984	1987	1989	1990	1991	1992 (Estimate)
World market (= World production)	442,5	681,1	822,3	908,6	972,4	1 013,4
Average annual progression		1987/84	1989/87	1990/89	1991/90	1992/91
		+ 15,5 %	+ 9,9 %	+ 10,5 %	+ 7,0 %	+ 4,2 %

Source: — G. Fahrenkrog and F. Caballero-Sanz. *Europe and the world IT&T markets*. Commission.
— Electronic International Corporation — *L'électronique dans le monde*. 1991 and 1992 editions.

Table 6 — Evolution of the interregional balance of trade in electronics products

(000 Mio USD)

	1984	1987	1989	1990	1991
Europe	- 12,2	- 21,9	- 34,2	- 39,6	- 45,8
United States	- 1,2	- 7,2	- 7,7	- 0,1	- 4,5
Japan	+ 35,5	+ 54,3	+ 62,7	+ 62,7	+ 70,7
Rest of world	- 22,1	- 25,2	- 20,8	- 23,0	- 20,3
% deficit Europe / market Europe	- 11,7	- 11,8	- 15,8	- 14,6	- 16,1
% deficit Europe / world market	- 2,8	- 3,2	- 4,2	- 4,4	- 4,7
% deficit United States / world market	- 0,3	- 1,1	- 0,9	- 0,0	- 0,5
% surplus Japan / world market	+ 8,0	+ 8,0	+ 7,6	+ 6,9	+ 7,3
% deficit rest of the world / world market	- 5,0	- 3,7	- 2,5	- 2,5	- 2,1

Sources: — G. Fahrenkrog and F. Caballero-Sanz. Europe and the world IT&T Markets. Commission.
 — Electronic International Corporation. L'électronique dans le monde. 1991 and 1992 editions.

results is circulated widely by publishing periodicals, reports and project summaries and including data on projects and their results in databases (chiefly CORDIS). Information is also publicized efficiently through the working groups created by the Commission or the industrialists concerned outside the project framework, as well as seminars and the ESPRIT conference, which is attended by more than 3 000 people every year. The ESPRIT programme has also done a lot to advance European standardization. Its most remarkable achievement was to secure hardware compatibility by freeing the market from the constraints of the 'proprietary system', whereby each manufacturer ensured that its standards were incompatible with those of other manufacturers.

Publicity in the service of the competitiveness of European industries

2.30. The legislation is increasingly insistent in calling for research to be used as a means of increasing the international competitiveness of *European* industry (Article 130f of the EEC Treaty) and for 'the constitution or consolidation of a *specifically* European industrial poten-

tial' (7th recital of the ESPRIT III decision) (1). When considering the ways of disseminating information, a clear distinction must be made between those which provide access to sensitive information, thus enabling anyone who so wishes to exploit it industrially (publication of final reports on projects, as well as scientific and technical publications) and those which state only that an innovation exists, giving references as to its origin but without making appropriation of the technology possible (summary, synopsis, CORDIS database). Without depriving the inventor of his invention, this second method of disseminating the information can be a way of helping the inventor to find the means of exploiting an invention and negotiating a concession or licence. This second form must be developed systematically, whereas the first must be limited to cases where there is no hope of immediate exploitation. The Commission takes implicit account of this vital distinction in its interventions. Nevertheless, the distinction is not apparent in the records and studies of publication measures.

2.31. A similar distinction can be made in the matter of standardization. The nature of standardization is to open up and facilitate communication between countries. In the electronics field, however, the speed of technical change is such that a new standard still gives a head start to those

(1) Council Decision of 8 July 1991 adopting a specific research and technological development programme in the field of information technologies (1990 to 1994). OJ L 218, 6.8.1991, p. 22.

manufacturers who are prepared for it. On the other hand, one of the conditions on which the competitiveness of European industry depends is its ability to take full advantage of the single market. Consequently, standards which facilitate communication between all types of European network must be actively pursued, as the bearers of specifically European benefits (e.g. the 'EUROPEAN NERVOUS SYSTEM' project, which concerns administrative networks) ⁽¹⁾.

The protection of intellectual property rights

2.32. The protection of intellectual property rights is an excellent way of promoting 'specifically European' innovations. Nevertheless it is still not fully available in the field of information technology. Software cannot be patented. In theory hardware can, but undertakings seldom make use of patents. The Patents department at Directorate XIII-C handles all the Community's patents, but none of them originated from the ESPRIT programme. In fact, the patent procedure requires details of the process or invention to be published in full — a potentially hazardous business, despite the legal protection afforded by the patent, since the legal process is likely to be far too protracted to be of use in an area of rapid technological change.

2.33. Software is not protected by universal regulations such as apply to patents. The Community did make provision for its own system of protection, by means of the Directive of 14 May 1991 ⁽²⁾, which adapted the system of copyright which applies to literary and artistic works. The Directive has not yet been incorporated into national law, however. The degree of protection it affords is less than that conferred by the law of some countries, and the difference operates to the detriment of those who hold European rights. In the face of these weaknesses in the system for protecting their rights, undertakings tend to fall back on secrecy.

Commercial exploitation — an essential element of specifically European exploitation

ESPRIT too remote from the market

2.34. Apart from a limited sub-programme of basic research, ESPRIT is a programme of precompetitive

applied research. It is sometimes concluded from this that ESPRIT projects stop just short of the stage at which an undertaking is able to launch a new product on the market. In reality, the undertaking must pass through four stages before it obtains any commercial revenue: basic research; applied research (usually leading up to a prototype); development (defining the marketable product as a complete concept); and, finally, the industrial stage (during which the productive investment is realized). The ESPRIT projects are upstream of the third and fourth stages, which usually occupy several years; they are, therefore, often fairly remote from the commercial stage.

Numerous cases of successful commercial exploitation

2.35. As of mid-1991, the Commission had registered 270 cases where exploitation had resulted in the marketing of products or services and 167 cases where undertakings had introduced tools and manufacturing improvements as a result of ESPRIT projects. The Commission likes to point to the striking successes achieved with the launch of the interactive compact disc as a result of the DOMESDAY and COMIS projects; the 'Transputer' microprocessor, of which 450 000 have already been sold and which was the end-product of SUPERNODE I and II, PUMA and GENESIS II; and PCTE, the reference model as regards the engineering for computer-assisted software which successfully penetrated the American market.

2.36. During its examination of the project files, the Court noted similar cases of successful commercial exploitation, notably: TIP BASE, which has already led to industrial investment in Caen (F) and Catania (I), resulting in product improvement for all the partners and the introduction of integrated processes in factories owned by several of them; BICMOS II yielded a large number of patents and led to the use of various techniques in the manufacturing processes of two large electronics companies; thanks to MONOFAST an Irish SMU will be setting up a new production facility in Cork.

Some projects not market-orientated

2.37. A large number of projects were, however, designed and executed without sufficient regard for their prospects of commercial exploitation. Even though it was modified following the first appraisal, this was one of the defects of the ATMOSPHERE proposal. Despite very real efforts to apply a mid-course correction, the consortium was behind schedule in 1991, especially with the technology transfer aspect. One of the large partners even withdrew, on grounds of dissatisfaction with the theoretical, rather than practical, direction the project was taking. The TIP

⁽¹⁾ The 'European Nervous System' project is included in the specific programme of research and technological development in the field of telematic systems in areas of general interest adopted by Council Decision No 91/353/EEC of 7 June 1991. OJ L 192, 16.7.1991, p. 18.

⁽²⁾ Council Directive of 14 May 1991 on the legal protection of computer programs. OJ L 122, 17.5.1991, p. 42.

TROPICS, GENESIS I and LIT projects were all stopped for similar reasons: there was no adequate plan for exploiting the results commercially at the end of the project. These were major projects, however TROPICS and LIT had received, respectively, financing of 12,0 Mio ECU and 1,7 Mio ECU. GENESIS I, for which the Steering Committee had given a favourable opinion in respect of a maximum budget of 9,1 Mio ECU, was halted after the completion of an initial contract limited to financing of 2 Mio ECU and a duration of six months. In the case of HECTOR, it was clear from the one-year exploratory phase that the project was heading towards viable results, but the Commission rejected the proposal for an extension shortly before the final review in May 1990, without consulting the assessors.

Gradual withdrawal of certain partners

2.38. In the case of a significant number of projects, after an initial stage that is both dynamic and promising there supervenes a stage during which the intensity of cooperation starts increasingly to fall off as the exploitation stage gets nearer. Cooperation between the BWN partners was good in the beginning, but deteriorated mid-way through the project. The project targets had to be cut back, mainly as regards the elements which were capable of producing practical results. The satisfactory cooperation of the first stage was followed by apathy and loss of motivation, which compromised the final, most practical part of work on EPSILON. PROMPT showed promise of commercial exploitation, but in October 1991, only two months before the end of the project, no prototypes had been produced. Two-thirds of the way through BICMOS II, two partners, from the 'Big Twelve', had still not informed the Commission what their commercial intentions were. One aspect of TAO, the computer element, was theoretical, the other, the medical one, more practical. When the project ended, the medical element was a long way behind the computer aspect and none of the medical partners attended the final review in June 1991.

