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MID-TERM REPORT FROM THE COMMISSION TO THE COUNCIL,
THE EUROPEAN PARLIAMENT AND THE ECONOMIC AND SOCIAL COMMITTEE

on the implementation of the main phase of the SPRINT programme
(1989-1993)

1. INTRODUCTION

- 1.1 Innovation is increasingly becoming considered as a key factor for competitiveness and economic growth. At the same time there is a concern that while Europe may be good in fundamental research, it seems to be less effective in exploiting and applying new technologies than some of its major competitors.

In mass markets and strategic product areas the US and Japan apparently are more successful in reaping the economic benefits which result from carrying new technological opportunities through the innovation chain.

Recognizing this situation, the Council adopted, in the beginning of 1989, the Commission's proposal to launch the main phase of SPRINT (Strategic Programme for INnovation and Technology Transfer)⁽¹⁾ with a five-year duration, from 1989 till the end of 1993, and a budget of 90 MECU.

It also required the Commission to present to the Council, the Parliament and the Economic and Social Committee, after 30 months of implementation of the programme, a report assessing the results achieved.

- 1.2 To assist in the preparation of this mid-term report the Commission appointed a Panel of independent experts, acknowledged in the field of innovation and technology transfer. Its mandate was to review the objectives, priority lines of action, results achieved and to make recommendations concerning both current actions and possible future developments of the programme. The Panel conducted its review between November 1991 and May 1992. The Panel report presenting its findings and recommendations is attached under Annex.
- 1.3 In addition to the conclusions and recommendations of the Panel, the Commission used several other inputs in establishing the underlying report. Notably the findings of two independent evaluation studies covering two of the longer-running principal actions. These surveys had been commissioned parallel to the activities of the Panel, to which the preliminary findings were made available. Also the opinion of the Committee for Innovation and Technology Transfer, which assists the Commission with the implementation of SPRINT, on the Panel review and the two evaluation studies has been taken into account, as well as the feedback of the Commission services responsible for the implementation of the programme.
- 1.4 The structure of the present report is as follows : Paragraph 2 provides a description of SPRINT and its evolution through time. Paragraph 3 reviews the objectives, priority lines of actions and the implementation of the programme so far. Finally, Paragraph 4 presents proposals for possible future developments of the programme, which appear necessary in the light of the results and recent changes in the technological, economic and political environment in Europe. They can be implemented within the context of the current Council Decision.

(1) see Council Decision 89/286/EEC in OJ No L 112 of April 25, 1989, p. 12

2. THE PROFILE OF SPRINT

- 2.1 The SPRINT programme was launched in December 1983 as a three-year pilot programme. It was then called "Plan for the transnational development of the supporting infrastructure for innovation and technology transfer"⁽²⁾. With a limited budget (10 MECU over 3 years), it had an exploratory character. The pilot programme focussed on the development of transnational linkages and cooperation between innovation support services, and the creation of a favourable environment for the innovative efforts of small and medium-sized firms in the Community.
- 2.2 In 1987, on the basis of the results achieved till then the Council decided⁽³⁾ to prolong by two years the pilot phase with an additional budget of 8.6 MECU, to extend marginally its lines of action and to rename it SPRINT (*Strategic Programme for Innovation and Technology Transfer*).
- 2.3 The current main phase of SPRINT was launched in 1989. The objectives were further broadened as follows :
- I to strengthen the innovative capacity of European producers of goods and services, with a view to the 1993 Single Market;
 - II to promote rapid penetration by new technologies and the dissemination of innovation throughout the economic fabric of the Community;
 - III to enhance the effectiveness and coherence of existing instruments and policies, whether regional, national or Community-wide, in the field of innovation and technology transfer.
- 2.4 In order to achieve these objectives the Commission, in accordance with the main lines of action indicated in the Council Decision, has concentrated its activities on three areas :
- * the development of **innovation support services** and their corresponding European infrastructure (see § 2.5 to 2.9 below),
 - * the **demonstration** of intra-Community technology transfer and technology acquisition (see § 2.10),
 - * the improvement of **knowledge** on the innovation process, systems and policies at Community, national and regional levels (see § 2.11).

Moreover as the objectives for SPRINT set by the Council are very wide in scope, but the budget is relatively restricted, the programme's actions can be neither of extensive nor intensive nature. This implies that SPRINT had to be implemented as a learning programme, with particular emphasis on actions which are experimental, catalytic or demonstrative of best practice.

- 2.5 The main reasons for focussing on **innovation support services** are : on the one hand the notion that firms, notably those of small and medium size with limited resources, need to be able to rely on outside expertise and resources to facilitate their innovation and technology acquisition efforts; on the other hand that these services and their degree of professionalism are unevenly distributed across the Community.

⁽²⁾ see Council Decision 83/624/EEC in OJ No L 353 of December 15, 1983 p. 12

⁽³⁾ see Council Decision 87/307/EEC in OJ No L 153 of June 13, 1987 p. 45

Activities concentrated on the following types of services : technology brokerage and liaison, dissemination of technological information, regional innovation assistance, financing of innovation, innovation management functions such as intellectual property rights, value analysis, design and quality management.

2.6 In order to develop these services and their corresponding European infrastructure SPRINT has supported various types of actions, in particular :

- * the establishment of transnational linkages between organizations providing these services - the so-called "**technology transfer services networks**" - working in cooperation and disseminating best practice in their fields;
- * the launching of **experimental schemes**;
- * the setting up of **working groups** for exchanging experiences.

2.7 As regards **networks of technology transfer services**, SPRINT currently supports 60 networks involving in total more than 300 technology brokerage and liaison services. The organizations in these networks are cooperating to facilitate transnational acquisition of technology by companies or to establish technological cooperation between them.

SPRINT also supports 55 networks of research and technology organizations (RTOs), mainly collective sectoral research centres such as the Industrial Research Associations in United Kingdom, the "Centres techniques industriels" in France and the "industrielle Forschungsgemeinschaften" in Germany - grouping in total 200 such organizations, i.e. one third of all such centres in Europe, in either traditional industries such as construction, textiles, wood or concerned with generic technologies such as information technologies and optronics. The organizations in these networks are working together to disseminate technological information and to promote the adoption by firms of advanced manufacturing technologies and quality management procedures.

In addition the programme has supported the establishment of the EUROTECH network which brings together twelve national research and development organizations including ANVAR (F), British Technology Group (UK), CDTI (E), CNR (I), Fraunhofer Gesellschaft (D), TNO (NL), etc. to exchange experience and to develop cross-licensing.

SPRINT was also instrumental in launching the European Association for Contract Research Organization (EACRO), which currently gathers more than fifty contract research organizations in Europe. The aim of this macro network, similarly to the European Venture Capital Association (EVCA) and the European Association for the Transfer of Technologies, Industrial Information and Innovation (TII), which were launched during the pilot phase of the programme, is to become the forum in Europe for the organizations it represents and to provide them with the services necessary for their development such as training, exchange of information, etc.

With the same objective in mind, the programme also has been promoting the exchange of experience, the comparison of work methods, the establishment of quality standards by innovation support services in Europe through group visits, professional exchanges and transfer of know-how seminars.

- 2.8 As regards the **experimental schemes** three such initiatives have been launched in recent years of which two in the area of financing innovation, notably the Technology Performance Financing and the Transnational Investment Fora.

Technology Performance Financing aims to facilitate the financing of the acquisition of new technology by making the payment dependent on the technology producing the benefits claimed for it.

Under the TPF scheme, SPRINT supports a core group of major European banks and financial institutions to promote the technique, by underwriting a proportion of the risk finance which they make to technology suppliers under TPF projects and by providing a commercial and technical framework within which to operate.

Transnational Investment Fora bring together entrepreneurs of innovative growth companies from several Member States, looking for sources of funding with financiers, also from several Member States, looking for investment opportunities.

The third such experimental scheme is the Science Park Consultancy Initiative which enables local and regional authorities to better design and plan Science Parks and Innovation Centres by providing them with European expertise and best practice in the area.

- 2.9 **Working groups** have been established in the the fields of regional innovation assistance on the one hand, and, on the other hand, innovation management techniques such as technology auditing, value analysis, design, quality and management of intellectual property rights. They are concerned with identifying and exchanging best practice in these areas, training providers of innovation support services in the application of such techniques and creating awareness of the economic benefits associated with the application of such techniques. An example of an action within this third aim is the European Community Design Prize competition which was held in 1990 and 1992.

- 2.10 As regards the second main strand of activities, i.e. **demonstration** of actual intra-Community technology transfer and acquisition, SPRINT has supported large scale, industrially relevant, experimental projects which are concerned with the transfer and adaptation of existing technologies in sectors and regions of the Community other than those in which they are currently used. These projects are designed to provide a comprehensive approach to large scale technology transfer and serve as demonstrations of best practice in this area. Their inclusion in SPRINT was dictated by the following main considerations :

- * many available new technologies are not as widely used as they might be. Their introduction into certain, often traditional, industrial sectors and certain firms, especially small and medium-sized ones, is slower than it could be. This is often due to lack of relevant information on their economic advantages and on the proper way to implement them. This general reluctance to risk and change can in many cases be overcome by appropriate targeted demonstration exercises.
- * classical technology demonstration projects, while providing working examples of technical innovations, are not usually organized to answer firms' questions about the practicalities of implementation (e.g. how to integrate them into an existing production set-up, modification of distribution channels, staff re-training, etc.). There is a growing need for companies to be provided with a global demand-led approach for adopting new technologies covering all the aspects mentioned above, not just technical performance.

- * in certain regions or industrial sectors, groups of companies have common innovation or modernization needs, whose solution is to be found in another Community region or sector. Experience shows that these needs often have to be pointed out to companies, especially SMEs in traditional sectors, and that such companies require guidance during the modernization process. This may involve some adaptation of available technologies to specific requirements which may represent an innovation in itself.
- * introduction of new technologies poses specific problems, especially when different "agents" from two or more countries are involved. Multi-agent applications normally make use of a wide mix of technologies and rely on a high degree of cooperation and interaction among participants. In such cases spreading innovations more widely and adapting technologies calls for experiments involving all parties concerned. There are many such examples in the various Member States and it is essential that the Community dimension is taken into account to avoid duplication of effort and incompatibility of technical solutions.

Although projects can be from any industrial sector and involve any newly available technology, the focus has been on broad spectrum technologies (e.g. information technologies, biotechnology, advanced manufacturing technology) and the modernisation of traditional industries. Many projects have also been aimed at answering the needs of society and have involved health care issues (e.g. introducing new technology into products for the disabled) or environmental concerns such as water treatment or urban engineering.

Projects are undertaken in phases, starting with the definition phase, followed by the implementation and dissemination phases. So far two calls for proposals for definition phases have been launched, one in 1989 and one in 1990, resulting in support for 40 definition phases, each ranging between 4 and 9 months. These definition phases are expected to lead to 14 to 18 implementation phases which will last between one and two years and require an average Community support of 1 MECU.

- 2.11 The need to improve the **understanding of the innovation processes and systems** and to increase the **concertation** between the Member States and the Commission is spurred by the drastic changes which are taking place in the competitive environment of innovating firms in Europe. Examples of such changes are the emergence of a Single Market, the internationalization and globalization of technological development, the application of new managerial and organizational principles in companies and the changing relationships in industrial cooperation and competition. As a consequence of these transformations, there is a growing need for information, amongst public and private actors, to enable them to respond successfully to this changing technological and competitive environment.

For this reason Council Decision 89/286/EEC has given a mandate to SPRINT to establish the European Innovation Monitoring System (EIMS) to improve innovation monitoring in Europe. More specifically the aims of EIMS are to improve :

- a) the understanding of the basic mechanisms and developments of innovation processes in Europe;
- b) the systematic monitoring of the capabilities, strategies, activities and performance of public and private actors, related to technological innovation and diffusion in Europe;

- c) the identification and dissemination of best practice in managing and supporting technological innovation and diffusion - as well as major obstacles to their success; and
- d) the impact assessment of public policies on technological innovation and diffusion.

The focus of EIMS is on applied research. EIMS aims to produce knowledge that can effectively support the decisions of policy makers, at regional, national and Community level, suppliers of innovation support services and innovating firms.

A Call for Tender was launched with the intention of establishing a pool of experts and research institutions to carry out the various tasks required. This resulted in the selection, in April 1991, of 53 teams spread across Europe having expertise in innovation research.

An example of the on-going projects is the preparation together with EUROSTAT, and in close collaboration with OECD, of the Community Innovation Surveys project to be launched at the end of 1992, beginning of 1993. It will result in a series of coordinated national surveys covering the innovative capabilities and strategies of European firms as well as the diffusion of technologies and the application of innovation management techniques.

In addition to the EIMS which is concerned with innovation monitoring and research, SPRINT has supported a set of activities, which partly already started during the pilot phase, to exchange knowledge and experience between the Member States and the Commission concerning innovation support services and innovation and technology transfer policies so as to increase the coherence and effectiveness of public policies in these areas.

Examples of topics which received particular attention are :

- * Regional Technology Advisory Infrastructures,
- * Innovation Management Consultancy systems,
- * Promotion of quality management.

