

# The first action plan for innovation in Europe

Innovation for growth  
and employment

Document drawn up on the basis of COM(96) 589 final

20 November 1996

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (<http://europa.eu.int>)

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# Foreword

In the debate about employment currently sweeping Europe, it is only rarely that the driving force of innovation is highlighted. It is nevertheless clear that our economies are increasingly subject to accelerating scientific and technological progress. The following figures give an idea of this increasingly rapid trend: 78 % of income in the computer industry comes from products which have been on the market for two years or less, while the biotechnology market, which was estimated at less than ECU 10 billion in 1996, is expected to be nearly ECU 80 billion in the year 2000.

The situation of the American economy illustrates the impact of innovation on employment, particularly in the high-technology fields. Of the 10 million new jobs created over the last four years in the United States — two out of three of which were managerial or technical posts — one third were created by small and medium-sized high-technology businesses.

Europe's weakness in creating jobs must be seen in terms of its lack of innovation. Development of new products accounts for less than half of research expenditure in France and Germany, against more than 60 % in the United States and Japan. It is therefore not surprising that Europe's trade balance and balance of payments in high-technology goods and services are rapidly deteriorating. Whereas the United States and Japan together are in surplus to the tune of some USD 150 billion, Europe is now in deficit by nearly USD 25 billion.

This plan of action is an initial step which will lead to others. The aim is to bring about dynamic conditions which will generate growth and create jobs. This will enable Europe to face the future with the necessary confidence and show the same capacity for innovation and creativity which brought it the first industrial and technical revolution.

A handwritten signature in black ink, reading 'Édith Cresson'. The signature is fluid and cursive, with the first name 'Édith' and the last name 'Cresson' clearly distinguishable.

ÉDITH CRESSON  
Member of the European Commission

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*In order to fight unemployment, Europe must secure a stronger growth, better centred on the domains of the future*

*(Confidence Pact for Employment, June 1996)*

## Introduction

The public debate launched by the Green Paper has largely confirmed the basic principles of the Commission's diagnosis of the reasons for the innovation deficit<sup>1</sup> plaguing the European Union. There is widespread agreement on the need for a global approach to the problem, incorporating technological aspects, training, venture capital development and the legal and administrative environment. The debate has also drawn attention to the importance of the international dimension and highlighted the diversity of national, regional and sectoral situations.<sup>2</sup> At the Florence Summit, the European Council clearly indicated that 'the fight for employment must remain the main priority for the Union and its Member States' and within the framework of a strategy to achieve that objective 'requested the Commission to establish a plan of action for the measures to be undertaken in the field of innovation'.<sup>3</sup>

As a matter of fact, new markets are developing at a steady pace in the domains of information, the environment, health, food and culture. A demand for new products and services is emerging. The ability to innovate in order to satisfy these new needs is a precondition for the future creation of jobs in Europe. This ability is also necessary in order to maintain competitiveness and employment in the other sectors of activity.

To act for innovation is in the first instance the responsibility of citizens, of industry and of national, regional and local authorities.

Action at Community level, while respecting the rules of subsidiarity, is necessary to draw

up and enforce the rules of the game, particularly those on competition, intellectual property rights and the internal market. This level will also provide the necessary overview and enable exchanges of experience to be organized and best practice to be propagated. Lastly, the Commission should show an example by mobilizing its own instruments, above all the framework programme for research and development, and the Structural Funds.

The Green Paper on innovation opened up a number of pathways. For the sake of efficiency, this 'first action plan' refers to a limited number of priority initiatives to be launched very soon at Community level and includes a number of schemes put into action or announced since the launch of the Green Paper, identified as essential to the innovation process.<sup>4</sup>

This is an initial action plan. The Commission is on the one hand continuing to investigate some of the long-term schemes identified in the Green Paper; on the other, it is proposing to carry out a more detailed analysis of activities in the Member States and applicant countries,<sup>5</sup> with their collaboration, with the aim of establishing, in a second phase, a common reference framework which will help to identify priority options and opportunities for cooperation.

The action plan for innovation identifies three areas for action:

- ☐ to foster an innovation culture;
- ☐ to establish a framework conducive to innovation;
- ☐ to better articulate research and innovation.

<sup>1</sup> The meaning and scope of innovation are defined in the Green Paper (COM(95) 688 final) and Supplement 5/95 to the *Bulletin of the European Union*.

<sup>2</sup> A summary of the comments received is given in Annex 2.

<sup>3</sup> Florence Summit, conclusions of the Presidency, 21 and 22 June 1996, SN/300/46 and *Bulletin of the European Union*, 6-1996.

<sup>4</sup> Details of these initiatives and their justification are set out in Annex 1.

<sup>5</sup> The 10 associated countries of Central Europe, Cyprus and Malta.

# 1. Fostering a genuine innovation culture

Innovation requires, first and foremost, a state of mind combining creativity, entrepreneurship, willingness to take calculated risks and an acceptance of social, geographical or professional mobility. Being innovative also demands an ability to anticipate needs, rigorous organization and a capacity for meeting deadlines and controlling costs.

An innovation mentality needs to be promoted, and neither legislation nor short-term measures will be of any use here! The means to act exist:

## **(i) Education and training first**

At national level, continue reviewing courses and teaching methods, above all for their ability to stimulate creativity and a spirit of enterprise from the earliest age, and think about any changes which may be necessary to the training of trainers. Member States should also continue to develop lifelong training.

The Commission's contribution will be to set up a permanent 'training and innovation' forum to stimulate the exchange of experience and best practice in this area. It will continue to implement the White Paper on education and training, particularly where apprenticeship (Erasmus apprenticeship, European apprentice statute) and continuing training are concerned. It will foster links between schools as part of the 'Learning in the information society' initiative.

## **(ii) Easier mobility for researchers and engineers to firms**

In the orientations for the fifth framework programme for research, the Commission proposes a wide programme with the main objective of enhancing human potential. It should in particular boost the efforts of the framework programme to arrange for transnational secondments of young researchers and engineers to businesses, in particular SMEs, to help with their innovation or technology transfer projects.

Member States are invited to adopt similar measures and to set up the conditions for making this mobility a reality.

The Commission has launched a debate on mobility on the basis of the Green Paper and will study the recommendations of the Veil group.<sup>1</sup>

## **(iii) Demonstrate effective approaches to innovation in the economy and in society**

It is easier to make innovation acceptable and hence successful in the long run if citizens, industry, and their representatives are involved in the debate on the major technological choices to be made and if employees, users and consumers take part in the process. The dissemination of good practice in this field will be strengthened.

Moreover, the future framework programme for research should open up new approaches to demonstration, including technical, economic and social aspects, management and organization, and fostering participation.

## **(iv) Propagate the best management and organizational methods amongst businesses**

More and more of the firms that succeed are 'agile', reactive and likely to forge cooperative links with external centres of expertise.

Greater priority should be given at both national and Community level to disseminating organizational innovations and using information and communication technologies in this field. The Commission will see to favouring the use of the instruments at its disposal (the framework programme, the Structural Funds

<sup>1</sup> The Commission has entrusted a high-level working party headed by Mrs Veil with the task of examining the obstacles still hindering the free circulation of workers and individuals. On the basis of its conclusions, the group will draw up proposals for removing the legislative, administrative and practical barriers identified.

and the training programmes) to this end. Quality promotion policy contributes to steering business and public administrations in that direction.

Emulation amongst firms, such as comparative evaluation or benchmarking, enabling them to compare themselves with the international leaders in their field, is an effective way of propagating good practice. The Commission will therefore set up a pan-European benchmarking system, starting with quality, and will help to network the national initiatives which it is inviting the Member States to develop.<sup>1</sup>

**(v) Lastly, stimulate innovation in the public sector and in government**

At national level, innovation training or awareness schemes for decision-makers and man-

agers of projects and funds in the public domain need to be developed.

The Commission will stimulate exchanges of experience on ways of promoting and propagating innovation in government departments and authorities. This may culminate in the issue of a Green Paper in 1998.

It will also compile a permanent trend chart of innovation performance and policies in Europe, forming the basis for a regular report on innovation in the European Union.

Finally, Member States are requested to pursue their schemes for fostering competition in public invitations to tender and the use of performance standards.

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<sup>1</sup> COM(96) 463, 9.10.1996.

## 2. Setting up a legal, regulatory and financial framework conducive to innovation

### **(i) The legal and regulatory environment needs to be adapted and simplified**

The European Union and the Member States should first of all make efforts to improve the European patent system, making it more efficient, more accessible and less expensive. The public debate has confirmed the needs of users in this field.

Many of the defects in the current situation stem from the coexistence in the European Union of three patent systems: national, European and Community. Since the European patent system provides for no European-level tribunal with jurisdiction over disputes in this area, there is a danger that the competent courts in the Member States may deliver conflicting decisions. The Community patent is still not in force, not yet having been ratified by all Member States, and has already fallen behind the changing requirements and the construction of Europe.

The Commission will prepare in 1997 a Green Paper on the issue of the Community patent. It is foreseen that this text will consider:

- ☐ whether the Luxembourg agreement on the Community patent should be converted to a legal instrument under the Treaty;
- ☐ whether national patent conventions should be further harmonized at Community level;
- ☐ whether bridges should be built between the European and the Community patent system;
- ☐ whether it is possible to adapt the system of taxes and duties in a way that corresponds to the services provided and is not a barrier to the protection of innovation.

The Commission will pursue its plan with the Member States, to harmonize and complete legislation (especially with regard to the information society, design or employment) and will reinforce the role that it can play in the action against counterfeits. It will implement an infor-

mation and support service for participants in the research framework programme.

The Commission recommends that Member States put in place instruments for assisting SMEs and universities in the event of litigation, to raise awareness in SMEs and to develop training schemes in this area.

### **Business start-up and innovation support must be simplified at both national and Community level.**

The Commission recommends that Member States set quantitative objectives and an ambitious timetable for cutting the formalities and delays involved in starting up businesses.

The Commission will take on board what is being done in some Member States by testing an *ex ante* mechanism for assessing the impact of regulations on innovation within the general guidelines for legislative policy.

Businesses, particularly SMEs, often get lost amongst the plethora of support services which have burgeoned at local, regional, national and Community level. Efforts to rationalize structures and coordinate initiatives need to be accentuated so as to maximize their added value and their effectiveness.

Similarly, local or regional networks of one-stop shops for SMEs for innovation support need to be generalized.

Suitable legal structures (European companies, joint undertakings) must be adopted, and the promotion of existing instruments (EEIGs) will be actively pursued.

### **(ii) Innovation financing must be made easier in Europe**

In this vital area, much depends on private initiatives or those at regional and national level. The Commission needs to work on propagating good practice and facilitating its adoption, particularly with the support of pilot projects, but also by mobilizing the Structural Funds and newer instruments such as the Euro-

pean Investment Fund (EIF). This action should be guided by three objectives:

□ First, investment in risk capital and equity needs encouragement.

This applies particularly to start-up investment and innovative, high-growth firms, which are a major source of new jobs.

Long-term sources of funding (pension funds, life insurance, 'business angels' and save-as-you-earn schemes) should be directed more towards risk investment.

The Commission will support more EIF intervention to promote innovation. This could take the form of a pilot mechanism for attracting risk capital funds in which the EIF will take out shares<sup>1</sup> to be invested in the early stages of investment and in innovative projects, particularly those derived from Community research.

□ Secondly, the conditions within which European capital markets for innovative, high-growth companies (such as the New Market Federation or EASDAQ) develop must be secured, which means reviewing a number of legal and fiscal provisions and seeing to it that the necessary expertise is available.

□ Thirdly, the interfaces between technological innovation and financial circles need to be strengthened. Support is needed for the transnational dissemination of good practice and the testing of new methods in this area. Also, closer links between Community research and risk capital should improve the exploitation of the results of the research. An information and guidance service on this topic will be set up for those taking part in the framework programme.

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<sup>1</sup> Since June 1996, the EIF's statute allows it to take such participations.

### 3. Gearing research more closely to innovation at both national and Community level

In knowledge-based economies, the efficient systems are those which combine the ability to produce knowledge, the mechanisms for disseminating it as widely as possible and the aptitude of the individuals, companies and organizations concerned to absorb and use it. The crucial factor for innovation is thus the link between research (the production of knowledge), training, mobility, interaction (the dissemination of knowledge) and the ability of firms, particularly SMEs, to absorb new technologies and know-how.

**(i) At national level, several types of action are necessary, depending on the Member State; the Commission may give assistance where appropriate**

**Firstly, develop a strategic foresight vision of research and of its application.**

Exercises such as 'Key technologies', 'Delphi' or 'Foresight' can contribute to directing collective efforts to the sectors, areas or technologies which are the most relevant for the future. Member States which do not have any experience in that area ought to consider the opportunity of this type of approach.

The Commission will act to:

- ☐ facilitate the exchange of experiences between Member States and exploit the results of these exercises in order to identify relevant leads at the Community level;
- ☐ reinforce technology watch activities at European level within the framework of the European Science and Technology Observatory, set up by the JRC's Institute for Prospective Technological Studies as a focal point for the Member States observatories.

**Secondly, strengthen the research carried out by industry, in both absolute and relative terms.**

Member States are requested to draw up quantified and ambitious objectives aiming to

increase the share of the gross internal product dedicated to research, to development and to innovation, in particular by encouraging research undertaken by industry (in particular the one financed by enterprises or the one financed by governments within the limits set by Article 92 of the EC Treaty). In Europe, the share of GDP devoted to research financed by industry, which offers more opportunities for exploitation, is on average 38% below that of the USA and 55% below that of Japan.

**Thirdly, encourage strongly the start-up of technology-based firms ('campus companies', spin-offs, etc.).**

The Commission recommends that Member States step up the action they are taking in this area and exploit the structures which have proved effective in the field.

As from 1997 it will organize a thorough exchange with Member States on this topic, involving leading players in the field. This will concentrate on measures for facilitating this spin-off process (covering intellectual property rights, social rights, financial arrangements, etc.) and national or regional promotion schemes. It will back up the dissemination of best practice through pilot projects involving, for example, university technology transfer departments, the regional institutions concerned, venture capital companies and technology brokers.

**Fourthly, intensify the cooperation between public, university and industrial research.**

The Commission recommends that Member States establish a legal and practical framework which will foster this cooperation by, for example:

- ☐ providing opportunities for universities and researchers to spend some of their time developing companies;
- ☐ enabling universities and public research centres to conclude exclusive contracts with industry for exploiting results, including through financial holdings.

**Lastly, strengthen the capacity of SMEs for absorbing new technologies and know-how, whatever their origin.**

Substantial effort needs to be made in this area. Member States should extend the scope of their measures to include the transfer of technologies of international origin. Companies, particularly SMEs, should have easier access to expertise at the highest level, European or worldwide, in technological, organizational or management methods.

At national and regional level, moreover, the drive to rationalize innovation support organizations, as mentioned above, needs to be accompanied by measures enabling them to achieve critical mass and the necessary degree of professionalism.

The Commission will intensify activities for creating improved links between the various national and regional innovation-support systems. Working with the players concerned, it will help to professionalize or, where appropriate, certify the new professions which will need to emerge in this context.

## **(ii) At European Union level, the Community will mobilize all of its innovation instruments**

**First, the Commission will establish within the fifth framework programme a single, simplified horizontal framework for integrating the 'innovation' and 'SME' dimensions.**

Accepting that large companies have an important role to play in the innovation process, in particular with smaller firms, this action should give more SMEs access to all research work and its results, develop technology transfer and stimulate innovation.

□ The framework programme approach should be an integrated approach. Research projects will take more systematic account of organizational, management, market, financial, legal and protection aspects.

□ Secondly, the methods of implementing projects and programmes will be changed. This means in particular:

- the criteria for assessing proposals;
- encouragement during the research phase to prepare for exploiting and disseminating the

results (documentation of results, complementary studies, training schemes, licence preparation, finding partners, upstream consideration of the pre-standardization dimension, etc.);

- adapting contracts, particularly to make them more flexible and to give better protection to the intellectual property rights of contractors where development or demonstration projects are concerned;
- aiming at maximum user-friendliness for SMEs and faster procedures involving fixed deadlines for the various phases.

□ Thirdly, the coordination of the conception and the management of these measures needs to be reinforced:

- more global consistency of actions;
- an integrated range of services suited to the needs of the various categories of SMEs;
- gateways between projects at different stages (research, demonstration, transfer, exploitation);
- optimum use of the existing networks of assistance, with innovation, project preparation and the search for partners, especially with regard to SMEs.

□ Lastly, the positive experience of the research industry task forces will be benefited from in the fifth framework programme for research.

The debate on the Green Paper on innovation and the experience gained through the task forces in the fourth framework programme have demonstrated the usefulness of instruments which:

- better identify, together with users, researchers and industry, the technological obstacles whose solution is an economic and social priority in Europe;
- mobilize expertise and private or public resources, Community or national, to the maximum extent in order to bring large-scale targeted projects to a successful conclusion, thereby obtaining faster results from research effort, avoiding duplication and increasing the visibility and the exemplary nature of Community research.

In consequence, it would be desirable to improve at Community level:

- the incentive character of participation in the work of task forces, by taking innovation more into account as a selection crite-

tion for projects within the fifth framework programme;

- the efficiency of procedures by planning simultaneous or integrated calls for proposals for the various programmes for priority research.

**In addition, outside the framework programme, all Community instruments will be mobilized to support innovation:**

□ The increased input of the Structural Funds into innovation will be continued at Community level (Article 10 of the ERDF, SME initiatives, ADAPT, Leader II) and national and regional level.

Member States and the regions concerned are requested to invest more in schemes linked to innovation, subject to the resources available for the current programming period and in the next generation of Structural Funds.

Here, the Commission will draw on the experience gained with regional innovation strategy projects jointly subsidized by Article 10 of the ERDF and the Innovation programme. It will also stress the importance of innovation in its various initiatives.

□ The European Union must make full use of the international dimension of innovation. Two thirds of world innovations and scientific discoveries are made outside the European Union, and most expanding markets are to be found outside Europe. This means, in particular:

- closer interaction of the framework programme with the COST and Eureka cooperation frameworks;
- support for international industrial cooperation;
- intensified international cooperation on research and development with non-member countries;
- stronger encouragement to entities in the countries concerned, through the possibilities offered by instruments such as TACIS, PHARE,<sup>1</sup> MEDA, etc., to search for a stronger synergy with community research projects.
- continued vigilance in international negotiations for aspects liable to affect European innovation and its outlets (such as intellectual property rights and anti-counterfeit measures).

**Lastly, the action plan will be fleshed out in various priority sectors or fields.**

Situations vary widely according to the country, the sector and the technology. The action plan will therefore need to be adapted to certain fields or sectors designated as priorities. These might include environmental protection and sustainable development, the services sector, rural development, aspects related to demand and consumers, the audiovisual sector and better exploitation of space and dual-use technology.

<sup>1</sup> For those countries which are not applicants.



# Conclusion

In the three main fields identified, the Commission is putting forward those measures whose priority, expected impact or urgency has been confirmed by the debate. These are summarized in the tables below. At Community level these measures can be financed from existing or planned budgets.

The main effort must nevertheless be made at local, regional or national level. The Commission proposes to analyse in more detail those activities in the Member States, in collaboration with them, in order to establish a joint reference framework and so help them identify the priority options and the opportunities for cooperation.

It will take the necessary steps to ensure effective coordination of the measures deriving from various policies and will strengthen interaction with Member States. It invites the Member States to do the same.

The Commission will draw up a detailed implementation schedule and will precisely

quantify the costs of the measures it is proposing. On this basis it will submit the corresponding legislative and regulatory proposals to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions. It will report regularly to the European Council on the implementation of the action plan, including, where necessary, proposals for any adjustments or additions which may prove necessary in the light of developments or in view of the specific contexts in which the plan is applied.

The enthusiasm and energy demonstrated must be mobilized in order to implement this action plan and so build a more innovative, competitive and job-creating Europe.

\* \* \*

The summary tables below are an integral part of this action plan.

# **1. Fostering an innovation culture**

## **1.1. New actions**

### **1. Education and initial and further training**

#### *Commission*

- Set up a 'training and innovation' forum to exchange experience and disseminate best practice (1997).

#### *Member States and regional authorities*

- Make a critical examination of teaching programmes and methods and the training of instructors.
- Adapt the content of initial training to develop, from the earliest age, creativity, spirit of enterprise, etc.

### **2. Mobility of students, research workers and teachers**

#### *Commission*

- Put forward a wide horizontal programme aiming to enhance human potential in the fifth framework programme for research (FPRD) (first half of 1997).
- Stimulate transnational 'Industrial PhDs' (placement of research workers/engineers in firms) (pilot action in 1997).
- Make Community aids to mobility more flexible (fifth FPRD).

#### *Member States*

- Adopt measures for the temporary secondment of research workers to firms, especially SMEs.
- Ensure that the conditions actually exist for mobility between research and enterprises (assessment of qualifications, career development).

### **3. Innovation and management of enterprises**

#### *Commission*

- Promote organizational innovation through Community instruments at its disposal (framework programme, Structural Funds and training programmes, etc.) (1997-98).
- Introduce a benchmarking system at the European level (pilot project in 1997).

### **4. Public authorities**

#### *Commission*

- Develop exchanges of experience on the promotion and dissemination of innovation in government offices and public services. Conference in 1997 and publication of a Green Paper in 1998.
- Compile a permanent trend chart of innovation performance and policies in Europe (to be put in place in 1997).

#### *Member States*

- Develop initiatives to provide information and increase awareness among politicians and senior officials of what is at stake with innovation.

## *1.2. Current actions for improving the innovation environment in Europe*

### **1. Education and initial and further training**

#### *Commission*

- Implement the proposals of the White Paper on education and training (especially Erasmus apprenticeships, European apprenticeship statute)
- Pilot projects to encourage links between schools ('Learning in the information society' initiative)

#### *Member State and regional authorities*

- Develop sandwich-course training, especially at university level.
- Encourage the effective knowledge of several Community languages.

### **2. Mobility of research workers, students and teachers**

#### *Commission and Member States*

- Launch a debate on the Green Paper with regard to the mobility of research workers, students and teachers, and implement proven routes of action; examine and possibly implement the recommendations of the Veil group.

### **3. Raising public awareness and involving those concerned**

#### *Commission*

- Develop initiatives to disseminate best practice in this field.

#### *Member States*

- Foster a scientific and technical culture and awareness of the beneficial effects of innovation.

#### *Commission and Member States*

- Involve enterprises, the public and their representatives in discussing major technological options.
- Develop measures to increase the involvement of employees, users or consumers and to facilitate the acceptance of innovation.

### **4. Innovation and management of enterprises**

#### *Member States*

- Increase training activities for innovation management.
- Foster the development of the practice of 'benchmarking' among enterprises.

### **5. Public authorities**

#### *Member States*

- Stimulate competition in public invitations to tender and the use of performance standards.



## **2. Establishing a framework conducive to innovation**

### **2.1. New actions**

#### **1. Protection of intellectual and industrial property**

##### *Commission and Member States*

- Launch of a Green Paper on the issue of the Community patent (September 1997).

##### *Commission*

- Set up a service of assistance on intellectual property (IPR-helpline) for Community research (1997).

##### *Member States*

- Set up instruments to inform and help SMEs and universities in the event of disputes.

#### **2. Administrative simplification**

##### *Commission*

- Introduce a pilot mechanism for the *ex ante* assessment of the impact of regulations on innovation (end-1997).
- Implement operational procedures for coordinating Community innovation support networks (1997).

##### *Member States*

- Set objectives and a precise timetable for simplifying business start-up formalities.

##### *Member States and local authorities*

- Speed up the rationalization of innovation support activities and bodies.

#### **3. Financing**

##### *Commission*

- Reinforce EIF action in favour of innovation and cooperation between the EIB and the Structural Funds (beginning of 1997).
- Improve the links between Community research and risk capital, particularly in order to provide information and guidance services for those taking part in the framework programme and for investors (mid-1997).
- Develop the exchange of experience and the dissemination of best practice between Member States and operators (1997 and 1998).

##### *Member States*

- Introduce the framework conditions for stock exchanges for growth enterprises.
- Make greater efforts to direct 'patient' capital towards risk investment.

#### **4. Taxation**

##### *Commission*

- Consider a communication on 'taxation and innovation' (possibly in 1997).

##### *Member States*

- Promote fiscal and accounting treatment more favourable to intangible investment.

## **2.2. Current actions for improving the innovation environment in Europe**

### **1. Competition**

#### *Commission*

- Follow-up to the Green Paper on merger monitoring, extending the field of application of unified European monitoring of mergers and harmonizing the treatment of joint structural enterprises.
- Publish a Green Paper on the application of the rules of competition to vertical agreements.
- Continue the dialogue with the competition authorities in the United States, to allow the bringing together of the definitions of the relevant market, particularly in agreements with a high technology content.

### **2. Protection of intellectual and industrial property**

#### *Commission and Member States*

- Complete the harmonization of legislations to take account of developments linked to the technologies of the information society and supplement legislations on design protection and employees' inventions.

#### *Commission*

- Strengthen anti-counterfeit measures.

#### *Member States*

- Ensure the adoption of the proposal for a Directive on biotechnological inventions.
- Support the efforts of the European Patent Office to reduce filing costs.
- Transpose the European directives on the protection of intellectual property into national legislation by the end of 1996.
- Develop training in this field.
- Make enterprises aware of the competitive benefits of protection.

### **3. Administrative simplification**

#### *Commission*

- Introduce a special action on innovation into the work of the committee for the improvement and simplification of the business environment.
- Accord the required importance to innovation when simplifying administration (e.g. in the choice of sector under the SLIM project).

#### *Member States*

- Provide enterprises with one-stop shops for innovation questions.

### **4. Legal and regulatory environment — Company law**

#### *Council*

- Speedy adoption of a European company statute.

#### *Commission*

- Continue to encourage the use of European Economic Interest Groupings (EEIGs), especially by providing better information.
- Study the feasibility of creating a joint undertaking statute (Article 130n of the Treaty).



### **3. Gearing research to innovation**

#### **3.1. New actions**

##### **1. National measures and their Community back-up**

###### *(i) Strengthening research carried out by companies*

###### **Member States**

- Formulate quantified objectives and put in place the appropriate incentive policies.