2.39. The question of competition between partners comes to the fore as projects approach the stage where the results are to be exploited. Many partners go on to exploit their own results individually on a limited scale (e.g. ITHACA).

Exploitation of results in large companies

2.40. In large companies research is usually entrusted to a department which is separate from the production and marketing sections. It is difficult for the staff of the research section, who are involved in the projects, to 'sell' their results to the production areas, and it is virtually impossible

for the Commission to know how far the latter have adopted and exploited the results.

2.41. The EWS project provides a typical example. Among the viable results produced by the project was an electronic simulation accelerator. The main contractor, one of the 'Big Twelve', filed a patent on it in 1990. In a fax dated 8 January 1991, the scientific officer at the Commission put forward various suggestions for exploiting it commercially and asked the main contractor to inform it of any action taken. On 22 May 1991 the latter replied that no decision had yet been taken. And, in fact, none ever has.

2.42. In order to overcome this problem the Commission has, with the introduction of ESPRIT III, started to require in the contracts a formal undertaking from the production and marketing departments of the large companies involved in the project. The company is required to designate a sponsor from these departments and the Commission requires them to sign an undertaking to exploit the results, with, where appropriate, a confidential paragraph describing the expected method of commercial exploitation.

Courses of action open to the Commission

2.43. The Commission has very limited means of obliging contractors to exploit results. The specimen contract does, of course, place every contractor under an obligation to exploit the results. Before signing the contract, the Commission requires the plan for exploiting the results to be set out clearly in the technical annex. This preoccupation with concrete applications remains at the forefront during the technical reviews. In accordance with Annex II, Article 17.1 of the specimen contract, the Commission asks each contractor, towards the end of the project, to state its intentions on this point, and agrees with them a 'reasonable period of time' within which they are to carry out those intentions.

2.44. Such measures barely survive the end of the project, however. According to Annex II, Article 17.6 of the specimen contract, the Commission has the right to verify, from documents and on the spot, whether the obligation to exploit the foreground information and patents has been complied with. It does not avail itself of this right. Under Article 19.2 of the same Annex, if a contractor is unwilling or unable to file a patent for a project invention, the Commission may, by agreement with the contractor, file a patent itself, if it deems fit. It has never done so.

2.45. Moreover, although the statistics on projects are fairly good (EPIC database), those on the exploitation of

the results do not appear to be adequate. A systematic survey of contractors and former contractors is being carried out, however, by means of questionnaires. This will provide data for the CORDIS database. The Commission must continue to consider ways of improving the proportion of results which are actually exploited to their full potential.

The IT industry between research and the other common policies

Four principles recognized by the Community

Research is precompetitive

2.46. Community research is said to be 'precompetitive'. This peculiarity was not imposed by the Treaty, nor do the framework programmes impose it exclusively either. It is, therefore, a commonly accepted practice, rather than an absolute rule.

2.47. Furthermore the legislation does not contain a definition of 'precompetitiveness'. There are two aspects to this. The competitive stage is reached either because the invention concerned is marketable, or because an identifiable beneficiary will openly derive industrial and commercial profit from it.

Respect for the rules of competition

2.48. The rules governing competition derive from the EEC Treaty. Within the Common Market, the Treaty prohibits concerted practices which distort competition (Article 85), abuse of a dominant position (Article 86) and State aid which is likely to favour certain undertakings (Article 92). It provides for the elimination of customs duties between Member States (Article 13) and the abolition of quantitative restrictions (Articles 30 to 37). In the case of trade with non-member countries, the Treaty provides for the establishment of an external common customs tariff (Article 19) and anti-dumping measures may be adopted in certain cases (Article 91). According to Article 18, however, 'The Member States declare their readiness to contribute to... the lowering of barriers to trade' by entering into agreements 'on a basis of mutual advantage' to the contracting parties.

The definition of a 'European undertaking'

2.49. According to Article 58 of the EEC Treaty, companies and firms, like natural persons, have nation-

ality, which is determined by the location of their registered office, central administration or principal place of business. Article 7 of the Treaty lays down the principle of non-discrimination on grounds of nationality. Any undertaking which is national to a Member State is, therefore, a European (Community) undertaking. Thus, there may be no discrimination against any undertaking provided that it satisfies one of the above criteria concerning location on the territory of a Member State.

Subsidiarity

2.50. This principle is not new: all the framework programmes adopted it more or less explicitly ⁽¹⁾. According to this principle, the Community must not take action in areas where the Member States are able to act as well as or better than the Community.

Community practice

2.51. In the activities which are linked to ESPRIT, the IT sector in general and innovation, the Community side-steps these principles on more than one count. Sometimes there is pressing economic justification, or the legislation provides for a derogation.

In the context of the ESPRIT programme

2.52. The natural logic of research is to achieve economic efficiency by pursuing the research through to the stage where the results can be exploited industrially. The precompetitive principle derives, therefore, not from an inherent imperative of research, but from the rules of competition: funding projects beyond the precompetitive stage is tantamount to granting aid which 'threatens to distort competition by favouring certain undertakings or the production of certain goods' (Article 92(1), EEC Treaty).

a) Transparency of choice of beneficiaries

2.53. The ESPRIT programme has conferred a substantial advantage on companies identified in the case of the

⁽¹⁾ Annex II to the first framework programme; Annex III to the second framework programme; ninth recital and Annex III to the third framework programme.

TIP projects (see paragraph 12.9). In this case, the contracts incorporated to a considerable extent expressions of interested communicated before the call for proposals. The same is true of the ESPRIT III PTP projects.

b) Research through to market level

2.54. Some of the measures financed by the ESPRIT programme extend beyond the applied research stage almost to the precompetitive stage. The accompanying measures provided for by ESPRIT II and III include promoting the exploitation of results and technology transfer, measures which form part of the competitive stage. The 'Special measures' which benefit Spain, Portugal, Greece and, at a more general level, SMUs, extend beyond the precompetitive phase and propose pilot projects which involve transfers of technology by means of design, production and inclusion in products and processes of ASIC ('application specific integrated circuits' intended to be produced in small quantities). These measures include training, as well as the supply of services and equipment. The JESSI (Joint European Submicron Silicon) projects come under the dual headings of EUREKA and ESPRIT and are concerned with the miniaturization of semi-conductors. They employ an integrated approach, from basic research to product, from manufacturer to user, and are thus concerned with competitive aspects of industrial development.

2.55. The rules on the Community framework for government aid to research and development ⁽¹⁾ limit the amount of funding for basic research to 50 % and the level of aid then diminishes as the subsidized activity comes nearer the market. The Commission adopted an upper limit of 25 % for applied research and development. No aid is available for industrialization. Although it is universally agreed that ESPRIT is primarily a programme of applied research, ESPRIT projects are funded at the 50 % rate. In Spain, the GAME special measure receives 30 % from the Ministry of Industry, in addition to the 50 % from the EEC, and if all the sources of Community and national finance are added together, some operations even receive 100 % funding. As stated above (previous paragraph), the special measures are, however, located downstream of applied research. The Commission does not consider itself bound by the above rules on the framework, which it maintains concern only the Member States, not the Community.

2.56. The current shibboleth is that users must be involved in projects to a much greater degree. This is a welcome development, orienting projects to real needs. It is clear, however, that collaboration within a consortium between a manufacturer and a user will often lead to concrete results, which will then be taken over directly by the user, thus achieving a genuine transfer of technology for the benefit of individual undertakings.

2.57. The truth is that the boundary between the precompetitive and competitive phases is very indistinct and in view of this uncertainty ESPRIT is tending to move towards more competitive practices. The reference to the precompetitive nature of ESPRIT, which was still to be found in the ESPRIT II ⁽²⁾ Decision (fifth recital), has now vanished completely from the ESPRIT III ⁽³⁾ Decision.

a) Criteria concerning acceptance of companies controlled by non-European capital for ESPRIT projects

2.58. For an undertaking which is controlled by non-European capital to be admitted to an ESPRIT project, the Commission imposes, in addition to the criterion regarding the location of the registered office or principal place of business, a condition that the research, and/or manufacturing and marketing functions, must be in Europe. The results must be exploited in Europe and the dissemination of results must be targeted on Europe. The participation in question must be useful for the project partners. The location criteria are always expressed in these terms, but include other factors apart from the single criterion of location of the registered office, which Article 58 of the EEC Treaty considers sufficient for an undertaking to be deemed to be 'European'. This policy of more subtle criteria was drafted and ratified by the ESPRIT management committee, and thus by the Member States, in 1988 and 1989 and was included by the Council in the ESPRIT III ⁽⁴⁾ decision which called for the consolidation of a specifically European industrial potential (paragraph 2.30)

Precompetitive research and industrial policy

2.59. In the absence of any operating appropriations for industrial policy, the Commission made use of a small proportion of the appropriations allocated to the precompetitive ESPRIT research programme in order to implement certain aspects of industrial policy.