In general for each of those topics a European-wide survey and evaluation of national public and semi-public measures or incentives is carried out. Its results are then discussed in workshops with the concerned policy makers at national and regional level, aiming at brokering best practice in the related fields. If and when need be, pilot transnational cooperative activities are launched with community support, as a practical experiment after the workshops.

3 ASSESSMENT OF THE PROGRAMME

- 3.1 The review Panel felt strongly that there is a clear need for a comprehensive Community action programme in the field of innovation and technology transfer, focussing on the adoption of technologies which are new to firms. The ultimate goal of all such action in the economic and industrial sphere is to improve Europe's competitiveness, a goal reiterated at Maastricht. To achieve this objective measures to support the development of technology must go hand in hand with policies that increase the capabilities of firms to acquire and use technologies which are new to them. In this regard, Community programmes such as SPRINT which are concerned with creating the conditions in which businesses, especially SMEs, take up new

technology, should be regarded as complementary to other Community, national and regional actions, notably the specific technology generation programmes of the Community R&D Framework Programme. The efficiency of actions which promote the industrial exploitation of research results can be increased if efforts are also dedicated to improving the climate for innovation, notably the infrastructures, services and supply of risk capital for the up-take of new technologies by firms, in particular innovating SMEs. This type of policy requires a systems and demand-led approach, combining different measures in an integrated way.

- 3.2 As regards the objectives of the programme, the review confirmed their appropriateness also taking into account major changes in the economic and political environment such as the gradual realization of the Internal Market, the establishment of the European Economic Space and the reforms in Central and Eastern Europe.
- 3.3 As regards the first main line of action, i.e. measures to develop innovation support services and their corresponding European infrastructure, the Panel, and the two independent evaluation studies referred to under 1.3, came to the conclusion that in general, and given the resources allocated, these measures have contributed significantly to creating and strengthening the European Infrastructure supporting innovation and technology transfer. As a consequence it is felt that other innovation support services, such as engineering consultancies or university-industry liaison services, could usefully be considered. Assistance to such networks should continue but should be limited to their launch and establishment. It should not provide long-term support.
- 3.4 The evaluation also indicated that in order for the networks to be more effective with respect to promoting the adoption of new technologies by firms, more focus should be put on stimulating the demand by firms for the services these networks provide.
- 3.5 The Science Park Consultancy Scheme is seen as an interesting scheme whose methodology implies a clear Community added value and which could easily be extended to other actions. This methodology involves the use of centres of expertise within the Community to assist the less experienced to develop their ideas and plans, especially when they concern large-scale capital projects.
- 3.6 Technology Performance Financing is considered a promising experiment which should be continued and carefully monitored. The scheme embodies a number of interesting features, potentially applicable to future actions :
 - * risk sharing between producers of technology, users and financial institutions,
 - * the possibility, if the experiment is successful, that it could be adopted - in a similar or different form - by financial institutions on a wide-spread basis. As such the scheme embodies an exit strategy and a capacity for large scale application of the technique developed from the experiment.
- 3.7 In order to further increase effectiveness of some of the above schemes (e.g. network of Research and Technology Organizations, Science Park Consultancy Scheme) from a cohesion point of view the Commission will explore some modifications recommended by the Panel, mainly of an operational nature, such as more emphasis on arrangements facilitating systematic transfer of know-how between the more and the less experienced.
- 3.8 The Commission also proposes a special effort to extend the use of these measures to the Five New Länder and the EFTA countries, these latter ones within the context of European Economic Space Agreement when ratified.

- 3.9 As regards the demonstration projects for intra-community innovation transfer, the review has indicated that this action line, which has been of an experimental nature so far, has been largely successful and should be strengthened. As a result of the two calls and the successful nature of the experiment a substantial momentum has been built up. However this will fade away if the batch of existing projects is not soon replenished with new ones. It is therefore proposed to launch, in 1993, a third call for proposals to accommodate new specific projects. As SPRINT comes to completion at the end of 1993 the corresponding resources which may be necessary for its continuation in 1994 (the period until the adoption of the 4th Framework Programme) may be proposed in the form of an annual accompanying action (APAS). Any amount to be proposed for 1994 will be evaluated by reference to the budgetary constraints in existence when the Commission's 1994 PDB is prepared.
- 3.10 As regards the third main line of action, i.e. measures to improve the understanding of innovation and enhance the effectiveness of existing innovation and technology transfer policies, the evaluators focussed their attention mainly on the European Innovation Monitoring System (EIMS), which started to become operational in 1991. They considered EIMS central to the SPRINT programme for several reasons :
- * it provides a basis for the development of knowledge about both the innovation and technology acquisition process at the level of the enterprise, the sectors and regions and about the impact of policy measures to foster innovation.
 - * within SPRINT, EIMS draws knowledge from other actions, provides feedback on the better operation of these actions and generates and tests ideas for possible future actions.
 - * in being closely linked to policy development at Community and Member State level, EIMS offers the prospect of assisting other programmes at the Community, national and regional level, as well as in other geographical areas, for example those covered by PHARE and EFTA countries.

The Commission will take into account the recommendations of the Panel as regards the future development of EIMS :

- the scheme must be more international in its orientation, not limiting itself to Community experiences, but also taking into account those of the US, Japan and other Asian countries;
 - the scheme should be closely linked with other Community actions;
 - the scheme should pay full regard to the regional and sectoral dimensions of innovation.
- 3.11 Finally, the review also indicated that many of the actions currently implemented by SPRINT are very management intensive. The Commission will explore ways to meet the programme's heavy management demands, for example through some decentralization of the follow-up of the management of these actions.

4. PROPOSALS FOR FUTURE DEVELOPMENTS OF THE PROGRAMME

In addition to assessing the programme's objectives and current major action lines, the Panel made a number of recommendations as regards the future development of SPRINT, in particular concerning its operating principles and possible new areas for future surveys and pilot actions within the context of the current Council Decision.

As regards the operating principles, the Commission shall only propose action of which the objectives, by reason of the scale or effects of the proposed action, can be better achieved if this action is carried out at Community level rather than by the Member States. As such, the Commission, will further strengthen the brokerage of best practice, the risk sharing between the Member States and itself as regards experiments, the transnational dimension and the coordination of policies and instruments.

Also the existing demand-orientation of the programme should be reinforced through actions to raise awareness, particularly among SMEs, about the need to adopt new technologies and innovate and the availability of support measures and services.

As regards new areas for future surveys and possible pilot initiatives within the current SPRINT actions, the following issues have been recommended by the Panel for the attention of the Commission :

- * the role and importance of the regional innovation systems and technology transfer infrastructures;
- * the role and mechanisms of innovation and technology transfer in the new democracies of Central and Eastern Europe;
- * large firm / small firm technology links;
- * the role of New Technology Based Firms (NTBFs) both as sources and carriers of innovation, with particular attention being paid to the financing of these businesses;
- * innovation relating to the environment, cities and health services;
- * the re-orientation of defense related enterprises and the civil exploitation of defense technology.

The Commission will consider the panel's recommendations in the light of the principle that it shall only take action of which the objectives, by reason of the scale or effects of the proposed action, can be better achieved if the action is carried at Community level rather than by the Member States.

5. CONCLUSION

The Commission considers a Programme such as SPRINT, concerned with creating the conditions in which businesses, especially SMEs, take up new technology, an important action for improving the climate for innovation in the Community.

During the first three years since the launch of the main phase of SPRINT implementation of the three main strands of action, as specified in the Council Decision, has well advanced. Those which were launched under the pilot phase, such as the development of innovation support services and their infrastructure, are obviously further advanced, but significant progress has been made in the implementation of the new initiatives such as the Specific Projects for demonstrating intra-Community technology transfer and acquisition and the

European Innovation Monitoring System of which the bases are now firmly in place and a certain momentum has been reached.

In addition, some new and related initiatives such as the Science Park Consultancy and Technology Performance Financing Schemes have been launched on an experimental basis. One particularly notable feature is the increasing emphasis on the demand-led approach and the way companies and end-users are beginning to play a significant role throughout the programme.

During the remainder of the main phase the Commission will further advance the implementation of the programme along the lines specified by the Council Decision. It will thereby take into account the recommendations, indicated in the previous pages, resulting from the mid-term review, either for modifying some operational aspects of current actions to improve their effectiveness or launching surveys and, within the current SPRINT actions, possible pilot initiatives in new areas spurred by the changes which are taking place in the economic, social and political environment.

The Commission considers the recommendations as very valuable and expresses its recognition for them to the Review Panel.

The present communication together with the Annex is addressed to the European Parliament, the Council and the Economic and Social Committee complying with article 8 of the Council Decision of 17 April 1989 related to the main phase of the SPRINT programme.

11

ANNEX

**STRATEGIC PROGRAMME FOR INNOVATION AND TECHNOLOGY TRANSFER
(SPRINT)**

Mid-term Review

**A report to the Commission of the European Communities prepared by a Review Panel under
the Chairmanship of M. Pierre Aigrain**

**STRATEGIC PROGRAMME FOR INNOVATION AND TECHNOLOGY TRANSFER
(SPRINT)**

Mid-term Review

**A report to the Commission of the European Communities prepared by a Review Panel
under the Chairmanship of M. Pierre Aigrain**

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FOREWORD

As the Chairman of the Panel I would like to thank all the participants who invested a lot of their time and competence in the review.

Credit is also due to Segal Quince Wicksteed Limited for their contribution to the organisation of the Panel meetings and to the writing of the final report in accordance with the Panel's views.

The report could not have been completed without the complete cooperation of Commission civil servants, especially those in charge of SPRINT, who provided full information and discussed openly all issues raised by the Panel.



P. Aigrain
Chairman

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EXECUTIVE SUMMARY

Introduction

1 This report presents the findings of an independent review of the SPRINT (Strategic Programme for Innovation and Technology Transfer) programme. The review was undertaken by a panel of experts, chaired by Mr Pierre Aigrain, with a mandate to:

- consider SPRINT's objectives;
- review the main action lines;
- assess the impact of the programme in relation to its cost; and to
- recommend possible modifications to the programme.

The SPRINT Programme

2 Originally launched as a pilot programme in 1983 the current phase of SPRINT started in 1989 with a 90 MECU budget for a five-year programme. The development of SPRINT reflects a concern within the Community that although its fundamental research is considered to be of high quality, in relation to competitor regions Europe is less effective at applying new technologies.

3 In seeking to help remedy this situation the Community has launched a series of actions, those most specifically addressing innovation, technology transfer and diffusion falling under the SPRINT programme. This programme has three main objectives:

- to strengthen the innovative capacity of European enterprises;
- to promote rapid promotion of new technology throughout the Community;
and
- to enhance the effectiveness of existing innovation and technology transfer support measures, whether regional, national or Community.

4 In its discussions, the panel adopted the following definitions of the innovation process:

- (i) *product innovation* is the commercialisation of a technologically changed product. Technological change occurs when the design characteristics of the product changes in ways which deliver new or improved services.
- (ii) *process innovation* occurs when there is a significant change in the technology of production of an item. This may involve new equipment, new management and organisation methods, or both.
- (iii) *diffusion* is the way in which innovations spread, through market or non-market channels. Without diffusion, an innovation will have no economic impact.
- (iv) *technology transfer*, was taken by the panel to include all activities concerned with the transformation of new technology into innovation and the various means by which technological knowledge is spread.

The SPRINT programme consists of a range of linked groups of actions, as follows.

Network measures

5 The primary aim of these measures is to improve the infrastructure supporting innovation and technology transfer by encouraging, through financial assistance, the formation and operation of networks of experts and organisations across national boundaries. The main measures comprise:

- the **interfirm technological cooperation networks**, drawn from a variety of different types of organisations, have members from public and private sectors, principally innovation consultants and technology brokers, who are concerned with assisting firms (predominantly SMEs) to form technological collaborations. Network participants involve 250 organisations and in the recent period SPRINT has laid great stress on the conclusion of agreements

between the firms assisted by network members. Indeed this has become the key measure for success and is taken into account in determining the level of support to each network;

- **research and technology organisation networks (RTOs)** comprise groups of mainly industrial research organisations, like industrial research associations and centres techniques industriels. Support is granted towards a specific project carried out by network members on a collaborative basis and typical projects include the adaptation of a particular piece of technology for application among firms linked to RTO members, or the testing and evaluation of a technique for a specific application. Each project must have a dissemination stage aimed at introducing the technology/technique into commercial practice;
- the **science park consultancy scheme** provides support for prospective or new science parks or similar technology oriented property schemes to gain access to European experts in order to help ensure the adoption of best practice in this field.
- In addition **SPRINT** has helped in the establishment of networks of important actors in its field of activity, for example covering contract research organisations (EACRO) and public sector organisations responsible for commercialising the results of publicly funded R&D (EUROTECH). Also it has sponsored a range of initiatives and events aimed at encouraging technology transfer intermediaries to share experience and increase the deal flow between them.