###### *(ii) Start-up of technology-based companies*

###### **Commission**

- Organize thorough exchanges with Member States and players in the field on legal, fiscal and promotional measures (1997).
- Launch pilot schemes for disseminating good practice, involving universities, risk capital, industry and regional institutions (1998).

###### *(iii) Intensified cooperation between research, universities and companies*

###### **Member States**

- Set up a legal framework to facilitate exploitation by research organizations, including business start-up.

###### *(iv) Strengthening the ability of SMEs to absorb technologies and know-how*

###### **Member States**

- Support transnational technology transfer.

###### **Commission and Member States**

- Better links between national and regional innovation systems at Community level.

###### *(v) Demonstration of effective approaches to innovation*

###### **Commission**

- Set up a new generation of demonstration projects integrating the technical, organizational and social aspects of innovation (fifth FPRD).

##### **2. Incorporating the innovation and SME dimensions into the framework programme for research**

###### **Commission**

- Adapt the implementation procedures for the framework programme (project selection criteria, faster project selection, more demonstration schemes, legal framework for contracts) (fourth and fifth FPRD).
- Strengthen the consultation and coordination role of the research industry task forces.
- Develop a programme 'Innovate and give SMEs greater involvement', providing an integrated approach to the goal of innovation through the legal and financial treatment of projects, particularly those supporting SMEs (fifth FPRD).

##### **3. Mobilize other Community instruments**

###### **Commission and Member States**

- Prepare to flesh out the action plan in various priority sectors and fields of technology.

### *3.2. Current actions for improving the innovation environment in Europe*

#### **1. National measures and Community back-up**

##### *(i) A strategic vision of research and development*

###### **Member States**

- Consultations on long-term technology forecasting (Foresight).

###### **Commission**

- Facilitate the exchange of experience and the exploitation of results on a Community scale.
- Stimulate the technology watch (network of national organizations around the European Science and Technology Observatory (ESTO)).

##### *(ii) Start-up of technology-based companies*

###### **Member States**

- Stronger promotion of 'campus companies' and spin-offs.

##### *(iii) Intensified cooperation between research, universities and industry*

###### **Member States**

- Pursue and strengthen action in this area.

###### **Commission**

- Analyse the obstacles and disseminate good practice.
- Support national efforts to improve the management of research and technology organizations and their international benchmarking.
- Organize sectoral and intersectoral technology platforms.

##### *(iv) Strengthening the ability of SMEs to absorb new technologies and knowledge*

###### **Member States**

- Improve the efficiency and transparency of support structures.

###### **Commission**

- Help professionalize the innovation-support services.
- Set up a scheme for promoting the absorption and use of technologies (first-use support, access to technologies not developed in the European Union, internationalization of young technology-based firms, regional projects).

##### *(v) Demonstration of effective approaches to innovation*

###### **Member States and Commission**

- Make better use of specialists in the social and behavioural sciences in technology projects.

#### **2. Incorporating the innovation and SME dimensions into the framework programme**

- (See 'New actions'.)

#### **3. Mobilize other Community instruments**

###### *Commission and Member States*

- Direct more of the Structural Funds towards innovation.
- Make the most of the international dimension of innovation.

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## Annex 1

### Description of actions

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# Introduction

## 1. Consultation

The Green Paper on innovation<sup>1</sup> prompted a very important reaction and there was a wide-ranging debate, which extended beyond the borders of the European Economic Area. More than 40 000 copies were circulated. The Green Paper was studied by the various Community institutions, by the governments and by those directly concerned.

The opinions of the European Parliament, the Economic and Social Committee and the Committee of the Regions<sup>2</sup> were favourable and emphasized in particular the importance of technology dissemination, the principle of subsidiarity, the role of the economic operators and the social aspect of innovation.

In all the Member States, together with Norway and Iceland, conferences to discuss the Green Paper were organized at the Commission's initiative and with the support of the national authorities. They brought together more than 5 000 people: industrialists and representatives of research centres, financial institutions, government departments, innovation bodies, trade unions, universities, etc.

More than 300 detailed contributions were also submitted to the Commission, mainly from enterprises or their representative organizations.<sup>3</sup>

Lastly, in addition to the comments from field players directly involved, official responses<sup>4</sup> were received from most of the Member States, as well as from Norway and Hungary.

There was thus an unprecedented response to the need for innovation, viewed not as an end in itself but as an essential instrument for attaining fundamental social objectives and lasting and sustainable growth, as well as for improving the competitiveness of enterprises

and employment. At the Florence Summit, the European Council clearly indicated that 'the fight for employment must remain the main priority for the Union and its Member States' and within the framework of a strategy to achieve that objective 'requested the Commission to establish a plan of action for the measures to be undertaken in the field of innovation'.<sup>5</sup> As a matter of fact, new markets are developing at a steady pace in the domains of information, the environment, health, food and culture. A demand for new products and services is emerging. The ability to innovate in order to satisfy these new needs is a precondition for the future creation of jobs in Europe. This ability is also necessary in order to maintain competitiveness and employment in the other sectors of activity.

## 2. Reactions

The views that were expressed naturally differ, but there was agreement on:

- ☐ the importance and relevance of the discussion;
- ☐ the integrated approach proposed by the Commission (ranging over the questions of training, competition, legal and administrative framework, venture capital, etc.);
- ☐ the broad lines of the diagnosis;
- ☐ the urgent need for action that is coordinated at each separate level of intervention as well as between levels.

A number of salient points emerged from the debate:

- ☐ the diversity of national, regional and sectoral circumstances. A uniform Community-wide approach which would disregard these specific features would inevitably fail. To act for innovation is in the first instance the responsibility of citizens, of industry and of national, regional

<sup>1</sup> Green Paper on innovation, COM(95) 688 final and Supplement 5/95 to the *Bulletin of the European Union*.

<sup>2</sup> See Annex 2.1.C.

<sup>3</sup> The annexed document 2.1.A summarizes these contributions.

<sup>4</sup> See Annex 2.1.B.

<sup>5</sup> Florence Summit, conclusions of the Presidency, 21 and 22.6.1996, SN/300/96 and *Bulletin of the European Union*, 6-1996.

and local authorities. Strict application of the principle of subsidiarity is essential;

□ value-added at Community level, especially for:

- drawing up and ensuring compliance with the rules of the game (framework conditions for competition, the internal market, industrial property rights, etc.);
- providing the overall view needed for formulating options on a common basis;
- exchanging experiences and disseminating best practice;
- providing the necessary impetus and political signals by means of Community policies and instruments (research, Structural Funds, internal markets, SMEs, etc.);

□ the areas in which priority actions should be launched, at both national and Community levels.

The main aims are to:

- foster in the economy and society a genuine innovation culture, favouring creativeness, willingness to take risks and experimentation. This requires, in particular, long-term actions in the areas of education and further training, closer links between the worlds of education and the economy and promoting awareness among those involved in the public and private sectors;
- adapt the administrative, legal, regulatory and financial environment, so that it is permanently more conducive to innovation. In addition to streamlining administrative procedures, at Community as well as at national and regional levels, this involves, in particular, rules on competition and intellectual property to encourage innovation and legal arrangements to facilitate the setting-up of international cooperation, but also the creation of an environment which is more conducive to innovation financing and to the reinforcement of the financial structure and own funds of innovative enterprises;
- maintain — but also and more usually to focus and consolidate — collective research efforts, especially among enterprises, as well as their ability to access and benefit from new technologies and knowledge, from whatever source. This involves better anticipation of requirements, technical changes and markets, together with closer collaboration between research and industry

and a special emphasis on the dissemination of technologies and skills, especially among SMEs and the least-favoured regions;

□ the importance of the international dimension, which is both a fact and a necessity.<sup>1</sup> Promoting innovation in Europe does not mean turning inward. Action needs to be taken against an open and dynamic background of international cooperation and competition.

### 3. A first action plan

The Green Paper on innovation suggested various options. For the sake of effectiveness, this first action plan outlines a limited number of priority actions to be launched speedily at Community level and incorporates actions which are in progress or which have been announced since the publication of the Green Paper and which were identified there as vital for the process of innovation.

This is a first action plan, with the Commission both continuing to study some of the options indicated in the Green Paper, the implementation of which requires a long-term approach, and also proposing with regard to activities which are the responsibility of the Member States and applicant countries to conduct a more thoroughgoing analysis in collaboration with them, with the aim of establishing at a second stage a common framework of reference which can help to identify the priority options, as well as opportunities for cooperation. With regard to the Community level, at this stage the only measures considered are those for which the operating method could be described and which can be inserted in the known budgetary framework, without incurring any new expenditure but through the possible reallocation of available resources.

Innovation involves a variety of operators and implies an integrated approach with intensive

<sup>1</sup> Two thirds of the world's advances in science and technology are made outside the European Union. The expanding markets are outside Europe, primarily in South-East Asia, with its three billion inhabitants and an overall income which in a few years will exceed that of the United States and the European Union combined. Flows of capital, information and technology are global. Direct investment abroad soared from USD 68 billion in 1960 to 1 650 billion in 1993, excluding intra-Community investment. Strategic alliances, especially in the R&TD field, undermine the ability of governments to identify the beneficiaries of their technology policies. Close on 40% of world trade is conducted within enterprises.

interaction. This means that the proposed measures are inevitably multiple and varied. For the sake of clarity, they have been classified by order of decreasing chronology and likely effect in accordance with the following three objectives:

- ☐ fostering an innovation culture in the economy and society;
- ☐ establishing a framework conducive to innovation;
- ☐ linking research and innovation more effectively.

This initial plan outlines a general framework for action at Community and Member State level, and also for applicant countries.<sup>1</sup> It is intended to be the first stage in a lasting

mobilization of the Community, the governments and those in the field for the benefit of innovation.

At Community level, the new actions will be launched immediately. Current actions will be speeded up or consolidated, if need be. Reflection will continue and the plan will be applied, where appropriate, in the thematic fields and the industrial or services sectors where it seems suitable.

At national level, the Commission will carry out further analysis, in collaboration with the Member States and applicant countries, in order to establish a common framework of reference and to help them identify priority options and cooperation opportunities.

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<sup>1</sup> In compliance with the conclusions of the Council meetings in Copenhagen and Essen, Community programmes or similar initiatives will be undertaken to allow the applicant countries to participate as part of the strategy for preparing for accession. These countries are therefore concerned by a large number of the points dealt with in the action plan. These are in particular the proposals on education and training, the mobility of students and research workers, public awareness, as well as the involvement of these countries in the fifth framework programme's targeted socio-economic research. Furthermore, account must be taken of these countries with regard to the implementation of the recommendations on competition and improving the legal, administrative and regulatory environment. They should also be in a position to benefit fully from trans-European capital markets. The concrete arrangements for their involvement in the fifth framework programme are still to be worked out. It is nevertheless likely that they will emphasize university-industry links and measures for innovation among SMEs. A special debate will be initiated with these countries as part of the structural dialogue on the way in which they can be integrated in the action plan.

# A — Fostering an innovation culture

1.1. Innovation depends on creativeness, a sense of initiative and enterprise, a willingness to take calculated risks and a readiness to cope with mistakes and accept social, geographical or professional mobility. But innovation also needs other skills: the ability to anticipate needs, careful organization, and a capacity for meeting deadlines and controlling costs. Innovation increasingly relies on a wide range of interaction, which means that skills in information collection and processing and personal and social communication skills are also needed. A favourable culture is essential.

The United States of America, with its frontier mentality and the idea of the melting pot, thrives on risk, social and geographical mobility and straightforward relations. In Japan, culture and society emphasize excellence, steady improvement and organization. As for Europe, it has grown up around social systems which differ widely but where, today, as a rule, risk-taking is shunned in favour of seeking security and stability.

Changing the culture and the mentality of a people cannot be achieved by legislation or by any short-term measures. Means of action exist, however. First and foremost come education and training. The mobility of people facilitates the spread of knowledge and the flow of ideas. Participative approaches make it easier for the groups concerned to adhere. Actions to inform and raise awareness, in particular through the use of new media, together with the dissemination of new methods of organizing and managing business and government, are also needed.

## 1. Education and training

1.2. Initial education needs to concentrate on imparting the skills that are needed to produce and implement innovation. Technical education and vocational training must not be neglected.<sup>1</sup> But the acquisition of a basic

educational grounding is essential to facilitate ongoing adaptation to the new skills that innovation requires.

It is wrong to think that training at the start of life will always suffice. Training is a necessity throughout life. It comes up against particular problems in SMEs (especially the limited available time of managers and employees) which need to be dealt with through novel solutions,<sup>2</sup> possibly involving distance-learning and multimedia techniques. The third multiannual programme for SMEs proposes pilot projects to help find new approaches in this area.<sup>3</sup>

There is also a need to bring education and business closer together, especially by means of sandwich courses, so that apart from helping young people to enter the job market it is possible to prepare for the new skills or qualifications that are needed and to adapt training to these needs. Alongside its education and training programmes, especially Leonardo da Vinci and Socrates, the European Union contributes to these aims through the European Social Fund under various Community objectives and initiatives such as ADAPT and Emploi.

The Member States and regional or local authorities are invited to reinforce their action in these fields and, in particular, to:

□ take a critical look<sup>4</sup> at the programmes and methods of education, especially their ability to stimulate critical sense, lateral thinking, creativeness, interpersonal communication, teamwork, willingness to experiment, skill in finding and using information, learning ability, and entrepreneurial spirit;

<sup>1</sup> 'In 1996 Europe had 4.7 scientists and engineers for every 1 000 inhabitants, compared with 7.4 in the USA and eight in Japan. Also, the combined total of scientists and engineers in China, India and Indonesia is now the same as the figure for the European Union' ('Inventing tomorrow: Europe's research at the service of its people', p. 6; COM(96) 332 final, 10.7.1996).

<sup>2</sup> The joint Council and Commission report on employment (SI(95) 1000) stresses the importance of adapting training programmes to the needs of SMEs and providing incentives for SMEs that want to invest in training.

<sup>3</sup> Proposal for a Council Decision on a third multiannual programme for small and medium-sized enterprises (SMEs) in the European Union (1997-2000), COM(96) 98.

<sup>4</sup> As in Denmark, where the Ministry of Education recently considered means of fostering an innovation culture and entrepreneurial spirit from primary and secondary education. At Community level, the matter has already been considered in the White Paper on education and training (COM(95) 590 final, 29.11.1995).

- ☐ analyse the changes that apparently need to be made to the training of trainers;
- ☐ extend training, if need be, to include economics and management, company formation, protection of intellectual property, design and marketing, especially in science and technical courses;
- ☐ develop sandwich courses at the level of higher education and decompartmentalize disciplines;
- ☐ encourage the effective command of several Community languages;<sup>1</sup>
- ☐ stimulate real cooperation between education and business;
- ☐ develop long-term partnerships between enterprises and training bodies;
- ☐ encourage broader access for enterprises to the best vocational training facilities in Europe.

The Commission will continue to implement the proposals contained in the White Paper on education and training adopted in November 1995.

It will promote the exchange of experience and the dissemination of good practice in these areas among the Member States and with the social partners by introducing a permanent 'training and innovation' forum.

1.3. The Commission therefore plans to introduce from 1997 an 'Erasmus of apprenticeship' and to draw up, with the governments and the social partners, a European apprentice statute. Furthermore, as part of the follow-up to the European Year of Lifelong Learning, it will draw up proposals<sup>2</sup> seeking to facilitate, at European level, the valorization and accreditation of skills throughout life.

1.4. Lastly, with the 'Learning in the information society' initiative, it will set out to coordinate existing instruments and actions (education and training, research, trans-European telecommunications networks, Structural Funds) to link schools throughout Europe using existing

national initiatives, promote the development of the software and content that are needed and assist the training of teams to provide instruction in the use of these new technologies.

## 2. Encouraging mobility

1.5. The mobility of students, research workers, engineers or scientists from one country or industrial sector to another, as from education or research to industry, encourages the transfer of technology and the dissemination of know-how. In spite of efforts to promote it, such as the programme for the training and mobility of researchers, this kind of mobility between research centres, universities and industry is all too often hampered by practical or cultural barriers. Similarly, as technologies are becoming more and more 'trans-sectoral', mobility between branches of industry needs to be made easier.

The Green Paper entitled 'Education — training — research: barriers to transnational mobility', published at the end of 1996,<sup>3</sup> points out that the barriers to mobility arise mainly in the areas of right of residence, social security, taxation and the lack of a legal framework at European level, including for apprentices.<sup>4</sup>

At Community level, the Commission will introduce the priority measures to encourage the mobility of students, teachers, engineers and researchers that have emerged from the debate on this Green Paper.

In setting priorities for the fifth framework programme for research, the Commission is proposing a wide programme with the main objective of enhancing human potential. It should in particular boost the efforts to arrange for transnational secondments of young researchers and engineers to businesses, in particular SMEs, to help with their innovation or technology transfer projects. It will take all the necessary steps to make the mobility aid programmes of the Community more flexible, particularly by:

<sup>1</sup> A survey of 927 SMEs in 1995 as part of the Euromanagement action revealed that the language barrier was a decisive factor for 67% of the SMEs that were eligible for Community R&D programmes but were afraid to go ahead.

<sup>2</sup> On the basis of current evaluation of the Member States' transposition of the Council Recommendation of 30 June 1993 (OJ L 181, 23.7.1993) on access to continuing education.

<sup>3</sup> COM(96) 462.

<sup>4</sup> The Commission has asked a high-level group, chaired by Mrs Veil, to examine the barriers that still hamper the free circulation of workers and individuals. On the basis of its findings, the group will draw up proposals to remove the legislative, administrative and practical barriers that have been noted.

□ making exchanges of staff one of the eligible cost headings in long-term cooperation projects on R&TD and the use of large-scale equipment;<sup>1</sup>

□ linking mobility support measures and research projects, enabling their beneficiaries to combine them in a single innovation project;

□ making age limits and authorized secondment periods more flexible, in order to enlarge the potential pool of beneficiaries (older researchers, SME staff).

At national level, it will recommend establishing effective 'interoperability' of the systems for assessing career development or qualifications (e.g. the introduction, in the systems for assessing government research workers, of a positive recognition of periods spent in industry, on industrial projects or for patents filed, as well as the adoption by the enterprises or bodies concerned of arrangements, in the event of external mobility, to ensure seamless careers).

### **3. Raising public awareness and involving the operators concerned**

1.6. Innovation can develop and spread only if it is accepted by society. It is stimulated by the existence of demanding consumers who accept novelty. Innovation is not restricted to advances in scientific knowledge and technical performance. Innovation in the forms of social organization and communication needs to go hand-in-hand with technical or business innovation. This is often more difficult, since it affects the attitudes, values and positions of the social groups involved. There needs to be a special effort in this area.

The need for and beneficial effect of change, in the broadest sense, need to be widely discussed. Mechanisms whereby enterprises, the public and their representatives can be involved in discussing the major technological options and arrangements for the involvement of employees, users or consumers pave the way for the acceptance and ultimate success of innovation.

<sup>1</sup> Short-term scientific missions under COST are one example of short-term staff exchanges.

There are many initiatives and successes at national level in these fields. The exchange of experience between Member States needs to be stimulated, and also, where appropriate, the linking in networks at European level of successful ventures, if this can help with their dissemination and improvement.

1.7. The Commission will make a coordinated effort to use its various resources to identify best practice and disseminate the methods facilitating the involvement of socio-economic operators in managing innovation projects likely to have major social impact.

1.8. It will encourage greater cooperation among national and regional bodies responsible for the promotion of science and technology and innovation and will disseminate the best practice, as part of the INFO 2000 programme, especially via the national focal points network (MIDAS).

1.9. It will study the feasibility of greater cooperation among European television companies, especially as part of the MEDIA programme, with a view to using successful national experience as a basis for promoting programmes for the popularization of science and technology, as well as ways of reflecting scientific work realistically in audiovisual fiction productions.

### **4. Business management**

1.10. Involvement in the management of enterprises is not of course the responsibility of public authorities. However, these authorities can and must create an environment conducive to the ongoing improvement of business management and organization. The rapid spread of information and communication technologies will contribute greatly to these adaptations and must be actively supported.

Innovation is primarily the responsibility of enterprises, and managing change is one of the main challenges they have to cope with. But change is occurring with increasing speed, affecting markets and techniques and the related methods of design, production and organization. If they are going to remain competitive, enterprises need to be able to absorb new techniques. But it is just as important for them to modernize their structure and organization and reshape the methods, roles and responsibilities of each in order to innovate. They



have to become not only places of permanent apprenticeship but also learning enterprises.

'Agile' enterprises that are ready to react speedily to changing circumstances, to forge cooperative links with a wide variety of external partners (other enterprises, universities, consultants, centres of excellence) and thereby to constitute flexible sets of competence are likely to be the best suited to the demands of innovation.

Innovation is also prompted by changes in the regulatory environment, the availability of resources and forms of financing and communication. Enterprises need to keep an eye on changes in these fields and keep a technological, economic and business 'watch'.

Emulation of other enterprises, especially by means of benchmarking, is an effective way of spreading good practice in these fields. There needs to be more widespread use of management techniques<sup>1</sup> at the most suitable level, especially among SMEs.

1.11. For the benefit of enterprises the Commission will launch transnational pilot actions for the networking of certain sectors or technologies (see Section C.3(iii) below). These actions should be designed to explore best practice in the management and training fields. The results of these projects will be disseminated throughout the Union. A European guide to industrial innovation will offer manufacturers a method of self-assessment for their strengths and weaknesses in the field of innovation, together with a guide to the relevant help and advisory services.

1.12. In its communication on benchmarking the competitiveness of European industry,<sup>2</sup> the Commission pointed to the usefulness of this move for improving the competitiveness of enterprises.

The Member States are invited to encourage the development of this practice which allows enterprises to track their progress against the best performers in a number of key areas of their activity (similar to the R&D 'scoreboard' in the United Kingdom or to the company visits as part of the TOP schemes in Germany

and Spain, the 'Références' programme in France or the 'Inside UK enterprise' scheme in the United Kingdom).

For its part, the Commission will support the linking in a European network of the various schemes at national level. It will introduce a Europe-wide 'benchmarking' system, especially in the field of quality.

1.13. The Member States are called on to reinforce their actions for the training of business managers and the social partners in innovation management.

The Commission will support training schemes for innovation management, especially through the development of European networks of business schools and their cooperation with industry and SME support bodies. These actions will be especially designed to encourage thought about new forms of business organization and their impact on the support structures and SMEs.

As part of the operations under Objectives 2 and 4 of the Community ADAPT and SME initiatives, the Commission will also increase its support for the training of business managers, in particular of SMEs, in new management methods and the training for employees that is needed to introduce these new methods in enterprises.

## **5. Public authorities**

### **(i) Innovation in the public sector**

1.14. Government policy-makers are paying more and more attention to innovation and technology. But their idea of what is at stake and of the potential of technology,<sup>3</sup> as well as of the details of action on innovation, remains generally sketchy.

The Member States are invited to take steps to ensure that politicians, senior officials, regional authorities, project and fund managers are informed and made aware of what is at stake with innovation and technology.

1.15. Public spending is close to and even exceeds 50% of gross domestic product in

<sup>1</sup> These methods include quality management, concurrent engineering, flexible or 'smart' production methods, integrated logistics management, teamwork and the empowerment and involvement of employees.

<sup>2</sup> 'Benchmarking the competitiveness of European industry', COM(96) 463 final, 9.10.1996.

<sup>3</sup> The proportion of political leaders in the countries of the European Union with a scientific or technical background is low; recent surveys among some governments have confirmed that few of their members were skilled users of computers or the Internet.

several countries of the Union. In this context, improving performance and spreading innovation in the public sector and in government offices can have a significant direct economic impact. This should also contribute greatly to improving the environment in which enterprises operate, as emphasized by the Advisory Group on Competitiveness (Ciampi Group) in its second report.

From 1997 the Commission, in conjunction with the European Institute for Public Administration and on the basis of current work, will undertake a series of discussions and exchanges of experience on the promotion and dissemination of innovation in government and public services. A conference on this topic will be organized in 1997, and its findings could result in the publication of a Green Paper at the beginning of 1998.

1.16. The Commission will continue its action under the 'Information society' initiative designed to encourage innovative approaches in the public sector.

## **(ii) Public contracts**

1.17. More active competition in the case of public invitations to tender is desirable, as it can stimulate innovation. Several provisions in European legislation on public contracts allow for derogation or special rules of application, particularly in special sectors (water, energy, etc.), if a tender relates to innovative products or manufacturing processes; full use should be

made of these possibilities. Furthermore, the use of performance standards can ensure innovative technical solutions while ensuring proper competition.

## **(iii) Analysis of innovation policies and systems**

1.18. There is a need for careful monitoring and constant analysis of innovation processes, their results and their impact at the socio-economic level. The comparative study of innovation systems, policies and infrastructure in the developed nations, and especially in the European Union, needs to be continued and exchanges of information and experience among the Member States encouraged. It is also important to boost the development, coordinated by the Commission, of a harmonized statistical information system including regular surveys on innovation in industry, services and SMEs, while ensuring that there is no extra administrative burden on enterprises.

The Commission will reinforce its system of collecting and analysing information on research and innovation. It will draw up a permanent management trend chart for innovation policy and performance in Europe, with comparisons with the rest of the world. It will produce and distribute widely a regular report on innovation in the Union, based on national and international studies and analyses in this field.

# **1. Fostering an innovation culture**

## **1.1. New actions**

### **1. Education and initial and further training**

#### *Commission*

- Set up a 'training and innovation' forum to exchange experience and disseminate best practice (1997).

#### *Member States and regional authorities*

- Make a critical examination of teaching programmes and methods and the training of instructors.
- Adapt the content of initial training to develop, from the earliest age, creativity, spirit of enterprise, etc.

### **2. Mobility of students, research workers and teachers**

#### *Commission*

- Put forward a wide programme aiming to enhance human potential in the fifth framework programme for research (first half of 1997).
- Stimulate transnational 'industrial PhDs' (placement of research workers/engineers in firms) (pilot action in 1997).
- Make Community aids to mobility more flexible (fifth FPRD).

#### *Member States*

- Adopt measures for the temporary secondment of research workers to firms, especially SMEs.
- Ensure that the conditions actually exist for mobility between research and enterprises (assessment of qualifications, career development).