Pilot projects

2.60. In addition to the research projects, the Community finances various pilot and demonstration projects. These

⁽¹⁾ OJ C 83, 11.4.1986, p. 2.

⁽²⁾ Council Decision of 11 April 1988 concerning the European strategic programme for research and development in information technologies (ESPRIT). OJ L 118, 6.5.1988, p. 32.

⁽³⁾ Council Decision of 8 July 1991 adopting a specific research and technological development programme in the field of information technologies (1990 to 1994). OJ L 218, 6.8.1991, p. 22.

projects extend beyond the precompetitive phase. Nevertheless, some of them receive Community and national funding at a level substantially higher than the limits defined under the framework for government aid for research. These limits are, however, themselves a derogation — one, moreover, that is perfectly legal but confined to research — from the basic principle forbidding the granting of State aid that is laid down in Article 29 of the Treaty. The Court has already pointed this out in connection with demonstration projects in the energy sector ⁽¹⁾. Some of the projects managed by Directorate XIII-E (Information industry and market) concern information technology. The rates of funding vary between 20 % and 45 % and in some cases even exceed 50 %, which is, moreover, in agreement with what the Council has authorized in its decisions concerning this type of project.

2.61. Under the ERDF's STRIDE, STAR and TELEMATIQUE programmes, the Community finances the development of research capabilities, demonstration projects and infrastructure creation, some of which concern information technology and telecommunications. Within the framework of these programmes, however, the levels of funding vary substantially, often exceeding 25 % and on occasion even 50 %.

Attempt at a critical appraisal

Competitive action and rules of competition

2.62. The Community is facing a dilemma: the research work is required to render European industries competitive and yet it is confined to the precompetitive stage. As the Court pointed out in Special report No 2/91 of 7 March 1991 ⁽²⁾, it is vital for the Community to take the exploitation of research results more seriously. Exploiting results means, however, passing on to the competition stage.

2.63. It is not enough to carry out research and exploit the results of it. Through structural fund intervention, since the Communication of 16 November 1990 from the Commission to the Council and the European Parliament on industrial policy in an open and competitive environ-

ment ⁽³⁾ and since the Community initiative to promote economic recovery, which was adopted at the Edinburgh summit in December 1992, there has been a call for diversification of the industrial development measures. Steps must be taken, alongside the measures that are being taken at undertaking level, to create an environment in which the electronics sector can compete internationally.

2.64. Under the present system of precompetitive European research, it is usually only possible to begin to exploit results by breaking with the research stage. The EWS project illustrates this approach. It was a good project and was given priority by the Commission, but it ended disappointingly on 31 March 1991 because the main partner pulled out when it was on the point of exploiting the remarkable results it had achieved. As the ESPRIT consortium had split up, the research results would have been lost, had not another consortium been formed, slightly later, with a different composition, this time with industrial aims instead of the previous research objectives. ESPRIT thus funded the research stage only, but another Community financial instrument — the VALUE programme — took over from it.

2.65. The break-up was not inevitable. In this respect the new ESPRIT III targeted projects are based on a very new form of thinking. Even though these projects are precompetitive in that they are funded by ESPRIT, they have a market 'target'. But a project will not be a real 'targeted project' unless the partners give a firm undertaking, in advance of any ESPRIT funding, that they will follow the initiative through to the production and marketing stage. Such continuity between the research and commercial exploitation stages is advisable in the case of certain large-scale projects which involve cooperation between European undertakings, but also where results need to be achieved quickly because of the pressure of competition.

2.66. The Commission is also aware that the rules of competition must be reconciled with other industrial requirements and has provided for a number of categories which are exempted from the prohibition on concerted practices set out in Article 85 of the EEC Treaty. These are: agreements on research and development and exploitation of results ⁽⁴⁾, patent licensing agreements ⁽⁵⁾ and know-how licences ⁽⁶⁾. In addition to these exempt categories, the

⁽¹⁾ Annual report concerning the financial year 1990, paragraph 11.27(B). OJ C 324, 13.12.1991, p.165.

⁽²⁾ Special report No 2/91 on the utilization of the results of Community research work. OJ C 133, 23.5.1991.

⁽³⁾ Industrial policy in an open and competitive environment. Communication of the Commission to the Council and to the European Parliament. 16 November 1990. Document COM (90) 556 final.

⁽⁴⁾ Commission Regulation (EEC) No 418/85 of 19 December 1984 on the application of Article 85(3) of the Treaty to categories of research and development agreements. OJ L 53, 22.2.1985, p. 5.

⁽⁵⁾ Commission Regulation (EEC) No 2349/84 of 23 July 1984. OJ L 219, 16.8.1984, p. 15.

⁽⁶⁾ Commission Regulation (EEC) No 556/89 of 30 November 1988 on the application of Article 85(3) of the Treaty to certain categories of know-how licensing agreements. OJ L 61, 4.3.1989, p. 1.

Commission reserves the right to grant individual exemptions on a case-by-case basis.

Competitive action and subsidiarity

2.67. The precompetitive principle is not unrelated to the principle of subsidiarity. The Member States accept the idea of developing authentic research activity at Community level, but they are less willing to admit that the results must also be exploited at the same level. For them, this is something which is better done on a national scale.

2.68. As the Court stated in Special Report No 2/91 of 7 March 1991 ⁽¹⁾, in paragraphs 6.21 and 6.22 in particular, exploitation of research results must, in the main, be effected within the national framework. The Commission takes the view that it must become part of the network of national and local organizations which promote the exploitation of results, so that it can pass on to them results which are ready for exploitation or can encourage the partners to make use of them. The SPRINT and VALUE II programmes have, moreover, adopted the 'network approach', for which the Court called in its Special Report. Nevertheless there will still be projects, such as those mentioned in paragraph 2.65, which call for rapid, ongoing action and thus require Community intervention through to the competition stage.

2.69. In contrast, there are some research measures which may revert to national level, because they have been hoisted up to Community level unnecessarily. The ESPRIT III programme mentions COST projects, i.e. national measures which are coordinated by the Community but receive Community funding for the coordination costs only. An early example of this is to be found in the ESPRIT II programme — the BASIC GOODS project, where the Commission did not finance the consortium's research work and provided funds for travel, publicity and meetings expenses only (see also paragraph 2.81).

Rules of competition and subsidiarity

2.70. The Commission has not hitherto applied to itself the aid restrictions and the rules on the framework for R & D aid which it imposes on the Member States (see paragraphs 2.55, 2.60 and 2.61). By not doing so, it is contravening the principles of cohesion and subsidiarity. The mere fact that the aid is provided by the Community does not mean that it distorts competition any the less. If,

⁽¹⁾ Special report No 2/91 on the utilization of the results of Community research work. OJ C 133, 23.5.1991.

for the reasons discussed in paragraphs 2.67 and 2.68, the Community wishes to leave a greater share of the responsibility for exploiting research results with the Member States, they must have corresponding freedom of action, which at present is being denied them.

Rules of competition, definition of a 'European undertaking' and the competitiveness of a specifically European IT industry

a) The need for balanced interdependence

2.71. The ESPRIT III programme ⁽²⁾ considers that 'the constitution or consolidation of a specifically European industrial potential' in the IT sector 'is an urgent necessity' (7th recital). As the Commission pointed out in its Communication of 16 November 1990 on industrial policy in an open and competitive environment ⁽³⁾, 'technological innovation has become a prime source of competitive advantage'. '(...) key technologies such as advanced materials and electronics, information systems, integrated manufacturing systems, life-science applications... are important for a great number of industries'. The all-pervasive nature of these key technologies is thus pointed out. For these reasons control of these key technologies 'has become of crucial significance.' 'Semi-conductors represent a prime example' of these vital components, which form part of a large number of products in a vast range of different industries.

2.72. That is what the Commission was saying when, in its Communication of 3 April 1991 on the European electronics and IT industry ⁽⁴⁾, it expressed its preoccupation with the 'search for a balance between international cooperation and technological independence' (p. 23). Seen from this angle, the development of cooperation between Europe's main competitors does not pose any problem, provided that care is taken to ensure that it produces a balance of mutual benefits.

⁽²⁾ Council Decision of 8 July 1991 adopting a specific research and technological development programme in the field of information technologies (1990 to 1994). OJ L 218, 6.8.1991, p. 22.

⁽³⁾ Industrial policy in an open and competitive environment. Communication of the Commission to the Council and to the European Parliament. 16 November 1990. Document COM (90) 556 final.