Specific Projects

- 6 Under the **Specific Projects** scheme financial assistance is provided for the development, adaptation and transfer of existing technologies into another sector or region to that in which they are currently applied. The receiving sectors tend to be traditional industries or to have a strong social dimension (health care, environmental protection etc). Projects are undertaken in phases commencing with definition and

needs assessment, and continuing support is based on the outcome of the prior stage. These projects are designed to serve as demonstrations of best practice in transnational technology transfer, encompassing not only the technical aspects of transfer but also the management aspects as seen from the perspective of other end-users.

Technology performance financing (TPF)

- 7 The TPF scheme is experimental in nature, its aim being to explore new ways of financing innovation. It is a scheme where the risks of investment in new technology are shared between users, the producers of the technology and financial institutions. As far as users are concerned payment for the technology is in part dependent on its performance, as measured against pre-agreed milestones. The pilot scheme has attracted considerable interest from financial institutions through whom it is administered. Under the pilot SPRINT will underwrite some of the risk involved.

Measures to improve the practice and understanding of innovation and technology transfer

- 8 Identification, development and assessment of best practice in this field is supported by a range of small-scale measures. They include international conferences and seminars, comparative studies and the sponsorship of prizes. Areas of interest include innovation management, design, value analysis and quality management.
- 9 The European innovation monitoring system (EIMS) aims to generate reliable information as a foundation for the formulation of innovation policies at Community, national and regional level. By supporting research, training and contact between those concerned with policy development and evaluation it is building up a knowledge base about the innovation process and about the effectiveness of innovation support measures, and helping to establish centres of excellence in research into innovation.

Panel's Assessment

- 10 The panel's assessment of SPRINT was conducted through analysis of statistics and documentary material (including the interim output of evaluation studies on two of the network actions), presentations from and discussions with officials responsible for the programme, and consultations in panel members' respective countries with those who have experience of the programme and/or a sound knowledge of innovation and technology transfer. This summary of the main findings and conclusions arising from the review is divided into three parts, the first dealing with the programme as a whole and its relevance within overall Community policy, the second presenting comments on the main action lines and the third providing guidelines for the future development of the programme.

The SPRINT Programme

- 11 The panel was of a strong view that the Community needs a distinct programme in the field of innovation and technology transfer. If Community action in the economic and industrial sphere is to contribute effectively to an improvement in Europe's competitiveness, a goal reiterated at Maastricht, then it must encompass not only measures to increase the rate of development of technology but also policies which will increase the rate of application. It is through application of new technology to products and processes that improved competitiveness will ultimately be achieved. In the light of its view of the importance of innovation and technology transfer and its judgement that particular difficulties are encountered in the SME sector the panel supported the overall philosophy of SPRINT - creating the conditions in which businesses, especially SMEs, take up new technology and so become more efficient and effective. In this regard SPRINT should be regarded as a complement to other Community actions in the economic and industrial sphere, most notably the RTD Framework Programme.
- 12 The panel was made aware of the possibility that SPRINT might, mainly for administrative reasons, be integrated into the Framework Programme. It was unable to comment on the reasons for such a change though it appreciated that indirectly benefits could accrue, most particularly in terms of improving the links with

technology development activities and raising SPRINT's profile (especially in the Commission itself where knowledge of the programme is often poor). The main danger of integration is that it would dilute the distinctive nature of the SPRINT programme and its emphasis on innovation and technology transfer. It cautioned the Commission to ensure that this distinctiveness is not lost.

- 13 The panel gave full consideration to the view that SPRINT appears a disparate programme, comprising many (often small-scale) actions, many of them experimental in nature. It judged that such a view was a superficial one, based on misunderstandings about the process of innovation and technology transfer and SPRINT's role in relation to that process. For several reasons SPRINT would necessarily have to continue to comprise a number of action lines and to innovate:
- (i) innovation with business and other organisations can involve many component activities, including strategic planning, technology assessment, organisational change, management development, technical training and accessing technology itself and the finance to develop new technology. Successful innovation requires the systematic integration of all these elements. A key role of SPRINT is to help to tackle deficiencies in each of the component activities that comprise the innovation process and to increase competence in their interpretation. Necessarily this involves a variety of actions;
 - (ii) SPRINT is a demand-led programme in the sense that it responds to the needs of innovating organisations. However, it cannot be passive; it must seek, through a variety of instruments, to raise awareness about the need for innovation and what the process entails;
 - (iii) within Member States, particularly at regional level, there is an increasing concern with innovation and growth in the number of organisations involved in innovation support. As new needs emerge SPRINT must respond to the changes in the support environment, filling gaps and, more importantly, encouraging and assisting in the transfer of best practice in measures to support innovation and technology transfer;

- (iv) innovation is substantially a response to changes in the external environment, for example new competitive pressures brought about by emerging industrial powers, the identification of new environmental issues, structural change (for instance caused by reductions in defence expenditures) and new social concerns like urban problems. There must be scope for SPRINT to respond to these changing needs and again this demands a programme with considerable flexibility;
- (v) finally, to be effective SPRINT must seek to influence and support a range of actors involved in the innovation process, including firms and other innovating organisations, producers of new technology, financial institutions, technology transfer agents and policymakers. Again, this necessitates an armoury of actions.

14 Overall, the panel considered SPRINT to be a worthwhile programme, with appropriate objectives and actions. In relation to its budget it was judged to have a significant impact. In view of these conclusions and the importance of the field in which SPRINT operates, the panel felt that an expansion of the programme was fully justified.

Assessment of individual actions

Specific projects

15 The panel considered this action to have been successful in terms of its impact on the parties involved in each project and to have the potential to achieve a substantial demonstration effect. It recommended that the action should be expanded but that some modifications be made, in particular:

- a reduction in the time horizon for projects in order to generate a more rapid impact;
- greater financial involvement from the outset of those firms that will eventually benefit from the supported project;

- more emphasis on clusters of projects around particular sectors or technologies or around particular issues in order to increase the demonstration effect.

Network measures

- 16 As regards the **transnational networks of interfirm technological cooperation** the panel had the benefit of interim output from an evaluation study. On the basis of this and its own deliberations the panel judged that while this action had had considerable success, particularly in encouraging much more collaboration, this success was qualified. In particular the goal of technological agreements had diverted attention and effort from building competence among technology transfer agents. The panel therefore recommended that the programme should be continued but radically reoriented, with less emphasis on agreements and much more on training of actors, exchange of experience and the linking of networks.
- 17 The **RTO networks scheme**, also the subject of an external evaluation, was judged to have been more successful in meeting the objectives with virtually all participating RTOs (particularly the less experienced) gaining in competence as a consequence of involvement. The projects themselves had generally been conducted well though there was limited evidence of dissemination to end users - the ultimate aim of the action.
- 18 The panel considered that this aspect could be remedied by putting more emphasis on the dissemination stage of projects and recommended that **SPRINT** give more attention to this at project definition and appraisal stage. It also proposed that a more strategic dimension should be introduced, for example, concentrating groups of projects in particular sectors. Finally, more emphasis should be given to assisting inexperienced RTOs to develop their skills.
- 19 The **science park consultancy scheme** was well regarded by the panel. Its use of centres of expertise to assist the less experienced and its emphasis on the proper planning and assessment of large-scale capital projects were thought to be the strengths of the scheme. Moreover it had had a large impact in terms of raising the profile of **SPRINT**. Reservations were expressed about some aspects of the scheme's

operating principles and it was recommended that SPRINT give more attention to assessing experts and ensuring that the teams that are constructed for particular projects have the necessary range of skills and experience.

Technology performance financing

- 20 While this pilot action was at too early a stage to assess the panel were attracted by some of the features it embodies, in particular the risk sharing arrangement and the fact that if successful there is a good possibility that it will be adopted by financial institutions on a large scale, without the need for external support. The panel felt that because of these features the scheme justified the considerable financial risks involved and should be carefully evaluated at an appropriate time.

Measures to improve the understanding and practice of innovation and technology transfer

- 21 The panel considered these actions to be very important to SPRINT and was supportive of the idea that such types of actions should be extended, for example to cover a wider range of aspects of innovation management. It was suggested that EIMS in particular offered the prospect of enabling SPRINT to become the focal point of centres of excellence in the innovation support and technology transfer field. In order to help achieve this goal the panel recommended that the scheme should be:

- a catalyst for other Community services involved in innovation and technology transfer related activities
- more international in orientation
- better linked with other Community actions
- pay more regard to the regional dimension of innovation support
- used more as a means of raising the profile and reputation of SPRINT more generally.

Future development of SPRINT

22 The panel did not feel it appropriate to make proposals about specific new proposals that should be launched by SPRINT. Rather it considered that it could make a more worthwhile contribution by providing some guidelines which will assist the Commission in developing future actions. The proposed guidelines are summarised as follows:

- more emphasis should be given to the testing and development of new approaches to innovation support and promotion and less to actions which require long-term support
- SPRINT should become more international in orientation in support of its development as a centre of excellence in its field
- the existing demand-orientation of the programme should be re-inforced through actions to raise awareness, particularly among SMEs, about the need for innovation, the complexity of the process entailed and the availability of support measures and services
- there must be a preparedness to operate at regional and sectoral levels
- collaboration between SPRINT and national innovation promotion organisations should be strengthened whenever appropriate
- the Commission must ensure that SPRINT is adequately staffed, or otherwise resourced, to meet the heavy management demands of its programme
- SPRINT itself must avoid spreading its management resources too thinly
- more effort should be given to helping inexperienced actors develop their skills

- there should be more emphasis on the use of competition, rather than collaboration, as a driving force for innovation
- consideration should be given to actions (particularly in the financing sphere) that focus specifically on new technology based firms (NTBFs), a major force in innovation currently not covered by SPRINT
- SPRINT should be provided with the resources to assist in innovation and technology transfer in Central and Eastern Europe.

1 INTRODUCTION

- 1.1 This document represents the findings of an independent review of the SPRINT (Strategic Programme for Innovation and Technology Transfer) programme of the Commission for the European Communities (the Commission). The review was conducted by a panel, whose names are given below, appointed by the Director General of DGXIII of the Commission, with the help of the Committee for Innovation and Technology Transfer, the committee that assists the Commission with the implementation of the SPRINT programme.

Chairman: Mr P Aigrain
Conseiller du President, Thomson, France

Secretary: Professor W Zegveld
Chairman, Organisation for Technology Assessment
The Netherlands

Mr M Bullock
Regional Director, Barclays Bank plc, Leeds, UK

Professor Ing. D A Martegani
Professor of Machine Design
University of Padova, Italy

Dr L Crespo
Director General
Asociacion Espanola de Nuevas Tecnologias, Spain

Dr H-J Hass
Director for Research, Technology & Structural Policy
Bundesverband der Deutschen Industrie e. V. BDI, Germany

The economic and management consultants, Segal Quince Wicksteed Limited, assisted in the Panel's secretariat function.

Background to appointment of panel

- 1.2 The SPRINT programme was launched in 1983 by the Council of European Communities as a three year pilot programme in the field of innovation and technology transfer. The pilot programme was extended by two years in 1987, after which the Council approved the launch of the current, main phase with a significantly increased budget and enlarged terms of reference.

- 1.3 Under Article 8 of the Council decision to launch the main phase, the Commission is required to present after 30 months of implementation of the programme a mid-term report to the Council, the Parliament and the Economic and Social Committee, assessing the progress achieved by the programme to date and indicating possible modifications. To assist it in the preparation of this report, the Commission appointed a panel of independent, acknowledged experts in the field of innovation and technology transfer to review the programme in the context of overall Community innovation policy and to make recommendations for possible amendments. The panel conducted its review between November 1991 and May 1992, and this report represents its findings and recommendations to the Commission.

Scope of review and methodology

- 1.4 The panel was given a mandate to:

- (a) assess the objectives of SPRINT in the context of Community innovation policy and in the light of recent/forthcoming changes in the environment in Europe;
- (b) assess the priority lines of action pursued by SPRINT in view of the objectives of the programme;
- (c) assess the results achieved taking into account the expenditure applied;
- (d) assess the benefits resulting from the implementation of the programme at the Community level (Community added value);
- (e) propose possible modifications to the programme, which appear necessary in the light of the above assessments.

- 1.5 Although the mandate required the panel to consider SPRINT within the context of Community innovation policy, the main emphasis was upon the assessment of the programme in the terms of its own objectives. In view of recent and continuing changes (technological, economic and political) in the wider environment of innovation the panel judged that some consideration should also be given to broader innovation issues, including trends in technology and implications for organisational management and structure. The changing political environment for Europe in respect of both its internal and external relationships was also considered relevant to the assessment, particularly in making recommendations for the future direction of the SPRINT programme. These considerations are addressed in chapter three of this report.
- 1.6 At the start of the review there was limited quantitative data available on the results achieved by the various SPRINT programme actions. Independent evaluation studies covering two of the longer-running, principal actions had therefore been commissioned, and the preliminary findings of these studies were made available to the panel in February. In most other cases, the actions had not been running for long enough to allow for full-scale evaluation.
- 1.7 The panel was appointed in November 1991, and required to report by the end of the following April. In view of the nature of available information, and the time and resources devoted to the exercise, the panel decided to limit the scope of the review to a primarily qualitative assessment of the SPRINT programme based upon information supplied by SPRINT officials and supplemented by informal enquiries at national level within panel members' own countries. The panel met on five occasions and agreed at its first meeting to structure its subsequent sessions around the need to produce this report, an outline of which was agreed at the second meeting, together with the work programme. Presentations were sought from SPRINT officials on the key action lines, and the relationship of SPRINT to other Community programmes. The background information supplied by SPRINT is summarised in Appendix A.