### **3. Innovation and management of enterprises**

#### *Commission*

- Promote organizational innovation through Community instruments at its disposal (framework programme, Structural Funds and training programmes, etc.) (1997-98).
- Introduce a benchmarking system at the European level (pilot project in 1997).

### **4. Public authorities**

#### *Commission*

- Develop exchanges of experience on the promotion and dissemination of innovation in government offices and public services. Conference in 1997 and publication of a Green Paper in 1998.
- Compile a permanent trend chart of innovation performance and policies in Europe (to be put in place in 1997).

#### *Member States*

- Develop initiatives to provide information and increase awareness among politicians and senior officials of what is at stake with innovation.

## *1.2. Current actions for improving the innovation environment in Europe*

### **1. Education and initial and further training**

#### *Commission*

- Implement the proposals of the White Paper on education and training (especially Erasmus apprenticeships, European apprenticeship statute).
- Pilot projects to encourage links between schools ('Learning in the information society' initiative).

#### *Member State and regional authorities*

- Develop sandwich-course training, especially at university level.
- Encourage the effective knowledge of several Community languages.

### **2. Mobility of research workers, students and teachers**

#### *Commission and Member States*

- Launch a debate on the Green Paper with regard to the mobility of research workers, students and teachers, and implement proven routes of action; examine and possibly implement the recommendations of the Veil group.

### **3. Raising public awareness and involving those concerned**

#### *Commission*

- Develop initiatives to disseminate best practice in this field.

#### *Member States*

- Foster a scientific and technical culture and awareness of the beneficial effects of innovation.

#### *Commission and Member States*

- Involve enterprises, the public and their representatives in discussing major technological options.
- Develop measures to increase the involvement of employees, users or consumers and to facilitate the acceptance of innovation.

### **4. Innovation and management of enterprises**

#### *Member States*

- Increase training activities for innovation management.
- Foster the development of the practice of 'benchmarking' among enterprises.

### **5. Public authorities**

#### *Member States*

- Stimulate competition in public invitations to tender and the use of performance standards.



# B — Establishing a favourable framework

2.1. The establishment of an environment conducive to innovation needs, in the first instance, competition to function properly. The next task is to introduce an effective system at an acceptable cost for the protection of intellectual and industrial property. This also involves constant efforts to lighten the burdens on enterprises, especially the administrative formalities, while maintaining the protection enjoyed by consumers with regard to health, safety and the environment. Lastly, innovators need to have easy access to the funding they require for the various stages of their projects, and that their fiscal treatment should be conducive to innovation.

## 1. Legal, administrative and regulatory environment

### (i) Competition

2.2. Competition is one of the driving forces behind innovation. It is stimulated by efforts to combat monopolies and to open and liberalize markets. The Commission has always devoted special attention to innovation in its competition policy. The Commission will therefore continue to ensure that competition functions properly in the internal market and internationally. It will continue its action for the liberalization and deregulation of sectors of the European economy that have hitherto been protected or too strictly compartmentalized.

2.3. The Commission, in applying competition law, acknowledges the economic importance of a properly functioning patent system. It guarantees holders, by means of individual exemptions as well as exemptions linked to technology transfer agreements, maximum freedom to exploit their patents without any unwarranted distortion of competition. Recently,<sup>1</sup> it adopted a new Regulation exempting certain categories of technology transfer agreements,

thereby streamlining the rules that had previously governed such agreements.<sup>2</sup>

In the past the Commission has adopted similar Regulations exempting specialization agreements<sup>3</sup> and research and development agreements.<sup>4</sup> The aim is to avoid an individual notification system and case-by-case consideration, while ensuring legal security.

Since these two exemptions will expire on 31 December 1997, the Commission will revise them, after the possible publication of a Green Paper, in order to update and adapt them to the current circumstances. The rules on State aids in the field of research and development (new arrangements of February 1996) set out to ensure equal treatment for the various operators in this area.

Following the debate on the revision of the Regulation on the monitoring of concentrations, the Commission is putting to the Member States a proposal to expand the scope of European merger supervision in order to cover a larger number of operations of Community interest and to avoid enterprises having to give simultaneous notification of cooperation agreements to a large number of national authorities that apply very different procedures, deadlines and physical criteria. Mergers of Community interest would thus be supervised using uniform criteria by the Commission acting as sole European antitrust authority. The Commission is also proposing to harmonize the treatment of structural joint enterprises. Lastly, the Commission is currently completing a Green Paper on rules for vertical agreements (exclusive distribution agreements etc.) in competition law.

With regard to new high-technology products, where markets increasingly overlap, exchanges of information between the various bodies

<sup>1</sup> Regulation (EC) No 240/96 of 31 January 1996 (OJ L 31, 9.2.1996).

<sup>2</sup> The new Regulation in fact abolishes the discrepancies between the regulations on patent licensing and on the communication of know-how, eliminates or shifts to the appeals procedure (the period of which is reduced from six to four months) several clauses which in these regulations prevented the exemption of certain categories and provides for new lawful clauses to ensure greater contractual freedom for the parties.

<sup>3</sup> Regulation (EEC) No 417/85 of 19 December 1984 (OJ L 53, 22.2.1985).

<sup>4</sup> Regulation (EEC) No 418/85 of 19 December 1984 (OJ L 53, 22.2.1985).

supervising competition are extremely useful. The Commission will therefore continue its dialogue with the competition authorities in the United States, to allow approximation of the definitions of the relevant market, especially concerning agreements with a high technology input.

## **(ii) Protection of intellectual and industrial property**

### *Reviewing the overall structure*

2.4. The overall structure of the European system for the protection of industrial property is far too complex. A 'Community' solution has been adopted for trade marks and designs (Office for Harmonization in the Internal Market in Alicante), as well as for plant breeding (Community Plant Variety Office, provisionally located in Brussels), where incidentally the first protection rights were recently granted. An international convention has been used, however, for the European (or Community) patent. The Community can negotiate international agreements (TRIPS agreements under the GATT, for example) and it can issue regulatory texts, but there is a risk that they will have no effect on the convention for the European patent.

In the European Union there are currently three patent systems, only two of which are fully operational. There are national patents and also European patents, which are the result of the Munich Convention of 1973 and are administered by the European Patent Office in Munich. The European patent is not a uniform industrial property right but it allows protection to be acquired in as many European countries as the applicant wants. The advantage of this system is its great flexibility, but there are some drawbacks because of the complexity and cost.<sup>1</sup> Also, there is no provision in the system for any court at European level with jurisdiction in patent disputes, which means that there is a possibility that courts in the Member States may make different rulings.

The overall structure of the patent system should be completed by the entry into force of the third system of protection, the Community

patent, stemming from the Luxembourg Convention of 1975. This convention, which was amended in 1989, has still not entered into force because of delays in ratifying it by the 12 Member States that signed it.

The patent system in Europe was set up by means of international conventions. The reason for this is that these initiatives were taken at a time when the Community's responsibility in this field had not yet been established. This time is now over, and the Court of Justice has on numerous occasions acknowledged the Community's power to act with regard to patents, if this helps to attain an objective of the Treaty (free movement of goods or establishment of undistorted competition).

According to the views expressed by users of the system, the European patent is generally satisfactory, although there are two major changes that need to be quickly introduced. The first concerns the patentability of biotechnological inventions, where current uncertainty should be remedied by the speedy adoption of the new draft Directive submitted by the Commission at the end of 1995. The second change involves cutting the cost of European patents, and this could be achieved by revising the system of fees charged by the European Patent Office and by adapting the procedures for translating European patents. Both of these ideas are currently being considered.

As for the Community patent, the question is whether in its current form it still satisfies the objectives that were outlined at that time or whether it would be better to adapt it to progress in the construction of Europe and to the needs of users. In its current form the Luxembourg Convention applies only to the 12 Member States that signed it in 1989. The enlargement of the Community that has since occurred, and further enlargement in the future, require the convention to be adapted to the new circumstances.

The Commission will prepare, in 1997, a Green Paper on the issue of the Community patent. It is foreseen that this text will consider:

- ☐ whether the Luxembourg agreement on the Community patent should be converted to a legal instrument under the Treaty;
- ☐ whether national patent conventions should be further harmonized at Community level;

<sup>1</sup> The total cost of filing and maintaining a patent in eight Member States is about USD 120 000 (compared with USD 13 000 for the whole of the United States).

- ☐ whether bridges should be built between the European and the Community patent system;
- ☐ whether it is possible to adapt the system of taxes and duties in a way that corresponds to the services provided and is not a barrier to the protection of innovation.

### *Special case of biotechnology and the information society*

2.5. In advanced technology sectors, such as the information society or biotechnology, there are considerable economic imperatives involved.<sup>1</sup> Speed of action or response is vital. There is a need to achieve speedy harmonization at world level of the rules of protection relating to new technologies if we want to maintain the ability for relevant research in Europe and stimulate the creation of new enterprises and the marketing of results.

The co-decision procedure on the new draft Directive on the legal protection of biotechnological inventions needs to be completed as quickly as possible. For its part, the Commission will play an active part in the consideration which is now under way with regard to the revision of Article 27 of the TRIPS agreement and the follow-up to the Convention on Biodiversity. It will ensure, in these discussions, that European industry does not have to cope with conditions that are less favourable than its competitors' because of restrictive approaches to intellectual property rights.

Article 27(1) of this agreement allows all inventions, products or processes in every technological field to be patented. It follows that, in theory, data processing programs and software inventions can be patented. On this basis the United States Patent Office has decided in some cases to issue patents for data processing programs for which copyright, which is usual, seemed inadequate, which would be impossible in Europe. This situation will become even more complicated with the development of multimedia software and the advent of the information society.

<sup>1</sup> Products that have been on the market for two years or less account for 78% of income in the data processing industry. The biotechnology market, valued at less than ECU 10 billion in 1996, should be close to ECU 80 billion by the year 2000 ('Inventing tomorrow: Europe's research at the service of its people').

With regard to the patentability of software and the repercussions of information society technologies on industrial property rights, the Commission recently started looking at the matter together with those concerned with a view, if necessary, to supplementing the harmonization of the Member States' legislation. The Community has already adopted five directives since 1991 on copyright and related rights. In order to meet the new challenges related to the development of the information society, the Commission has published a Green Paper on copyright and related rights in the information society, which prompted wide-ranging discussion among those involved. The Commission has just adopted a communication to the Council and to the European Parliament concerning the follow-up to the Green Paper; this one identifies four priority issues for which legislative proposals will be soon submitted (reproduction rights, right of communication to the public, legal protection of the integrity of technical systems and distribution rights. In addition, it is proper to give special attention to the questions linked to the application of the rules of responsibility within the global environment of the information society.

### *Other harmonization methods*

2.6. In view of the major economic importance of designs and models and of the differences among the Member States with regard to design protection, the Commission will continue its efforts with a view to harmonizing national laws<sup>2</sup> and to creating a body of Community law in that field.<sup>3</sup> In the field of employees' inventions it will launch a study on the need for and possible content of harmonized national laws and will start a discussion of this topic with those concerned. Lastly, in the light of comments on its Green Paper on utility models it will make a decision on the advisability of draft Community legislation in this field.

2.7. As the Commission has pointed out in its Confidence Pact for Employment, the potential of the internal market will not be attained unless the relevant directives are transposed

<sup>2</sup> Modified directive proposal of the European Parliament and of the Council relative to the legal protection of designs. OJ C 142, 14.5.1996, p. 7.

<sup>3</sup> Regulation proposal of the European Parliament and of the Council on community designs and models. COM(93) 342 final. OJ C 29, 31.1.1994, p. 20.

into national legislation and actually applied. In the key area of intellectual property, in particular, the situation gives rise to concern, since only one directive has been transposed by all the Member States. The Commission asks the Member States in question to assume their responsibilities and to submit to their respective parliaments the required draft legislation by the end of 1996.<sup>1</sup>

### *Reducing costs*

2.8. In the field of patents, there are supplementary proposals designed to solve the tricky problem of translation, as well as alignment with the systems of rival countries with regard to eligibility and costs and help in combating counterfeiting.

The Commission supports the efforts of the European Patent Office (EPO) to cut the costs of filing and maintaining patents, such as the review of current requirements concerning translation (along the lines of the 1975 Convention on the Community Patent, which requires translations only for the summary and in the event of protection being invoked) and will study whether to introduce incentive measures for SMEs, individual inventors and universities ('small entity fee').

With a view to a better allocation of the resources relating to fees for European patents, the Member States are called on to examine the current system of apportioning the fees for maintaining European patents (half of which at present are paid to the European Patent Office, while the other half are retained by the contracting States), in the light of the following questions: (1) Is it appropriate that taxes to maintain the validity of European patents should finance part of the national patent systems? (2) Should the present distribution ratio be kept as it stands or should it be modified? (3) Within the framework of promoting innovation, doesn't this system entail negative effects, in particular when a large part of these resources is directly allocated to the general budget of the State and not to tasks directly related to innovation?

<sup>1</sup> 'Action for employment in Europe: a confidence pact', CSE(96) 1 final, 5.6.1996, and Supplement 4/96 to the *Bulletin of the European Union*.

### *Promoting protection*

2.9. Actions to make enterprises aware of the range of possibilities provided by the system for protection and training are needed. The Commission, in the fifth framework programme, will reinforce its activities in this field, especially:

□ exchanging best practice among the Member States (especially the national patent offices) and with the EPO concerning the dissemination of 'patent' information, and especially ways of making it accessible and comprehensible to SMEs;

□ checking the novelty of research proposals,<sup>2</sup> and the introduction of an information service for those involved in the framework programme ('IPR-helpline').

2.10. The Member States are also invited to develop, with full regard for the international dimension, their training activities on protection.<sup>3</sup>

### *Combating counterfeiting*

2.11. Counterfeiting imposes a significant cost.<sup>4</sup> It therefore constitutes a special threat to SMEs, which are often reluctant to take legal action, especially in a third country.

The Member States are invited to set up a support system for SMEs and universities in the event of disputes and, where appropriate, loan procedures designed to finance the cost of a patent and the introduction of insurance schemes to protect enterprises, especially SMEs, against infringements of their intellectual and industrial property rights.

The Commission has ordered a study on the potential role of the Community, by way of supplementing national action, in combating

<sup>2</sup> The Quick Scan system pilot project under the Innovation programme, and in conjunction with the EPO, shows that the costs involved come to less than 0.5% of the total costs of the project, and that it affects some 5% of the projects, which have to be redefined, reorganized or rejected for the lack of novelty.

<sup>3</sup> Like Germany, which created 100 teaching posts in higher technical education during the first half of 1996.

<sup>4</sup> In 1994, industry in Europe spent about ECU 2 billion on legal or out-of-court proceedings to protect patents.



counterfeiting and will start consultation on the basis of the results.

### (iii) Administrative simplification

2.12. 'Administrative and regulatory constraints cost far too much in Europe. Some studies suggest the cost comes to more than ECU 100 billion a year,<sup>1</sup> particularly disadvantaging SMEs. Both the Community's approach and the work of national authorities in this area need to be reviewed.'<sup>2</sup>

A step in this direction has been taken with the establishment of the Molitor group<sup>3</sup> and the creation by the Commission, as part of its integrated programme for SMEs and craft industries, of the Committee on the Improvement and Simplification of the Business Environment. This committee provides the framework for the exchange of best practice in this area between the Member States and the Community. The Commission will put a proposal to the committee for a special programme on innovation.

#### *Business start-ups*

The formalities relating to business start-ups, together with all the other compulsory procedures, are generally more complicated and take longer for European enterprises than for their competitors elsewhere. This has an effect on their dynamism, especially with regard to competitiveness.

The studies and investigations that have been conducted have shown that some Member States had already started a sustained effort towards administrative simplification. In some countries of the European Union, the formalities for starting up an enterprise have thus been reduced to a single form at a one-stop shop. Other countries that have not adopted measures of this kind are called on to follow this exam-

ple and to simplify the formalities for setting up new enterprises. (Measures for stimulating business start-ups are also referred to in points B.2(i) 'Financing' and C.1(iii) 'Start-up of technology-based companies'.)

#### *Analysis of the impact of rules on innovation*

2.13. In the area of the internal market, the Commission recently launched a pilot project designed to simplify legislation in four test sectors: the SLIM initiative (Simpler legislation for the internal market), a testing ground for more ambitious actions. If the pilot project is a success, the Commission will take account, when new sectors are being considered as part of the SLIM initiative, of the possible impact of the legislation on innovation and will ask the SLIM teams involved to attach the required importance to this aspect during their work.

As has been done in some Member States, the Commission will test an *ex ante* mechanism for assessing the impact of regulations on innovation<sup>4</sup> as part of the general guidelines for legislative policy.<sup>5</sup>

A much more uniform application of Community rules by national administrations also needs to be encouraged. This requires greater cooperation among the relevant authorities in the Member States, in line with the Council resolution of 8 July 1996.<sup>6</sup> The Commission will develop its support actions, especially with regard to the exchanging and joint training of

<sup>1</sup> A survey of 8 000 SMEs by the French Ministry of Industry in 1995 and 1996 revealed that the average annual cost of completing official forms was equivalent to one person working full-time for three months.

<sup>2</sup> 'Action for employment in Europe: a confidence pact', CSE(96) 1 final, p. 8, and Supplement 4/96 to the *Bulletin of the European Union*.

<sup>3</sup> Comments of the Commission on the report of the Independent Experts Group on Legislative and Administrative Simplification, SEC(95) 2121 final, 29.11.1995.

<sup>4</sup> Similar to the German Federal Ministry of Economic Affairs, which indicated in a report entitled 'The future of the German industrial site', adopted in 1993, that 'the German Government will ensure that existing or planned legislative and administrative provisions will be examined to see whether they represent an obstacle to innovation and to avoid, in the future, other provisions with the same effect'. A working party on the 'deregulation of research and innovation' was formed 18 months ago within the Ministry of Research, Technology and Education. It reviews laws and regulations, etc., from the angle of research and innovation. It is advised by external experts from many disciplines. The comments are sent to the relevant ministry, which is required to reply. Experience so far has shown that 70 to 80% of complaints are unfounded or can be easily resolved by properly applying existing rules. Another important problem that was identified is the multiplication of legal texts on the same subject but starting from different angles. The question here is one of coordination.

<sup>5</sup> SEC(95) 2255/7.

<sup>6</sup> OJ C 224, 1.8.1996.

national officials, similar to the Mattheus and Karolus programmes.

### *One-stop shops to support innovation*

2.14. The readiness of public authorities and private operators to provide support services to SMEs has often resulted in a variety of advice, information and assistance services at national or regional level, the relevance and intelligibility of which are no longer obvious to the recipients.

The Member States where there has been no initiative along these lines are invited to provide SMEs with networks of one-stop shops operating at local or regional level which can be contacted by enterprises and others involved in innovation for information on innovation-support questions and to make the best possible use of the opportunities offered by new information and communication technologies in these fields.

At Community level the Commission will disseminate good practice in this field and implement greater coordination among the various networks for research and innovation support that are its responsibility. It will also ensure better contact between these networks and the national bodies performing the same functions in the Member States, in order to draw on existing bodies with acknowledged expertise. It will promote the Euro-Info Centres as the initial contact points for SMEs that do not yet have links with other networks.<sup>1</sup>

### **(iv) Company law**

Initiatives are needed concerning the European company statute, the promotion of European Economic Interest Groupings (EEIGs) and the joint undertaking or private company statutes.

#### *European company statute*

2.15. The adoption of the European company statute would make it possible to lift certain obstacles to innovation that stem from the application of 15 different legal systems and would help to attract the private capital that is

needed for major innovation projects.<sup>2</sup> Enterprises in Europe would benefit from a legal framework adapted to the internal market and world competition.

In November 1995 the Commission initiated a wide-ranging consultation of the institutions and social partners at Community level concerning the communication of 14 November 1995<sup>3</sup> on informing and consulting workers.

The primary aim of this communication is to make the Community framework in this area more consistent and complete and to facilitate the adoption of the European company statute which has been with the Council for many years, and consequently some other proposals for statutes such as those relating to the European cooperative society, the European association and the European mutual society, as well as the proposal for the 10th Directive on cross-border mergers.

The Commission has set up a group of high-level experts responsible for presenting proposals which could resolve the impasse affecting these particular matters.

### *Other types of company*

2.16. The EEIG is an instrument for cooperation among enterprises which has already proved its worth for launching and managing innovative projects.

The Commission will encourage better dissemination of information on EEIGs.

2.17. In the search for a structure that will make genuine legal integration a possibility, in addition to the cooperation permitted by EEIGs, the Commission is examining the feasibility of a joint undertaking statute based on Article 130n of the Treaty, which provides for the possibility of the Community's setting up 'joint undertakings or any other structure necessary for the efficient execution of Community research, technological development and demonstration programmes'.

<sup>1</sup> Proposal for a Council Decision on a third multiannual programme for small and medium-sized enterprises (SMEs) in the European Union (1997-2000), COM(96) 98 final, 20.3.1996.

<sup>2</sup> The Ciampi Group estimated that the lack of such a framework involves enterprises in an extra cost of ECU 30 billion every year. At the conclusion of the Florence Summit the European Council asked for negotiations to be speeded up with a view to its speedy adoption.

<sup>3</sup> COM(95) 547 final, 26.11.1995.

2.18. It also seems useful to encourage the creation at national level of a simplified private company statute. A flexible legal instrument of this kind would help the formation of small enterprises and companies with private-share ownership, which are often innovative, without affecting the safeguards which company law must continue to provide for companies with wide-share ownership.

## **(v) Standards**

2.19. The creation of an environment for standards that is conducive to innovation instead of hampering it requires the promotion of performance standards and voluntary agreements, better links between the formulation of standards and scientific and technical development (perinormative research), together with greater awareness among those who devise and use standards, especially SMEs.

The Member States (and, in their areas of responsibility, the European standardization committees) are invited to encourage the adoption of voluntary standards between manufacturers and suppliers and, whenever possible in the technical rules and standards they issue and for public contracts, opt for performance standards, thereby ensuring greater freedom for designers of new products and stimulating competition among suppliers.

They are also invited to increase their actions for informing and raising the awareness of enterprises, and also of industrial designers and research laboratories working on standards, and to promote the involvement of industry and SMEs in standardization bodies and committees.

The Commission intends in its fifth framework programme to devote more attention to the links between research projects for the development of new technologies and standardization activities (especially pre-standards), as well as to the application of scientific knowledge to measuring performance (standardization-oriented research and metrology). The Joint Research Centre (JRC) will have a special role to play in this latter area.

The Commission will catalyse initiatives of market players for the deployment of new standards through experimentation, validation and demonstration (pilot) projects.

The Commission will promote cross-fertilization between sectors by stimulating the assimilation of standardized products, services and best practices from highly innovative sectors into more classical industrial sectors.

## **2. Financial environment**

### **(i) Financing**

2.20. The question of financing is one of the major priorities that emerged from the discussion prompted by the Green Paper on innovation. In this field a lot depends on private initiative or on the national or regional dimension. The aims to be pursued include:

- ☐ developing a trans-European capital market for innovative enterprises, serving as the counterpart of the NASDAQ in the United States, as well as encouraging additional initiatives at national level;

- ☐ encouraging investment in equity finance, in particular through venture capital, especially for new enterprises (start-up) and high-growth innovative enterprises which are a major source of new jobs;<sup>1</sup>

- ☐ improving the interfaces between those involved in innovation (including participants in Community research programmes) and the world of finance.<sup>2</sup>

For its part, the Commission has to ensure that the right framework conditions are in place, namely the effective introduction of the single market in particular, and compliance with the rules of competition. It also plans to work on ensuring that best practice is disseminated and facilitating their adoption, primarily through support for pilot actions but also by making full use of the Structural Funds and other

<sup>1</sup> In 1994, ECU 310 million was invested by venture capital in Europe in start-up projects, representing 5.7% of the value of all such investment that year. In the United States the corresponding figure was 37%. The proportion of venture capital invested in technology-based projects in Europe in 1993 was 17% in terms of value. In the United States the figure was about 80%.

<sup>2</sup> In order to encourage investment in high-technology projects, Eureka prompted in 1995 the 'Interlaken Declaration', which was signed by banks in many Eureka countries as well as by the EIB. This declaration represents an indication of goodwill with the aim of examining, in a favourable light but without any guarantee of acceptance, applications for risk investment from Eureka projects.

existing instruments such as the EIB or the European Investment Fund (EIF).

### *Development of capital markets for high-growth enterprises*

2.21. The Commission will see to it that the framework conditions are put in place for the development and proper operation in Europe of stock markets for 'growth enterprises'.

In particular, the Member States need to complete the transposition into national law of the directives on financial services and information on enterprises, cooperation among national supervisory bodies needs to be increased, and the remaining legislative or regulatory obstacles need to be removed. There is also a need to create an environment conducive to their proper operation in terms of:

- ☐ informing enterprises, and preparing applicants (the multiannual programme for SMEs provides for the part use of the Euromanagement initiative);
- ☐ practices for dissemination of information on enterprises;
- ☐ training of required specialists (analysts);
- ☐ electronic communication systems etc.

A study which is being conducted as part of the Innovation programme will allow specification of the actions to be undertaken.

### *Investing in equity for innovation*

2.22. The Commission will disseminate existing best practice to direct long-term savings (pension funds, life insurance, save-as-you-earn schemes, 'business angels') towards investment involving risk.

2.23. It will endeavour to consolidate the development of venture capital in Europe by encouraging the establishment of a favourable fiscal and regulatory framework in the Union and by favouring the establishment and use by the profession of performance statistics which could be evaluated in an objective and comparable manner at international level, especially with a view to facilitating the raising of new capital among institutional investors.

2.24. Also, as indicated in the Confidence Pact for Employment, the Commission plans to

strengthen cooperation between the EIB and the Structural Funds in order to develop financial instruments for the benefit of innovative enterprises and projects in the least-favoured regions.

2.25. In collaboration with the EIF, the Commission will study the possibility of introducing mechanisms to support venture capital investment which have already proved successful, in particular in the United States (loans based on the amount of funds raised), and whose leverage effect on investors' anticipated returns minimizes the impact of their fiscal treatment.