⁽⁴⁾ The European electronics and information technology industry: state of play, issues at stake and proposals for action. Commission Communication of 3 April 1991. Document SEC (91) 565 final.

- b) The difficulties of establishing balanced international competition

2.73. Both as regards international trade and foreign investment, Europe is in a profoundly unbalanced situation. Some Asian markets are closed to European exporters and investors for reasons which have much more to do with the internal structure of the countries concerned than with their foreign trade policies. In its Communication of 21 May 1992 the Commission examined the balance of relations between the Community and Japan ⁽¹⁾ and included a list of such structural reasons, which extended to several pages.

Need for adjustment by the Community

2.74. Whatever its intrinsic merits, ESPRIT alone cannot provide an adequate response to these strategic data, because economic and technological events move faster than it does. Without an adequate response it will be difficult for Europe to recover its position in the IT sector.

ADDITIONALITY

The net contribution of the ESPRIT programme

2.75. To a significant extent, it has been possible, because of ESPRIT, to carry through research initiatives which, without it, would have been impossible. In overall terms it has certainly increased the volume of European research in the IT sector. In Spain the national policy is to retain national programmes and to treat ESPRIT contributions as a net supplement. In Ireland, ESPRIT has helped to reduce the 'brain drain' and to increase the number of researchers in the IT sector. Some subject areas which call for wide-ranging cooperation could not have been dealt with in the national framework. The standardization measures are, by nature, one of the assets of the ESPRIT programme, because the international dimension is essential. Generally speaking, ESPRIT has not duplicated national programmes. In Germany, Spain and France (the Member States

visited by the Court), the national authorities are careful to work with the Community authorities, to ensure that the areas of national and Community research are complementary without overlapping.

Substitution effects

2.76. Nevertheless, it is impossible to deny that to some extent there is a substitution effect in cases where particular projects would have been carried out anyway, even without Community funding, especially for some of the projects carried out by large undertakings or large research centres. In some countries the elasticity of the actual research capacity is somewhat limited, at least in the short term. Above a certain level of Community funding, there is no-one left to take up the corresponding amount of national funding which is released.

2.77. The United Kingdom has abolished the national IT research programme (ALVEY). In the field of integrated manufacturing (CIM), the German research ministry no longer provides any funds. Its microelectronics and information technology sub-programme was cut back substantially in 1987-1988. Thus, as the ESPRIT programme expands there is a corresponding contraction in some of the national programmes.

The costs of additional effects

2.78. The additionality of ESPRIT stems mainly from the transnational nature of its projects. Applying the principle of transnationality is, however, expensive in both time and money because of the travel and meetings involved. The additional cost to the partners is of the order of 20 % to 30 %. Nevertheless, the partners only have to bear the additional costs of transnational cooperation once and in return they have enduring prospects of European cooperation. For that reason it appears unlikely that the increased costs will jeopardize the net additionality of the programme.

2.79. The Commission nevertheless tends to underestimate the additional cost and grants only one, insufficient allocation for travel and subsistence expenses in the consortia's budgets. Most of the Irish partners encountered during the Court's visit commented on this aspect. ATMOSPHERE provides an interesting example of an attempt to remedy the excessive burden of overheads, which is spread unequally among the partners. The project consortium earmarked 1 Mio ECU (out of a total budget of 18 Mio ECU) for general expenses such as publications, public demonstrations, coordination with other projects and use of consultants. The earmarked budget was

⁽¹⁾ A consistent and global approach. A review of the Community's relations with Japan. Communication of the Commission to the Council of 21 May 1992. Document COM (92) 219 final.

managed centrally and was finally divided equally between the partners. A similar solution could perhaps be applied for the additional costs of transnational cooperation.

ESPRIT's qualitative contribution

2.80. The benefits of the ESPRIT programme should not be measured solely in terms of initiatives and amounts of additional funding. The foregoing comments on the subject of international cooperation (paragraphs 2.2 — 2.8) show that, by virtue of their inclusion in the ESPRIT programme, these same initiatives acquire certain characteristics which frequently increase their value in qualitative terms. In some cases, European transnational cooperation has displaced an older form of cooperation with Europe's competitors (especially the United States). The cohesive effect must be emphasised: the countries which are most ready to recognize the benefits of ESPRIT are the countries which benefit from the Community effort towards economic and social cohesion, especially Ireland and Spain.

Alternative ways of pursuing the various objectives

2.81. In view of the constraints associated with each objective of the ESPRIT programme, it is perhaps going too far to expect every project to make a contribution towards every objective. It would be reasonable for some of the objectives to be disregarded on occasion. It would be possible for some projects not to include all the organisational categories. Others could have a limited transnational dimension. Some might be of significant technological interest, but for only some of the countries of the Community: in some cases it could be of interest to the countries which are economically more advanced, in others the contrary and, more particularly, the countries which the Community supports through its efforts to achieve economic and social cohesion. Each and every one of these examples would, of course, be acceptable only if the characteristics of the project in question were such that it made a substantial contribution, by way of compensation, to the pursuit of the other official programme objectives. Even if the project appears to contribute to the pursuit of all the objectives, its results ought, in many cases, to be exploited within a local framework, or even at the level of individual partners. In all these cases, the additionality of the project could remain strong, even though it might take a more specific form.

GENERAL CONCLUSION

3.1. The European IT industry is in difficulties (paragraphs 2.27 — 2.28). It was apparent as early as the

Commission's Communication of 3 April 1991 on the European electronics and information technology industry ⁽¹⁾ that this was a matter of serious concern, but the situation has deteriorated still further since then. The crisis has certainly become a worldwide one, but it is more serious in Europe than elsewhere.

3.2. The Community has the possibility of using the ESPRIT programme as a strategic instrument to overcome these developments. The first step, therefore, is to make as many improvements as possible to the programme systems and management. There are, in fact, certain weaknesses which still persist.

3.3. In view of the speed of international technological and economic change in this sector of industry (paragraph 1.34), the most pressing need is for the introduction of reforms to speed up the research process, which is currently much too slow (paragraphs 1.35 — 1.96).

3.4. At a more general level, the Commission must clarify the reasons for the existence of certain practices which are sometimes historical rather than rational in origin (see, for example, paragraph 1.70). There are, perhaps, grounds for questioning some current received opinions concerning the most effective vectors for research and for reconsidering the respective roles of large and small undertakings (paragraphs 1.31 and 2.13), undertakings and universities (paragraphs 2.10 and 2.11), manufacturers and users (paragraph 1.31) and high-cost and low-cost projects (paragraphs 1.62 — 1.66).

3.5. A project's success depends to a large extent on the internal management and motivation of the consortium and, therefore, on the qualities of the coordinator (paragraphs 2.2 and 2.3). Most careful attention must be given to all the factors which contribute to this quality of motivation. It is important that the composition of the consortium and the choice of coordinator (paragraph 2.3) and, therefore, of the principal contractor, be examined carefully right from the stage where proposals are being evaluated (paragraph 1.14) and when contracts are being negotiated. As regards the functioning of the consortia, technical monitoring must be and, in fact, is the factor which contributes most to its satisfactory operation (paragraphs 1.21 — 1.23).

3.6. Whilst the Commission is mainly concerned with the effectiveness of research, it must not forget to give consideration to the concerns of contractors. Here, again, it is imperative that procedures be speeded up and simplified, but this time it is payments which are concerned (paragraphs 1.48 — 1.60 and 1.82 — 1.96). The Commission must not misuse procedures to simplify its own work by shifting the difficulties onto contractors

⁽¹⁾ The European electronics and information technology industry: state of play, issues at stake and proposals for action. Commission Communication of 3 April 1991. Document SEC (91) 565 final.

(paragraphs 1.89 — 1.92). It must attend to the special needs of those contractors which are weakest in economic or legal terms — the SMUs (paragraphs 1.6 and 2.17), associate contractors and subcontractors (paragraphs 1.91 and 2.5 — 2.6). The Commission is required to be prudent in its use of Community funds, but it must, nevertheless, be realistic in its estimates of projects' start-up costs (paragraph 1.9) and the costs of transnational cooperation (paragraph 2.79), and, maybe, even reconsider the extent of contractual obligations regarding the communication of information (paragraph 2.7).

3.7. Simply improving the internal management of the ESPRIT programme will not, however, resolve the problems of the European IT industry. Moreover, although there were weaknesses in ESPRIT's management, they were not extensive enough to jeopardise the value of the programme and the additionality effects are undeniable (paragraphs 2.75 — 2.81). But that is not enough. The sector's fate depends on choices which extend far beyond the field of research (paragraph 2.63).

3.8. Firstly, the results of the programme must be exploited fully and effectively. They constitute a vast reserve of potential progress (paragraphs 2.29 — 2.45). At the research stage and in the subsequent exploitation of the results, the matter of main concern, to which everything else must be subordinated, is the market target, the product. The previous stages will then be defined by implication. The Commission has already moreover begun to move in this direction, with the 'targeted projects' (paragraph 2.65). This approach must be extended.