Structure of this report

- 1.8 This chapter has briefly indicated the origins of the SPRINT programme as well as of the independent review, and outlined the approach adopted by the panel. The development of SPRINT and its key action lines are described more fully in the next chapter, while the third considers the wider innovation environment in which the SPRINT programme must operate, and explores some of the key political, technological and market trends which will affect Community innovation policy in the future. Chapter four covers the panel's assessment of the objectives of the programme, and the effectiveness of the principal lines of action in the terms of those objectives. The panel's recommendations for change are given in the final chapter.

2 SPRINT PROGRAMME

- 2.1 The purpose of this chapter is to set out the background and history of the SPRINT programme, and to outline the principal lines of action and their evolution with time, since both background and programme have changed substantially since inception. It also seeks to explore the underlying philosophy and operating principles which have influenced the Commission's interpretation of the objectives set by the Council, and considers the relationship of SPRINT to other Community programmes which to a greater or lesser extent include innovation and technology transfer among their activities.

Background and history of programme

- 2.2 The SPRINT programme was launched in December 1983 as a three-year pilot programme for the "transnational development of the supporting infrastructure for innovation and technology transfer". With a limited budget (10 MECU) it was largely exploratory in character, reflecting the recognition within the Community of the economic and political importance of its field of operation. The pilot programme was directed at promoting the rapid penetration of new technologies throughout the economies of Member States through the development and transnationalisation of innovation support services, and with particular emphasis on small and medium sized enterprises (SMEs). At the time not every Member State had similar sets of initiatives, and there were marked differences in the level of development of innovation support services across regions. Thus SPRINT had a pioneering character, and placed considerable emphasis on learning and the transfer of experience.
- 2.3 The pilot programme was extended for a further two years in 1987 with a budget of 8.6 MECU, and slightly wider terms of reference. At this time it acquired its current title - the Strategic Programme for Innovation and Technology Transfer, reflecting the increasing awareness within the Community of the importance and complexity of industrial innovation.

2.4 The current, main phase of SPRINT was launched in 1989 with a budget of 90 MECU for a five-year programme. The objectives were further broadened as follows:

- I to strengthen the innovative capacity of European producers of goods and services, with a view to the 1993 Single Market;
- II to promote rapid penetration by new technologies and the dissemination of innovation throughout the economic fabric of the Community;
- III to enhance the effectiveness and coherence of existing instruments and policies, whether regional, national or Community, in the field of innovation and technology transfer.

These objectives give SPRINT a unique character compared with other national or Community initiatives in that it has both a vertical dimension, deriving from the first two objectives (the improvement of the strategic capabilities of innovating companies, and the facilitating of technological diffusion), and a horizontal dimension, deriving from the third objective (the development of a cohesive innovation strategy across the Community).

2.5 The development of the SPRINT programme as outlined above reflects the increasing concern within the Community that although Europe does not lack technological or scientific competence in the creation of new technologies, it is far less effective than some of its major competitors (notably the USA and Japan) at exploiting new technologies. Modern research indicates that industrial innovation is a highly complex, interactive process which transcends traditional boundaries, and in which the social, economic and political framework is as important as scientific and technological competence. The situation is further complicated by the pace of change imposed by the rapid advance of technology, and factors such as the increasing globalisation of markets.

2.6 As understanding of the industrial innovation process has improved, public action at regional, national and Community level has increased, but at different paces, rhythm and intensity, thus increasing the risk of wider divergence in actions and the need for Community measure to improve cohesion. The rationale for public action in this area derives from a perceived need for measures to help build an innovation and technology transfer support infrastructure, to enable companies to benefit from available resources, (technological, advisory and financial) to assist with innovation, and to remove barriers to the operation of market mechanisms in relation to technology transfer and industrial innovation. This rationale is based upon two premises:

- (a) that industrial innovation and diffusion of new technologies are decisive factors in the achievement of technological competitiveness;
- (b) that industrial innovation strongly benefits from technological linkages between companies, and between companies and regional innovation infrastructures.

2.7 The SPRINT programme actions deriving from this rationale therefore emphasise measures to enhance the innovation environment and infrastructure with the ultimate aim of increasing technology diffusion both within Member States and transnationally within Europe. A further dimension is derived from the Panel's perception of the lack of an integrated Community innovation policy, need for which is strengthened by the complexity of the processes involved and the pace of change imposed by technological developments. These issues were brought out at Maastricht where competitiveness was highlighted as an objective of Community policy, and exploitation of R&D results and innovation were recognised as important contributors to the achievement of competitiveness .

Overall philosophy and operating principles of action

- 2.8 The objectives for SPRINT set by the Council are very wide in scope, but the budget is relatively restricted. In view of the limited resources available, the programme initially concentrated on the support and development of intermediary structures (the so-called technology transfer or innovation support services), with the emphasis on transnational collaboration. The underlying assumption was that development of technological linkages between firms are fundamental to industrial innovation, but that lack of experience in collaboration, directly or through intermediaries, was a barrier to the formation of such linkages between SMEs. In addition, the process of technology development and acquisition by smaller firms was seen to involve access to external sources of competence in several domains including patenting, idea generation, assessment of technological opportunities, market appraisal and management techniques. The limited knowledge at Community, national and regional level of the effectiveness of policy measures was such that SPRINT was conceived as a learning programme for all participating actors, with particular emphasis on actions which were experimental, catalytic or demonstrative of best practice. The main focus in the pilot phase was on transnational intermediary infrastructures rather than specific technologies and the actions launched during this phase included two designed to promote the formation of transnational networks of providers of innovation support services, such as technology brokers, development agencies and research and technology organisations, as well as a programme of conferences with a European dimension on technology transfer and innovation issues.
- 2.9 Following the actions launched during the pilot phase it became increasingly clear that the learning process must operate over a relatively long timescale on account of the complexity of the innovation process itself, and the differences between regions in technological knowledge and infrastructure. With the launch of the main phase of the programme therefore there was a shift in emphasis towards actions which may speed up the learning process, and which specifically encourage transnational technology diffusion. The Specific Projects action, consisting of large scale industrially relevant technology transfer projects, is indicative of this shift, since it is intended to provide best practice demonstrations of transnational transfer of specific existing technologies and their successful acquisition and integration by the new end users (including the successful management of the organisational changes brought about by the introduction of the new technology).

- 2.10 Over time there has been an additional shift in focus from the early concentration on the supply side of innovation - the availability of resources - towards the exploration of ways in which the programme may seek to stimulate demand.

Current actions

- 2.11 The complexity of the innovation process makes it difficult to classify individual actions strictly in relation to the SPRINT objectives, and most actions address more than one of the programme's aims.
- 2.12 The actions can however be considered in three groups:
- (a) measures to facilitate the diffusion of new technologies to companies;
 - (b) measures to strengthen the European innovation and technology transfer service infrastructure;
 - (c) measures to improve the understanding of innovation and technology transfer.

Measures to facilitate the diffusion of new technologies to companies

- 2.13 There are three main areas of action which fall into this group - the Specific Projects action, measures on information and finance for technological innovation, and innovation services networks and associated support measures.

Specific Projects

- 2.14 The Specific Projects action is relatively recent, having been introduced in the main phase with a budget of 30 MECU. The projects selected under this action are concerned with the transfer and adaptation of existing technologies into another sector or region of the Community where they are not yet used, the adaptation and transfer representing the innovation rather than the technology itself. Although projects may involve any sector or technology, most focus on 'broad spectrum' technologies such as information technology or biotechnology. The receiving sectors tend to be drawn from traditional industrial sectors or those with a strong social dimension such as health care, environmental protection, urban engineering or water

management. These projects are designed to serve as demonstrations of best practice in transnational technology transfer, including not only the application of the technology itself but also the whole management process required to implement the successful transfer. The intention is to provide a comprehensive approach to large scale technology transfer which may be adopted as a model for similar projects in other sectors or regions. The projects also have a strong transnational dimension, and are intended to demonstrate the effectiveness of collaboration between complementary organisations such as companies, research organisations, consultants, financial institutions, local authorities, training institutes etc.

- 2.15 In selecting projects a clear orientation towards the end-user was considered essential, but both demand-led and technology-driven approaches were accepted. Two calls have been made, resulting in acceptance of 29 projects for possible implementation, with a majority drawn from the electronics and IT sectors. One hundred and fifty organisations are involved, including large industrial manufacturers, SMEs, trade associations, local authorities, and research and education institutions. Implementation of a project consists of three phases, the first of which (the definition phase) requires a full feasibility study together with recommendations for implementation. Following evaluation by internal and external experts with experience of other EC programmes, the project proceeds to the implementation and finally the dissemination phases. Proposals accepted in the first call have now largely completed the definition phase, and the process of transition to implementation is under way. It is expected that about 40% of those selected for the definition phase will actually proceed to implementation, partially on account of budget limitations. Each project is expected to cost between one and three million ECUs, and the EC contribution is limited to 75% of the definition phase costs, and 35% of the implementation and dissemination costs.

Information for technological innovation

- 2.16 The availability of appropriate information is a key requirement for successful innovation, which SMEs often experience difficulty in obtaining either. SPRINT therefore includes a range of measures to improve access to technological and managerial information, primarily through its networks of Research and Technology Organisations (RTOs).

- 2.17 RTOs are organisations which provide a range of services of interest to either a particular industrial sector, or to the users of a particular technology, such as laser technology, which may have applications in several sectors. Services offered include R&D, information on related sectors/technologies and establishment of norms and standards. Such organisations represent an important resource for technology transfer and innovation, and include public and private sector organisations, with the potential to influence every area of industry. As such, they were seen as ideal subjects for the second SPRINT action launched to encourage the development of transnational support networks and there are now some 55 networks involving approximately one third of Community RTOs, ie about 200 organisations.
- 2.18 Both sectoral and technology based organisations are represented, and the main aim of the action initially was to foster transnational cooperation and the demonstration of best practice between such organisations within the Community. As the programme has developed it has become more focused, with a greater emphasis on the involvement of user companies and on the dissemination of technical and economic information on new technologies. Projects receiving support under the scheme include those involving specific development and the testing and evaluation of technologies in order to determine those most effective for a particular application.
- 2.19 The preliminary findings of an independent evaluation of this action indicate that it has been broadly successful in strengthening the innovation support infrastructure and encouraging a European dimension (ie the first objective), although there is some doubt that the networks will be self-sustaining, particularly where participants differ in funding base or R&D capabilities. RTOs tend to fall into two groups: those whose funding derives primarily from compulsory private sector subscriptions and/or public funds, and those which are largely dependent on commercial income. The latter are understandably more market oriented in their activities, and often have developed good international links, whereas the former tend to be more research oriented. The differences in funding tend to be reflected as well in technology diffusion capabilities, with the market oriented RTOs tending to be stronger in this respect. Networks combining RTOs of differing R&D capabilities and funding bases tend to give fewer advantages to the stronger parties, giving rise to some doubts as to the attractiveness of their remaining in such networks without continued SPRINT support.

- 2.20 Up till now the action has had less impact on the diffusion of new technologies and other resources to firms, partly because of the length of time needed for networks to establish good working relationships where no prior knowledge exists between the participants, and partly because of the lack of priority given by some participants to the diffusion process.

Finance for technical innovation

- 2.21 There are two actions to facilitate access to financial information and resources - investment fora, and the Technology Performance Financing scheme. Investment fora were intended to provide a meeting ground between European investors and innovative firms, and a degree of selectivity is therefore encouraged in order to maximise the likelihood of achieving deals. The fora are organised by Community and national agencies such as the European Venture Capital Association (EVCA), CDTI (Spain) and ANVAR (France). The trial phase was considered to be successful, and the action is continuing with 12 fora to be held throughout the Community between 1991 and 1993.
- 2.22 The Technology Performance Financing action is experimental in nature. Technology performance financing was developed in the USA to promote the uptake of modern technology by industries and organisations which are resistant to change. One of the key elements of such resistance is the perceived risk of acquiring unproven modern technology, particularly since significant financial investment is usually required. Under technology performance financing, risks are shared by the financial institution and the supplier as well as the receiving organisation, since payment for the technology, which can include both equipment and services, is at least partially contingent on performance.
- 2.23 SPRINT has launched a pilot scheme to obtain the active participation of a core group of major financial institutions each to invest in a minimum of ten projects each over two years. The aim is to gain experience of such financing, and to demonstrate its feasibility in Europe with a view to establishing it as an accepted market mechanism. Under the scheme, SPRINT subsidises part of the appraisal and administrative costs together and underwrites some of the losses which may arise from under-performance or default. The pilot scheme has attracted considerable interest, and the core group of financial institutions has been established.