2.26. The Commission will endeavour to strengthen the actions of the European Investment Fund in favour of innovation by introducing a pilot mechanism to encourage venture capital funds in which the EIF will have holdings to invest<sup>1</sup> in the early stages of investment and innovative projects.

### *Developing interfaces between investors and innovators*

2.27. Using existing bodies, the Commission will develop the exchange of experience and the dissemination of best practice between public or private national and regional operators.<sup>2</sup> As part of the Innovation programme, it will provide support for transnational cooperation for the joint testing of new methods (e.g. technology rating, use of patents as guarantee, etc.).

2.28. The Commission will endeavour to improve access to private finance (venture capital) for those involved in Community research programmes (and Eureka). This could involve the setting-up of an 'innovation financing help-desk' designed to inform potential investors about current projects and their potential (e.g. access to Eurotech Data) and to help the enterprises and researchers in question to have easier access to private capital, especially at national level (e.g. information on sources and terms of access to venture capital, investors' expectations, etc.).

<sup>1</sup> Since June 1996, the statute of the EIF allows it to take such participations.

<sup>2</sup> The first topics may be the stimulation (of networks) of business angels and their involvement in innovation, securitization, hybrid financing (public-private) or the assessment of technical risk by financial institutions.

## **(ii) Statutory deductions**

2.29. The Commission has already issued a number of recommendations and communications in fields affecting the fiscal treatment of innovation. Two examples are the communication on the fiscal environment of small and medium-sized enterprises (SMEs) and the recommendation concerning the taxation of SMEs.<sup>1</sup>

The Commission has previously stressed the need for a global approach to the question of statutory deductions (direct taxes, indirect taxes, social security contributions) in the wider context of Community policies.

The European Council in Florence<sup>2</sup> asked the Council for a report on the development of tax systems within the Union that took into account the need to create a fiscal environment which stimulates enterprises and the creation of jobs. This work will include possible actions to improve the fiscal environment of enterprises, which would also help innovation. There is a need, for example, to review the fiscal treatment of cross-border payments, interest and

charges, since the Council has not been able to reach agreement on a Community solution.

Given that intangible investment has a strong work content (research, training), it is much more affected than tangible investment by the steady rise in labour-related tax and social security contributions. This structural trend, which has been detrimental to employment, ought to be reversed, as was pointed out in the White Paper on growth, competitiveness, and employment.

In 1997 the Commission will consider a communication on taxation and innovation which will take into account the effects of the trend in the structure of statutory deductions and which will propose to the Member States a number of 'good practices' in this area, based on an analysis of national circumstances in the light of work under way in the Member States and OECD.

2.30. The Commission will analyse means of promoting a fiscal and accounting treatment of intangible investment, especially in training,<sup>3</sup> that is conducive to competitiveness.

<sup>1</sup> 94/390/EC, 25.5.1994, OJ L 177, 9.7.1994.

<sup>2</sup> See conclusions of the Presidency, Florence, 21 and 22 June 1996, SN/300/96 and *Bulletin of the European Union*, 6-1996.

<sup>3</sup> The White Paper on education and training recommends equal treatment for tangible investment and investment in training.

## **2. Establishing a framework conducive to innovation**

### **2.1. New actions**

#### **1. Protection of intellectual and industrial property**

##### *Commission and Member States*

- Launch of a Green Paper on the issue of the Community patent (September 1997).

##### *Commission*

- Set up a service of assistance on intellectual property (IPR-helpline) for Community research (1997).

##### *Member States*

- Set up instruments to inform and help SMEs and universities in the event of disputes.

#### **2. Administrative simplification**

##### *Commission*

- Introduce a pilot mechanism for the *ex ante* assessment of the impact of regulations on innovation (end-1997).
- Implement operational procedures for coordinating Community innovation support networks (1997).

##### *Member States*

- Set objectives and a precise timetable for simplifying business start-up formalities.

##### *Member States and local authorities*

- Speed up the rationalization of innovation support activities and bodies.

#### **3. Financing**

##### *Commission*

- Reinforce EIF action in favour of innovation and cooperation between the EIB and the Structural Funds (beginning of 1997).
- Improve the links between Community research and risk capital, particularly through the provision of information and guidance services for those taking part in the framework programme and for investors (mid-1997).
- Develop the exchange of experience and the dissemination of best practice between Member States and operators (1997 and 1998).

##### *Member States*

- Introduce the framework conditions for stock exchanges for growth enterprises.
- Make greater efforts to direct 'patient' capital towards risk investment.

#### **4. Taxation**

##### *Commission*

- Consider a communication on 'taxation and innovation' (possibly in 1997).

##### *Member States*

- Promote fiscal and accounting treatment more favourable to intangible investment.



## **2.2. Current actions for improving the innovation environment in Europe**

### **1. Competition**

#### *Commission*

- Follow-up to the Green Paper on merger monitoring, extending the field of application of unified European monitoring of mergers and harmonizing the treatment of joint structural enterprises.
- Publish a Green Paper on the application of the rules of competition to vertical agreements.
- Continue the dialogue with the competition authorities in the United States, to allow the bringing together of the definitions of the relevant market, particularly in agreements with a high technology content.

### **2. Protection of intellectual and industrial property**

#### *Commission and Member States*

- Complete the harmonization of legislations to take account of developments linked to the technologies of the information society and supplement legislations on design protection and employees' inventions.

#### *Commission*

- Strengthen anti-counterfeit measures.

#### *Member States*

- Ensure the adoption of the proposal for a Directive on biotechnological inventions.
- Support the efforts of the European Patent Office to reduce filing costs.
- Transpose the European directives on the protection of intellectual property into national legislation by the end of 1996.
- Develop training in this field.
- Make enterprises aware of the competitive benefits of protection.

### **3. Administrative simplification**

#### *Commission*

- Introduce a special action on innovation into the work of the committee for the improvement and simplification of the business environment.
- Accord the required importance to innovation when simplifying administration (e.g. in the choice of sector under the SLIM project).

#### *Member States*

- Provide enterprises with one-stop shops for innovation questions.

### **4. Legal and regulatory environment — Company law**

#### *Council*

- Speedy adoption of a European company statute.

#### *Commission*

- Continue to encourage the use of European Economic Interest Groupings, especially by providing better information.
- Study the feasibility of creating a joint undertaking statute (Article 130n of the Treaty).

## C — Gearing research to innovation

3.1. European firms have more difficulty than their competitors in turning the fruits of research into innovative products. The wide variety of situations in Europe means that this is not always true to the same extent, of course, but a number of indicators show that the efforts made so far have been inadequate.<sup>1</sup>

3.2. Decision-makers and taxpayers regard an increase in research input as justifiable in a period of cuts in public expenditure<sup>2</sup> and when businesses are striving to become competitive, if its advantages and spin-offs for society (health research, environmental protection,

energy savings, etc.) and for new products, processes or services are clearly perceived.

Of course, research has the further objective of pushing back the boundaries of knowledge without necessarily bringing immediate practical benefits for industrial applications. Both basic and longer-term research are preparations for the future, but such work may also produce spin-offs in terms of immediate industrial applications. It therefore deserves to be pursued, particularly at national level, where most money is spent on it, but also at Community level in certain cases.

In knowledge-based economies, the efficient systems are those which combine the ability to produce knowledge, the mechanisms for disseminating it as widely as possible and the aptitude of the individuals, companies and organizations concerned to absorb and use it. The crucial factor for innovation is thus the link between research (the production of knowledge), training, mobility, interaction (the dissemination of knowledge) and the ability of firms, particularly SMEs, to absorb new technologies and know-how.

3.3. This requires a series of specific, essentially national measures which the Community can support by disseminating good practice, establishing gateways between national innovation systems and taking similar or complementary measures at Union level.

The second series of measures is concerned with the architecture and methods of the framework programme, the aim being to meet the needs of industry and society more closely and to integrate the innovation and SME dimensions fully, particularly through the development of the task force system as a coordination mechanism.

Lastly, the Community will see to it that other policies and instruments, particularly the Structural Funds and international cooperation schemes, are properly mobilized to this end.

<sup>1</sup> The document 'The competitiveness of European industry' (COM(96) 463/3) is clear in its diagnosis: 'Research and development represents another significant form of intangible investment for which European performance is insufficient. In spite of maintaining an advanced science base, total European spending on R&D at 1.9% of GDP is up to one third lower than that of the United States (2.5%) and Japan (3.0%). Research undertaken and financed by industry itself is an area for which the European lag with the United States and Japan remains particularly large (1% of GDP compared with 1.6% and 2.2% respectively). Europe has not been using its advanced base in science and technology to the best advantage and indeed the European research base does appear to be less market-oriented than that of its major competitors. Product development makes up less than half of R&D spending in Germany and France compared with over 60% in the United States and Japan. In addition, fewer human resources are devoted to R&D. Scientific research personnel represent only 0.47% of the labour force, compared to 0.74% in the United States and 0.80% in Japan.

Between 1984 and 1993, the European Union lost shares in patents, the principal method of protecting intellectual property, for all sectors except aerospace and transport equipment. In terms of the total number of patents, however, these two sectors remain quite minor. In chemicals, the loss in shares remained limited. The most significant loss took place in electronics, a sector in which R&D is highly intensive and which exerts considerable influence on innovation in the rest of industry through technology embedded in investment goods'.

<sup>2</sup> At the conclusion of its meeting in Florence the European Council asked Member States to 'strengthen their efforts to rebalance their budgets in the light of the general principles already identified, particularly with a view to reducing expenditure rather than increasing revenue, to restructure their expenditure selectively so as to promote intangible investment in human capital and research and development, innovation and the infrastructures essential to competitiveness...', SN/300/96 and *Bulletin of the European Union*, 6-1996.



## **1. National measures with Community support**

3.4. There are huge differences between national contexts, and all initiatives taken will need to be tailored to the situation in the country concerned. A number of general recommendations can nevertheless be applied according to the needs of each innovation system. They concern:

- (i) a long-term strategic approach to research;
- (ii) strengthening of research by industry, in both absolute and relative terms;
- (iii) start-up of technology-based companies;
- (iv) closer cooperation between public research, universities and industry;
- (v) expansion of the capacity of SMEs for absorbing new technologies and know-how;
- (vi) demonstration of effective approaches to innovation.

### **(i) A long-term strategic approach to research**

3.5. Europe needs to develop a long-term strategic approach to research and its applications which is targeted more closely at growth sectors of the market (including services) and at relevant gaps in national markets.<sup>1</sup> Initiatives of the 'Key technologies', 'Delphi' and 'Foresight' variety may help direct collective efforts towards those sectors, disciplines or technologies which will be most crucial in the future. Their forte lies in their ability to foster broad-based discussion of potential technology options, to generate industry/research/public-sector/training/financing and other networks and to spark off interdisciplinary and inter-sectoral thinking.

The Commission's role will be to:

- ☐ facilitate exchanges of experience between Member States in this sector;
- ☐ exploit the results of these initiatives to identify suitable pathways on a Community scale;

<sup>1</sup> The expected growth in the services sector has better prospects for job creation than the manufacturing industry, for example. The innovation process in this sector is very different from that of more traditional sectors.

☐ strengthen technology watch activities at European level within the European Science and Technology Observatory (ESTO), set up by the Institute for Prospective Technological Studies of the JRC as a focal point for Member States' observatories.

The Commission invites Member States which have no experience in this area to consider pursuing this type of long-term approach (it will, if necessary, make a financial contribution from the Structural Funds).

The Commission will also set up a working party to examine the types of — and means of administering — research and technology transfer programmes best suited to the needs of firms in the services sector, based on the experience gained through specific programmes which are already aimed directly at services (e.g. telematics, transport) and through the Leonardo training projects.

### **(ii) Strengthening research carried out by industry**

3.6. The share of GDP devoted to research financed by industry varies widely from one country to the next: some are already above the level of our competitors, while others still have a long way to go. The total for Europe is 38% below that of the USA and 55% below that of Japan. Good practice, already fairly widespread but requiring strengthening in certain regions, includes:

- ☐ involving industry in defining research programmes and, where appropriate, in assessing proposals;
- ☐ increased contract activities of public research centres and universities (some of their resources must come from industrial contracts, obtained through competition);
- ☐ generalized cooperative research programmes (of the COST or Eureka variety), requiring a minimum participation from businesses;
- ☐ institutional mechanisms or suitable tax incentives.

Member States are requested to draw up quantified and ambitious objectives aiming to increase the share of the gross internal product dedicated to research, to development and to innovation, in particular by encouraging research undertaken by industry (in particular

the one financed by enterprises or the one financed by governments within the limits allowed by Article 92 of the EC Treaty.

### **(iii) Start-up of technology-based companies**

3.7. Actions for encouraging researchers and engineers to start up technology-based companies, whether within universities ('campus companies'),<sup>1</sup> located in science parks or as spin-offs from large firms, need to be intensified.

Member States are invited to step up the action they are taking in this area, subject to the rules governing State aid and with emphasis on indirect measures, by exploiting existing structures which have proved to work, such as the European Community business and innovation centres (EC-BICs).

The Commission meanwhile will begin in early 1997 to organize, as part of the Innovation programme, a more thorough exchange with Member States on the best practice in this domain, involving leading players in the field. This exchange will concentrate on measures for facilitating the spread of such practice (covering intellectual property rights, social rights, financial arrangements, etc.) and national or regional promotion schemes.

It will support the dissemination of best practice through pilot projects involving, for example, university technology transfer departments and the regional institutions concerned (local authorities, chambers of commerce, etc.), risk capital companies and technology brokers.

### **(iv) Closer cooperation between public research, universities and industry**

3.8. This type of cooperation needs to be intensified at national and regional level and geared more effectively towards innovation, start-up of new companies and, more generally, the transfer and dissemination of knowledge by:

☐ closer links between research and training, by anticipating the needs of the productive sector;

☐ opportunities for universities and researchers to spend some of their time developing a company;

☐ a legal instrument enabling university staff and public research centres to conclude exclusive contracts with industry for exploiting results (already practised in several countries), or by taking equity participation;

☐ encouraging research and technology organizations to introduce management and assessment parameters taking these aspects into account and to develop international benchmarking practices;

☐ stimulating dialogue between the producers and users of technology (such as sectoral and intersectoral forums, technology clubs, etc.).

The Commission will continue to analyse the existing barriers and the factors conducive to this cooperation and will disseminate the results to interested circles on a wide scale.

It will support the efforts made at national, regional and professional level to improve the management of research and technology centres to gear them up for innovation and will organize transnational sectoral or trans-sectoral forums with the aim of setting up specific cooperation schemes, and will ensure that they are professionally organized and managed.

The aim of these forums will be to foster dialogue with industrial and research circles and between representatives of industry themselves on technological and organizational challenges requiring a response on a European scale via the framework programme or other mechanisms. The forums might constitute a basis for exchanges of best practice amongst firms and sectors of activity. If the mechanisms enable key pilot schemes to be identified, the Commission will ensure that the necessary resources for trying out these innovative approaches are made available.

The Commission will also draw on the experience of the research-industry task forces in order to strengthen cooperation between players and disciplines and to concentrate and coordinate the efforts made.

<sup>1</sup> Numerous empirical studies have demonstrated the economic impact of this type of company, particularly where innovation dissemination is concerned (Storey, 1996), and the added value of public support for their start-up (Mustar, 1995).

### **(v) Expansion of SMEs' capacity for absorbing new technologies and know-how**

3.9. This aim is to be pursued whatever the origin of new knowledge, methods and technologies. On a national scale this would involve such schemes as:

- ☐ enhancing the effectiveness and transparency of national or regional innovation support activities;
- ☐ developing the job of mediator — between research, technology and SMEs (interface services similar to the British business links, technology follow-up teams similar to the French 'centres de ressources technologiques', etc.) — able to put technological problems in the context of all SME innovation requirements (organization, training, marketing, financing, etc.);
- ☐ easier access to external expertise, European or worldwide, particularly where organization and management methods are concerned (e.g. the knowledge resource centres advocated in the Ciampi report) and cooperation between firms (clusters, networks and value chains);
- ☐ helping to recruit or second researchers, engineers and technicians to SMEs; promoting visits (particularly transnational) between firms and other methods of demonstrating innovative technologies, methods and processes.

Member States ought to extend the scope of their national measures for fostering the transfer of technology of international origin.

A continued drive is needed to rationalize activities and innovation-support organizations in the regions and Member States (see Section B.1(iii) above), enabling them to reach critical mass and the necessary degree of professionalism.

The Commission will continue to support such procedures under the Structural Funds and the Innovation programme (regional innovation strategies and audits of the regional infrastructures for supporting technology transfer and innovation).

The Commission will also intensify activities for creating improved links between the various national and regional innovation-support systems.

Working with players in the field, it will identify the skills required and the tools needed to professionalize or, where appropriate, certify the new professions which will need to emerge in this context.

The Commission will put forward, as part of the fifth framework programme, a coherent and reinforced set of initiatives for encouraging and facilitating the transfer, use and absorption of technologies, whether or not these were developed in the European Union.

It further proposes to give a considerable boost to the innovation-support measures under the Structural Funds (see Section C.3(i)). Closer and more systematic coordination will ensure that these initiatives are complementary.

These initiatives may include the following:

- ☐ support for technology transfer to companies or sectors in less-developed regions, particularly under the Structural Funds;
- ☐ support for the first use of new technologies, subject to subsequent dissemination of the experience acquired by the user (along the lines of the FUSE initiative and Esprit), and for technology transfer schemes giving young innovative firms access to European or international markets.

### **(vi) Demonstration of effective approaches to innovation**

3.10. The Commission, in collaboration with European industry, will put forward a new generation of transnational demonstration projects, many of them under the European Union research programmes, illustrating effective approaches to innovation and incorporating technical, organizational and social aspects.

These transnational projects will provide a framework for 'live' testing of transnational innovation and will demonstrate how similar innovations are treated in different cultural and national contexts, thus making it easier to remove obstacles to their dissemination. They will involve all:

- ☐ enable new methods, partnerships and services (such as intellectual property rights, project management and innovation financing) to be tested;
- ☐ show how to optimize the social benefits of technical innovation, particularly those affect-

ing employment and improvements to working conditions but also involving the adoption of common standards;

- ☐ develop good participative management practice, so as to improve and accelerate industrial innovation;

- ☐ enable social groups<sup>1</sup> able to act as innovation catalysts and multipliers to take part;

- ☐ encourage intersectoral apprenticeship by disseminating the results of pilot innovation projects between sectors.

The Commission recommends that industrial research projects take socio-economic aspects into account and will take steps to promote their incorporation into its own programmes, with the help of economic and social science experts.

It will take appropriate steps under the fifth framework programme to support research and development schemes offering short-term and medium-term results and guaranteeing the environmental sustainability of production systems, and to facilitate the social acceptance of new technologies, particularly those in the information society (such as projects demonstrating the ability of new technologies to give stronger protection to fundamental rights, such as the respect of private life through the use of privacy-enhancing technologies).

## **2. Incorporating the innovation and SME dimensions into the framework programme**

3.11. This means totally re-engineering the framework programme. Its approach, implementation methods and management organization therefore need to be adapted:

### **(i) An integrated approach**

3.12. Firstly, the framework programme approach needs to be an integrated approach.

<sup>1</sup> The Green Paper 'Living and working in the information society' illustrates how important it is for society as a whole and for wage-earners in industry to accept change. This last point will be enlarged on in the Green Paper on work organization which is currently being drafted. COM(96) 389 final, 24.7.1996, and Supplement 3/96 to the *Bulletin of the European Union*.

The Green Paper debate has confirmed<sup>2</sup> that research and technology in general were merely one aspect of innovation — an important one, of course, but insufficient on its own. The organizational, management, market, financial, legal, protection, etc. aspects will be taken into account more systematically. This has a number of implications:

- ☐ these elements will be incorporated from the definition phase of the most industrial programmes and the corresponding projects (including the safeguarding of intellectual property rights, standards and the subsequent assessment of conformity with such standards, private financing networks, long-term market analysis, design, etc.);

- ☐ closer links between R&TD and other policies (training, internal market, Structural Funds, etc.) will be fostered with a view to meeting the general criteria for rapid exploitation and dissemination of results;

- ☐ the task force mechanism as a coordination instrument for designing and monitoring initiatives targeted at priority societal and industrial objectives, making for visible, selective and concentrated efforts, will be refined to make the selection of topics more transparent and to ensure that as many SMEs as possible from all regions take part;

- ☐ coordination of Community and national policies should be put into practice.

### **(ii) Adapted approaches to implementation**

3.13. Secondly, the ways of implementing programmes and projects will be adapted, primarily with a view to:

- ☐ determining the overall technological aims and content of the work programmes for specific programmes, taking account of the main factors affecting innovation in their own spheres of activity;

- ☐ revision or stricter application of the evaluation criteria for project proposals to place more stress on the novelty of proposals, the quality of the exploitation plans submitted by the main contractors within consortia (and the extent to which they match the business plans of the

<sup>2</sup> In the Community innovation survey, the ability to solve technical problems was the least of the obstacles to innovation named by companies.

companies or research centres concerned), the relevance of elements needing access to a transnational level (effects of scale, access for SMEs to the European market, etc.), the expected benefits for other Community policies (employment, cohesion, environment, etc.);

- ☐ encouraging preparations to exploit and disseminate results during the research stage by making available to the contractors new instruments, methods or good practice and support services for innovation and technology management, intellectual property, access to sources of private finance, etc. As stated above, close links will be established between Community research and innovation projects and sources of risk capital able to provide finance for projects arriving on the market, in cooperation with the European Investment Fund in particular;

- ☐ redirecting the management and contractual follow-up of projects towards producing results ('deliverables') and/or achieving measurable objectives ('milestones') clearly identified by each main partner within a consortium. 'Project lifecycle management for R&TD' will be developed, tested and put into practice. This model aims to achieve homogeneous criteria and methods for the whole of the framework programme, possibly using total quality management techniques;

- ☐ aiming at maximum user-friendliness for SMEs: faster procedures, a single interface and a system of rolling calls for proposals with a two-stage submission procedure;

- ☐ adapting contracts to allow more flexibility in forming consortia and enable them to be changed during the project, for example by bringing in SMEs or transfer organizations at a downstream stage to exploit or transfer the results, or to give stronger protection to the intellectual property rights of contractors when development or demonstration projects are involved;

- ☐ strengthening the measures taken (methods and resources) under the specific programmes in order to promote the exploitation of their results and the dissemination, mainly through demonstration programmes, of the generic know-how and technologies generated by them, to enable a growing number of firms to benefit from the spin-offs of Community R&TD;

- ☐ effective exploitation of the results of research projects will depend largely on the

action taken by the partners themselves from the research phase onwards to prepare for exploitation by consortia or, failing this, for transfer to other partners (complementary studies on technology introduction, training in new technologies, documentation from the start of the project, preparation of licences, identification of partners, etc.). Substantial funding is needed for such action if it is to work. The research project should therefore be part of an innovation strategy. This must be taken into account in the selection criteria, throughout the implementation of the project and in the assessment of the results.

### **(iii) Coordinated management**

3.14. Accepting that large companies have an important role to play in the innovation process, in particular through their collaboration with smaller firms, this action should give more SMEs access to all research work and its results, develop technology transfer and stimulate innovation. This will call for closer coordination of the various initiatives so as to ensure:

- ☐ better overall consistency, optimum exploitation of synergies between the various initiatives and increased visibility for action in support of innovation and SMEs;

- ☐ an integrated range of services designed specifically for different categories of SMEs (including intellectual property rights, innovation management methods and access to risk capital);

- ☐ more homogeneous implementation of measures for promoting innovation and measures aimed at SMEs, and the provision of gateways between projects at various stages (research, demonstration, transfer, exploitation);

- ☐ greater coordination with other policies (regional, training, etc.).

Innovation promotion and more effective involvement of SMEs will depend largely on the availability, strengthening and rationalization of existing networks of locally-based organizations covering the entire territory and possessing the necessary skills for advising and assisting the various players concerned, particularly SMEs, in innovation, preparing projects and finding partners (see Sections B.1(iii) and C.1(v)).

The proposed programme 'Innovate and enable SMEs' participation' should boost and effectively coordinate efforts to innovate, to disseminate technology and to promote greater participation by SMEs in research.

3.15. Finally, the debate on the Green Paper on innovation and the experience gained through the task forces in the fourth framework programme have demonstrated the usefulness of instruments which:

- ☐ identify, together with users, researchers and industry, the technological obstacles whose solution is an economic and social priority in Europe;

- ☐ mobilize expertise and private or public resources, Community or national, to the maximum extent in order to bring large-scale targeted projects to a successful conclusion, so obtaining faster results from research effort, avoiding duplication and increasing the visibility and the exemplary nature of Community research.

In consequence, it would be desirable to improve at Community level:

- ☐ general incentives to participate in the work of task forces, by taking innovation more into account as a selection criterion for projects within the fifth framework programme;

- ☐ the efficiency of procedures by planning simultaneous or integrated calls for proposals for the various programmes for priority research.

### **3. Mobilizing other Community instruments**

#### **(i) Gearing the Structural Funds more towards innovation**

3.16. Not all regions have equal innovation capacity. Statistics show that the technology gap between the developed and less-developed regions of the European Union is twice the size of the 'cohesion' gap, and various factors threaten to widen the gulf still further. The region is thus becoming a particularly appropriate level for promoting and strengthening innovation in Europe. Moreover, the links between cohesion, research and innovation can be managed more easily at regional level. Three considerations support this argument:

- ☐ innovation policy must be based on in-depth knowledge of the demand from companies, including SMEs, in a given economic system: there is no standard model which could be generalized and this type of policy should be anchored in a regional context. Regions must find their own paths to innovation;

- ☐ the region is the most suitable level for the necessary collaboration between the key players in innovation;

- ☐ regional and local authorities are best placed to organize, at their own level, the innovative environment which is the basis for regional innovation capacity.

With the above points in mind, and in addition to the action taken to promote innovation throughout the European Union, the Commission has implemented initiatives for strengthening the importance given to innovation in the Structural Funds. Most Commission initiatives such as the SME initiative, ADAPT and Leader II, as well as Article 10 of the ERDF, give innovation high priority. Moreover, innovation is one of the priorities of the new directives concerning Objective 2, which states that 'innovation is essential for maintaining competitiveness and employment'.