3.9. Very often urgency will require continuity between the research stage proper and the stage where the results are being exploited (paragraph 2.64). Hitherto that continuity has been hampered (paragraph 2.61) by the observance of principles that are not properly understood by the Community: the latter has no objection to providing high rates of funding for initiatives which find their way on to the market in cases where the initiatives are clearly separate from research (technology transfer, pilot projects, structural measures) (paragraphs 2.60 and 2.61), but it is loath to do so if it is a question of extending a research initiative (paragraph 2.62) or if the initiatives are being undertaken by Member States (paragraph 2.70). There is no reason for the existence of such fine distinctions. The precompetitive concept must be rethought, so that it ceases to paralyse the research effort just at the point where it could be crowned with success (paragraphs 2.37 — 2.42).

3.10. Finally, the Community must concentrate all its attention on the new facts of technological, economic and financial developments in the world IT industry and to the strategies of the European industry's competitors. It must find a suitable way of adjusting to these new circumstances (paragraph 2.74). The relationships between structural policy, industrial measures, competition policy, and the Community's R & D policy must be reconsidered. In the absence of these adjustments the ESPRIT programme could become a bottomless pit, with the attendant risk that the considerable sums expended on it may cease to be effective, not because of any intrinsic weakness of the programme, but as the result of extrinsic causes both within the Community and outside. This is the area in which the stakes will be highest in the short term.

This report was adopted by the Court of Auditors in Luxembourg at the Court meeting of 25 November 1993.

For the Court of Auditors

André J. Middelhoeck
President

COMMISSION REPLY

The Court's report comprises a wide-ranging and realistic analysis of the challenges currently facing the European information technology (IT) industry and the methods adopted for tackling these subjects at European level, principally through the Community R&D programmes in the field of IT. The report clearly recognizes the role of ESPRIT as a strategic instrument for boosting the international competitiveness of the European IT industry and Community cohesion in the field of IT which covers a wide spectrum and is of vital importance for all economic, scientific and social activities. In this regard, the Commission welcomes the report's recognition of the programme's virtues of transnational cooperation, its net additionality, its openness to industry and its successes in standardization and application. It is also pleased to see that the Court's report takes note of the merits of the project assessment and guidance system, the careful monitoring of the use of appropriations and the efforts to disseminate information.

The Commission would like, however, to make the following comments for the purposes of clarification and explanation.

CHAPTER 1

The administration's management of the programme

MANAGEMENT STAGES

Preparation of programmes and calls for proposals

Information concerning programmes and calls for proposals

1.4–1.6. The Commission notes the Court's positive assessment of its efforts in the field of information, even though some organizations may claim not to have been properly informed.

Within the Commission, the Directorate-General with responsibility for the ESPRIT Programme was the only source of information about the programme and coordinated all the information campaigns carried out by the individual units. Moreover, since 1991-92 the DG XIII magazine has been the only regular publication on the programmes and activities of DG XIII.

Finally, the Commission realizes how complex and numerous small businesses are and how important they are for the information technology industry; no effort will be spared to circulate information to these companies via a wide range of channels — including professional organizations and their federations — and to adapt Commission procedures to their capacities. However, small firms' problems with regard to information must be seen basically in terms of their potential for digesting the information available.

In any event, an interdepartmental working party is working on improvements to research management procedures with a view to introducing practical provisions at the level of the Framework programme for research and development itself. Better dissemination of information is one of the subjects dealt with.

Selection of projects and negotiation of contracts

Management of the overall funding

1.12. It is difficult to establish a link between an acceptance rate and a particular type of company since proposals are submitted by consortia made up of a variety of companies irrespective of size. For ESPRIT III, for example, the acceptance rate for proposals including at least one small firm (17 %) is higher than for proposals without any (15 %) (see also 2.16).

Assessment of proposals

1.14. Although technical assessment lies at the heart of the open competition procedure governing operation of the

programme and calls for proposals, it does not do away with other aspects.

Thus the financial soundness of a project, and hence the protection of the Community's investment, depend partly on the joint and several responsibility imposed by the contract binding the partners and the Commission: this provision encourages contractors to choose their partners carefully. Nevertheless, the Commission is studying whether and how to introduce a more detailed assessment for future years of the programme — particularly in connection with the growing emphasis being placed on the willingness of the partners to exploit their findings — even though refining this type of assessment cannot completely rule out the element of risk.

Contract signature procedure

1.16. The procedure described by the Court was adopted to avoid any misunderstanding which might lead to disputes. To speed up the signature and return of contracts, the Court suggests that these should be signed by the partners on receipt. Assuming that appropriate wording can be found for the covering letter accompanying contracts, the possibility of changing the current procedure along the lines requested by the Court will be studied.

Monitoring the work

Role of the management departments

1.18. The number of staff available to the Commission for managing the programme has been based on normal operating conditions. At peak periods, conflicts of priority can arise, leading to delays in some operations.

Selection of assessors

1.20. The selection of assessors is the direct responsibility of the Commission. The selection criteria — technical competence, the need to have a majority of representatives of industry, and the systematic replacement of assessors — are well known to the Management Committee and the ESPRIT Consultative Committee. Once the assessment is completed, the names of the assessors are sent to the committees which assist the Commission.

The responsibilities of beneficiaries

Participation by industrialists at every stage of the procedure

1.25. Unlike most small firms, large undertakings have a fairly wide range of interests and may be just as interested in large projects receiving Community financing of at least ECU 1 million per year as by smaller-scale ones. In order to concentrate effort, the Council's decision adopting the ESPRIT II programme required at least 70 % of the programme's budget to be devoted to large projects. It is the combination of these two factors, rather than the active participation of large undertakings in the working parties, which explains the success rate of large companies. The 70 % rule has been dropped from ESPRIT III and is unlikely to be reintroduced in the future.

Role of the 'Big 12'

1.29. It is common practice, as part of the preparation of the programme, to estimate the volume of work to which the principal subjects are likely to lead and the types of undertaking which might be involved. This exercise was carried out under ESPRIT II for the TIPs on the same terms as for the other topics. However, since the TIPs were particularly ambitious, the preliminary analysis included a more detailed examination of their credibility with the major companies which were likely to be interested in taking part. The TIPs, and the volume of work it was planned to devote to them, were a means of encouraging the concentration of effort demanded by the decision adopting the programme and the exploitability of the results (see points 1.25 and 2.53). The topics covered by the TIPs appeared as a matter of routine in a call for proposals under ESPRIT II.

1.31. As explained in point 1.25, the level of participation by large companies can be explained by the fact that these undertakings are equally interested in large projects and smaller-scale projects; moreover, under the provisions of the decisions adopting ESPRIT I and ESPRIT II, which were designed to encourage concentration of effort, 70 % of resources must be devoted to large-scale projects.

Participation by user industries

1.32. The only criterion for analysing the participation of the various categories of industry is the objectives of the programme. These objectives, which are primarily tech-

nological at the start of the programme, explain the low participation by users. With ESPRIT III, the accent was placed on generic applications, which has opened up the programme more to users; moreover, users have always been strongly represented in the aspects of the programme relating to computer integrated manufacturing (CIM). This trend, which is connected with the measures to promote 'best practice' in IT which by their nature involve users and IT professionals, will be increased in the fourth RTD framework programme.

UNWIELDY AND SLOW

The facts: slowness

Implementing the programmes

1.35. The decision-making process is as follows: presentation of the framework programme containing outlines of the specific programmes, adoption of these programmes, calls for proposals and award of contracts. It is true that some time can elapse between the first and last stages. A number of steps have been taken to counteract the adverse effects of these delays. Thus, the call for proposals asks tenderers to conform to the most up-to-date data and the work carried out is the direct result of the proposal put forward by the industrial partners a few months before the launch of the project. In the case of the 1993 call for proposals under ESPRIT III, the period between publication and the award of the first contracts was reduced to six months, which is a remarkable achievement.

The funding decision and the negotiation of contracts

1.41. The term 'retrospectively' is not entirely appropriate to describe the practice to which the Court is referring. It is more a matter of recognizing the validity of work undertaken by the partners at their own risk, before the date on which the contract was signed, and in respect of which the Commission had no legally binding commitment. Moreover, this leeway was used for extending projects by amending the contract rather than for new contracts. This practice can have certain undesirable effects and is in very limited use.

1.44. An important improvement in the operation of the decision-making mechanisms, which has speeded up the procedure, was introduced in July 1993 as a result of new rules on the delegation of powers. Briefly, the Commission as a whole takes decisions by written procedure on the establishment of the work programme, assessment of

research projects and the estimated amount of the Community contribution; the Member of the Commission responsible takes the decisions on updating the work programme, the invitation to tender, etc.; the Director-General takes decisions on implementing the projects on the lists adopted by the Commission.