Innovation services networks and associated support measures

- 2.24 The first action launched by SPRINT was the creation of transnational networks for technology transfer and innovation management advisory services, and this has formed one of the main thrusts of the SPRINT programme. The underlying assumption is that in order to innovate successfully SMEs need access to information and intermediaries, and that provision of innovation support services by such intermediaries can be enhanced by development of transnational links. During the pilot phase of the programme, the principle emphasis was on the establishment of stable networks with a view to long term self-sufficiency, but during the main phase there has been more emphasis on the number of technology transfer agreements achieved by the network.
- 2.25 The network participants now include some 250 organisations, and represent a wide range of character and experience and both private and public sector organisations eg private consultants, local authorities, science parks and universities. The preliminary findings of the recent independent evaluation suggest that the action has had been successful in the promotion of a transnational infrastructure although it is unlikely that the networks would continue to operate to the same extent in the absence of SPRINT funding.
- 2.26 In terms of facilitating the diffusion of new technologies and other resources to firms, it would appear to date that many of the agreements reached have been general commercial agreements incorporating little significant technology transfer. However, the lead time necessary to conclude agreements are often significant, and a commercial agreement is often a first step towards building mutual confidence and achieving a genuine technology transfer arrangement.

2.27 Finally, network support measures directed at fostering technology diffusion include technology transfer days which are organised on a regional basis to put selected firms seeking partners in other countries in touch with technology brokers from other regions. Brokers are informed about the participants in advance and therefore are able to identify possible opportunities among their clients before the day. Experience shows that each participating company usually achieves 4-5 bilateral meetings and that approximately 10% of such meetings result in subsequent negotiations between firms and technology brokers. With approximately 60 firms participating in a TT day, this represents a very cost effective way of achieving technology transfer negotiations and the programme is planned to continue to the end of 1993 at present. The European Association for the Transfer of Technologies, Innovation and Industrial Information (usually abbreviated to TII) provided useful assistance during the initial phase of these measures.

Measures to strengthen the European innovation and technology transfer service infrastructure

2.28 The networks described above could clearly be considered in relation to this heading as well, and it would have been more appropriate to do so in the early phases of their development. The measures to be considered in this group are less concerned with directly improving the flow of new technologies to companies, and include the Science Park consultancy scheme, the creation of new networks, measures to support the development and effectiveness of networks and measures to increase the penetration of new management techniques.

Science Park Consultancy scheme

2.29 The purpose of this action is to assist the promoters of science parks to improve the planning, and therefore the chances of success, of new science parks by supporting the establishment of a panel of independent experts drawn primarily from other Community countries. Under the scheme, the EC provides financial support to the promoters of a new science park or incubator initiative for the establishment of a panel of three to five independent advisers, of whom only one may be from the country in which the science park is to be located. Support is limited to 50% of the panel's costs (75% in priority regions), up to a maximum of 40,000 ECUs per project and 15 mandays per expert. Launched in 1990, a register of experts has been

compiled, and 52 applications have been identified for support, ranging from the establishment of new multi-disciplinary science parks to those with a sectoral emphasis. About 40 projects have appointed their panel of experts, and 18 have completed the initial stages of the consultancy. Financial investment to date has been low, but the returns have already been encouraging and the action is a good illustration of a low-cost, bottom-up, catalytic and incitative type of approach with possible applications in other fields.

Development of new networks

- 2.30 Two new networks have been launched under the main phase of the programme - the European Association of Contract Research Organisations (EACRO) and EUROTECH.
- 2.31 EACRO was established as a result of a study undertaken during the pilot phase of SPRINT which identified contract research organisations as key agents for trans-sectoral technology diffusion which had to that date a very national market. It is a professional association, with some 50 members drawn from 10 countries. To date it has established working parties on matters such as the preparation of a code of conduct for the research profession, and has initiated five transnational cooperative research programmes with support from SPRINT. Training courses, seminars and two international conferences have also been held. According to its members international orientation and cooperation between members has significantly increased since EACRO's creation.
- 2.32 EUROTECH was launched in 1988 as a pilot programme to facilitate the cross commercialisation of technology arising from research in national (public) research and development organisations. Its members include British Technology Group (UK), ANVAR (France), CDTI (Spain), Fraunhofer-Gesellschaft (Germany). It reflects concern over the considerable differences between Member States in the dissemination and exploitation of publicly sponsored research, and the recognition that such dissemination should not be limited by national boundaries. To date, the main activity within EUROTECH (which now includes organisations from all Member States except Luxembourg) has been the identification of best practice, and the transfer of know-how between organisations notably between the more advanced

northern ones and the less experienced southern ones (thus strengthening cohesion), but more recent actions emphasise the need to achieve transnational licensing agreements.

Network support measures

- 2.33 These measures are intended to facilitate the formation of networks and to improve their operational efficacy primarily through the exchange of experience. The measures consist of group visits to introduce groups of intermediaries to the innovation infrastructure in particular regions; professional exchanges to allow intermediaries to gain experience of similar organisations' working methods; and transfer of know-how seminars aimed primarily at reducing discrepancies within the Community in the level of experience and development in the provision of innovation support and technology transfer services.

Innovation and management techniques

- 2.34 The identification, development and assessment of best practice in management techniques which encourage innovation and technology uptake by companies is seen as being an important area for further development of the SPRINT programme eg innovation diagnosis, value analysis, design and quality promotion techniques. Particular emphasis is being given to creating awareness of the economic benefits associated with the successful application of such techniques in an integrated "systemic" approach. Action in this area consists of a range of measures aimed at developing both the supply of and demand for such techniques throughout the Community. The actions employ a range of techniques including international conferences and seminars, comparative studies, sponsoring of prizes, (such as the Community Design Prize) and production of specialised publications.

Measures to improve the understanding of innovation and technology transfer

- 2.35 The group of actions considered under this heading are primarily concerned with the SPRINT's third objective - the enhancement of innovation instruments and policies at every level of the Community to give greater effectiveness and coherence. The actions consist of measures to build up a knowledge base for innovation and

technology transfer (the European Innovation Monitoring System - EIMS), to monitor and evaluate SPRINT actions, and to encourage the synergy of Community and Member States' actions through the exchange of information and experience on innovation policies and support measures.

European Innovation Monitoring System (EIMS)

- 2.36 This action reflects the increasing need for reliable information as a foundation for formulating innovation policies in the face of the major changes in the innovation environment which are considered in more detail in the next chapter. Its main aims are to collect and disseminate information on innovation and technology transfer, and to organise a permanent and interactive system for the production and use of such knowledge. This is to be achieved through the development of centres of excellence for applied innovation research at a European level, the provision of a clearing house for the results of relevant studies, and the development of a permanent Community wide system for monitoring innovation performance and processes on an industrial and regional basis. Evaluation studies of some of the main SPRINT actions have already been commissioned under this action.

Working groups

- 2.37 The Commission is assisted in the implementation of the SPRINT programme by the Committee on Innovation and Transfer of Technology (CIT) whose members are nominated by Member States. Working groups established by CIT aim to promote the systematic exchange of experience between policy makers at national and Community level, and also launch experimental actions, notably those taken in the field of innovation management techniques such as Design, Quality and Value Analysis described above. Current working groups also include one on Industrial Property Rights and Innovation, which advises the Commission on measures to overcome obstacles to innovation arising from intellectual property issues, and another on Regional Technology Advisory Centres.

Boundaries with other Community programmes

- 2.38 As mentioned above, SPRINT is part of a broad range of actions at regional, national and Community level which include innovation and technology transfer among their activities, but SPRINT is the only programme which is concerned exclusively with all aspects of innovation and technology transfer. The principal Community actions which have boundaries with SPRINT are the RDT Framework Programme, the Structural Funds, the SME Action Plan, and to some extent also the COMETT programme.

RDT Framework Programme

- 2.39 Although this programme is essentially concerned with pre-competitive research, there is an increasing emphasis on the utilisation of results and on the early involvement of end-users, as a result of which programmes such as ESPRIT and BRITE (with the CRAFT initiative) include technology transfer and diffusion activities but only in relation to R&D which has been supported by the Community. Although this focus is likely to increase following the Maastricht agreements these programmes are concerned primarily with particular R&D projects. The programmes tend to operate over longer timescales than SPRINT, and involve larger scale projects. In this respect there is a strong complementarity between SPRINT and the specific programmes of the Framework Programme in that the former is seeking to create the conditions which will stimulate innovation and technology uptake by companies while the latter is seeking to promote the development of new technology which may lead to a specific innovation.

Structural funds

- 2.40 The Structural Funds have been considerably augmented in recent years, and they are likely to play an increasingly important role in the development of innovation and technology transfer activities as they move towards funding intangible investment as well as regional infrastructures. However, the actions remain firmly based on fostering cohesion based on regional development and the levelling of discrepancies between regions. Some actions, most notably STRIDE, have been specifically concerned with innovation, but most structural actions have lacked the transnational

emphasis which characterizes SPRINT. However recent developments, including INTERREG and ERDF grants on Networks and Urban Pilot Projects have a strong transnational dimension which includes innovation support and technology transfer. It seems likely that there will be increasing commonality between these actions and SPRINT in the future. However, the modes of operation and management of actions are very different.

SME Action Plan

- 2.41 Many Community programmes, to varying degrees, have an explicit regard for the needs of SMEs. Furthermore, under its Enterprise Policy the Commission has developed a series of SME support measures, which tackle the problems of all types of SMEs across the board. Some of these actions such as BC-Net and Europartenariat, like SPRINT, operate through intermediary organisations. Some of these organisations, particularly those which provide a broad range of services, participate in both programmes. This has called for a considerable amount of liaison between SPRINT and the SME Action Plan on particular projects.

Other relevant Community programmes

- 2.42 There are areas of potential overlap between SPRINT and some other Community programmes, notably in the field of training (COMETT, EUROTECNET) and the activities of DGIII in the area of norms and standards. The European Development Funds and in particular the PHARE and PVD/ALA programmes of support for development in Eastern and Central Europe, developing countries and Latin America are likely to involve many activities of potential relevance to SPRINT.

3 THE CONTEXT FOR THE SPRINT PROGRAMME

Introduction

3.1 The panel considered that it was only possible to review the SPRINT programme within the context of the environment within which the actions operate. Therefore one of the panel meetings was devoted to a discussion of the factors affecting innovation and how these factors would be likely to change over the medium term. Members felt that if it was to continue to be effective SPRINT must be sensitive to the changes in the factors underlying innovation and must respond flexibly to developments in the environment affecting innovation.

3.2 This chapter of the report summarises the conclusions of the panel's discussion on the context within which SPRINT operates. It is divided into four sections dealing respectively with:

- the innovation process and barriers to innovation
- the rationale for SPRINT
- likely developments in the external environment
- implications for the future of the programme.

The innovation process

3.3 As a basis for working discussion the panel adopted the following definitions:

- (i) A *product innovation* is the commercialisation of a technologically changed product. Technological change occurs when the design characteristics of the product changes in ways which deliver new or improved services.

- (ii) *A process innovation* occurs when there is a significant change in the technology of production of an item. This may involve new equipment, new management and organisation methods, or both.
- (iii) *Diffusion* is the way in which innovations spread, through market or non-market channels. Without diffusion, an innovation will have no economic impact.
- (iv) *Technology transfer*, which is not covered by the OECD definitions was taken by the panel to include all activities concerned with the transformation of new technology into innovation and the various means by which technological knowledge is spread.

3.4 The panel felt strongly that there was a real need for an EC programme focusing specifically on innovation, technology diffusion and technology transfer. While Europe has sufficient capacity to develop new technology, the panel believed that it lagged more in its capacity to rapidly apply new technology. In itself this demands public policy action. Additionally, likely changes in other Community programmes reinforce the need for a programme to create a favourable environment for the absorption of new technology by firms. In particular the possible shift within the RTD Framework Programme towards development (as opposed to fundamental and applied research) will require that more effort is devoted to technology transfer and innovation if the full benefits of this investment are to be exploited.

3.5 While the focus of SPRINT should be technological innovation and its diffusion (as defined above), the panel recognised that innovation (in particular process innovation) requires management and organisational changes. Indeed, innovation is much more a management than a technical function. While successful innovation management requires technological competence, on its own technological competence is insufficient. SPRINT actions should not, therefore, be limited solely to technical issues but must seek to operate on any part of the innovation process where there is justification for public policy intervention.

3.6 The panel was also aware of the dangers of basing policy actions too heavily on the linear model, which assumes a linear progression: research, invention, innovation, diffusion. Such a model tends to emphasise the primacy of R&D and to policy interventions in support of R&D which assume that:

- the output of R&D will itself be directly useful, and
- will feed through to the economy.

3.7 Similarly, the demand pull model, while providing some useful insights, was also felt to be simplistic. Under this model the market exerts pressure for technological change which feeds back through the process to the R&D stage.