In the same vein, the Commission considers that innovation is an important element of the priority given to employment in the use of the Structural Funds. It considers desirable therefore that Member States and the regions concerned invest more in innovation promotion schemes, subject to the resources available for the current planning period and in the next generation of Structural Funds.<sup>1</sup>

The Commission will draw on the experience gained from the regional innovation strategy projects supported jointly under Article 10 of the ERDF and the Innovation programme.

<sup>1</sup> The Employment Confidence Pact identifies the development of SMEs as the priority for structural policy, stating that 'There should be a special effort in favour of the formation of SMEs and one-person firms. What is needed now is to make wider use of innovative measures that have proved to work, especially those involving financial engineering — notably access to risk capital. The development of SMEs is also helped by the research and technological innovation effort, as in the case of environmental technology, and especially access to new markets linked to environment-friendly products.' ('Action for employment in Europe: a confidence pact', CSE(96) 1 final, 5.6.1996, p. 24, and Supplement 4/96 to the *Bulletin of the European Union*.)

In the Objectives 1 and 2 regions, the Commission recommends that Member States and the local or regional authorities concerned take fully into account the necessity to concentrate the measures for innovation, and particularly research, development, technology transfer and qualifications for workers, in order to satisfy the priority given to employment. In rural areas, in particular Objective 5b areas, the Commission will seek, within the framework of strategies for employment, to disseminate as widely as possible the good practice identified and validated by the European innovation and rural development monitoring system within the framework of the Leader II initiative. Under Objective 4 of the Community initiative ADAPT, efforts will need to concentrate on innovation action, particularly on anticipating requirements and improving training systems, and helping SMEs to manage their human resources more efficiently.

## **(ii) Making the most of the international dimension of innovation**

3.17. Action in support of innovation should take account of the globalization of technologies and markets. Flows of information, knowledge and capital are accelerating and multiplying on a world scale. Incorporating this dimension means taking several complementary approaches:

- ☐ Closer interaction between the framework programme and the COST and Eureka cooperation frameworks.
- ☐ Support for international industrial cooperation and promotion of collaboration between firms on the basis of bilateral agreements, giving European firms, particularly SMEs, better access to world technologies, knowledge and skills, taking maximum advantage of their know-how and strengthening their profiles on the markets of the future.
- ☐ Intensified international R&TD cooperation with non-member countries. This should be in line with the political objectives of the European Union (e.g. on energy and environmental protection or the establishment of the information society), adhere to the principle of mutual interest and, where appropriate, be based on bilateral agreements. In a spirit of reciprocity it will aim to involve organizations in non-member countries in Community R&TD projects. Special attention will be given to the countries

of Central and Eastern Europe on the waiting list for accession to the EU. Another aim will be to boost the attraction of the European research area for researchers from countries with which the European Union has links. Lastly, specific international scientific cooperation activities will be drawn up on the basis of topics and countries or regions such as the Mediterranean, the CIS and developing countries, in support of external policies and the industrial policy of the European Union.

- ☐ Stronger encouragement to entities in the countries concerned, through the possibilities offered by instruments such as TACIS, PHARE,<sup>1</sup> MEDA, etc. to search for a stronger synergy with community research projects.
- ☐ Continued vigilance in international negotiations over aspects liable to affect European innovation and its outlets (such as intellectual property rights and anti-counterfeit measures).

## **(iii) Fleshing out the action plan in various priority sectors and fields of technology**

3.18. Some of the proposals in this action plan may prove to be suitable to specific sectors or technologies and adjustments will be necessary. The Commission will, as far as is possible, arrange for effective cross-over learning by setting up intersectoral and intertechnology links. Efforts will be made to take more account of the preoccupations of industry when policies are drawn up.

The fields to be fleshed out include better exploitation of space and dual-use technology, rural development, consumption and the audiovisual sector as well as the environment and the services sector. Some examples are given below:

- (a) Innovation is an important factor in the development of rural economies. Emphasis should therefore be placed on encouraging and disseminating innovation in the various domains of rural development, above all:
  - ☐ getting SMEs in rural areas to use new technologies;

<sup>1</sup> For non-applicant countries.

☐ improving access by users in rural and/or peripheral areas to modern methods of information and communication;

☐ extending the services rendered to agricultural producers and SMEs in rural areas (studies, assistance with management, forecasting, risk assessment, etc.).

(b) Aspects of demand are essential to innovation. This means, in particular, ensuring that new products and services meet the needs not only of firms but of the end user. Innovation should above all meet needs which may not be apparent through market forces alone (aspects of social and territorial cohesion, universal and general-interest services, user-friendly products and services, illiteracy, social exclusion, etc.). Considerations of demand also need to take a 'sustainable consumption' approach.

This also affects consumer protection in terms of product quality and legal environment. The latter is particularly important to computer products or services (Internet, smart cards, cyberspace, etc.). Legislation on these is still in embryo where both law and order and user protection are concerned. A multidisciplinary approach to these issues needs to be fostered in order to identify the action which needs to be taken.

(c) The audiovisual sector is a priority area whose evolution has accelerated under the impact of new technologies. The Commission will encourage partnerships between the digital electronics industry and centres of culture (broadcasters, museums and designers). To this end, wider consultation procedures on the effects the new technologies may have on the audiovisual sector in Europe will be launched and pilot demonstration projects will be run.

(d) An important sector of economic growth is the environmental sector (e.g. waste water, waste management, air and noise emissions) both in terms of manufacturing industries and services. These sectors have shown a significantly higher growth than the rest of the economy. Jobs in this sector grew by 3% per year — about twice the rate of other sectors.

Currently the environmental sector is dominated by end-of-pipe technology (and related services). However, the future trend will be towards the development of integrated clean technologies, an area where innovation is essential and necessary to speed up market introduction and application of these technologies.



### **3. Gearing research to innovation**

#### **3.1. New actions**

##### **1. National measures and their Community back-up**

###### *(i) Strengthening research carried out by companies*

###### **Member States**

- Formulate quantified objectives and put in place the appropriate incentive policies.

###### *(ii) Start-up of technology-based companies*

###### **Commission**

- Organize thorough exchanges with Member States and players in the field on legal, fiscal and promotional measures (1997).
- Launch pilot schemes for disseminating good practice, involving universities, risk capital, industry and regional institutions (1998).

###### *(iii) Intensified cooperation between research, universities and companies*

###### **Member States**

- Set up a legal framework to facilitate exploitation by research organizations, including business start-up.

###### *(iv) Strengthening the ability of SMEs to absorb technologies and know-how*

###### **Member States**

- Support transnational technology transfer.

###### **Commission and Member States**

- Better links between national and regional innovation systems at Community level.

###### *(v) Demonstration of effective approaches to innovation*

###### **Commission**

- Set up a new generation of demonstration projects integrating the technical, organizational and social aspects of innovation (fifth FPRD).

##### **2. Incorporating the innovation and SME dimensions into the framework programme for research**

###### **Commission**

- Adapt the implementation procedures for the framework programme (project selection criteria, faster project selection, more demonstration schemes, legal framework for contracts) (fourth and fifth FPRD).
- Strengthen the consultation and coordination role of the research industry task forces (fifth FPRD).
- Develop a programme 'Innovate and give SMEs greater involvement', providing an integrated approach to the goal of innovation through the legal and financial treatment of projects, particularly those supporting SMEs (fifth FPRD).

##### **3. Mobilize other Community instruments**

###### **Commission and Member States**

- Prepare to flesh out the action plan in various priority sectors and fields of technology.

### **3.2. Current actions for improving the innovation environment in Europe**

#### **1. National measures and Community back-up**

##### *(i) A strategic vision of research and development*

###### **Member States**

- Consultations on long-term technology forecasting (Foresight).

###### **Commission**

- Facilitate the exchange of experience and the exploitation of results on a Community scale.
- Stimulate the technology watch (network of national organizations around the European Science and Technology Observatory (ESTO)).

##### *(ii) Start-up of technology-based companies*

###### **Member States**

- Stronger promotion of 'campus companies' and spin-offs.

##### *(iii) Intensified cooperation between research, universities and industry*

###### **Member States**

- Pursue and strengthen action in this area.

###### **Commission**

- Analyse the obstacles and disseminate good practice.
- Support national efforts to improve the management of research and technology organizations and their international benchmarking.
- Organize sectoral and intersectoral technology platforms.

##### *(iv) Strengthening the ability of SMEs to absorb new technologies and knowledge*

###### **Member States**

- Improve the efficiency and transparency of support structures.

###### **Commission**

- Help professionalize the innovation support services.
- Set up a scheme for promoting the absorption and use of technologies (first-use support, access to technologies not developed in the European Union, internationalization of young technology-based firms, regional projects).

##### *(v) Demonstration of effective approaches to innovation*

###### **Member States and Commission**

- Make better use of specialists in the social and behavioural sciences in technology projects.

#### **2. Incorporating the innovation and SME dimensions into the framework programme**

(See 'New actions'.)

#### **3. Mobilize other Community instruments**

##### *Commission and Member States*

- Direct more of the Structural Funds towards innovation.
- Make the most of the international dimension of innovation.

# Conclusion

In the three main fields identified, the Commission is putting forward those measures whose priority, expected impact or urgency has been confirmed by the debate.

At Community level these measures can be financed from existing or planned budgets without additional funding.

The main effort must nevertheless be made at local, regional or national level. Action in support of innovation must be first and foremost the province of the Member States and those active in the field — above all companies.

A more thorough analysis will be needed to take account of the wide variety of situations in the Member States. The Commission proposes to organize this in close collaboration with the Member States, so as to establish a joint reference framework and so help them identify the priority options and the opportunities for cooperation.

It requests Member States to take the necessary steps to ensure, on an internal basis, efficient

coordination of the measures deriving from various policies and, on an external basis, optimum interaction with the other Member States and with the European Union.

The Commission will draw up a detailed implementation schedule and will precisely quantify the costs of the measures it is proposing. On this basis it will submit the corresponding legislative and regulatory proposals to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions.

The Commission will report regularly to the European Council on the implementation of the action plan, including, where necessary, proposals for any adjustments or additions which may prove necessary in the light of developments or in view of the specific contexts in which the plan is applied.

The enthusiasm and energy demonstrated must be mobilized in order to implement this action plan and so build a more innovative, competitive and job-creating Europe.

## Annex 2

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# Annex 2.1. Reactions to the consultation on the Green Paper

## 2.1.A. Summary of the comments from those in the field

### Introduction

Consultation on the Green Paper has involved an unprecedented debate on innovation not only in the 15 countries of the European Union, but also in Norway and Iceland.

More than 40 000 copies of the Green Paper were distributed. It was analysed, discussed and commented upon by researchers, the heads of large concerns and SMEs, public authorities, trade unions, professional associations and the various Community institutions. Conferences were held in 17 countries involving nearly 5 000 people.

A large number of specific proposals were submitted to the Commission. Apart from the national conferences, whose reports of proceedings reflect the range of reactions and the expectations aroused by this initiative, the Commission received more than 300 contributions directly,<sup>1</sup> and their length and the quality of analysis of many of them bear witness to the interest aroused by the Green Paper.

An initial analysis of the reports of proceedings of the conferences and the most representative (particularly of the main professional associations and trade unions, national and European federations, large concerns and financial institutions) and relevant contributions is given here. These communications mainly concern the topics and the various routes of action proposed by the Green Paper, in particular as regards the improved orientation of research towards innovation, improvements in innovation financing, intellectual property rights and support for SMEs. In addition, some of these contributions propose topics little touched on in the Green Paper, such as organizational innovation, innovation in services, the role of large concerns, etc.

This document gives an initial, non-exhaustive summary of these comments, grouped under the main topics in the Green Paper. The summary does not cover either the contributions of the European institutions or the official contributions of the Member States, which are described in Sections 2.1.B and 2.1.C of this annex.

### Summary

1. Amongst the topics proposed by the Green Paper, a number of major subjects are touched upon more frequently in the contributions. This concerns, in particular, the improved orientation of R&D towards innovation, innovation financing, the protection of industrial property and support for small and medium-sized enterprises.

As regards the improved orientation of research towards innovation, the general opinion is that the links between the world of research and industry must be improved by strengthening the capacity for dialogue between the two and by improving researchers' understanding of the problems of the business world. Technology watch is considered important, and national initiatives must be coordinated and exchanges of information improved, rather than setting up a new Community institution. As regards public research efforts, there is a difference of opinion between the proponents of the financing of pre-competitive research only and those who favour the financing of the entire research process (up to the industrial-scale phase). In general terms, task forces are of interest to the larger countries, but the desire is that their working should be more transparent and that manufacturers should be able to become more involved in their definition. Finally, there is unanimous agreement that research programmes should be faster in selecting projects and that their procedures should be simplified.

<sup>1</sup> The list of individual reactions to the Green Paper is annexed.



As things stand at present, they seem ill-suited to almost all SMEs.

As regards human resources, greater mobility is recommended, particularly between university and industry, along with Europe-wide recognition of qualifications and greater emphasis on innovation-linked matters in school and university curricula.

Improvements in innovation financing were the subject of a great many comments which focused, in particular, on the need for a European-level financial market for innovative businesses, the establishment of links between technology and financing, the introduction of guarantee schemes and the use of the tax system to promote innovation.

As regards the legal and regulatory environment, the comments focused on industrial property rights — considered to be a tool which was expensive, difficult to access and unfamiliar to businesses — and the need for a company statute suitable for the single market and affordable to SMEs.

Finally, a great many suggestions concerned direct support for SMEs and the national or regional support infrastructure for such businesses. These are frequently specific to the individual Member States, and it is difficult to discern any common denominator. However, there are some recurrent features, such as the need to facilitate participation in research programmes (national and Community), to rationalize and make more transparent the supply of services (particularly public) and to consider SMEs no longer in isolation, but against the background of their relationship with large concerns, customers and suppliers.

2. In addition, some comments concerned topics which were not, or hardly, touched upon in the Green Paper.

This concerned, in particular, innovation in the services sector (despite the fact that it is the largest employer in Europe) and in the public sector (for the same reason), 'Innovation in services is a field which has been largely ignored. Innovation in the services sector plays an important role in instigating changes in the manufacturing sector' (Oslo).

There was some criticism that the Green Paper puts too much emphasis on the technological aspects of innovation, while neglecting the social and environmental factors. In particular,

some circles feel that the promotion of the organizational capacity of businesses has been ignored. 'The DGB regrets that the Green Paper is too much geared towards the promotion of technology and that it takes only little account of direct measures to promote the operational capacities of businesses, which are of decisive importance in absorbing R&TD'. Furthermore, the trade unions (particularly in Germany) regret the absence of a reference, in the proposed measures, to those measures aimed at motivating and involving employees. The UEAPME also points out that 'It is important to remember that innovation means more than just the development of new products: it is also organizational and structural'. In the same vein, the concept of incremental (progressive) innovation is felt to have been insufficiently emphasized as compared with radical innovation and high technology (IRDAC).

Large concerns are frequently mentioned in the contributions as producing a large number of innovations. There is some surprise that they do not then feature in the Green Paper. 'Large businesses are left out of the debate, despite the fact that they are major sources of R&D and the first to adopt innovations coming from SMEs' (CEST).

Finally, the picture painted by the Green Paper is sometimes felt to be too bleak. The pharmaceutical industry, for instance, is cited as an example of a European sector which has been very successful in exploiting its technological know-how in the commercial world.

3. The main topics raised in the various contributions are given below according to the five major objectives set out in the summary of the Green Paper:

- ☐ improving the orientation of research towards innovation;
- ☐ bolstering the human resources for innovation;
- ☐ improving the conditions for financing innovation;
- ☐ establishing a legal and regulatory environment conducive to innovation;
- ☐ developing the role and procedures of the public authorities.

## **1. Directing research efforts more towards innovation**

### **It is important to improve links in Europe between the world of research, in particular universities, and industry**

There is a widespread wish for improved adaptation of research programmes to the needs of industry. Some contributions nevertheless stress the need to maintain fundamental research which is not directly linked to immediate market needs. This adaptation could be the outcome of increased dialogue and coordination between sectors, particularly with a view to avoiding harmful competition in the use of the resources devoted to research. It also requires the active involvement of intermediaries such as collective research associations, and the organization of — and support for — technology transfer from the university to industry.

One of the proposals at the Paris conference was to increase the involvement in research of business engineers and project managers trained in establishing relations between businesses and accompanying research projects right up to their transfer to industry. (The contribution of the CNPF also points out that, within France, there is a need to reassess the technology programmes and research bodies, which have in many cases 'aged' without any subsequent review.)

The unsuitability of university assessment criteria is frequently mentioned. The traditional criteria are based on publications and leave no leeway for taking account of researchers' aptitude for mobility and exchanges with industry. 'The current system for assessing public researchers is an obstacle to their participation in industry' (Madrid). It is proposed that these criteria be revamped and that the use of research results by businesses becomes a positive criterion.

The principles currently governing researchers' careers are regarded as a powerful brake on such collaboration. Researchers in fact often have a job for life. 'Fixed-term contracts for researchers working in public research institutes should be encouraged, possibly with tax incentives for firms taking them on when they become available on the labour market'

(Milan). In addition, their awareness could be enhanced and they could be trained in knowledge of the business world. However, the trade union organizations think that, on the contrary, young researchers should be assured of stable career prospects in order to ensure that they have the peace of mind needed for their creativity.

### **Technology watch and economic information**

Technology foresight and technology watch exercises carried out at national level are sometimes considered by businesses as a means of orienting the technological and industrial policies of the Member States, rather than as tools useful to businesses. 'Technology watch and technology foresight initiatives create jobs only in the science of forecasting and not in businesses' (UEAPME). Economic and technical information for businesses — particularly SMEs — is considered a problem to be dealt with separately, although a summary is nevertheless thought necessary, with manufacturers taking part in prospective technological study projects and the results of such projects providing some of the information of use to businesses.

As regards prospective technological studies, emphasis is placed on the need to exploit what has already been achieved by Member States by relying on their individual skills. Setting up a network of such initiatives receives more support than developing a new scheme at European level. 'The centralized model for technology foresight is risky' (Oslo).

SMEs appear to be making insufficient use of the technology watch. Some doubts are expressed as to the need to provide businesses with even more information. The Berlin conference stressed that 'In general, SMEs do not need more information on the technological situation. They already cannot use the information they have.' At this level, the distinction between technological and economic information appears artificial. Businesses should be supplied with information of direct use to them, for example information on markets, the competition and the financial and legal fields. Many correspondents say that SMEs should be made more aware of economic intelligence. The suitable framework for this type of action would seem to be the regional level, at which

exchanges of information and studies between businesses could be organized and local bodies such as chambers of commerce and innovation relay centres involved.

## **The public effort**

A number of points arose as to the advisability of increasing the public R&TD effort, in particular the questioning of the distinction between pre-competitive and other research, the notice taken of cohesion objectives and the need for efforts to be more narrowly focused.

The participants at the German and British conferences displayed a certain lack of enthusiasm for a possible increase in R&D budgets. While this is regarded as a possible additional burden on businesses, a large number of comments question the existence of a direct link between R&D expenditure and the results in terms of innovation. The Birmingham conference felt that 'Europe does not need more research. It needs correctly-applied, effective and high-quality research.'

Taking account of cohesion objectives in R&D programmes is thought to conflict with the objective of strengthening the innovative capacity of European businesses, particularly by the participants at the Berlin conference. The BDI, in particular, states that 'It is just as harmful to use Community funds allocated to research policy for cohesion objectives, as it is justified to fund R&D from the structural funds'. Nevertheless, measures aimed at strengthening cohesion are considered necessary. 'Cooperation between less-developed and more-developed regions must be promoted, taking care to ensure that the benefits of such cooperation remain in the less-favoured regions' (Madrid).

A number of contributors feel that the question of the advisability of financing beyond the pre-competitive stage — and particularly in the industrial application phase — remains to be settled. In particular, it is felt that 'The innovation process does not finish with the production of a prototype. Support must be continued and include market entry' (Berlin). The Madrid conference mentions the possibility of launching a programme which might finance the initial applications of specific technologies which have already proved their industrial utility. However, there is clear opposition from some large concerns. 'Moving publicly-funded

R&D towards the market place means that it must choose between overtly favouring a single commercial enterprise or publishing late-stage information. Neither of these strategies is realistically sustainable' (SmithKline Beecham).

Finally, certain sectors (the electrical industries, in particular) feel there should be compensation for the fall in public R&D spending on defence.

## **Task forces**

Task forces are generally considered — particularly by the large countries — to be a useful instrument for concentrating resources in major fields. Nevertheless, in order to improve their transparency, it is recommended that manufacturers be more effectively involved right from the design phase in selecting topics and preparing the work programme. 'The role and operation of the task forces must be open and informed by consultation with industry and the output from various national foresight programmes' (CBI).

While the participation of SMEs in the task forces is considered desirable, a large number of comments stress the incompatibility between SMEs and task forces. The latter are regarded as being of potential benefit above all to large concerns, and this explains the reservations on the part of some Member States. 'The task forces, as set out in the Green Paper, are of no use to Portugal' (Lisbon).

Finally, some major manufacturers have reservations about any move on the part of the European Union to coordinate industrial research efforts. They feel that a better solution would be to strengthen the cohesion of the Community programmes.

## **Research programmes**

There is unanimous agreement that these should speed up the selection of projects and simplify procedures. In particular, they seldom appear to be adapted to the constraints facing SMEs: the cost of drawing up a file is considered disproportionate. 'A small high-tech business cannot wait for Community support — six months is an eternity' (Birmingham). Finally, the business needs greater freedom and flexibility in the use of the funds. The very participation of SMEs in the framework programme is

questioned, since it is felt that only a very small number of them are capable of making a genuine contribution and hence being eligible for participation in the specific programmes.

A number of proposals are aimed at decentralizing the decision-making procedures and setting up bodies in the field. One comment mentions that 'Eureka-type projects, which are close to manufacturers' concerns and to products, are worthy of reinforcement' (Paris). It is also suggested that participation in the specific programmes could be replaced by more flexible arrangements involving indirect support.

Furthermore, a number of comments relate to the project selection procedures:

- ☐ they should involve more experts from industry;
- ☐ technical qualifications should be deciding criteria, rather than the involvement of a number of partners from different Member States;
- ☐ the performance objectives should take account of the return on investment in terms of R&D and innovation;
- ☐ the project evaluation should take account not only of the business plans, but also of the plans of the research institutes taking part in the projects.

Finally, the programmes should take more account of the concept of collaboration between small and large businesses, and it should be possible to subsidize projects deriving from predetermined topics.

## **2. Bolstering the human resources for innovation**

### **The mobility of persons between research, the education system and industry must be strengthened**

This echoes the concern mentioned before as regards the criteria for assessing researchers, which do not encourage them to take part in industrial projects.

Making it easier to integrate young graduates into businesses, particularly SMEs, is considered by all the conferences to be highly important. 'Local mobility of researchers and students between academic and industrial circles might be an interesting way to improve education and training, but also to foster inventiveness and

entrepreneurship' (UNICE). There are already programmes at national level (teaching company scheme in the United Kingdom, CIFRE and Cortechs in France, etc.) which could act as examples for other Member States. One specific suggestion relates to graduates with doctorates, whose integration could be helped through postdoctorate traineeships in businesses, in particular SMEs.

A number of comments — sometimes contradictory — are aimed at adapting the programmes (particularly the Community ones) to promote mobility:

- ☐ they should be made more flexible in order to genuinely meet the needs of businesses;
- ☐ they should have no age limit;
- ☐ they should be more focused;
- ☐ they should be expanded and have their funding increased.

The lack of internal employee mobility towards fields in different specialisms is regretted. There is a need to reward changes of stream, promote assistance for career guidance, help staff to cope with change, expand part-time working, etc.

There were numerous suggestions to the effect that school and university curricula should include subjects of relevance to innovation. In particular, there is a need to include economics and management in the training of scientists. More importance should be attached to experimentation in scientific and technical curricula. Industrial property rights should feature more prominently in university and even secondary education, etc.

Training should be suitable for all levels — whether for future managers or future unskilled operators, who should be prepared for frequent rethinks and technical changes.

For some bodies, the Commission's intervention should be directed towards developing networks of national agencies with responsibility in the field, rather than setting up an additional body.

## **3. Improving the conditions for financing innovation**

Financing is obviously a major concern. However, some comments draw attention to the fact that financing remains a resource like any

other, and that it alone is not enough to ensure innovation. 'The problems associated with organization and entrepreneurial attitudes are more important than the financial or technological deficits' (Berlin).

There is a major role for the European Union in facilitating the exchange of experience and best practice, in implementing harmonization measures, or encouraging transnational financing initiatives.

## **Markets**

Most of the national conferences are in favour of the creation of a (NASDAQ-type) European market on which shares in young growth companies could be traded. Plans for setting up such a market should be speeded up. 'It is not satisfying to have to be forced to point successful venture capital businesses towards the US market, and this will naturally have major repercussions on the business itself, even to the extent of demanding relocation' (BDI). 'National markets of this type must become international' (Paris).

Since this type of market caters only for the most dynamic businesses, other solutions have to be found to encourage investors (assistance funds for the transmission of enterprises, schemes giving investors the chance to recover their shareholding, mutualization of risks along the lines of the Joint Venture Capital Fund, etc.).

## **Technology and financing**

There is general agreement on the need for more account to be taken of innovation and technology by financial institutions. To this end, it is suggested that technology investment operations be launched, perhaps by setting up a bank specialized in technology (Birmingham), that a technical certification or guarantee/insurance system be set up (at Community, national or regional level) to serve as a point of first resort and attract outside finance, and that the development of 'technology rating' systems be encouraged, so as to be able to quantify the chances of the industrial success of a technical project. 'The European Union must encourage exchanges of experience on this subject' (ANVAR).

## **Guarantees**

Encouraging support from banks for innovative businesses involves minimizing the risk to the banks. In France, 'increasing the Sofaris coverage rates should encourage banks to provide more funding for innovative SMEs' (Paris). Against this background, the fact that the EIF provides guarantees to banks is widely welcomed (Dublin, Helsinki, Milan, etc.).

Mutual guarantee societies should be authorized in a directive to have a more favourable capital ratio. 'The risk cover levels required from these societies for providing guarantees should be authorized to be more or less the same as those for banks' (Madrid).