Execution of projects

1.46. Problems can arise in the course of research as a result of the actual nature of the work. In the case of Bicos II, the work was of a high standard and the objectives were still relevant despite the delay in relation to the original forecast. The Commission was therefore in full possession of the facts when it agreed to an adjustment of the timetable.

Delays in making payments

1.48. Advances are paid in the two months following the signature of the contract and cover the period set aside for examining the work (six to twelve months) plus an additional three months; furthermore, the investment needed for the execution of a project is financed at the beginning of the project; intermediate payments are then made every time the project is assessed, following approval of the statement of costs submitted by the contractors for the period in question. These arrangements were agreed so that the advance payment might anticipate any problems which might occur at a later stage as a result of possible delays in intermediate or final payments. This should be borne in mind when considering the impact of delayed payments.

As a general rule, work on a project should correspond more or less to the programme set by the company to meet its own requirements; the short-term economic survival of the company should not depend directly on Community financing. Nevertheless, the Commission is aware that improvements could and should be made to speed up payment; this important topic is being considered by the interdepartmental working party on the improvement of research management.

1.49. Payments are conditional on a detailed statement of costs; this document often arrives late, incomplete and only at the request of the Commission despite the fact that it should be supplied at the initiative of the contractors. The delays are in fact a reflection of the Commission's desire to

find satisfactory solutions for all concerned rather than to apply to the letter the rules permitting rapid closure of the file.

1.50. The Commission admits that the delays in payment for the TAO, Atmosphere, Epsilon, Hector and Dasiq projects were very long. These projects were affected by problems or disputes for a variety of reasons; the delays were a result not of bad management on the part of the Commission but of a desire to solve the problems by negotiation, leading ultimately to an apparent delay in making payment.

Statistical measurement of delays

1.52. In the course of 1992 the Commission introduced new measures for improving procedures for intermediate payments and reducing delays; data-processing tools have been developed to simplify operations and will be further improved to speed them up; the units have a monitoring system enabling them to send early reminders and thus reduce the length of time the contractors themselves take to submit their request; finally, the overall operation is supervised centrally. A recent survey covering 1992-93 showed an improvement: the delays attributable to the contractors and to the Commission respectively had been reduced from the 103 and 136 days shown in the Court's survey (Table 4 of the Court report) to 55 and 99 days. For the record, the contract requires contractors to submit their application within 30 days and the Commission to process it within 60 days; it is the overrun on these deadlines which should be regarded as delays (see also 1.55).

In the case of final payments, there has recently been a 10 % reduction in delays; an analysis is under way with a view to a thorough reform. The Commission acknowledges that considerable improvements still have to be made in the case of intermediate and final payments; it is planning to study solutions and implement them as soon as possible.

Advances

1.53. Some work carried out before the contract is signed is taken into account as a concession to contractors (see 1.41) and should not be included in the calculation of delays in making advance payments.

Internal delays at the Commission

1.55. The progress reports and cost statements submitted to the Commission are often incomplete or unsatisfactory. A lengthy correspondence between the Commission and the contractors may be required to bring them up to standard; during this period the Commission cannot be considered to be in possession of the necessary information. To avoid disputes and any increase in the complexity of procedures no time limit for the approval of cost statements has therefore been imposed on the Commission (see also 1.52).

1.56. Entry in the accounts by DG XIX is essential for sound management. It is necessary first of all for the checking of the accounts, which at present takes an average of two days. Next, the joint signature of two duly authorized officials must be obtained (Article 53 of the Financial Regulation), which, with the bank transfer, currently takes an average of five days. The introduction of SWIFT (July 1992/May 1993) has considerably shortened the banking procedure.

Final payments

1.57. The Commission acknowledges that improvements could and should be made in the processing of final payments (see 1.49, 1.52, 1.59).

In the case of the BWN and DASIQ projects, work did not follow the plan agreed between the Commission and the partners, and the planned objectives were not achieved. The Commission quite legitimately refused financing for certain work.

In the case of ITHACA, it should be remembered first of all that it is for the Commission department responsible, as one of the signatories of the contract, to approve any statements submitted by the partners. It was this department which was actually involved with the statement presented by the ITHACA I partners. The statement was amended to take account of activities carried out under ITHACA I in the light of the activities laid down for ITHACA II. It was necessary in the case of ITHACA to treat two stages of the same project as two successive projects, firstly because the decision adopting ESPRIT II required the TIPs to be decided stage by stage and, secondly, to allow a change to be made to the composition of the consortium (the project was continued without CAP SESA).

The Commission agrees that the payment procedures should be simplified and speeded up.

Interdependence of project partners

1.59. Following the Court's recommendations in cases where amounts for one partner are in dispute, the Commission is planning in future to pay the amounts owing to the partners which are not involved in the dispute, provided that the dispute is not due to a lack of cooperation for which the entire consortium could be held responsible.

1.60. The initial contract awarded to Epsilon was for ECU 2 million. The Commission can see that the seven-month delay between the end of the initial contract and payment of the first instalment in respect of the supplementary contract could and should have been reduced. However, the length of time spent in negotiations (caused on this occasion by the supplementary contract) should not be attributed solely to the Commission. The fact that the contractual amount was exceeded when the application for payment was made need not cause a hold-up.

*The causes: unwieldiness and complexity**Technical management**(a) The number of partners*

1.63. In successive calls for proposals, and with increasing insistency, the Commission has appealed to potential tenderers to try and limit the size of the consortium to the number of partners strictly necessary for the success of the project. Thus, between ESPRIT II and ESPRIT III, the number of partners signing the contract fell from an average of about seven to about five. It should be borne in mind that the ESPRIT Management Committee is a type III regulatory committee whose favourable opinion on the assessment of projects is required for a considerable number of projects, in particular large projects (with Community financing of at least ECU 1 million a year) and for all those involving an EFTA agency. The industry is well aware of these provisions and the consortia attempt to increase their chances of success by adopting a form which includes participants from a large number of different Member States, despite the Commission's exhortations to limit the number of partners.

In addition, to assess the actual size of a consortium in operational terms, it is necessary to look at the concentration of tasks between the industrial partners signing the contract.

Thus, in the case of KIWIS four industrial contractors receive about 60 % of the budget; in Genesis I, six industrial contractors are receiving over 75 % of the budget. The CNMA project is comparable to a standardization project, for which a large number of partners is in fact preferable. The EOC (basic research) project is a working group on optical computing and must, if it is to be successful, include all the major European operators in this field.

(b) The size of the budget

1.66. TIPs have been dealt with above (see 1.29). Of the 22 'priority technology projects' (PTP), for which proposals were received in July 1992, the projects selected were ASSET (software) for a 12-month exploratory stage, AIT (computer integrated manufacturing) for 18 months, and the ECAM (flat screen) project, which was actually drawn up within the programme before the PTPs. The ESPRIT Management Committee delivered a favourable opinion on these projects in accordance with Article 7 of the Decision adopting the ESPRIT III programme; the subjects covered, while they correspond to the general areas of interest identified by the large industrial groupings involved, form part of the ESPRIT III work programme.

The concept of the 'targeted project' is indeed promising, as the Court states; it was introduced for the first time as part of the open microprocessors initiative (OMI) and will be extended in the fourth R&TD framework programme.

Too many reports

1.67. Management reports for ESPRIT I were submitted once a month. For ESPRIT II and ESPRIT III the frequency is optional, and reports are generally submitted every three months, as recommended by the Court. The report must be concise and be confined as a rule to one page. In many cases this report proved very useful in detecting potential problems in good time and preventing them from getting worse. It is also common practice in industry to draft regular reports for activities similar to those of the R&D projects.

Staff management

State of the system

1.74 – 1.79. The Commission notes the Court's comments and points out that a study is to be carried out shortly in consultation with the staff to obtain an overall view of the constraints of staff management in the research sector.

Financial management

Satisfactory follow-up of the utilization of commitments

1.81. ESPRIT I and ESPRIT II shared a budget heading; ESPRIT III has a separate heading.

Identifying eligible costs

(b) Actual costs and estimated costs

1.83. The Commission does not have the information necessary for assessing whether the estimated costs originally submitted by the contractors are justified until the contract has been signed and the statements of expenditure and costs are submitted prior to payment. The financial audits, which the Commission reserves the right to initiate and which are carried out by sampling and in a systematic manner, provide additional information which may give rise to adjustments. However, in the light of past experience, an assessment of whether the overheads quoted by the partners are reasonable is increasingly conducted before the contract is signed and this approach will be adopted more systematically in future. This is one of the topics being considered by the interdepartmental working party on the improvement of research management.