3.8 Modern theories of innovation, for example the "chain-link" model prepared by Kline & Rosenberg or the "innovation poles" model proposed by Michel Callon, envisage a much more complex and interactive process. These models embody a wide range of factors which interact with each other within the innovation process, including:

- strategic decisions by firms about what markets they wish to serve
- all aspects of R&D, prototype design and testing
- non technological actions by firms to develop concepts for new products (for example through brainstorming or through market research)
- the acquisition of technology from other organisations (business and non-business)
- innovation embodied in capital equipment
- innovation in management methods and organisation

- the environment for innovation (availability of capital, technical support, regulations, local innovation support services etc)
 - innovation which can have a strong regional and/or sectoral dimension.
- 3.9 In addition modern theories stress the role of *existing* as opposed to *new* knowledge as a source of innovative ideas and as a pre-requisite for successful innovation and diffusion. There is often a failure to recognise sufficiently the role of existing knowledge and an overemphasis on the development of new knowledge. It is well known that the assimilation of new technology within an enterprise depends critically on the level of existing knowledge about that technology and complementary technologies. So, R&D has a role not only in the development of new technology but also in the maintenance and enhancement of the body of knowledge. It is because of the crucial nature of knowledge that people are so important to the innovation process; to a very large extent knowledge is embodied in individuals.
- 3.10 The panel considered that while there were strong barriers to innovation the nature of these barriers had not changed significantly in the recent past and that there was no indication that they would change significantly within the medium term future. Briefly the panel concluded that constraints on innovation derived from the technological and commercial risks involved. Any innovation involves technological risk and almost all involves commercial risk.
- (i) Innovation commonly involves investment and investment needs to be funded. Depending on the type of funding (loan vs equity) the business may become more susceptible to failure (through increased fixed costs).
 - (ii) Frequently also innovation is linked to a change in the scale of the business and a need to find new markets. Again, this has inherent commercial and thereby financial risks.

These factors tend to combine strongly in the case of new technology-based firms (NTBFs).

- 3.11 As regards barriers which are internal to the firm it was felt that to some extent firms are failing to spot appropriate new technologies, ie their technology scanning skills are insufficiently developed. Of more significance are poorly developed innovation management skills within businesses; ie the inability of firms to manage the process efficiently deters them from innovating or exposes them to undue commercial risk. There are several necessary elements to innovation management including strategic planning, marketing and R&D; the activity requires a great deal more than just technological skills. Firms' capabilities across the range of required expertise and their abilities to integrate different skills are the main determinants of successful innovation.
- 3.12 As far as external barriers are concerned any capital market rigidities which limit the availability of risk capital will tend to reduce the rate of innovation. Similarly, any economic factors that create market fluctuations would be likely to reduce innovation to the extent that economic fluctuations lead to changes in the cost of capital and at the same time changes in aggregate demand and thereby the output of the innovating enterprise.

The Panel's assessment of the rationale for SPRINT

- 3.13 The panel considered that the role for SPRINT was justified on two grounds
- 3.14 First, if the Community is to improve its competitiveness vis à vis other major trading blocs in the world then collective action on technology transfer and innovation between organisations in different Member States is necessary,
- (a) to supplement action at national and regional level;
 - (b) to help improve innovation support in disadvantaged areas (and contribute to cohesion); and
 - (c) to help ensure that policy lessons learnt in one country are rapidly transmitted to and applied in all others.

The means must exist for technological developments made in one Member State to be rapidly disseminated and fed through to innovation in all others. Because of market and institutional imperfections, in some fields of innovation and in some Member States such transnational links are not well developed, particularly in relation to SMEs. It is judged that many of these market imperfections derive from inadequate knowledge and that they decline significantly once organisations have experience of working together.

- 3.15 Second, in a similar way many of the barriers to innovation per se (for example, the difficulty in funding innovation) derive from inadequate knowledge. Though they may differ in degree all Member States suffer from such imperfections and this justifies action at the Community level to encourage the spread of best practice in innovation support at national, regional and local level.
- 3.16 In its discussion the panel concurred with the rationale for SPRINT. The view of all panel members was that there is a critical need for Community action to help develop and exchange experience of transnational technology transfer and to tackle some of the common barriers to innovation and technology transfer, and to contribute to cohesion. The panel considered that with practical experience many of the constraints on technology transfer and innovation will decline.
- 3.17 However, for three reasons the panel felt that SPRINT actions must be carefully targeted.
- (i) As described in the previous section much Community action in other fields (most notably relating to the RTD Framework Programme, the Structural Programme and in the SME sphere) has an influence on innovation and technology transfer. It is well understood that it would be impractical to have strict lines of demarcation between SPRINT and other programmes. Indeed there are positive benefits in mutually reinforcing policies. However, the panel felt that SPRINT must be positioned in relation to other programmes such that:

- total overlap is avoided;
 - SPRINT initiatives reinforce and are reinforced by initiatives under other programmes, ie programmes have a high degree of complementarity; and
 - the lessons learnt in running the only explicit innovation programme are built upon to provide greater coherence in and understanding of innovation.
- (ii) All Member States also have programmes and initiatives which directly or indirectly relate to innovation and technology transfer. In a similar way SPRINT actions must complement national and regional measures, filling gaps where they exist such that support of key aspects of innovation is available throughout the Community. It must also concentrate on exchange of experiences in innovation and technology transfer, and in public policy as it relates to these activities, such that best practice techniques are quickly and widely adopted. In this regard it is worth noting the strong regional dimension of innovation support. In recent years the range of regional development organisations involved with innovation and technology transfer has increased very significantly. In this way the programme can help improve coherence of national and regional innovation policies.
- (iii) The environment within which innovation is taking place is a rapidly changing one. The critical issues affecting the rate of innovation are not constant but shift with changes in the overall environment. To be most effective SPRINT must be alert to these changes and focus its activities where they will have the greatest impact.

To conclude, SPRINT needs to sustain actions consistently over long periods (to maximise impact) but also be sufficiently flexible to cater for new/changing needs.

- 3.18 The last of the three sets of factors outlined above was selected for detailed discussion in one of the panel's working sessions. The aim of this discussion was to help identify key changes in the innovation environment and by so doing to highlight possible opportunities or needs for future SPRINT action.

- 3.19 Part of the panel's discussion did focus on technological trends but this was not pursued to any extent. It was felt that work in other parts of the Commission (notably under FAST or SAST in DGXII) were more directly concerned with these issues and in any event doubt was expressed as to whether SPRINT should have a technology-specific dimension. The general view was that it should encourage innovation and technology transfer across the board, concentrating its activities on the relief of specific constraints. However, it was felt that in terms of generating a demonstration effect there may be merit in clustering projects in a particular sector/technology or round a particular issue.

Contextual issues

- 3.20 There are a variety of background or contextual issues which are likely to impact strongly on economic life over the next ten years and which may, therefore, have an important bearing on the context within which innovation takes place and maybe also on the needs for different types of innovation support actions. These can be dealt with in four groups.

Geo-political issues

- 3.21 A range of geopolitical changes are evident at the present time, including the emergence of several strong Asia Pacific economies, and the development of a common market in North and Central America. The change likely to have the most important influence in Europe is the breakup of the former Soviet Empire. These dramatic developments have several ramifications for the Community.

Instability

- 3.22 While potentially the members of CIS and the former satellites of the USSR constitute a large new market for the Community, they also are a major force for instability. Such instability will be exhibited in large capital (aid) flows, increased competition from the members of the old Soviet Bloc (perhaps even the dumping of some products on the Community market) and economic migration (of people). To the extent that instability is not conducive to innovation because it acts to increase risk,

these changes are likely to slow down rather than speed up the rate of innovation. But, they also represent a positive challenge for innovative solutions and newer fields for action (for example economic restructuring and the environment).

Defence conversion

- 3.23 For similar reasons the defence posture of Member States is likely to change - shifting from major nuclear and conventional forces designed to confront the Soviet Threat to smaller scale, rapid reaction and peacekeeping forces. The overall outcome is likely to be a fairly substantial decline in defence expenditure. However as far as innovation is concerned this effect is likely to be offset to some extent by the increased technological complexity of defence equipment, ie technology will get a large share of a smaller budget. At the same time many scientists and technologists could be released from defence work. Because of the concentration of defence industries in particular localities there is certain to be pressure to encourage and facilitate conversion at the company level and to avoid the more painful process of transferring resources through redundancy and closure. This poses some challenging problems in relation to innovation and technology transfer, both in terms of the use of defence technology in the civil sphere and in terms of the management changes needed to reorientate defence businesses to civil work.

The Single Market

- 3.24 As the Single Market plays a more and more important role it is likely to increase the pressure for innovation (ie the competition stimulus). At the same time it could operate to create a degree of defensiveness as more and more national markets are the subject of competition from firms of other Member States. This impact will be particularly strongly felt in relation to government (public) procurement of goods and services which to date has been afforded considerable de facto protection. So, while the pressure to innovate will increase there may be some reluctance to collaborate on technology transfer across national boundaries.

Economic issues

Technology and competitiveness

- 3.25 Technology has always been one of the means by which companies or nations achieve a competitive advantage and thereby increase market share. But there are other sources of competitive advantage, for example control of privileged channels of distribution, privileged access to raw materials, more skilled or hardworking labour, or brand image. The general view is that technology has become one of the most important source of competitive advantage and that it is likely to become even more so in future. The rate of innovation must, therefore, increase.

Globalisation

- 3.26 For many goods the rate of product change is such that it is only worthwhile to market them on a global scale. In particular, spending on R&D has become a major and necessary element within business overheads. This creates additional pressure to reduce the time to market, and to minimise quality losses. So, the pace of innovation has, in itself, become an important source of competitive advantage and innovation itself has a strong transnational dimension.

Interfirm relationships

- 3.27 In turn this has implications for interfirm relationships. First, the costs of developing new or enhanced products and the need to market globally have encouraged the formation of strategic alliances between large businesses. Second, strategic links between large firms and small firms are an increasingly important means by which international corporations obtain some of the strengths of small businesses - ability to act quickly and to undertake R&D inexpensively. Third, the same set of pressures have encouraged large companies to develop closer relationships with their component suppliers. As well as coordinated production and the operation of just-in-time, such links are also shifting the responsibility for product development down the supplier chain. Fourth, alliances between small firms or the formation of groups of small firms are, for similar reasons, becoming more commonplace.

Customisation and service

- 3.28 Within all developed economies the growth of personal incomes has meant a steady shift in economic activity from the production of tangible goods to the supply of services. Additionally, consumers are also demanding increasing customisation, leading to an upsurge in high quality crafted products (including clothing and specialist food) and, at the other end of the spectrum, the deployment of flexible manufacturing systems. In the industrial sphere the reduced hardware costs and greater reliability/performance associated with microprocessors have caused more emphasis to be placed on accompanying services. All these changes have implications for labour supply (greater skill, less routine activities), work organisation (less vertical systems), and management (more participative).

Scale changes

- 3.29 Historically there has been a general shift towards larger scale business operations, particularly in manufacturing but also in services. The pressure for increased scale has largely been technologically driven (technological economies of scale) though this has often been accompanied by scale economies in marketing and distribution. In some sectors increasing production scale economies still apply but in many sectors modern production technology (like flexible manufacturing) has served to increase the viability of small units. As far as marketing is concerned the pressure to increase scale remains strong although, as noted above, this can be addressed through cooperation between businesses.

Population related issues*The environment and the cities*

- 3.30 There are a wide range of environmental issues currently causing concern, arising from pollution generated by Member States and nearby countries, particularly the former members of the Soviet bloc. Specific environmental problems are faced by cities. Indeed, large urban areas which face economic, social and environmental problems, have become a major issue in their own right. Making cities attractive places to live and work is one of the most important challenges facing industrial and industrialising countries.

Age, health and skills

- 3.31 Europe has an aging population and in some Member States the rate of reproduction is insufficient to maintain the overall population level. This has obvious implications for the aggregate demand for health service provision and for the nature of provision. It also has implications for skill supply and the ease with which new skill needs can be met. Most fundamental changes in overall skill levels within a population occur between rather than within generations. A slow growing or static population thus offers less prospect for introducing fundamental changes than a fast growing one. If Europe is to compete effectively with many Asian countries with continuing high rates of population growth it will need to find new means of skill upgrading.

Business organisation and management issues*Company culture and leadership*

- 3.32 With a shift away from vertical forms of organisation which have large numbers of unskilled or semi-skilled at the base of the pyramid, the trend is towards flatter structures involving fewer but better qualified people. This has important implications for the way in which staff are controlled and motivated. While a company's competitive position may be sustained by technology the pace of change is such that even a major breakthrough does not offer an enduring advantage. The need is to sustain a consistently fast rate of change and in turn this relies on an ability to motivate highly skilled individuals, not necessarily as individuals but as teams.
- 3.33 A similar point can be made about the capacity of business organisations to absorb rapid technological change. Many managers are resistant to new technology with which they are unfamiliar and generally feel more confident with the technology on which they, themselves, trained. The ability to attract and manage staff who are able to implement change in technology is therefore a key management skill.

Hybridised business leaders

- 3.34 True entrepreneurs are, by definition, multi-dimensional and able to integrate a range of elements to form a coherent business. The need for such managers, rather than narrow functionally based ones (such as production, finance or marketing) is increasing. Bureaucratic management systems are incapable of fully integrating all the elements necessary nor of acting sufficiently rapidly.