## **Taxation**

There is almost unanimous agreement on the need for more favourable tax treatment of the investor in innovative projects or companies. In particular, it is suggested that the capital gains on innovation securities (particularly in the case of individual investors) should be subject to lower taxes or even exempted, that the risk of loss for venture capital shareholders should be limited, perhaps via a tax credit corresponding to a certain percentage of the investment, that distributed profits should be tax exempted, etc.

These tax measures might be aimed specifically at encouraging sources of 'patient' capital (pension funds, life insurance funds, save-as-you-earn schemes) to turn to venture capital investments.

Finally, several suggestions relate to the improved tax treatment of investment by businesses in innovation, particularly in the field of training.

## **Other measures**

Start-up capital should be encouraged, perhaps along the lines of the American SBICs, so as to ensure a better yield. The various schemes set up in this field by the Member States should be studied and, if appropriate, introduced elsewhere.

The EVCA (European Venture Capital Association) recommends that the EIF should invest directly in SME capital via venture capital

funds. This idea is generally welcomed by the national conferences, although it is difficult to assess the costs and impact of this type of measure. 'There is no objection as regards the possibility of innovation funds, but there is some concern at seeing the money simply injected here and there' (Zeist, Netherlands).

The regulatory conditions within the Union must be harmonized to avoid a flight of capital to wherever conditions are most favourable.

#### **4. Encouraging a legal and regulatory environment conducive to innovation**

Intellectual and industrial property rights attracted a number of comments. It is generally felt that their importance is underestimated. The expensiveness of patent procedures and the need for a harmonized system in Europe are two points with regard to which most of the national conferences consider the present situation unsatisfactory.

##### **Intellectual property rights**

A large number of comments concern patents. The situation in Europe is regarded as too complex. 'The decision-makers should develop an integrated approach with a view to improved protection of intellectual property rights in all fields' (UNICE). As the Birmingham conference points out, 'A patent covering all the Member States is a clear priority.' The entry into force of the Community patent should be promoted. There is unanimous agreement that the costs involved in patents, particularly the cost of translation, are too high. To make a future Community patent more attractive, these costs and the processing period must be reduced. In line with many other comments, the Athens conference calls for 'a reduction in the cost of registering and protecting patents. R&D funding should be extended to the registration costs for innovative products'.

The importance of access to information on patents (information network, databases) is underlined. It also appears desirable to improve the image of industrial property rights, particularly by including specific courses in university (or even secondary) curricula. 'In the USA and Japan, patents and trade marks are considered factors which improve productivity' (Madrid).

Efforts to achieve harmonization are considered necessary and even urgently required in the new technologies (particularly biotechnology and telecommunications).

Opinion seems to be predominantly unfavourable as regards the use of utility models. 'The Commission should neither encourage their use at national level nor promote their use in the Union' (Birmingham).

Defending one's intellectual property rights, particularly in third countries, is an expensive business. It is suggested that an insurance scheme be set up to cover such costs, perhaps supported by public funds. 'The introduction of such an insurance system for infringement of intellectual property rights could be funded/supported from public funds' (Sweden).

##### **Administrative simplification**

Administrative simplification is considered essential. There is a widely shared opinion that it would be better to remove the administrative obstacles rather than set up new structures to overcome them. 'It is more useful to remove the various administrative obstacles than to set up even more structures for overcoming them' (UAPME). In this context, ANVAR mentions that 'the one-stop shop has proved to be a bad idea'.

##### **Company law**

All the comments agree as to the adoption of a European public limited company statute going beyond the concept of an EEIG. However, it is frequently felt that this concept is difficult to apply to SMEs, for whom there should be a special statute. 'The rapid adoption of a European public limited company statute is a major factor in facilitating cross-border cooperation. The proposal for a "small European limited company" is a step towards achieving a joint solution' (DIHT).

##### **Competition**

Competition is generally regarded as one of the driving forces of innovation. However, a number of comments call for a degree of relaxation of the rules in this field. The German Association of Chambers of Commerce states that

'progress in certain fields is possible only through joining forces'.

Some contributions call for a reduction in the administrative burden on businesses by extending the field of application of the uniform rules on mergers in Europe and by harmonizing the treatment of structural joint subsidiaries. The BDI points out, in particular, that 'The Commission should expedite and simplify authorization procedures for cooperative projects. The current legal situation tends to stifle cooperation because of lengthy procedures and a lack of legal certainty. Moreover, the scope of application of European merger control should be extended, so that companies are no longer compelled to notify joint subsidiaries simultaneously to a large number of national authorities.' In a similar vein, according to Siemens: 'More and more cooperation agreements are subject to national merger controls. This involves considerable expense and effort for the firms concerned, as well as risks. Mergers should be controlled on the basis of uniform criteria by the Commission.'

Siemens also mentions that 'Article 85 also covers barriers to vertical competition, whereas only the principle of abuse applies to this field under German competition law ... as regards exemptions by category for relations between firms (supplier and OEM contracts)'.

Others mention a revision of Article 85 'to make competition between competitors possible (American "rule of reason") except in the case of abuse or contraindication' (Thomson Multimédia). In the same way: 'Article 85 should be rewritten with a view to liberalization and a comprehensive and dynamic market approach' (IBM France).

### **Assessment of the impact of regulations on innovation**

'All regulations must be assessed on the basis of their capacity to promote or hamper innovation. To this end, businesses must be involved as far upstream as possible in drawing up these rules at both local and European level' (CNPF).

## **5. Adapting the role and procedures of public action in favour of innovation**

Although this topic attracts a large number of comments, it is sometimes difficult to obtain a coherent overview, particularly because of the major differences in the situation in the individual countries. Some major subjects of interest can, however, be discerned.

### **Support for SMEs**

There is frequent criticism of the system of classifying SMEs by employment size class, as this is considered unsuitable for reflecting the wide range of problems affecting them.

Several contributions also stress that, instead of placing the emphasis solely on SMEs as opposed to large concerns, account should be taken of the entire customer-supplier chain and the large concerns' unused technological resources.

In general, the comments are in agreement that pilot projects aimed at the internationalization of SMEs must be encouraged. Moreover, 'accompanying measures should be taken to allow selected SMEs access to markets and transnational cooperation, together with other firms or with universities or research centres in other countries' (Madrid).

### **The national or regional support infrastructure**

One general remark is that the public support programmes may appear complicated to SMEs, which have difficulty finding their way around them. The German chambers of commerce state that they would welcome a rationalization of the Community information centres, while the British employers' federation stresses the use of existing initiatives rather than the creation of new ones. 'Care should be taken to find the right balance between proximity and proliferation of information relay centres that would lead to confusion and subsequent rejection' (UNICE).

The French conference also mentions that the creation of support networks for SMEs should be promoted and the public support schemes opened up. More generally, most countries are



trying to promote global approaches to the problems of SMEs.

The Spanish contributions reveal a particular interest in the regional level (while stressing the fact that the Green Paper does not devote enough attention to regional aspects) and in strengthening the role of local authorities in innovation. This view is supported by several other contributions which mention the role of the local authorities in the field of support for SMEs. The field of science parks is also frequently mentioned as one in which there have been successes and which should be taken into account. Some other contributions are less upbeat, and the *Land* of Hessen states that 'It is important to strengthen the regional dimension of innovation; however, regional innovation must not be taken as a cure for all ills or as a reaction to the increasing globalization of economies.'

## **Research programmes**

A number of comments of relevance to this heading have already been made under the heading 'Directing research efforts more

towards innovation', in particular as regards the difficulty facing SMEs wishing to take part in the research programmes. To overcome these difficulties, Daimler-Benz mentions that one effective way of fostering the participation of SMEs in the research programmes might be to involve them in the programmes together with the large concerns.

Other measures might be more effective for SMEs than the research programmes 'with a view to meeting the needs of SMEs in the innovation process. General instruments, tax incentives, joint industrial research projects and the utilization of results are more suitable than fixed quotas in the specific programmes' (BDI).

The Madrid conference, finally, notes that there is a need to 'improve transparency in the presentation of the procedures for public support for firms, so that the stages the proposal must follow, the assessment criteria, the payment schedule, etc. are known from the outset'. It is also suggested that the application forms should be made more comprehensible and that businesses should be helped in replying to the authorities' requests.

## List of individual reactions to the Green Paper

Names	Acronyms	Country
aBaCus Partnership		United Kingdom
ABB Oy	ABB	Finland
Académie des sciences — Institut de France — Comité 'Applications' de l'Académie des sciences	CADAS	France
Action in Europe for education, invention, and innovation	AEI	France
Afonso Paulo Manuel (consultant)		Spain
Agence nationale pour l'amélioration des conditions de travail	ANACT	France
Agence nationale pour la valorisation de la recherche	ANVAR	France
Agència d'Avaluació de Tecnologia Médica		Spain
Air France		France
Air Liquide		France
Akademie für Innovation, Unternehmensdesign und Politikgestaltung GmbH	Die Denkfabrik	Germany
Akademie für Technikfolgenabschätzung		Germany
Allianz Lebensversicherung, AG		Germany
Amerada Hess Ltd		United Kingdom
Amsterdam Economisch en Sociaal Instituut	ESI-VU	Netherlands
Amsterdam University		Netherlands
Amt der Kärntner Landesregierung		Austria
Ann Christoph (professeur)		Germany
Ansaldo		Italy
Arcadi — Réseau — Association des consultants		France
ARGO — Plastic packaging materials — Plastics in engineering	ARGO	Greece
Arovit Petfood		Denmark
Associação Portuguesa de Profissionais em Sociologia Industrial, das Org. e do Trabalho	Apsiot	Portugal
Association 'Industrialisation des recherches sur les procédés et les applications au laser'	IREPA	France
Association des grandes entreprises françaises	AGREF	France
Association nationale de la recherche technique	ANRT	France
Association of European Radios	AER	Belgium
Associazione Italia per la ricerca	AIRI	Italy
Associazione Tigullio attiva + Promotigullio Srl		Italy
Atlantis Research Organization		Greece
Banca nazionale del lavoro	BNL	Italy
Banca Sella		Italy
BASF	BASF	Germany
Bayerische Vereinsbank AG		Germany
Bayerisches Forschungszentrum für Wissensbasierte Systeme	Forwiss	Germany
Becdelièvre Roland (Conseiller Général Le Mans)		France
Bertelsmann AG		Germany
Bio Soft		Denmark
Bodilsen Holding		Denmark
Boehringer Ingelheim		Germany
Bonn International Centre for Conversion		Germany
Bonnaure P. (expert)		France
Bosch GmbH		Germany
Bouju André (consultant)		Switzerland
British Ceramic Confederation	BCC	United Kingdom
British Technology Group	BTG	United Kingdom
British Telecom	BT	United Kingdom
Bundesarbeitskammer in der Ständigen Vertretung Österreichs bei der EU	BAK	Austria
Bundesverband der Deutschen Industrie	BDI	Germany

Names	Acronyms	Country
Bureau of European Designers Associations	BEDA	Netherlands
Burmah Castrol		United Kingdom
Büro für Energie und Ökologie Management		Germany
Cariplo	Cariplo	Italy
Casa de la Sabiduria SA		Spain
Centre d'études et recherches appliquées à la gestion	CERAG	France
Centre de coopération internationale en recherche agronomique	CIRAD	France
Centre de ressources et d'initiatives pour l'international (ministère de l'éducation nationale)	CR2i	France
Centre européen d'entreprise et d'innovation	Promotech	France
Centre européen des entreprises à participation publique	CEEP	Belgium
Centre for Exploitation of Science and Technology	CEST	United Kingdom
Centre for Working Life Research & Development — Halmstad University	CAU	Sweden
Centre technique des industries mécaniques	CETIM	France
Centro de Enlace del Mediterraneo — Innovation Relay Centre — Cenemes		Spain
Centro de Formação Profissional para a Industria Cerâmica	Cencal	Portugal
Centro de Robotica Inteligente	Uninova	Portugal
Centro di ricerca fitotecnica		Italy
Centro Promotor de Inovação e Negocios	CPIN	Portugal
Cerame-UNIE, Bureau de liaison des industries céramiques européennes	Cerami-UNIE	Belgium
Chambre de commerce américaine — The EU Committee		Belgium
Chambre de commerce et d'industrie de Paris	CCI de Paris	France
Chambre économique autrichienne		Austria
Chambre régionale de commerce et d'industrie de Lorraine	CCI de Lorraine	France
Chartered Society of Designers	CSD	United Kingdom
Chemical Industries' Association	CIA	United Kingdom
Christelijk Nationaal Vakverbond	CNV	Netherlands
Colas		France
Colonia Assurance		Germany
Commerzbank AG		Germany
Compagnie des signaux	CS	France
Compagnie nationale des conseils en propriété industrielle		
Compania Española de Petróleos	CNCPI	France
Computermac	CEPSA	Spain
Confédération européenne des syndicats	CES	Denmark
Confederation of British Industry	CBI	Belgium
Confindustria		United Kingdom
Conseil européen de l'industrie chimique	CEFIC	Italy
Conseil national du patronat français	CNPF	Belgium
Consejo Superior de Investigaciones Científicas	CSIC	France
Consiglio nazionale delle ricerche	CNR	Spain
Construction Industry Council	CIC	Italy
Construction Research and Innovation Strategy Panel	CRISP	United Kingdom
Cornwall Innovation Centre Ltd		United Kingdom
Corporación Empresarial de Extremadura		Spain
Cranfield International Ecotechnology Research Centre		Spain
Crédit local de France		United Kingdom
CUV Progress	CUV Progress	France
Daimler Benz		Bulgaria
Danel Technology Consultant		Germany
De Montgolfier Philippe (consultant) — ESOR Europe		France
Deutsche Aktionsgemeinschaft Bildung-Erfindung Innovationen	DABEI	France
Deutsche Ausgleichbank		Germany
Deutsche Bahn	DB	Germany
Deutsche Bank AG		Germany
Deutsche Erfinder Akademie		Germany

Names	Acronyms	Country
Deutsche Telekom		Germany
Deutscher Gewerkschaftsbund — Bundesvorstand	DGB	Germany
Deutscher Industrie und Handelstag	DIHT	Germany
Ejner Hessel		Denmark
Electrolux		Belgium
Empresa Nacional de Innovación, Sociedad Anónima	ENISA	Spain
Enemaerke & Petersen		Denmark
Ente per le nuove tecnologie, l'energia e l'ambiente	ENEA	Italy
Ernst & Young		Denmark
Esbjerg Oilfield Services		Denmark
Escuela Superior de Administración y Dirección de Empresas de la Universidad Ramón Llull	ESADE	Spain
Espoirs suscités par les études et la recherche	Club Esper	France
Esso AG		Germany
ETAN	ETAN	Belgium
Etane SA		Greece
Europabüro der Deutschen Kommunalen Selbstverwaltung	Europabüro	Germany
Europe's 500	Europe's 500	Denmark
European Association of Aerospace Industries	AECMA	Belgium
European Automotive Initiative Group	EAIG	Germany
European Business and Innovation Centre Network	EBN	Belgium
European Confederation of Iron and Steel Industries	Eurofer	Luxembourg
European Council for Construction, Research, Development and Innovation	Eccredi	Belgium
European Council of Applied Sciences and Engineering	EuroCase	Belgium
European Economic Interest Group	ZEUS	Greece
European Federation of Equipment Leasing Company Associations	Leaseurope	Belgium
European Federation of Technology & Innovation Consultants	EFTIC	France
European Foundation for Entrepreneurship Research	EFER	Belgium
European Independent Steel Works Association	EISA	Belgium
European Industrial Research Management Association	EIRMA	France
European Institute of Social Studies		Italy
European Organization for Research and Treatment of Cancer	EORTC	Belgium
European Organization for Technical Approvals	EOTA	Belgium
European Public Telecommunications Network Operators Association	ETNO	Belgium
European Telecommunication Professional Electronic Industry	ECTEL	United Kingdom
European Venture Capital Association	EVCA	Belgium
Eurostat		Luxembourg
Fauconnier Jean-Marie, (architecte)		France
Fédération internationale des conseils en propriétés industrielles	FICPI	United Kingdom
Federation of European Cancer Societies	FECS	Belgium
Federation of Small Businesses — National Federation of Self-employed and Small Businesses Ltd	FSB	United Kingdom
Federazione italiana delle casse rurali e artigiane		Italy
FIAT Auto	FIAT	Italy
FIAT SpA	FIAT	Italy
Finmeccanica		Italy
Finnish Forest Industries Federation		Finland
Forbitec		Portugal
Ford-Werke		Germany
Fraunhofer — Patentstelle für die Deutsche Forschung		Germany
Fraunhofer-Institut für Systemtechnik und Innovationsforschung		Germany
Fundación Cotec para la Innovación Tecnológica	COTEC	Spain
Fundación para el Desarrollo de la Función Social de las Comunicaciones	Fundesco	Spain
Gaz de France		France
General Electric Company		United Kingdom
Générale de placement, Banque	GP Banque	France
GlaxoWellcome plc		United Kingdom

Names	Acronyms	Country
GPV Industri		Denmark
Groupe école de hautes études commerciales du nord	EDHEC	France
Groupeement européen des caisses d'épargne	GECE	Belgium
Groupeement européen des entreprises d'électricité	Eurelectric	Belgium
Halarose of Oxford		United Kingdom
Handelsblatt — Wirtschafts und Finanzzeitung		Germany
Haour Georges (professeur)		Switzerland
Hellenic Republic — Ministry of Development		Greece
Helsinki Inventors' Association	HEKE	Finland
Helsinki School of Economics Business Administration		Finland
Hessisches Ministerium des Innern & für Landwirtschaft, Forsten, Naturschutz		Germany
Hoesch-Krupp AG		Germany
Huber Edelstahl		Germany
Ib Andersen Industri		Denmark
IBM Deutschland		Germany
Ideon Centre		Sweden
Industrie und Handelskammer zu Aachen	IHK zu Aachen	Germany
Industry Research and Development Group		Ireland
Infobrief		Luxembourg
Innovation Relay Centre — North of England	IRC North England	United Kingdom
Innovatop		Germany
Institut Català de Tecnologia	ICT	Spain
Institut français du pétrole	IFP	France
Institut national de recherche agronomique	INRA	France
Institute for Management of Innovation and Technology	IMIT	Sweden
Institute for Material Research — Universitair Centrum Limburgs		Belgium
Institute for Strategic Consumer Research	SWOKA	Netherlands
Institute of Professional Representatives before the European Patent Office	EPI	France
Institution of Civil Engineers		United Kingdom
Instituto de Desenvolvimento e Inovação Tecnológica do Minho	IDITE Minho	Portugal
Instituto Superior de Economia e Gestão	CEDE	Portugal
Instituto Superior Técnico	IST	Portugal
Instituut voor Maatschappelijke Innovatie	IMI	Netherlands
Instrument, Measuring, Technique Servicing and Trading Company Limited	MTA/MMSZ	Hungary
Inter Primo		Denmark
International Federation of Science Editors	IFSE	Italy
Istituto di studi sulla ricerca e documentazione scientifica — Consiglio nazionale delle ricerche	ISRDS – CNR	Italy
Istituto sperimentale per la frutticoltura		Italy
Jular Impotação e Comércio de Madeiras, Lda		Portugal
Kiel Institute of World Economics		Germany
Knight Peter (consultant)		United Kingdom
Koff		Denmark
Koninklijke Hoogovens		Netherlands
Kovacs Ilona (professeur)		Portugal
Kraft Malerwerkstätten GmbH	ARTA	Germany
Kredietbank		Belgium
Kreditanstalt für Wiederaufbau		Germany
Krog Iversen & Co		Denmark
Labri Mirko (project manager)		Italy
Lacave Michel e Del Castillo Jaime (consultants)		Spain
Lahure Bernard (consultant)		France
Lancashire Enterprises		United Kingdom
Lancaster Centre for the Study of Environmental Change		United Kingdom
Landesbank Berlin		Germany
Larsson John (consultant)		Denmark

Names	Acronyms	Country
Library and Information Commission		United Kingdom
Lloyds TSB Group		United Kingdom
LPE ID Databank (Lex Poot)	LPE	Netherlands
Lyonnaise des eaux		France
Magneti Marelli		Italy
Management Construction and Engineering	MACE	United Kingdom
Marks & Spencer		United Kingdom
Maroushkina Maria (consultant)		Russia
Medinova AB		Sweden
Merck KgaA Darmstadt		Germany
Micrel		Greece
Minister for Education of Lithuania		Lithuania
Mission of the Republic of Hungary to the European Communities		Hungary
MOA Développement	MOA	France
Monte dei Paschi di Siena		Italy
Mordchelles-Regnier G. (consultant)		France
Morgan Bruce Solicitors (avocats)		United Kingdom
Morin Jacques (consultant)		France
Mulcahy Noel (professor)		Ireland
Multi-Poles		Luxembourg
National Committee for Technological Development		Hungary
National School of Public Health		Greece
Nestlé		Switzerland
Nethold Finance		Belgium
Nonhoff Dieter (consultant)		Germany
North-East Innovation Centre Company Ltd		United Kingdom
North Tyneside Council		United Kingdom
Nuclear Research Institute — Department of Nuclear Technology		Czech Republic
NUTEK	NUTEK	Sweden
nv Bank Nederlandse Gemeenten		Netherlands
Observatory on Agricultural Research Systems	IBV	Italy
Ole Flensted Holding		Denmark
Omega Generation	BNG	Italy
Organisation de coopération et de développement économiques	OCDE	France
Österreichische Patentanwalt Kammer		Austria
Otakon KY		Finland
Otto Versand		Germany
PI Holding		Denmark
Pateloup Monique (consultant)		France
Patent-Och Registreringsverket	PRV	Sweden
Pechiney		France
Pentacle		France
PFI — Prüf- und Forschungsintitut für die Schuhherstellung		Germany
Plastre Robert (inventeur)		France
Preussag AG		Germany
Preussenelektra AG		Germany
Qazar 7		United Kingdom
Rank Xerox		United Kingdom
Renault		France
Repsol SA		Spain
Research and Consultancy Services for Food, Land, and Environment	SAC	United Kingdom
RETI NET — University of Salford	RETI NET	Belgium
Reunanen Matti — Kunniottaen (consultant)		Finland
Roma ricerche		Italy
RWE AG (Khunt Dietmar)		Germany
Siemens AG		Germany
SmithKline Beecham		Belgium
SNIA ricerche		Italy
Sociedad Estatal para el Desarrollo del Diseño Industrial	DDI	Spain

Names	Acronyms	Country
Société de calcul mathématique	SCM	France
Steelcon Chimney, Esbjerg		Denmark
Stephens David Huw (consultant)	S&M	United Kingdom
STOAS		Netherlands
Stokis Oil	S&M	Belgium
Stratégie et mutation (consultants)		France
Strategische Studien der Transformationsprozesse, Forschung und Beratung	ETHZ	Germany
Studio tempo Srl		Italy
Swedish Inventors' Association	ETHZ	Sweden
Swiss Federal Institute of Technology at Zürich		Switzerland
Swissair	ETHZ	Switzerland
Tampere University of Technology		Finland
Tech'InnoVe Expansion	TII	France
Technologie Beratung		Germany
Technology Innovation Information	TEKES	Luxembourg
TEKES — Teknologian Kehittämiskeskus		Finland
Télédiffusion de France	TDF	France
Telefónica		Spain
The CIM Institute	TME	United Kingdom
The College of Management, Tel Aviv		Israel
Thomson Multimédia	TME	France
Total		France
Toy Manufacturers of Europe	TME	Belgium
Trinity College, Dublin		Ireland
Unibus Rutertrått	UAP	Denmark
Unilever		Netherlands
Union des assurances de Paris	UBS	France
Union des banks suisses		Switzerland
Union des confédérations de l'industrie et des employeurs d'Europe	UNICE	Belgium
Union européenne de l'artisanat et des petites et des moyennes entreprises		
Union française des designers industriels	UEAPME	Belgium
Union internationale des associations et organismes techniques		France
Unioncamere Piemonte	UFDI	France
Unité de formation et de recherche en science sociales		Italy
Universidad Nacional de Educación a Distancia	CTESI	France
Universidade Aberta		Spain
Universidade Autónoma de Lisboa	CTESI	Portugal
Università degli Studi di Pavia, Dipartimento di elettronica,		Portugal
Prof. Franco Maloberti	UCG	Italy
Università di Bologna		Italy
Universität Innsbruck	UCG	Austria
University College Galway		Ireland
University of Hamburg	HH	Germany
University of Halmstadt — Höglan Halmstadt		Sweden
University of Central England in Birmingham	UCE	United Kingdom
University of Göteborg		Sweden
University of Iceland — Scientific and Technical Information Services	ACLU	Iceland
University of Lund		Sweden
University of Sheffield (National Transputer Support Centre)	NTSC	United Kingdom
University of Sussex — Science Policy Research Unit		United Kingdom
University of Sydney — Graduate School of Business	SPRU	Australia
University of Vilnius		Lithuania
University of Warwick	WRI	United Kingdom
Usinor-Sacilor		France
Veba AG	WRI	Germany
Verbindungsbüro des Landes Sachsen-Anhalt bei der Europäische Union		Belgium



Names	Acronyms	Country
Vew AG (Ziegler Fritz)		Germany
Victoria Holding Versicherung AG		Germany
Vienna Economics and BA University		Austria
Villa Real Ltd		Finland
Voest Alpine Stahl Linz		Austria
Volkswagen		Germany
Volvo AB		Sweden
Vuman Technology Services		United Kingdom
Welsh Development Agency	WDA	United Kingdom
Wenzel Joachim (advocat)		Germany
Wilson Roger (consultant)		United Kingdom
Wirtschaftskammer Österreich	WKÖ	Austria
Yorkshire and Humberside Regional Technology Network	RTN	United Kingdom
Zentrum Mechanisierung & Technologie		Germany

## 2.1.B. Reaction of the governments<sup>1</sup>

### The Danish Government's response

The Danish Government welcomes the initiative of giving a more central role to the innovation perspective in policies for research and industry. The subject of innovation has been topical in Denmark. The cultural context, social and institutional innovation, regard for the protection of natural and energy resources, as well as information society impacts, are all part of the context in which the Danish Government welcomes a discussion of concrete actions. However, in its opinion there is a need for better use of analytical foundation (OECD and EU studies, for example) to harness a coherent strategy for innovation initiatives. The Danish Government agrees with the five general objectives of the Green Paper on innovation (GPI), with certain reservations.