(c) Labour costs

1.86. It is hardly surprising that there are significant differences in hourly rates between partners from the same country in view of the diversity of the contractors: large companies, service industries, users, small firms with a few dozen or a few hundred employees, etc. The checks carried out are beneficial to sound management and, in particular, communications between the Commission and the contractors.

For example, the 81 audits carried out in 1991-93 on projects representing a total cost of approximately ECU 213 million, show that the readjustments to financing required came to approximately ECU 13 million in the Commission's favour and ECU 3 million at the Commission's expense; the cost of these audits was in the region of ECU 1.7 million.

The Commission acknowledges that the introduction of rules based on hourly rates for each country and each category of undertaking might simplify administrative procedures; however, any such changes would have to be examined very carefully, since they would have to combine fairness, simplicity and sound management. This is one of the topics being considered by the interdepartmental working party on simplification of research management.

(d) Overheads

1.87. The structure of costs, and especially those classified as overheads, differ considerably from country to country and from firm to firm. The Commission admits that, in examining the acceptability of the costs to be included as overheads, there may be some negotiation, but it is wrong to speak of a 'negotiated flat charge' since it is not general. The specialist firms which carry out audits on behalf of the Commission do in fact study the analytical accounts of the contractors. Admittedly, overheads constitute an important part of overall costs; despite the difficulty of verifying costs, the Commission feels it is doing its best to reduce as far as possible the scope for imprecision and lack of uniformity, particularly with respect to overheads.

Improvements and simplifications to be studied

(a) Intervals between payments

1.88. The interval between payments is determined by the nature of the project and the likely difficulty of the work rather than the duration of the project. It may be wise to opt for a six-monthly interval if this will allow better monitoring than a yearly interval.

(b) Indirect payments

1.89. Since ESPRIT II, the Commission has paid the whole consortium via the main partner, who is then responsible for dividing the payment up between the

partners; this is to avoid bottlenecks in the Commission's payment departments, which would have led to delay.

1.90. As the Court observes (1.91), it is the Commission which calculates the amount due to each partner. Generally speaking, the role of the principal contractor should therefore be confined to issuing the payment order to each partner on receipt of the payment from the Commission.

1.91 However, in view of the new means of processing payments recently made available to the Commission, the possibility of returning to a system of direct payment to each contractor as with ESPRIT I will be examined.

(c) Application of flat rates

1.93. From the point of view of payment procedures alone, the use of flat rates could indeed simplify matters. However, before that can happen, the hourly rates for Community R&D for different countries and categories of organization must be brought under control (see 1.86). Moreover, the application of flat rates could well have the drawback of considerably slowing down negotiations, and thus delaying the start of the projects, since it would be vital to arrive at a relatively accurate assessment of the volume of work and an agreement on this and on hourly rates, before the contract was signed.

(d) Other simplifications

1.94. The Court's recommendation is being actively considered by the Commission via the interdepartmental working party on the improvement of research management.

1.95. The Commission will study the second course of action suggested by the Court to assess the pros and cons of granting discharge at the end of the first contract and before the conclusion of any supplementary contract extending the project.

The rationalization of the checks carried out by the scientific unit and the financial unit is one of the measures being planned for the near future when the programme is transferred to DG III.

1.96. Overheads need to be taken into account to meet the rule that 50 % of costs must be financed. In assessing the solution suggested by the Court, it should, however, be borne in mind that the rates of financing could vary according to the nature of the project, since the level of direct costs can differ greatly from one project to another.

CHAPTER 2

The ESPRIT programme as a strategic instrument

THE OBJECTIVE OF TRANSNATIONAL COOPERATION

Pooling information: a qualified success

Pooling information within the consortium

2.5 – 2.6. The Commission recognizes the need to make the standard contract more specific on the matter of intellectual property rights and obligations for the partners involved. It is proposed to incorporate this point in the simplified standard contract being considered for the fourth framework programme.

A similar role for contract research companies

2.12. The Commission has its doubts about a policy designed to increase the role of contract research companies. These companies, for which there is in any case no precise definition, carry out supporting work limited to the supply of R&D services; care must be taken to ensure that the projects involving contract research companies also include a sufficient number of industrial companies which are directly concerned in making use of the results.

Increased SMU participation

2.16. Data for the ESPRIT I, ESPRIT II and ESPRIT III programmes show that there is considerable and growing participation by small and medium-sized undertakings which are not subsidiaries of the 'Big 12': these small firms are represented in 63 %, 75 %, and 80 % of projects under these programmes and their share of the financing is 17 %, 21 % and 27 % respectively. The Commission is aware that some small firms have or have had connections of various types and degrees with universities, research centres, large firms or even ministries, but this type of firm does not represent a majority of the small firms taking part in the programme. It is interesting to note in this connection that small firms which are subsidiaries of one of the 'Big 12'

represent 11 %, 17 % and 14 % of all small firms participating in projects under ESPRIT I, ESPRIT II and ESPRIT III, and 15 %, 17 % and 10 % respectively as regards their share of the financing. These statistics also show that there was a distinct fall in the relative importance of these small firms between ESPRIT II and ESPRIT III. The Commission is still aware that it must continue its efforts to help small firms take part, in particular when the programme is drawn up and by simplifying procedures.

THE OBJECTIVE OF ECONOMIC AND SOCIAL COHESION

Scope

2.19. The projects set up by the programme spring directly from the proposals submitted; they meet the assessment criteria of the call for proposals are intended to develop skills in those areas where an analysis of the proposals indicates there is a need; this analysis is also conducted in close cooperation with the national authorities concerned. As a rule, the projects involve transnational cooperation accompanied by a Community added-value and are chosen in the light of the contribution they make to cohesion.

COMMUNITY EFFORTS TO IMPROVE SMU PARTICIPATION AS WELL AS IMPROVING ECONOMIC AND SOCIAL COHESION

Suggested partners

2.24. In the early stages of the programme it was necessary in a small number of carefully selected cases not to 'pressurize' but to persuade a number of consortia to be more open to broader-based cooperation in the interests of cohesion. In most cases the original partners recognized that the outcome was positive. It is not unusual to find that the partnerships originally suggested became joint ventures in subsequent calls for proposals.

2.25. From the end of ESPRIT II and in ESPRIT III, the consortia involved in the programme were more balanced and it was unnecessary to resort to this practice of proposing partners, which was, admittedly, not entirely satisfactory. In the few cases in which the make-up of a consortium was changed in the interests of cohesion, this did not play an important part in increasing the size of a consortium or prolonging the contract negotiations. In some cases this opening-up led to a marginal adjustment in the distribution of work between the original partners and it was not necessary to increase the overall financing of the project; in other cases, tasks were added to the project and the financing was increased accordingly.

Desirable improvements

2.26. The ESPRIT III 'special actions' are in fact in line with the Court's recommendations for projects which are both of interest from the technological point of view and adapted to the needs of certain countries.

As it has said before, the Commission is anxious to make it easy for small firms to take part in the programme (1.6, 2.16). Different forms of assistance are worth exploring with a view first and foremost to benefiting the companies themselves and to help them to prepare high-quality proposals. A first step in this direction was tried in ESPRIT II through 30 or so projects known as 'exploratory actions', which in many cases led to subsequent proposals which were selected as projects.

ESPRIT AND THE INTERNATIONAL COMPETITIVENESS OF THE EUROPEAN ELECTRONICS AND COMPUTER INDUSTRIES

Commercial exploitation — an essential element of specifically European exploitation

Projects which were not market-oriented

2.27. It is only to be expected that at first there will be some uncertainty about the prospects for the successful commercial exploitation of some projects. However, if it looks in the course of the project as though these prospects

are not going to be realized, the Commission will try to obtain a change in direction and may withdraw support.

One of the aims of ATMOSPHERE, a software engineering project, was to align it with a EUREKA project called ESF, which had adopted a different methodology. For this reason a number of industrial companies from the ESF project formed part of the ATMOSPHERE consortium. In the course of the project, two partners, SEMA and GEC, withdrew. The reason given by one of them, 'the theoretical, rather than practical, direction the project was taking', reflects an unresolved difference in approach between two schools of thought and industrial interests: that of the core of industrial companies making up the ATMOSPHERE consortium (Bull, Siemens-Nixdorf, Philips) and that of the companies from the ESF project. GEC's withdrawal was for internal reasons, namely that company's wish to concentrate on embedded software systems.

The case of TROPICS should be analysed in conjunction with that of EDS, which the Court does not mention. These two projects, which ran concurrently but were based on very different approaches, were launched simultaneously at the beginning of 1989 for an exploratory period. The approach adopted by TROPICS was abandoned in favour of the EDS approach, and this project ran full term with a total financing of approximately ECU 28.5 million in four years. The termination of TROPICS was also justified by fundamental changes of direction on the part of the principal industrial partners: during 1990, Philips carried out a major restructuring and withdrew from informatics; Nixdorf was bought by Siemens. The know-how developed by Nixdorf within TROPICS was subsequently put to use in EDS by Siemens and Siemens-Nixdorf Informatics. EDS produced some important results leading to commercial exploitation launched on 20 October 1993 (database servers with parallel architecture).