Conclusions

- 3.35 The brief discussion of the constraints on innovation and the environment within which innovation takes place provided some guidance on those aspects which generally need to be afforded greater priority and where potentially SPRINT might consider playing a role. Broadly, these can be summarised as follows:
- new methods of funding innovative businesses, especially new technology-based firms (NTBFs)
 - the reorientation of defence related enterprises and the civil exploitation of defence technology
 - greater involvement with emerging regionally-based organisations involved in innovation and technology transfer
 - large firm/small firm RTD and supplier links
 - innovation relating to cities
 - innovation related to skills acquisition
 - technology transfer via people transfer
 - innovation in organisation and management
 - innovation and economic change in the CIS and former Soviet satellites.

- 3.36 Above all, however, the panel's deliberations pointed to the need for continued action to support the rate of innovation. It considered that the rationale for SPRINT, based on market and institutional imperfections, remained valid.

4 ASSESSMENT OF SPRINT PROGRAMME

Introduction

- 4.1 This section of the report presents the panel's assessment of the current SPRINT programme and sets out their views on the future development of the programme. The assessment was conducted in three main ways.
- 4.2 First, the panel called various individuals concerned with the establishment and operation of the programme to give presentations about SPRINT as a whole and about each of the main actions. These individuals included both Commission officials and staff of the Technical Assistance Unit (TAU). The panel questioned those it called at some length and are grateful to these individuals for their patience and, above all, their willingness openly to discuss all the issues raised by the panel.
- 4.3 Second, the panel had advance access to a variety of documentary material about the overall programme, including its rationale and objectives, and about each action. This material included information generated from routine monitoring activity. In the case of two actions, Interfirm Networks and RTO Networks, in addition the panel was provided with copies of the interim output of large-scale evaluation studies, on which it also received presentations from the consultants carrying out these studies. Though these studies had not reached a point at which detailed quantitative results were available the information provided was nonetheless very useful.
- 4.4 Third, between meetings panel members took the opportunity to make contact (mainly by telephone) with a range of organisations in their respective Member States which had knowledge of one or more aspects of the programme or, more generally, were knowledgeable about innovation and technology transfer and policy measures in this field. The panel is grateful to this wider group for their cooperation.

- 4.5 In presenting the panel's assessment of SPRINT this section is divided into four parts. The first part comments on the rationale for action in the field of innovation and technology transfer, on the overall justification for Community action in this field, and on the appropriate nature of that action. The second makes observations about the main elements of the current SPRINT programme. (Because of pressure of time the panel did not give detailed consideration to some of the minor parts of the programme but rather discussed the general approach that these minor actions embodied). The third part presents the panel's views on the future direction of SPRINT and on possible new fields in which the programme might engage in future. The specific recommendations to the Commission arising from the assessment are summarised in the final part of this section.

The rationale of SPRINT

- 4.6 It was felt strongly by all panel members that there is a clear need for Community action in the field of innovation and technology transfer. The ultimate goal of all Community action in the economic and industrial spheres, strongly reiterated at Maastricht, must be to improve Europe's competitiveness. Increasing the pace of development of technology is a key element within the broad thrust of improving Europe's competitive position but technology development on its own is insufficient. To be effective it must go hand in hand with the application of new technology. The evidence from the World's most dynamic economies is that the pace of innovation and the pace at which new technology is transferred throughout the economic system are the keys to success.
- 4.7 The panel's firm view was that the Community lags behind many other regions of the World in its rate of innovation and technology transfer. In particular innovative activity in the SME sector is insufficient due to a variety of constraints enumerated in Section 3 of this report.

- 4.8 The panel was well aware that several other Community programmes, most notably the RDT Framework Programme and within it particularly some of the specific programmes such as VALUE, actions in the SME sphere and the Regional Programme, are to some degree concerned with innovation (and to a lesser extent with technology transfer). Indeed their involvement in the field of innovation has increased in recent years. This increased interest in innovation was welcomed by the panel which felt that there was still scope to pay greater attention to innovation in these and other programmes. However, the panel was unanimous in its wish that there should be a separate and distinct programme dedicated to improving the pace of innovation and technology transfer within the Community. The ultimate aim of the programme should be to improve European competitiveness. It should seek to do so by creating the conditions in which businesses (most particularly SMEs) and other organisations take up new technology and so become more competitive. SPRINT therefore is seen as the creation of pathways through which technology flows to users in order to meet business and wider societal needs. In seeking to increase the rate of flow of technology the panel was in strong agreement with SPRINT's demand-led philosophy and accepted the three main objectives of the programme (see paragraph 2.4).
- 4.9 The panel was made aware of the possibility that SPRINT might be integrated into the RDT Framework programme, principally for administrative reasons. The panel was broadly neutral towards such a possibility. It felt that integration with the Framework Programme could have a beneficial effect in terms of improving the links with technology development activity and in raising the profile of SPRINT, particularly within the Commission itself where knowledge of the programme is often poor. However, there is a danger that such a move would dilute SPRINT's distinctive role in the innovation and technology transfer field and the panel strongly proposed that a clear identity for SPRINT should be maintained.
- 4.10 The panel stressed the need for SPRINT actions to take account of the integrated nature of the innovation process. Successful innovation can involve many component activities, including strategic business planning, technology assessment, organisational change, management development, accessing sources of capital and technical training. All firms need to innovate and for some firms innovation is the total key to

competitiveness, ie it is a permanent process for which specialist skills, inside and outside the firm, are needed. SPRINT's role is to raise the profile of innovation and technology transfer, to reduce the barriers to innovation (for example, by stimulating venture capital provision), to help build an infrastructure for innovation and technology transfer and to assist firms to gain competence in this field of activity.

- 4.11 SPRINT also has an important role in relation to public policy at both national and particularly regional level. It is vital that the experience of operating measures in support of innovation and technology transfer is shared across the Community. For these reasons it was felt that SPRINT would need to use a variety of instruments and seek to influence a range of actors in the innovation and technology transfer process: innovating firms themselves, transfer agents, producers of new technology (particularly NTBFs), financial institutions, business and other associations, and economic development agencies. In view of the importance of this field for European competitiveness the panel considered that there was considerable scope for and merit in an overall expansion in the programme budget. It was, however, aware of the danger of too complex a programme and made a number of proposals to help remedy this situation.
- 4.12 The panel would like formally to comment on one aspect of SPRINT: the quality and commitment of the Commission officials who run the programme and of the Technical Assistant Unit that helps them to do so. The consultations by panel members within their respective Member States confirmed this positive impression. The only negative comments recorded related to the slow payment (very slow in many cases) of organisations supported under the programme and of contractors. There is a danger that inadequate financial administration will adversely affect SPRINT's high reputation if this issue is not addressed seriously and quickly.

Assessment of individual actions

Specific projects

- 4.13 The action to support specific projects, like many of the SPRINT initiatives, is an experimental one. The panel considered it to be an interesting and worthwhile approach. Through the nature of the action (providing financial support to particular technology diffusion projects involving defined groups of end users - mainly SMEs), it has both a specific impact on those involved with each project and a more general impact on technology transfer through a demonstration effect. The panel judged that it should continue in expanded form but that, in the light of the experience gained, there was some scope for change. In particular:
- the time horizon for some projects has been too long and the action might beneficially focus more on projects with a much shorter period from commencement to implementation;
 - from the outset firms in which the innovations will eventually be applied should have a greater financial involvement. Through this means the action would be likely to secure a higher rate of take-up of the technology in question and to lead to shorter timescales;
 - in order to facilitate a demonstration effect more emphasis should be put on support of clusters of projects, for example in particular sectors/technologies or around particular issues, such as defence conversion or urban problems;
 - this action should seek to learn from the results of EIMS, making modifications to its operations where appropriate, and also to feed into the EIMS knowledge base about innovation and technology transfer.
- 4.14 In addition, the panel was also concerned that SPRINT should begin to give thought to an exit strategy for this element of the programme. The aim should be to demonstrate the benefits of this form of activity, not to subsidise it on a permanent basis. SPRINT should, therefore, begin to prepare the ground for changes which

would be likely to lead to a continuation in this form of collaborative innovation project after this action ceases to operate. A possible idea suggested by the panel was to increase the proportion of the cost of a project borne by the eventual beneficiaries (the SMEs in which the innovation is applied) to a point where project lead organisations might consider launching projects because they are financially viable without support. In addition the panel felt that consideration should be given to introducing a financial intermediary to fund projects on a commercial basis.

Network development and support

Transactional networks of interfirm technological cooperation

- 4.15 The main points arising from the interim report on the evaluation of this action, which were put to the panel, are summarised as follows:
- the action has succeeded in developing networks across Europe involving mainly public sector economic development organisations, technology transfer agents and university industrial liaison officers;
 - public sector bodies have tended to use the scheme as a broad tool for developing their relationships with comparable organisations in other areas and have tended to perceive their role in technology transfer mainly as one of providing information of potential opportunities to prospective users;
 - private sector agents, on the other hand, tend to become much more actively involved in assisting in the transfer process;
 - partly as a consequence of this many mixed public and private actors face problems in working together within a network;
 - relatively few agreements have been concluded and many of these are of a commercial, not technological nature, eg marketing or distribution agreements;

- while cooperation between many partners would be likely to continue in the absence of SPRINT funding there would not be great enthusiasm for experienced actors to continue to cooperate with their less experienced counterparts.

4.16 The panel Members felt that their own investigations accorded with those of the evaluation. They considered that less emphasis should be given to technology agreements and more should be given to building experience and competence of organisations engaging in technology transfer. In practice this will entail a major reorientation with much increased focus on such aspects as training, networking of networks and exchange of experience.

RTO networks

4.17 The interim evaluation report on this action provided the following findings to the panel:

- the action has led to increased levels of cooperation between RTOs, many of whom previously had operated only within their national context;
- inexperienced RTOs, in particular, would have been highly unlikely to have collaborated in the absence of support;
- in most cases collaborating RTOs successfully completed the information gathering and processing aspects of their projects. However, dissemination to end user businesses is less evident, particularly in earlier projects where less emphasis was given to the dissemination element;
- virtually all participating RTOs gained in competence in some way as a consequence of collaboration. The competence gain among less experienced RTOs has been particularly marked;

- while collaboration among experienced RTOs would continue (and in many cases has done so), without support from SPRINT, it is less likely that the experienced would continue to collaborate with the less experienced.

4.18 The panel accepted the findings and considered that it might be possible to improve the operation of the action with some modifications. Most notably it felt that more emphasis should be placed on dissemination at the project design and appraisal stages, and that this aspect of projects should be more closely monitored. It also felt that there was scope for focusing support on a more coherent set of projects, ie introducing a more strategic dimension. This might be achieved, for example, by concentrating on particular types of innovation or particular industries. On the issue of skill enhancement among inexperienced RTOs the panel felt that this was an important issue which needs to be addressed.

Developments of new networks

4.19 The panel considered that the two networks that SPRINT has helped to establish (EACRO and EUROTECH) have been very successful, particularly in sharing expertise between organisations with differing levels of experience. It felt that such assistance towards new networks in defined fields of innovation and technology transfer should continue. But, it is important that help is temporary, and limited to assisting the launch and establishment of networks. It should not provide long-term support.

Science park consultancy scheme

4.20 Again, while this scheme is in its early stages the panel was attracted to the principles underlying the initiative:

- the use of centres of expertise within the Community to assist the less experienced to develop their ideas and plans; and,

- the encouragement of those considering comparatively large-scale capital projects to undertake proper market assessments and formulate a detailed plan prior to proceeding.

4.21 Some concerns were expressed about the practical operation of the scheme, most particularly the lack of coherence of some expert teams and the narrow experience of some experts.

4.22 Nevertheless the panel's view was that this action should continue and that additional means should be found of pooling the Community's experience of science parks and similar initiatives. A possible action is the formation of networks of such initiatives.

Technology performance financing scheme

4.23 Although it is in its early stages the panel judged that it was worthwhile focusing on this experimental scheme because it embodies some interesting features, potentially applicable to future SPRINT actions. The particular distinguishing features of the scheme are:

- the risk sharing arrangement between producers of technology, users and financial institutions; and
- the possibility, if the experiment is successful, that it could be adopted (in a similar or different form) by financial institutions on a widespread basis.

4.24 So, potentially the scheme embodies an exit strategy and a capacity for large-scale application of a technique, developed from the SPRINT experiment.

4.25 The panel's assessment was that the scheme entailed considerable risks but, because of its leverage potential it was keen to see the experiment continued. Prior to any extension to TPF, however, the pilot initiative must be fully and carefully evaluated. The panel also felt that SPRINT should seek additional ways of stimulating the provision of commercial sources of finance for innovation and technology transfer, a lack of suitable finance being a major barrier in this field, in particular in relation to the funding of new technology-based firms (NTBFs).

Best practice in management techniques

- 4.26 SPRINT has used a variety of approaches, including conferences and seminars, comparative studies, publications and sponsoring of competitions to promote the development of knowledge and spread of best practice in innovation management techniques. The panel was very supportive of action in this field and felt that such assistance could beneficially be extended to a wider range of aspects of innovation management. In particular there is a need to recognise innovation as a systemic process, important for all firms (and indeed non-business organisations) and vital for many. The main thrust of future actions should be to stimulate the demand for and promote the development of a strong private sector providing help on a commercial basis to SMEs, rather than increases in the amount of free or heavily subsidised support provided by public sector bodies.