Community R&D policy should not be confounded with narrow industry policy objectives.

Improving the access to finance should primarily be seen as a national concern.

In general, the actions at Community level must respect the principle of subsidiarity and therefore be justified by their European dimension, as for instance in the case for standards, IPR or especially expensive R&D.

The following specific points are raised with regard to the GPI action lines:

- ☐ Technology watch will become more and more important for decision-makers in the public and private sectors. Community efforts should aim to develop cooperation and methodology in this discipline between the various national institutes.
- ☐ Priority areas for EU R&D should be defined with more attention to the demand side.
- ☐ Education must remain the concern of each individual Member State; however, whilst rooted in the traditions of its culture it could incorporate a European mutual recognition of skills and merits.

☐ Whilst agreeing with the benefits of mobility, such schemes must not become obligatory. Noting that the TMR programme has not achieved a sufficiently industry-oriented dimension, such schemes must have different and realistic means of meeting different needs.

☐ Special attention is needed towards administrative and economic barriers for SME participation in R&TD programmes. The coordination of the Commission's own instruments such as relay centres and CRAFT is worth considering.

☐ Fiscal instruments should not be introduced at Community level but increased transparency of innovation and company-related credits would be welcome.

☐ The primary aim of the Danish Government's industrial policy is to encourage innovation in enterprises, especially in SMEs and at regional level. SMEs which generally suffer from a lag in competencies and management remain a major concern and internal reinforcement, network and clusters are cited as key issues in this regard.

☐ The objective of developing 'economic intelligence' is an area in which the Danish Government would be keen to develop further experience.

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### The German Government's response

The German Federal Government welcomed the publication of the Commission's GPI and reported that the 'innovation debate' had been going on in Germany for a considerable time. There is a strong recommendation from this response that innovation issues should be managed at Member State and regional level for best results. It was also highlighted that the exchange of information and experience between Member States was of vital importance. It was felt that the Commission could undertake the coordination to initiate such dialogues.

<sup>1</sup> Summary established by the Commission services.

It made particular reference to the following German initiatives, the experience of which it felt could be of value to the European innovation debate:

- ☐ the Koopman report deals with the formal presentation and effectiveness of regulations;
- ☐ the INSTI programme (Innovationsstimulierung der Deutschen Wirtschaft durch wissenschaftlich-technische Information) the aim of which is to help stimulate the German economy by providing relevant scientific/technical information;
- ☐ the Delphi technology foresight initiative has operated successfully at national level.

Each Member State's education system is unique; however, it should contain basic information technology skills and legal/commercial studies. It should equip those that have the ability and will to pursue individualized career paths.

Technology watch activities are more successful if carried out at national level and Community coordinated comparisons made. Ultimately the decisions on which technologies are of most importance are the responsibility of each individual business.

Regular innovation surveys in each Member State were not recommended at this point.

The German Government agrees with issues relating to intellectual property and points out that patents are often a key factor in obtaining finance. It suggests that to illustrate to the public the true cost of patent infringement, estimation of the social costs should be illustrated, for example loss of profit for industry and subsequent unemployment. It agrees in principle with the Community. In the field of education, there is wide use of utility models.

It advocates greater transparency between Member States on the content of courses rather than concentrating on the mutual recognition of the end product, for example qualifications.

In order to enhance the mobility of researchers and students, it suggests that the EU Structural Funds be used to employ graduates or school leavers as innovation assistants.

The simplification of administration procedures was welcomed and it was suggested that a seminar with industrial participation should be established to have a 'brainstorming' session on how to simplify procedures.

Whilst in agreement with the concept that research efforts should be better directed towards innovation, care must be taken that this does not hinder creativity or decrease the level of basic science, particularly at Community level.

- ☐ The EU R&D programme should concentrate on a few specific areas of strategic importance to Europe's future.
- ☐ EU R&D should be reserved for larger, high-risk projects that could not be tackled at national level.
- ☐ The objectives of each R&D programme should be clearly defined with particular emphasis on their impact on the areas of strategic importance.
- ☐ EU Structural Funds should be targeted for innovative means.
- ☐ There is also agreement with the target that each Member State increases its R&D expenditure to 3% of its GDP.

The German Government agrees that the benefits of innovation need to be recognized, particularly by the general public and believes that the suggestions in the GPI do not go far enough. It suggests the following actions:

- ☐ the impact of the EU R&D programmes on day-to-day life should be illustrated to the public;
- ☐ examine the possibility of getting a group of PR consultants to put in place a series of practical measures to promote a positive image of innovation, possibly using modern IT methods;
- ☐ in future such measures should accompany the framework programmes.

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## **The Spanish Government's response**

### **General comments**

The Spanish Government welcomes the Green Paper. It approves the horizontal and integrated approach of the paper and shares the need to articulate a European strategy to foster innovation. Although the Spanish Government shares

in general the analysis undertaken of the situation in Europe, it regrets that the Paper does not fully exploit certain pointers given in the White Paper on growth, competitiveness and employment, such as the economic fracture between large companies and SMEs, the social fracture, etc. In particular, the poor treatment given to innovation as the foundation of a long-standing technological, social and economic cohesion is considered inadequate.

The Green Paper limits itself to addressing the main obstacles and challenges to innovation without a proper framework proposal to foster innovation in the EU. Finally, more attention should be given to initiatives to promote technology transfer among regions and (traditional) sectors, to strengthen the competitiveness of SMEs.

## Specific comments

### *1. Route of Action 1: To develop technology monitoring and foresight*

The role foreseen for the Institute for Prospective Technological Studies (IPTS) should be wider.

### *2. Route of Action 2: To better direct research effort towards innovation*

☐ The programme committees should address task force activities.

☐ There should be early SME participation in R&D activities, not only on application results.

☐ Among the parameters for the monitoring and evaluation of research programmes, social and economic cohesion and improvement of living conditions should be included.

### *3. Route of Action 4: To further the mobility of students and researchers*

Actions should be designed to attract (and retain) skilled human resources to less-favoured regions.

### *4. Route of Action 5: To promote recognition of the benefits of innovation*

Traditional media (TV, radio, press, etc.) should be used to promote public awareness in this field.

### *5. Route of Action 7: To set up a fiscal regime beneficial to innovation*

In the context of public deficit reduction, a previous thorough analysis of the budget cost of new schemes should be compulsory.

### *6. Route of Action 8: To promote intellectual and industrial property*

Research centres (public and private) should also be the beneficiaries of promotion policies.

### *7. Route of Action 9: To simplify administrative procedures*

The Commission's views are fully shared.

### *8. Route of Action 12: To encourage innovation in enterprises (SMEs) and strengthen the regional dimension of innovation*

The necessary interregional cooperation and the coordination role of national administrations should be strengthened.

### *9. Route of Action 13: To update public action for innovation*

Direct public support instruments should also be encouraged.

Finally, innovation policies should be addressed at the level of Heads of State or Government as the appropriate political forums to incorporate innovation issues into the Council of Ministers' agendas.

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## Comments by the French authorities

The Green Paper on innovation is a useful contribution to public debate and an undogmatic statement on the important subject of innovation.

### Innovation and subsidiarity

Innovation is a good example of a clear application of subsidiarity (innovation is first and foremost the responsibility of companies and founders of companies, since it is they, not governments, which have good ideas). European Union involvement in innovation is justifiable primarily for companies active on the European and world markets. Access for SMEs to European programmes needs to be improved.

### Analysis of the Green Paper

In order to improve the private financing of innovation in SMEs, France has taken risk capital support measures such as the creation of the *nouveau marché* (1996). Studies of tax reforms aimed at innovative companies are under way, together with an incentive for pension funds, once set up, to invest some of their resources in innovation.

France emphasizes that it would be in favour of a Community patent (ratification of the 1992 Agreement on the Community patent).

Simplifying administrative procedures is still a matter for the Member States.

The Commission analysis of the inadequacy of research input is pessimistic. In France, large sums have been invested in research at both national and Community level.

France feels that basic research should be subsidized by the State in order to guarantee, *inter alia*, a link between basic research and the development of new products.

France regrets that the Green Paper does not cover profit-sharing by researchers or nursery schemes.

## Action routes of the Green Paper

France notes that the Green Paper lacks specific proposals and practical action which could be taken by the Commission.

The Green Paper makes little mention of the framework research and development programme, and the over-rigid separation between Action 3, 'Dissemination and exploitation of results, and Action 1, 'Implementation' of research programmes, is regrettable. Better coordination between these two initiatives would be desirable in the fifth framework programme.

France also calls for more clarity in the objectives of the framework programme, which should promote our competitiveness in science and technology and cannot simultaneously play a specific coordination role (which is more a task for the ERDF).

France welcomes the excellent task forces initiative.

France has more reservations about the emergence of new observatories such as the European Innovation and Rural Development Observatory and the European Observatory of Innovative Practice in Vocational Training.

Strengthening the Seville Institute is not a priority. On the other hand, France suggests that more could be made of the forecasting efforts of the Member States, such as 'Technology foresight' in the United Kingdom and '100 key technologies' in France.

France wishes the European Union to act as a coordinator and to ensure that there is consistency between public initiatives and private input which will, within the framework programme, support the industrial research financed jointly by the Commission and manufacturers or public laboratories. The Commission could thus give basic research a genuinely European dimension and boost the development of key technologies.

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## The Irish Government's response

The Irish Government welcomed the GPI and agreed in principle with the main thrust of its

contents. The following points illustrate the Irish Government's point of view in relation to specific items:

(i) There is a limit to the capacity of Member States to mount extensive technology watch exercises; it would thus be beneficial if this activity could be carried out at EU level concentrating on 'technology push'.

(ii) Task forces as currently presented would only stimulate innovation in certain sectors or countries. It is suggested that the method of selection of task forces should reflect the needs of all Member States.

(iii) The importance given to SMEs in the GPI is welcomed and the Irish Government, under its EU Presidency, has been instrumental in having the CREST working group established to examine ways of encouraging greater SME participation in EU research programmes. Whilst a number of routes of action would also facilitate improving conditions for SMEs, it was stressed that a more interventionist policy was required to extract ideas and knowledge in research institutes into the commercial phase. Current policies in Finland and Israel were cited as examples.

(iv) The perception of science, technology and innovation must be improved amongst decision-makers, industry and the public. The whole concept of learning needed to be instilled as part of the innovation process. Training was considered too specific an activity to achieve this mentality.

(v) Financial incentives were considered most critical and proposals to establish EASDAQ, bank guarantees in favour of innovative SMEs by the EIF and the creation of multinational seed capital funds were welcomed.

(vi) The importance of technology transfer was emphasized and it was suggested that a dedicated set of actions be drawn up to emphasize that the absorption of technology, regardless of whether it was created inside Europe or outside, can often be a more relevant solution for firms than internal R&D.

(vii) The STIAC (Science, Technology and Innovation Advisory Council) review emphasized the importance of linkages and networks, particularly to overcome the disadvantage of small scale.

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## **The Italian Government's response**

The Italian Government welcomed the Green Paper on innovation and agreed with its conclusion and proposed action. It feels that the GPI and the Synthesis Conference in Rome (30 May 1996) were useful opportunities to raise awareness on various matters related to innovation in Europe.

The Italian Government agrees that investments in science and technology should be made according to the needs of society and/or industry.

It suggests that, apart from the barriers to innovation considered in the GPI, future action should take into account sectoral barriers to innovation, namely those relating to specific sectors of industry such as assembly, manufactured goods production and mature industries.

It suggests that particular attention be paid to encouraging the protection of European Union intellectual property.

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## **The Dutch Government's response**

The Dutch Government is in full agreement with the main points outlined in the Green Paper on innovation. Recent studies undertaken in the Netherlands have enabled this country to have experience in almost all the routes of action described in the GPI. Conscious of the principle of subsidiarity, the Dutch Government feels that activities at Community level should only be considered if a project transcends the national dimension or if they arise directly as a result of Community policy or regulations. The following points illustrate the Dutch Government's view on key policy areas:

(i) cautions against the use of European funds as investment capital;

(ii) welcomes the formation of EASDAQ, on condition that such an exchange is left to the market;

(iii) cautions against European prizes or certificates until the value of such Community initiatives becomes clearer;

(iv) endorses the key issues relating to permanent education and emphasizes the need to establish methods of mutual recognition of training and skills of each Member State.

The Dutch Government points out that the inclusion of issues of a general nature, for example administrative costs, labour/patent law, etc., are often addressed in separate regular consultative forums specifically set up for that purpose. It is imperative that innovation is included on the agenda of these forums.

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## **The Austrian Government's response**

The Austrian Government welcomes the Green Paper on innovation (GPI) and finds it positive to see a broad definition of the innovation concept being used, which recognizes the importance not only of technological factors but also issues such as organization, management, participation, qualifications and culture. Innovation is important for economic competitiveness, jobs and societal problems.

From an Austrian perspective, social innovation should be given more emphasis, with an accent on the relationship between technology, innovation and employment. However, future actions should take into account the qualified work in innovation policy and employment of the different organizations in the Member States, as well as the studies of the OECD.

The debate raised by the GPI is a process which, in Austria, will be combined with finalizing a national technology policy concept. The Austrian Government welcomes the fact that innovation has gained a central position in the preparation of guidelines for the fifth framework programme, and proposes that, at Community level, the Innovation programme should play a leading and coordinating role.

## **Subsidiarity**

The principle of subsidiarity must be the starting point for all considerations with regard to education, taxation, legal and other institutional characteristics. Caution should be raised against creating new bureaucratic procedures with which to tackle the individual action lines

of the GPI. Pragmatism and recognition of the crucial role played by individual economic actors should be the guiding principle.

## **Task forces**

Task forces are considered useful; however, attention should be paid to the financial contribution of the Union. Transparency and Member States' participation in decision-making must be secured

## **SMEs**

The 'supply side' must be better adapted to the real technology transfer and innovation needs of SMEs. Useful pointers in this direction would be to consider the notion of 'continuous innovation', better use of powerful IT instruments, acceptance of the long-term perspective from idea to commercial realization, and adaptation of the support programmes accordingly. (The contribution of the CREST working group on SMEs could usefully influence further work on the GPI.)

## **Orientation of R&D towards innovation**

The Austrian Government is also convinced that:

- ☐ innovation should be given a high priority in general in the framework programme;
- ☐ organizational and structural innovations are at least as important as the exploitation of inventions;
- ☐ a European innovation award and possible PR activities should be organized by the Commission in order to promote innovation among SMEs, as well as the general public.

The Austrian Government is sceptical about the role of a centralized institution for technology watch.

## **Human resources for innovation**

The government, in principle, supports the GPI proposals concerning human resources, notably:

- ☐ the importance of teaching technological themes in schools;



- ☐ the need for better capabilities in communication and cooperation;
- ☐ the promotion of a better image of scientific and technological disciplines;
- ☐ lifelong learning;
- ☐ more attention to innovation management in education;
- ☐ the enhancement of knowledge transfer and innovation through improved mobility of students, researchers and technicians/engineers.

### **Improved financial conditions for innovation**

For the Austrian Government a distinction should be made between business angels (mainly for small companies), venture capital (for medium-sized firms) and EASDAQ (for larger firms). Banks need to develop a culture oriented towards innovation and risk. More generally, there is a need for stronger coherence and networking amongst different services for technology transfer, finance, management, organization, technology, etc. The instruments of the Structural Funds could be more effectively directed towards innovation.

Fiscal subsidies are limited by national budget constraints and, in any case, are subject to the subsidiarity principle.

### **Create an environment favourable to innovation**

- ☐ It is better to reduce barriers to innovation than to create inefficient assistance for overcoming them.
- ☐ The setting-up of firms and innovative projects should be simpler; a general improvement of coordination between local, regional, national and Community levels is necessary.
- ☐ A culture of (de)regulation is required which takes into account the needs and possibilities of entrepreneurs.
- ☐ The strategic use of patents is lacking and should be made an element in patent policy at national level and in the European Patent Office.
- ☐ Harmonization of patent fees and lower fees for SMEs are recommended.

- ☐ Use of licences as a marketing instrument should be better promoted.

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## **The Portuguese Government's response**

### **1. Innovation policy**

The formulation of the 'European paradox' involves a linear and out-of-date vision of the phenomenon of innovation. The R&D policies and a possible Community innovation policy can neither remedy the gaps of the industrial policies and of enterprise policies, nor solve major problems, such as distribution and demonstration, which are of a prime necessity for SMEs. For Portugal, the transfer of resources of the R&D programmes towards an innovation policy appears to be lacking viability at the political and economic levels.

### **2. Growth and employment — Social and organizational innovation**

Portugal considers that the Green Paper tackles, only in a limited way, the problem of the links between innovation, growth and employment. It is not the technologies which can solve the problems of the organizations, or which create new opportunities for the companies, but their innovative application, including the new forms of social and organizational innovation. In this respect, Portugal also wishes the implementation of actions referring to town planning and to the revitalization of rural areas, teaching and training, health and problems related to old age.

### **3. Financing**

Portugal considers that the creation of a framework favourable to the operation of a European financial market should be envisaged, by encouraging the creation of European venture capital companies to finance the companies offering innovative goods and services. At the same time, it gives its assent for the creation of a market like EASDAQ.

#### **4. Taxation**

In order to be able to create a system of tax incentives articulated with the national systems of direct aid, Portugal suggests that action should be taken at the level of the tax harmonization for reasons of competition, in view of the increasing homogeneity of the regulations and in view of the conditions of investment in the single market.

#### **5. Transnational networks between companies**

Portugal stresses the lack of encouragement and Community support (in particular in the SMEs) in allowing the participation of the companies of the countries the least advanced in shared-cost transnational projects, gathering major companies and SMEs.

Consequently, it proves necessary to promote, within the SMEs, the knowledge of the European markets, and of the methods of access to the R&D Community funding, and to develop cooperation networks.

#### **6. Task forces**

The laudable intentions to coordinate and articulate between the various programmes which justify the creation of the task forces suffered from a lack of transparency in their selection and financing procedures, thus generating confusion in the debate between the Green Paper on innovation, the financial aid for the fourth framework programme on research and development, and the beginning of the discussion of the fifth framework programme. However, Portugal is favourable to the task forces concerning the intermodality of transport, maritime transport and multimedia educational software.

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#### **The Finnish Government's response**

The Finnish Government welcomed the GPI and wanted to share the experience it has gained at Member State level with the Community and to participate actively in the follow-

up work associated with this publication. The following current initiatives in Finland have proven particularly successful and may be of interest to other Member States.

(i) A national high-technology mentor programme has been introduced and tested with promising results. Experienced industrialists rate interested SMEs and issue a 'European venture capital certificate' to facilitate discussions with financiers. This approach has been prepared in cooperation with the Commission.

(ii) Kera (the regional development fund) has recently introduced a publicly funded small (under ECU 20 000) quick loan facility with very low security requirements for new companies. It has been very well received by SMEs.

The Finnish Government supports the rapid increase of R&D expenditure. Europe cannot compete with Japan and the United States unless this expenditure reaches approximately 3% of GDP. To enable favourable development of a European innovation policy and promote the industrial competitiveness of Europe, the R&D expenditure should be increased both on a national and European level. The ideas on improving European innovation processes must be incorporated into the fifth framework programme to ensure its impact on European competitiveness. There is a need for external assistance in evaluating innovation, making market analyses and in other issues where the SMEs have insufficient competence.

It supports the establishment of the EASDAQ and suggests that technology rating at a European level be experimented with and such knowledge disseminated. It also recommends that banks should develop skills and knowledge about the technologies and the specific financing issues that arise for technology-based companies. TEKES is about to use a new financing instrument called an equity loan. This loan is calculated as the company's own equity capital, thus improving the company's balance sheet. Use of the regional development funds should be directed to R&D projects at the national level.

It does not support the role of the IPTS in technology monitoring and would prefer to see current national systems used and experience exchanged.

Innovation in the service industry should be encouraged. The services sector should be

included in the innovation financing systems and be treated on an equal level with industry, as it is at least as important for employment.

The following elements relating to innovation should be carried out at Community level:

- (i) preparation of common standards, directives and global agreements;
- (ii) mechanisms and cooperation forums that help Member States and their enterprises to learn from the experience of each other;
- (iii) projects that are so wide or expensive that one country alone could not undertake them;
- (iv) new common legislative and regulatory elements (e.g. European company statute);
- (v) coordination of EU innovation policy activities with other Union measures (e.g. Structural Funds, industrial policy).

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## **The Swedish Government's response**

The Swedish Government was concerned at the very technical slant to innovation that was presented and stresses that innovation influences every aspect of life. It particularly emphasizes the role of schools in the creativity of individuals and suggests that work by the OECD could be of interest on this subject. It feels that all the routes of action are geared to improve economic performance through innovation and while this is commendable there are societal needs to be addressed which will also require very innovative approaches, for example care for the increasing numbers of elderly people in the population. Organizational innovations were also considered lacking.

A few specific points give an indication of the Swedish Government's opinion of the GPI.

□ The role of the Commission in improving European innovation should be limited to activities which are not viable to be undertaken at national level. One major area would be the coordination of transfer and exchange of experiences and knowledge between Member States.

□ The contents of the 13 routes of action contain nothing new. Such information has been tried and tested for some considerable

time, often not succeeding in contributing much to innovation.

□ It is concerned that the ratification of the European Patent Convention might not be such a positive approach.

It recommends that the work on innovation which has been undertaken by the OECD should act as a focal point for any further innovation activities undertaken by the Commission.

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## **The UK Government's response**

The UK welcomes the Commission's initiative to prepare and publish the Green Paper. The UK particularly welcomes the recognition of the need to build on the successful experience of individual regions and countries to spread best practice throughout Europe. Moreover, the UK welcomes the emphasis on the need to learn from each other through the exchange of best practice, rather than on all Member States necessarily doing the same thing.

In particular at the Community level, the UK welcomes and supports the fact that the Commission addresses deregulation, the streamlining of procedures and competition, as well as the use of private contractors and decentralization. There is room to increase the effectiveness of existing actions and initiatives within the Community and for better coordination between EU activities.

### **Better direct research efforts towards innovation**

Mechanisms linking basic research and innovation are essential. However, little attention has been paid to incremental innovation which is particularly important when considering innovation in SMEs.

The UK is strongly in favour of effective interprogramme cooperation. Task forces are found to be helpful in the recognition of useful areas for cooperation. However, the operation of the first round of task forces has raised a number of concerns.

It welcomes the proposal to include in the fourth framework programme's monitoring and

evaluation procedures an assessment of the impact of innovation.

It agrees with the need to take innovation factors into account in the fifth framework programme, but is unclear about how the Commission intends to do that.

There is no need for a new Community information programme.

The scope for adding value through technology monitoring and foresight at a Community level is relatively limited.

### **Reinforce human resources for innovation**

The recommendations are relevant. However, Member States will have a range of different priorities and approaches to improving their training systems.

Public authorities, at either national or Community level, are not best placed to identify skills and qualifications needed by businesses. There is no justification for setting up a new institution which would duplicate the work already undertaken.

There is no case for any increased funding of TMR, nor justification for creating further initiatives.

### **Improve the conditions for the financing of innovation**

The suggested mechanisms should be developed within the private sector. Experience shows that lack of access to finance is seldom a main barrier to innovate, though it is often used as an excuse. There are no objections, however, to proposals to allow the EIF to invest in equity.

Taxation issues are primarily a matter for Member States at national level under the subsidiarity principle.

### **Foster a legal and regulatory environment favourable to innovation**

Support should be given to efforts in international forums to achieve harmonization, where such measures are likely to lead to an improve-

ment in the trading environment and/or greater efficiencies or reduced costs in the IPR system.

The UK supports the promotion of patent information services as a method of technology watch.

The UK fully supports the streamlining of administrative procedures at the Community level.

It has no opposition, in principle, to a European company statute (ECS). However, there is no justification for a separate form of ECS or EEIG for small or for innovative companies.

Control of State aids should be a major priority for the Commission. In principle, the UK fully supports the Commission's efforts to restrict the levels of State aid to large investment products. The UK welcomes and fully supports the Commission's proposal to continue to have competition rules which facilitate technology transfer.

### **Adapt the role and modalities of public action regarding innovation**

The UK supports the objective of fostering cooperation among enterprises and strengthening groupings. Encouraging an internationally-minded approach among enterprises is an important issue.

Framework programmes should not be used to support regional actions which are best carried out through the use of the Structural Funds.

There should be proper evaluation of Community, national and regional investment in innovation. Regional and national initiatives should be evaluated by Member States. The UK welcomes the fact that the Commission facilitates exchange of best practice between regions and countries.

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### **The Norwegian Government's response**

The Norwegian Government welcomed this initiative to enhance the innovative capacity of Europe. The following points highlight its

opinions on critical factors emanating from the debate:

(i) Efforts on technology watch should be better coordinated and the work of institutes like the IPTS should be widely disseminated.

(ii) Further work in the area of statistical innovation surveys is required. Such work should be more closely linked to OECD work.

(iii) The Community should play a key role in developing new and transparent skills recognition systems.

(iv) The development of a European capital market, EASDAQ, was welcomed.

(v) Concerned at European companies moving their R&D activities outside Europe, due to

inhibiting legislation, for example intellectual property law. Further initiatives in this area should be closely linked to OECD and WTO initiatives and coordinated between national and community level.

(vi) Exchange of experience in the field of regional conditions for innovation should be strengthened.

The Norwegian Government points out the fact that skills to analyse and identify economic intelligence are in short supply and need to be strengthened. It also stressed that a European innovation policy for the 21st century must include a deeper analysis of the innovative capacity of the service industry.

## 2.1.C. Reaction of the institutions<sup>1</sup>

### 1. European Parliament

The European Parliament has welcomed the Green Paper and its action routes, and is keen that measurable results should follow. In a 35-point resolution, the Parliament calls among other things for:

#### Dissemination and exploitation of R&TD results

- ☐ Better diffusion of technical know-how, including more support for the Innovation programme and the programme for the stimulation of the training and mobility of workers.
- ☐ A new task force to foster dissemination and exploitation of R&TD.
- ☐ Focus on research that is interdisciplinary, application-oriented and network-driven, or that covers industries currently too small to be self-supporting in research.
- ☐ Greater use of information technology, the foundation to be laid by having Internet access for all schools.
- ☐ Priorities to be set based on a better knowledge of the innovation process, founded on quantitative innovation indicators.
- ☐ A permanent review of national 'best practice' encouraging innovation in the Member States.