GENESIS I received financing of ECU 2 million for an eight-month period which did not require extension; however, the topics studied gave rise at the end of GENESIS I to three projects: GENESIS II, which led, in particular, to the development of an important system software which underpinned the international success of MEIKO machines, PUMA, which enabled INMOS to study the T9000 microprocessor (successor to the T800, which was a success on the world market), and HSSC, which is concerned with a new multiscale and parallel architecture.

The LIT project on terminals for the projection of large-scale images, which received ECU 1.7 million in financing, looked promising but after several months of work insufficient prospects for commercial exploitation, com-

bined with the impossibility of achieving technical objectives, led to the project being halted and only work to a value of ECU 0.84 million was accepted.

The HECTOR project was only approved and launched for an exploratory twelve-month period with a ECU 0.8 million budget. In addition, in response to a call for proposals issued during the period of execution of the HECTOR project, the same consortium submitted a proposal on the same topic; this was assessed and rejected. This decision was taken in full knowledge of the quality of the existing project and the new proposal.

Gradual withdrawal of partners

2.38. The Commission takes precautions against the risk of a project not being completed. For this reason, the contracts for the projects selected are divided into two stages. At the end of the first contract the proposed extension takes place only if the following conditions are met: the work must have been carried out satisfactorily, the subject matter must still be topical and the prospects for exploitation still good, and the appropriations must be available. In addition, the clauses relating to exploitation apply to the ten years following the end of the work. In any event, the studies carried out by the Commission, notably as part of programme assessment, reveal that the majority of projects have an industrial impact.

Courses of action open to the Commission

2.44. The Commission has in fact encouraged partners to make use of project results and has created favourable conditions by the systematic guidance of projects and regular and careful assessments in the course of execution.

If the Commission has not itself filed a patent for an invention resulting from a project, it is because it has not proved necessary.

2.45. In addition to its contractual rights to establish what steps have been taken to exploit results, the Commission is concerned to measure the extent to which results have been exploited, and it feels the most appropriate way of doing so is to carry out a detailed study into a sample of cases, taking as a basis the work carried out as part of the programme assessment. The annually updated synopses set out the results achieved and provide

the information needed for establishing contact with the consortia. The Commission is planning to step up its monitoring of the exploitation of project results in the future.

impact on European industrial competitiveness as a whole; the growing involvement of users in the programme's work is a promising step in this direction.

Community practice

In the context of the ESPRIT programme

(a) Transparent choice of beneficiaries

2.53. As pointed out in 1.29, the topics covered by the TIPs have normally appeared in a call for proposals under ESPRIT II. Any company is entitled to submit proposals for the TIPs. The consortia behind the projects accepted have included many partners who have not contributed directly to the preparation of the work programme.

(b) Research through to market level

2.54. The accompanying measures specifically provided for in Article 2 of the decision adopting the programme (Decision 88/279/EEC, OJL 118 of 6 May 1988, p. 32), are designed to improve potential for subsequent participation in Community R&D programmes; they concentrate on the establishment of transnational links, technology transfer, training, etc.

JESSI, which is itself made up of a large number of projects, forms part of the EUREKA programme. The ESPRIT programme finances only some of these in accordance with its own rules. The ultimate aim of these and all other projects, is competitiveness but not industrial development as such. Finally, it is natural that any industrial R&D project should be ultimately concerned with the competitive aspects of industrial development.

2.55. As with the other Community R&D programmes, financing under the ESPRIT programme is normally 50 %. Part of this financing is intended to take account of the additional costs of cooperation, which may represent between 10 % and 25 % of the total cost.

2.57. The ESPRIT programme is placing greater emphasis on the relationship between R&D projects and their

Precompetitive research and industrial policy

2.59. The Commission has respected the principle of budgetary specialization. As stipulated in the Decision adopting the programme, the ESPRIT programme's appropriations have been allocated primarily to the study of the latest technology, the strengths and weaknesses of industry, future development of industry or the evaluation of the various instruments for Community action. These subjects fall entirely within the scope of the activities of a programme such as ESPRIT.

Pilot projects

2.60. Directorate XIII/E controls a number of projects in the fields of technology and the information market (notably the IMPACT programme). The aim is to establish a plan of action for an information services market. This programme falls within subsection B5 of the budget (Consumer protection, internal market, industry and trans-European networks).

Attempt at a critical appraisal

Rules of competition and subsidiarity

2.70. The provision of financial aid under ESPRIT shared-cost contracts follows different rules from those applied in the Member States, including for EUREKA projects; by definition, ESPRIT projects are of Community interest and follow a transparent procedure: selection is made following open calls for proposals to which any interested company may respond in competition with others. The overall know-how acquired during a project belongs equally to each contractor and must be exploited in the Community interest. If the results obtained in any given project are not exploited by any of the partners but are of interest to another Community undertaking, especially another contractor within the programme, the consortium concerned is under a contractual obligation to transfer the know-how acquired to this undertaking at a reasonable cost.

ADDITIONALITY

The costs of additional effects

2.78–2.79. As stated in point 2.55, the cost of the transnationality of a project has been estimated at between 10 % and 25 % of the total. Care must be taken to ensure that the various expenses allocated to the project, including mission expenses, are fully justified in terms of what is required for its proper execution. Mission expenses are calculated on the basis of actual costs, regardless of the distance of the partner from the destination. The disparity in the case of partners from the outlying regions is not sufficient to justify amendment of these rules; it is offset in part by the rotation of meeting places.

Alternative ways of pursuing the various objectives

2.81. Every ESPRIT project must meet the criteria laid down in the conditions of eligibility set out in the Decision adopting the programme; this is particularly true in the case of transnational cooperation and industrial competitiveness. However, it is true that it is at the level of overall implementation that the Commission is keen to realize all the objectives of the ESPRIT programme.

GENERAL CONCLUSION

3.4. As regards changes to the IT programme, the Commission endeavours to take maximum account of general political information as well as the economic and industrial situation; these changes are mainly found in the programme decisions and reflect as far as possible the various recommendations made, particularly those made every 30 months or so when the programme is assessed. The necessary changes are worked out carefully — they aim to be 'rational' but realistic, and take account of 'history' in the interests of continuity and efficiency.

Any debate on 'current assertions concerning the most effective vectors for research' must bear in mind the programme's prime objective, which is industrial competitiveness. The programme aims to give a high priority to the potential economic impact of the innovation and the likely willingness to exploit it; this is what governs the participation of the various types of operator: large or small undertakings, companies or universities, manu-

facturers or users, and the proportion of high-cost projects or more modest projects.

3.6. The Commission accepts the need to simplify and speed up the payment system; it intends to continue the efforts already begun to push the necessary improvements to their limits. Although the Commission does not feel that it has 'misused' procedures for passing on administrative tasks to the contractor in any way, it is planning improvements to simplify the contractors' administrative duties and reduce the causes of disputes; these measures should be of particular benefit to smaller firms and the associated partners. It feels, on the other hand, that the costs of launching projects and of transnational cooperation are taken into account in a fair way.

3.8. The Commission agrees with the Court that targeting projects on the market must continue to be a constant concern. The industrial impact of ESPRIT projects is already considerable and recognized as such; without delving further into the scope of the 'vast reserve of potential progress', the Commission is proposing to continue and step up its efforts, in close cooperation with the industrial partners, to ensure that the quality of the innovation, the willingness to exploit the results and the scale of the European economic impact will be of equal importance.

3.9. If they prove worthwhile, activities under ESPRIT are extended once or more under the programme until they reach a point where the partners possess all the technical information on which to base their decisions to undertake development work. In some cases it can be useful to prolong this work still further on a contract basis to better integrate the results, to develop one or more prototypes, or to carry out further evaluation of prototypes; the involvement of users, which the programme aims to encourage, tends to increase the number of cases in which these supplementary measures can be clearly justified, without however moving beyond the point where the taking and financing of risks should be entirely a matter for industrial responsibility.

The Commission considers that it has routinely observed the principles guiding Community action, without errors of interpretation, in bringing projects to their conclusion. The 'precompetitive concept' must be unconditional and must not lead to 'paralysis': this was always the case in the past, as it is now and will be to an ever greater extent in the future.

3.10. The Commission agrees with the Court that it is of prime importance for the Community to increase the synergy between structural policy, industrial measures, competition policy and R&D policy, without losing sight of the need for coordination between and with national

policies. With the entry into force of new institutional resources, the Commission will endeavour to encourage this to the maximum in close cooperation with the Member States and the Community institutions.

Finally, the Commission is grateful to the Court for its lucid and highly constructive report. In its constant search for improvements, it will do its best to take account of the Court's remarks, particularly as regards management.

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