European innovation monitoring system (EIMS)

- 4.27 The panel considered that EIMS was very important to the SPRINT Programme. It provides a basis for the development of knowledge about both the innovation process at the enterprise level and about the operation of policy measures to foster innovation; it also provides mechanisms for the dissemination of this knowledge and the adoption of best practice. Within the SPRINT programme, EIMS draws knowledge from other actions, provides feedback on the better operation of these actions and generates and tests ideas for possible future actions. Using EIMS, SPRINT has the capacity to develop its role as the focal point of best practice in the innovation and technology transfer sphere within the Community and more widely. As well as facilitating the evolution of a more effective SPRINT programme, EIMS also offers the prospect of assisting other programmes at the Community level, at Member State and regional level and in other areas, for example those covered by PHARE and the EFTA countries.

4.28 The panel made a number of specific comments about EIMS to help guide its future development:

- the scheme must be international in its orientation and not be limited to drawing its experiences only from the Community. There are highly pertinent lessons to be drawn from other areas of the World and there is every merit in SPRINT tapping into this wider network. In particular the US, Japan and other Asian countries provide some worthwhile insights into the innovation process and innovation support policies;
- through EIMS support SPRINT must seek to interest more and collaborate with other Community programmes;
- EIMS should pay full regard to the regional and sectoral dimensions of innovation and technology transfer, including the trend for support for these functions to be delivered on a regional basis;
- through work under EIMS, SPRINT should seek to raise its profile and achieve full and widespread recognition as a centre of excellence;
- in due course, as with other SPRINT actions, EIMS should be subject to a thorough evaluation.

General comments on the future development of SPRINT

4.29 The panel did not feel it appropriate to make proposals about specific new actions which should be launched by SPRINT. It considered that it could make the most effective contribution by commenting on existing actions (as in the previous part of this section) and by suggesting some guiding principles which will direct the Commission in formulating plans for the future of the programme. Such principles are based on the panel's deliberations on current actions and its more general discussions about the environment within which innovation occurs and the barriers to innovation, as well as the particular perspectives each panel member had on the innovation process (financial, policy enterprise level etc). The panel was strongly of the view that SPRINT cannot stand still. To date the programme has been an

innovative one and it must continue to innovate - to develop new actions in the light of experience, to take account of increased knowledge about innovation and technology transfer and to be flexible to developments in the external environment.

The guidelines for future actions developed by the panel are as follows:

- (i) Emphasis should be given to the testing and development of new techniques in the innovation sphere (of which TPF is a good example), rather than the continuing support of approaches that would not survive without long term intervention. In practice this means that for most of its actions SPRINT must have a well formulated exit strategy. It also means that SPRINT must continue itself to be innovative and be prepared to support experiments.
- (ii) Most particularly using EIMS but also through other actions SPRINT must strive to become, and be recognised as, the focal point of best practice in the field of innovation. To do this it must also become more international in its orientation.
- (iii) The programme must give full recognition to the fact that most innovation occurs within a sectoral, regional or local context. It must therefore be prepared to operate at these levels but within the constraints of subsidiarity.
- (iv) Many of the current actions are extremely management-intensive. That is, they involve the commitment of a lot of time and effort on the part of SPRINT officials and the staff of the Technical Assistance Unit. The Commission must recognise this fact and ensure that SPRINT is staffed accordingly, and also that it has the resources and the flexibility to bring in external expertise as and when it is needed.
- (v) As to SPRINT itself there must be a proper balance between actions that require considerable management effort and those which are more easy to administer, for example those operated through intermediaries. Care should be taken not to engage in new actions without the necessary management in place to support them adequately.

- (vi) The programme should continue to lay stress on the transfer of expertise and practical experience within the Community. It must, however, recognise that expertise is not uniformly spread across Member States and inevitably this means assisting the experienced to help the less experienced as well as collaborative partnerships.
- (vii) Many current SPRINT actions are based on collaboration. While the panel supports the principle of collaboration it considers that at the enterprise level, particularly among SMEs (where SPRINT actions should be focused) a much stronger motivating force is competition. Future actions should therefore seek to use the competitive spirit more strongly.
- (viii) No current programmes are concerned directly with new technology-based firms (NTBFs). However, it is well understood that NTBFs are of tremendous importance to innovation and SPRINT should consider what it might do specifically with this sector of business.
- (ix) There is a particular need for increased innovation in the new democracies of Central and Eastern Europe. In general these economies are typified by a high level of (often misdirected) research activity and low levels of innovation. SPRINT should consider developing in this part of the World, either through extending some existing actions to these countries, or, in conjunction with PHARE, by developing new ones.

Summary of recommendations

4.30 In this final part of the mid-term review report the panel's recommendations, as discussed in the first part of this review, are presented in summary form. Formally, these are directed to the Commission though they are obviously relevant to the deliberations of CIT, SPRINT's management committee, and SPRINT officials themselves. For ease of reference the recommendations are presented in two groups: those concerned with the overall programme and its future direction, and those concerned with particular actions.

Recommendations concerning the overall programme

- (1) There is a clear rationale for Community action in support of innovation and technology transfer and a need to raise the profile of this activity by having a distinct programme devoted to it. If SPRINT is integrated into the RDT Framework programme the Commission must guard against the loss of distinctiveness of SPRINT.
- (2) The current objectives of SPRINT should be maintained and the programme should continue to carry out its task by engaging in a variety of different forms of action.
- (3) The importance of innovation and technology transfer to competitiveness justifies an expansion of the SPRINT budget.
- (4) In the design of future actions the following guidelines should be followed:
 - more emphasis should be given to the testing and development of new approaches to innovation support and promotion and less to engaging in actions which require long-term support;
 - SPRINT must become more international in its orientation in support of its development as a focal point of best practice in the innovation and technology transfer sphere;
 - there must be a preparedness to operate at regional and sectoral levels;
 - collaboration between SPRINT and national innovation promotion organisations should be strengthened wherever appropriate;
 - the Commission must ensure that SPRINT is adequately staffed, or otherwise resourced, to meet the heavy management demands of its programme;
 - SPRINT itself must avoid spreading its management resources too thinly and, in the short term, effect a significant improvement in its financial management procedures;

- the programme should consider specific measures to develop the capacity of the inexperienced actors;
- there should be more emphasis on exploiting competition as a motivation for innovation and correspondingly less emphasis on collaboration;
- consideration should be given to formulating actions specifically focusing on NTBFs, particularly in relation to financing of these businesses;
- SPRINT should be provided with the resources to assist with innovation and technology transfer support in Central and Eastern Europe.

Recommendations on current actions

Specific projects

- (5) As a means of making this element of the programme more demand-oriented there should be increased focus on projects:
- which have a short time horizon;
 - in which the eventual beneficiaries have a significant financial involvement;
and
 - which are clustered in particular sectors/technologies or around particular issues.
- (6) Early thought should be given to an exit strategy which, over a period, would enable SPRINT to withdraw from funding specific projects but which would ensure that this activity continues without support.

Network support measures

Interfirm cooperation networks

- (7) More emphasis should be placed on building the competence and experience of bodies involved in technology transfer and less on technology agreements.

RTO networks

- (8) More emphasis should be placed on the dissemination phase of projects supported under this action, both at the appraisal stage and during monitoring.
- (9) Specific measures should be formulated to strengthen weaker RTOs in the Community and enhance coherence.

Science park consultancy scheme

- (10) This scheme should be continued though SPRINT should examine carefully some operational aspects to ensure that the expert panels are able to provide the best possible guidance to proposed new science parks.
- (11) The scheme should be carefully evaluated to provide the necessary knowledge to help improve the operation of this scheme and the design of future similar schemes involving the pooling of expertise.
- (12) Consideration should be given to supporting the formation of networks of science parks

Development of new networks

- (13) SPRINT should not provide long-term support to the two current networks it helped to establish but should work towards ensuring that they become self-sufficient.

- (14) It should actively seek further opportunities to help establish such networks but again be careful not to become locked into the provision of long-term support.

Technology performance contracting

- (15) This scheme should be maintained but the results of the current pilot initiative should be fully evaluated.

Best practice in management techniques

- (16) Activities in this sphere should be extended to other aspects of innovation management.
- (17) Emphasis should be placed on stimulating the demand for and promoting the development of a commercial innovation support capability throughout the Community.

European Innovation Monitoring System

- (18) This part of the programme should be developed and should be oriented towards the following:
- greater international orientation, in particular assimilating innovation experience from the US, Japan and other dynamic Asian economies;
 - more interaction with other Community programmes;
 - a greater regional and sectoral dimension;
 - the use of EIMS to raise the overall profile of SPRINT.

APPENDIX A

Background information supplied by SPRINT

BACKGROUND INFORMATION SUPPLIED TO THE PANEL BY SPRINT

Information on the SPRINT programme

15 July 1991	SPRINT - Mid-term Status Report
25 July 1991	SPRINT - Profile
February 1991	Committee on Innovation and Technology Transfer and its thematic working groups
January 1992	Specific Projects for Intra-Community Innovation Transfer - 1989 and 1990 Calls for Proposals
January 1992	Specific Projects for Intra-Community Innovation Transfer - Project Synopsis
January 1992	Specific Projects for Intra-Community Innovation Transfer - Review and possible future orientation (draft)
August 1992	Specific Projects for Intra-Community Innovation Transfer - Accepted projects and projects under negotiation
August 1991	Overview of Agreements resulting from SPRINT Technology Transfer Networks 1986-1991
Eur 11819 1989	Introducing Innovation into Europe's Traditional Industries - The SPRINT network of industrial research organisations
EUR 11349 1988	Innovating across Europe - The SPRINT network for inter-firm cooperation
	SPRINT Case Studies: Six transnational technology transfer agreements
April 1991	SPRINT Network of Research and Technology Organisations for Technology Diffusion
September 1991	The European network for technological inter-firm cooperation : project synopsis
	Science Park Consultancy Scheme : list of projects with negotiations in progress
	Networks for transnational technological inter-firm cooperation : overview of agreements achieved by networks C49 and C295

Other information

- 16 August 1989
OJL239 **Second report on the application of the Council decision of 28 July 1989**
- Draft report from the Commission on the coordination of activities in favour of SMEs falling outside the scope of Council decision 89/490/EEC**
- 6 September 1991
OECD **(Draft) OECD proposed guidelines for collecting and interpreting innovation data (Oslo Manual)**
- 15 February 1991
OECD **Ad hoc group of the Council on the Technology/Economy Programme (TEP) : report of a high-level group of experts**
- CEC COM(90)168
29 May 1990 **Working document of the Commission : Small and medium-sized enterprises and community activities in the field of Research and Technology Development**
- VALUE Programme : Mid-Term Review**

APPENDIX B

Abbreviations

ABBREVIATIONS

ANVAR	Agence Nationale de Valorisation de la Recherche
BC-NET	Business Corporation Network
BRITE	Basic Research in Industrial Technologies for Europe
BTG	British Technology Group
CDTI	Centro para el Desarrollo Tecnológico Industrial
CIS	Commonwealth of Independent States
CIT	Committee for Innovation and Technology Transfer
CNR	Consiglio nazionale delle ricerche
COMETT	Community Action Programme in Education and Training for Technology
DG XII	Directorate General for Science, Research and Development
DG XIII	Directorate General for Telecommunications, Information Industries and Innovation
DIC	Danish Invention Centre
EACRO	European Association of Contract Research Organisations
EC	European Community
ECU	European Currency Unit
EIMS	European Innovation Monitoring System
EOLAS	The Irish Science and Technology Agency
ERDF	European Regional Development Fund
ESPRIT	European Strategic Programme for Research and Development in Information Technology
EUROTECH	Network of national research and development organisations including ANVAR (F), BTG (UK), DIC (DK), CNR (I), EOLAS (IRL), FHG (D), IRSL/IWONL (B), ITE (GR), Luxinnovation (L), TNO (NL), JNICT (P), IMPI/CDTI (E)

EUROTECNET	European Technical Network
EVCA	European Venture Capital Association
FAST	Forecasting and Assessment in the field of Science and Technology
FHG	Fraunhofer Gesellschaft
IMPI	Instituto de la Pequena y mediana empresa industrial
INTERREG	Community Initiative concerning border areas
IRSIA/IWONL	Institute for the Encouragement of Scientific Research in Industry and Agriculture
ITE	Institute for Technological Applications
JNICT	Junta nacional de investigacao cientifica e tecnologica
MECU	Million ECU
NTBF	New Technology Based Firm
OECD	Organisation for Economic Cooperation and Development
PHARE	Poland Hungary: Actions for Economic Reconversion
RTD	Research and Technological Development
RTO	Research and Technology Organisations
SAST	Strategic Analyses in Science and Technology
SME	Small and medium sized enterprise
SPRINT	Strategic Programme for Innovation and Technology Transfer
STRIDE	Science and Technology for Regional Innovation and Development in Europe
TNO	Netherlands Organisation for Applied Scientific Research
TPF	Technology Performance Financing
TT Day	Technology Transfer Day