#### Monitoring of R&TD

- ☐ Improved cooperation as regards national and EU research policies.
- ☐ The Joint Research Centre's Institute for Prospective Technological Studies to have a key role in developing network links between centres engaged in similar activities.

#### Economic and financial considerations

- ☐ Member States to review their fiscal regimes with a view to promoting innovation. Suggestions include Japanese-style regulation of domestic financial markets, longer payback periods for investment, and cheap loans to innovative companies.
- ☐ More competition within the internal market, preventing large companies from dominating markets and subsidies.
- ☐ Independent technical assessments to give banks a better understanding of technology-based firms.

#### Administrative and legal constraints

- ☐ Simplification of administrative procedures at both national and Community level. The Commission's SLIM initiative (simpler legislation for the internal market) is welcomed, and the Parliament also calls for consideration of further administrative simplification of the research framework programmes.
- ☐ Early adoption of the European company statute.
- ☐ Patent protection periods that vary according to the product type, so as to balance innovation (helped by patents) with competition (hindered by patents).

#### Encouraging SMEs to innovate

- ☐ Support for innovation at the regional level, and programmes to encourage SMEs, to cooperate with universities, industrial research centres, and big enterprises.
- ☐ Attention to be paid to the role of intermediary organizations such as banks, consultants, marketing cooperatives and technical colleges in helping small firms.
- ☐ Structural Funds to be oriented towards innovation.
- ☐ Recognition that SMEs are not a homogeneous group, so that policies should respect

<sup>1</sup> Summary established by the Commission services.

their differences and be targeted on the basis of size and sector.

- ☐ Help for SMEs to reduce the financial risks of innovation, including support from the European Investment Bank

### **Social, educational and training aspects**

- ☐ Better communication between researchers and the public, especially through public broadcasting. Funding should carry a responsibility to communicate research findings to the public.
- ☐ A more consumer-oriented research policy.
- ☐ Greater involvement of the workforce in the innovation process, through education and direct participation.
- ☐ Attention to 'incremental' innovation, which can be just as important as products that are fundamentally new.
- ☐ Emphasis on the integration of innovation in education and vocational training, and a new framework for future innovation-based professional qualifications.

### **Task forces and innovation**

- ☐ Debate on the goals of the task forces and the establishment of clear links between their work and the Green Paper's action routes.

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## **2. Economic and Social Committee**

The Economic and Social Committee welcomes the Green Paper and feels that an integrated horizontal approach is essential for the success of any innovation policy.

It considers that encouragement of innovations must become the principal objective of decision-makers, as this is the key to improving competitiveness, employment and development, and that joint action must be taken at European level, while respecting the principle of subsidiarity. The Committee also considers that innovations are also key factors in economic and social cohesion.

The Committee stresses the importance of the entire research system, backed up by technology foresight.

The Committee feels that there should be greater reliance on a bottom-up approach, that more attention should be paid to the point of view of potential users, and that interaction between researchers and users should be promoted.

Resources should be concentrated in joint fields and projects which are of essential importance. Cooperation is essential, since effective use of the resources is more important than their quantity. Efforts should be concentrated and priority given to the objectives.

The Committee considers that conditions favouring innovation come about as a result of integrating firms, research centres and other factors on a scale that is large enough to generate 'critical mass'.

The Committee feels that innovation policy must improve the opportunities for the most poorly equipped firms to join innovation networks.

The Committee stresses that innovation policy within a firm or in any other structure requires the participation of all employees, in particular through further training and an atmosphere which is open and conducive to cooperation.

Of the issues which the Commission reviews and which are favourable to innovation, the Committee feels that each new proposal for legislation should be assessed with regard to its effects, a sustainable demand must be created in sectors important for society, and market rigidity must be reduced.

In the view of the Committee, among the most important areas for action are orientation of research, supported by technology foresight, training, financing, taxation, openness of markets and dissemination of innovation to SMEs.

The Committee considers it necessary to promote synergy between research, industrial and other policies.

The Committee thinks that the Green Paper stresses cooperation between research centres and firms but fails to take account of factors such as cooperation between different departments within a firm, the fact that a firm's potential increases with the quality of work for



employees, the firm's staff policy and the distinction between internal and external mobility.

As regards the routes of action in the Green Paper, the Committee has the following comments to make:

**Route of Action 1 — Technology watch and foresight.** Institutes involved in prospective technological studies in the Member States should be encouraged.

**Route of Action 2 — Orientation of research towards innovation.** The authorities have the right to intervene, particularly in sectors important for society, where the market itself would not generate demand, by using task force-type activities.

**Route of Action 3 — Initial and further training.** There must be a move towards ongoing improvement. The 'Knowledge resource centres' project should be launched, the purpose of which is to act as an interface between the supply and demand for information in the branch of training in question.

**Route of Action 4 — Furthering the mobility of students and researchers.** Mobility between different sectors and within individual countries must be promoted.

**Route of Action 5 — Promoting recognition of the benefits of innovation.** Any campaigns to heighten public awareness must be based on a thorough understanding of the factors involved.

**Route of Action 6 — Improving the financing of innovation.** Everything should be done to ensure that SMEs have the same financing conditions as those enjoyed by large firms.

**Route of Action 7 — A fiscal regime conducive to innovation.** When enacting or amending the tax system, any negative effects this may have on innovation must be considered.

**Route of Action 8 — Promotion of intellectual and industrial property.** A European patent system should be introduced.

**Route of Action 9 — Simplification of administrative procedures.** It is high time that concrete measures were taken.

**Route of Action 10 — A favourable legal and regulatory framework.** Account should be taken of innovation needs in EU competition policy. European standards concerning health,

the environment and safety should be strict and binding.

**Route of Action 11 — Development of 'economic intelligence' action.** The task of the authorities is to facilitate more education in this area.

**Route of Action 12 — Encouragement of innovation in enterprises, especially SMEs, and strengthening the regional dimension of innovation.** Economic and social cohesion is a key objective of the Union, and subsidiarity is its guiding principle.

**Route of Action 13 — Updating public action for innovation.** Action is increasingly being directed towards cooperation with the different segments of society.

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### 3. Committee of the Regions

The Committee of the Regions welcomes the Green Paper and thinks that it is necessary to achieve genuine coordination of measures to disseminate know-how and exploit results, while respecting the principle of subsidiarity. It welcomes the importance attached to local and regional authorities.

The Committee approves of the idea of a proactive policy on innovation and mobilizing local operators, as this is essential for maintaining and strengthening competitiveness and creating jobs. The local and regional authorities bear a major responsibility for this mobilization.

As regards support for innovation, local and regional authorities must be involved in setting up a legal, economic, financial and training environment that is conducive to innovation. The Committee insists on the priority which the authorities must give to financial support for research centres and innovation. Private financial circles must also be made more aware of the challenges of innovation. Finally, rules governing the intervention of the Structural Funds in financing venture capital must be clarified, so that this tool can become operational. There is a need to develop policies to encourage innovation with a view to improving manufacturing processes, creating new industrial and tertiary sector products and setting up training schemes as part of a policy to support

SMEs. The European Union has frequently supported efforts by local and regional authorities in this field. Finally, regional education and training programmes must help to provide training in innovation, supported in this by the Socrates, Leonardo and INFO 2000 programmes.

The Committee considers that dissemination of the results of innovation contributes to economic and social cohesion, and that improved spatial restructuring will result in the networking of regional innovation systems. Local and regional authorities must promote the establishment of links between research centres, universities and industry for the purpose of developing networks for exchanging information and experience at regional, transregional and cross-border levels. Mechanisms for assisting innovation should not be confined to research and development, but should also extend to the marketing and industrialization phases. There is a need to set up a regional technology watch policy. The Committee considers that the European network of innovation relay centres must reach a critical size, in geographical terms, and that, as part of the simplification of the schemes to provide aid and for the dissemination of research results, these centres could act as 'one-stop shops' for SMEs.

As regards the routes of action in the Green Paper, the Committee has the following comments to make:

**Route of Action 1 — To develop technology monitoring and foresight.** The information collected and processed by the Seville Institute for Prospective Technological Studies must be exploitable at regional and local level.

**Route of Action 2 — To better direct research efforts towards innovation.** Local and regional authorities must set up SME monitoring and watchdog organizations with a view to increasing SMEs' capacity for research into new technologies.

**Route of Action 3 — To develop initial and further training.** Regional and local authorities can familiarize young people with innovation, with the financial support of the European Union, and develop research cooperation between firms and educational establishments.

**Route of Action 4 — To further the mobility of students and researchers.** The Committee

emphasizes the importance of mobility and underlines the role of local and regional authorities, who are able to forge cooperation links between the regions of Europe.

**Route of Action 5 — To promote recognition of the benefits of innovation.** The Committee would like to see local and regional authorities kept informed of successful experience in innovation.

**Route of Action 6 — To improve the financing of innovation.** It is important to make all the financial partners aware of the need to overhaul their aid machinery and to introduce mechanisms for encouraging them to become involved in innovation projects.

**As regards Routes of Action 7, 8, 9 and 10,** the Committee approves the proposal to consult local economic and social operators on the establishment of a tax, administrative and legal environment conducive to innovation. Regional seminars could be organized as part of measures to simplify the business environment.

**Route of Action 11 — To develop economic intelligence actions.** The budgets of regional schemes in this field must be increased, whether for back-up for advisory services, continuing training or assistance in the recruitment of managerial staff. It would be of great help to have regular assessments of measures taken by the authorities in order to identify the impact of these policies.

**Route of Action 12 — To encourage innovation in enterprises, especially SMEs, and to strengthen the regional dimension of innovation.** The local or regional level is the most appropriate one for contacting businesses on matters concerning innovation.

**Route of Action 13 — To update public action for innovation.** The Committee approves the suggestions on the new conception of the role of the State in innovation.

In conclusion, the Committee welcomes the European Commission's initiative. It underlines the repeated references to subsidiarity and the role of local and regional authorities. Its members will be invited to give an account of their experience and submit proposals which might be of help in drawing up the summary report and the action plan.

# Annex 2.2. Recent developments in innovation policy in the Member States of the European Union

## Introduction

In the next pages a number of selected innovation policy developments in EU Member States in the 1990s are presented. In order to illustrate what is now embraced by the concept of innovation policy, examples are clustered according to the three broad objectives of the innovation action plan:

A — Human resources, education and training

B — Framework conditions for entrepreneurship and innovation finance

C — R&TD and industry

Concentrating such masses of information into a few pages can, of course, not do justice to the approaches of individual governments. However, it is easily observed that EU governments are attentive to giving new advanced content and increased coherence to their policies for innovation and technological change. Germany's Bundesbericht Forschung 1996, the UK White Papers and the three-yearly government proposals in Sweden are illustrative of such efforts.

## A. Human resources, education and training

Education, vocational training, further training, and concern for the skills level of the entire workforce are strong elements in the innovation policies. However, educational budgets in Member States are more decentralized than budget lines of most other innovation policy relevant actions. The observation that science subjects trail in popularity among school children and young people has become a concern to most Member State governments. For example, the Science and Technology Policy Council of Finland states in its development strategy 'Towards an innovative society', that '... the quality of teaching will be improved and educational content will be renewed for all levels of education'. The Innovation Agency in Austria promotes innovative projects in schools, nurtures innovative problem solutions developed by students by funding project costs, giving prizes to winning teams and enabling them to participate in international competi-

tions. The agency also runs the Award for Innovation. In Luxembourg a revision of the law on the secondary technical education and the relevant engineering diploma is promoted. In addition, the *prix à l'innovation*, has been developed by the Luxembourgish Federation of Industries and in connection with the educational system. In Denmark, the Ministry of Education is working on the ways that innovation and entrepreneurial culture can be encouraged from the primary and secondary educational levels. Also, the THOR (technology by highly oriented research) initiative, which is scheduled for 1997 and will consist of a limited number of large research grants awarded to excellent scientists, will also contribute to making the area of technology and science more attractive for young people to enter. In the United Kingdom the Prince of Wales Award has recently been extended with prizes for the most commercially successful innovations.

If we look in more specific areas in the field of education, we can mention the following initiatives.

### **A.1. The training and mobility of researchers at doctoral level**

In Germany the international exchange of researchers is supported through several programmes, such as the 'Alexander von Humboldt Stiftung' giving grants to more than 2 000 researchers per year and the 'Deutscher Akademischer Austauschdienst' supporting more than 50 000 individuals per year. In addition, the DFG doctoral programme (Graduiertenkollegs) has grown rapidly from ECU 1.6 million in 1990 to ECU 41 million in 1995. The three-year plan for research and innovation 1994-96, in Italy, states that 'the instruments of university diploma and the research doctorate, which have been introduced far later than in other industrialized countries, must be made more responsive to the requirements of the country's production system'.

In Greece the programme of targeted research fellowships (YPER) started in 1995 with the aim of creating a pool of highly educated persons dealing with industry-related problems. In Spain the national programme for the training of research personnel has been focused towards the priority areas of the 19 national programmes making up the third national R&D plan (1996-99). In Ireland PhD support grants will increase in 1997 from ECU 1 250 per individual at present to ECU 2 500 which is in addition to the number of PhD students supported by other lines in the S&T budget. In Denmark the government continues to give high priority to the training of researchers, for example by continuing the programme for visiting researchers from abroad and by providing grants for Danish research students to go abroad. The aim is to at least maintain the present level of enrolment at PhD courses.

### **A.2. The linkages between university-level education and the enterprise sector**

In this field most policies and measures aimed at supporting the mobility of university graduates into their first jobs and promoting the exchange of research staff. In Belgium the

Flemish and Walloon regions have each implemented programmes aiming at the financial support of graduates' recruitment by enterprises, especially SMEs. In Wallonia, the FIRST programme enables researchers to be recruited by universities and companies (SMEs) with a view to developing partnerships, and in Flanders a similar scheme is linked to the sponsoring of enterprise clusters. In the United Kingdom, the teaching company scheme encourages the mobility of students and graduates towards industry. Also, career problems of contract research staff at universities have been eased through an agreement involving the research councils, the Royal Society and the British Academy. In the Netherlands additional funds will be used for the Kennisdragers in het Midden- en Kleinbedrijf (KIM) project (similar to the UK teaching company scheme). In Sweden a report from the Ministry of Industry recommends that PhD programmes should be adapted to industry needs and that a new type of industrial associate professor should be introduced to allow the hiring of persons with experience from industry. The Ministry of Education and Science in Spain has initiated a sectoral programme for the training of university academic staff and improvement of research personnel with the aim of promoting the exchange of research personnel between industries and public research centres and the development of enterprises' R&D units.

In Germany, with the particular aim of integrating R&D manpower into R&D projects of SMEs in the new *Länder*, several programmes under BMBF and BMWi continue and are increasing in volume. The creation, in 1995, of the Centre of Advanced European Studies (Caesar) in Bonn is another effort to increase flexibility, notably avoiding giving tenure to researchers. Instead, scientists will be hired to work for only five years on fundamental and application-oriented research projects such as nano-technology or bio-electronics which are promising fields for the next century. Another novelty will be that Caesar is to be financed as a private institute benefiting from the interest of the initial endowment of ECU 360 million from the federal government and ECU 34 million from North Rhine-Westphalia. In Denmark the industrial PhD fellowships continue at the level of 45 new graduates per year, which are simultaneously employed by a company and enrolled at a university institute as PhD students. The Greek programme Diavlos has a

pilot demonstration character (co-financed by the European Social Fund) aiming to support first contacts between students and companies having R&TD activities. In Ireland schemes for graduate training and mobility include financial support for companies' R&D personnel in order to work in overseas companies' R&D departments; training to graduate entrepreneurs to assist them in developing skills required to run their own business; and assistance to SMEs to recruit technical graduates for one-year periods.

### **A.3. Vocational training and further training**

Member States' governments address the requirements for vocational training and further training primarily with the objective of giving an increased proportion of young people adequate skills and maintaining the employability of young people.

In the United Kingdom, the government, through the White Paper 'Competitiveness, forging ahead' (1995), endorses the new national targets for education and training put forward by the National Advisory Council for Education and Training (Nacett) and sets out its concrete objectives including the support of a sector target challenge for industry training organizations and others; the comparison of basic qualifications for employment with those of leading competing countries and work with

the industry training organizations to benchmark training in companies; to run a small firms' training challenge offering a total of ECU 6 million for the best training projects involving 10 or more small companies; and to publish a consultation document on individual responsibility for lifelong vocational learning. The Science and Technology Policy Council of Finland states in 1993 ('Towards an innovative society') that a growing emphasis will be placed on basic skills in initial vocational education aiming at more comprehensive curricula; and an evaluation of the educational sector of adults' training will take place due to its growing importance. In the Netherlands the White Paper 'Knowledge in action' (1995) stated the need to increase the efficiency and effectiveness of current funding to vocational training and enterprise-oriented training; to finance annually with ECU 7 million an innovation fund for technology and vocational training; and to stimulate fiscally apprenticeship and trainees in enterprises. In Austria technology relevant vocational training measures include the introduction and use of new technologies, methods, organizational forms, and promotion of quality; the development of educational models combining at-work and external qualifications; models that consider the connection between technological and communicative and social competencies; and development of cross-company qualification cooperation.

## **B. Framework conditions for entrepreneurship and innovation finance**

Recent national White Papers and action plans show the need to rationalize the framework conditions to support SMEs and industrial competitiveness. The following examples are listed under some main categories related to entrepreneurship and innovation finance.

### **B.1. Administrative simplifications**

Administrative simplifications, deregulation and liberalization, and the establishment of one-stop shops for enterprises are all part of

many governments' published plans. In Belgium each one of the regions is planning the establishment of one-stop shops as part of their efforts to simplify administrative procedures. In Denmark, as part of a larger action plan, the Ministry of Business and Industry includes several elements in its project to reduce administrative burdens like the removal or simplification of existing administrative rules; the simplification of fees and taxes; and the establishment of a simplified reporting system so that companies can satisfy all authorities through reporting to a single point. Both France and Germany have established one-stop shops for

administrative formalities. The German BMBF likewise reviews the existing legislation from the point of view of its effect on research and innovation. In France a pilot project will be launched in four regions in order to coordinate technical legal interventions of various State departments. In the United Kingdom a prototype one-stop regulation-shop has been developed and will be demonstrated at selected business links throughout the country. Furthermore, the Minister for Science and Technology has announced a package of deregulation measures to help small firms in the areas of single notification for tax and national insurance for new businesses; new rights for businesses in enforcement actions; streamlined development controls; a draft bill for consultation in industrial tribunals; and a prototype IT system to provide them with forms and regulations.

## **B.2. IPR and patents**

The excessive costs of patent protection in Europe compared with patent costs in the United States, and the increasing number of new problems related to IPR are addressed in most Member States. The variety of measures demonstrates the difficulty of combining the benefits of protection (allowing a payback to the inventor/innovator) with the benefits of wider exploitation of new products, processes (in particular in biotechnology), or services.

The European Patent Convention has been joined by Finland and it is under consideration in Ireland. Patent protection in Greece has been extended from 15 to 20 years to make it compatible with EU guidelines. In the United Kingdom studies are under way on the role of the UK Patent Office *vis-à-vis* the European Patent Convention and on the role of European directives applied to biotechnological inventions.

Other initiatives to make better use of patent information are being taken in Austria with the establishment of a platform called 'Patentverwertung'; in Spain with aid from the Ministry of Industry; and in Belgium via the Office for Industrial Property Rights. In Germany subsidies to SMEs for patent application will be available from 1997 and 100 new teaching posts in patent information will be created at science and engineering faculties under a new programme called 'Innovationsstimulierung der

deutschen Wirtschaft durch wissenschaftlich-technische Information' (INSTI).

Intellectual property right problems are under scrutiny in many countries. New norms have come into force in Italy concerning procedures and sanctions concerning patents, trade marks, royalties etc., while, in Germany, the Schlichterkommission's recommendations are now in the form of government proposals to be approved by the Bundesrat. The BMBF is supported in this work as well as in diminishing non-legal barriers to research and innovation by the so-called Clearingstelle für Innovation und Recht. In Sweden the particular problems of IPR when industry uses university research capabilities have been studied by the Ministry of Industry.

## **B.3. Norms and standards**

There is an uneven presence of adequate infrastructures to promote recent years' advances in the use of high-quality norms and standards, not least in the field of services and in the application of total quality standards or design as a competition parameter. Among the recent developments are the following:

In Spain regulations for the quality and industrial security and for environmental audits have come into function with a view to helping exports, and a National Certification Agency (ENAC) has been created as a private association. In Sweden the system for testing and control will be further adapted to European rules. In the United Kingdom the new national accreditation body for conformity assessment service, known as the United Kingdom Accreditation Service (UKAS), came into being in August 1995, thus completing the privatization of the former National Measurement Accreditation Services (NAMAS). In Austria support has been made available for ISO 9000 reviews in the services sector, and the Innovation Agency promotes industrial design. In Greece and Portugal promotion of standardization and certification are parts of the action lines for the promotion of industrial development and innovation.

## **B.4. Innovation financing**

Innovation financing and the more substantial investments needed for the exploitation of innovative products and processes are sup-

ported, in particular with a view to the needs of SMEs, in all Member States with schemes for seed and venture capital, soft loans and guarantees, or incentives to private savings, business angels and moves to allow pension funds and building societies to make funds available for knowledge-based enterprises. In many Member States the government budgets also allow for some revenue losses through fiscal incentives. In the large financial markets of London, Frankfurt, Brussels and Paris concrete steps are being taken towards the formation of EASDAQ (National Association of Securities Dealers Automated Quotation) by the end of 1996.

In Austria two initiatives will be implemented: Privatchapital for SMEs with guarantees for private investors, development of a standardized model for mobilizing equity capital, and establishing a 'market' for business angels; and Gründungssparen for long-term investment credits for new businesses at the start-up phase and for the foundation and takeover of enterprises. A seed financing scheme funded by the ITF and managed by the Innovationagentur provides assistance to new businesses active in novel technologies, by furnishing consulting services and supplying venture capital. In Denmark the industrial development companies scheme provides a guarantee (of 50%) for investment by private development companies that finance SMEs in need of further capital and management competence. Twelve such investment companies have been approved since 1994 under an overall State guarantee of ECU 132 million. In Finland equity-based development loans for R&D in SMEs and venture capital for business start-ups, the latter through the recently established Finnish Industrial Fund, seem to continue.

In France the launch of the 'nouveau marché' is expected to mobilize key players on the French equity market and aims to achieve around 30 introductions each year. The French plan for innovation foresees that venture capital funds should mobilize ECU 155 million within three years. In Germany the Deutsche Börse announced, in March 1996, that it will open a Neuer Markt in 1997. This new market will target telecommunication, biotechnology, multimedia and new services. Deutsche Börse will also join with the 'nouveau marché' in Paris and the Brussels Bourse with a view to develop a network of new markets for equities (Euronm) in growth companies. Government-supported equity and credit schemes for SMEs

will also be extended: the Kreditanstalt für Wiederaufbau innovation loan programme is to be improved with at least ECU 525 million per year (pending approval by the European Commission); and the experimental Beteiligungskapital für junge Technologieunternehmen (BJTU,) started in 1989, and will be continued by Beteiligungskapital für kleine Technologieunternehmen (BTU) with the release of another ECU 471 million.

In Greece a technology performance financing-type (XAT) programme will soon be launched with the aim of distributing the innovation financing amongst three parties, namely the technology supplier, the technology user and the financial institution. In Spain one of the action lines of the SME initiative for industrial development is devoted to the improvement of the access of SMEs to sources of financing and to the support of networks of interface organizations of financial character. ICO-Pymes is a new form of credit line available to companies that develop projects financed by the Centre for Industrial and Technological Development (CDTI), with the possibility of additional finance of up to 70% of the total investment of the project. The National Innovation Company (ENISA), which is a public venture capital company, foresees in its plan for 1996-99 investments of ECU 21 million. In Luxembourg, the Société nationale de crédit et de d'investissement (SNCI) has developed loan schemes for technology and innovation related projects.

In the Netherlands, while administrative costs for businesses are found to be a general problem concerning all kinds of companies, there are many initiatives to facilitate credit and finance for technology investment like the simplification of applications for pilot studies and small credits from the Technical Development Fund (Technisch Ontwikkelingskrediet); techno-starters will be given extra support by the government; technology brokers (seed capital or licences); technology ratings (feasibility check). In Sweden three NUTEK programmes are running, which bring down the costs of SMEs that engage in innovative projects; SNITS that supports technology transfer through feasibility awards for the development of a business plan; SMINT that promotes the formation of R&D consortia in particular for international cooperation; and seed financing, which gives small feasibility awards and soft loans for innovative projects during the stages



before commercial financing is possible. A Swedish version of the UK business expansion scheme has been introduced, allowing for tax savings when investing in small unlisted firms. A new risk capital operation for small, innovative firms is being launched by the Swedish Industry Fund. In 1993, the Swedish Parliament decided to dissolve the Wage-Earners Funds. About ECU 770 million was allocated to risk capital operations (while a larger amount was used to create 18 research foundations).

In the United Kingdom, the government's proposals in the 1995 and 1996 White Papers on competitiveness include the encouragement of greater competition in the provision of capital, in particular to SMEs; help to growing businesses to get access to the most appropriate finance through a new business link service in England, enterprise networks in Scotland, and business connect in Wales; continue to encourage prompt payment; and allow corporate bonds into personal equity plans and loosen restrictions to make it easier for companies to issue bonds. In the UK, that concentrates more than 45% of the venture capital funds in Europe, a number of initiatives and schemes have developed like the networks of business angels or the development of the 'alternative investment market' (AIM) by the London Stock Exchange in July 1995.

## **B.5. Fiscal incentives**

Fiscal incentives for firms to perform R&D are now in widespread use in Member States (Austria, Belgium, Greece, Ireland, the Netherlands, Spain and Sweden) but have been abandoned in Finland. For example, in Greece, the Investment Law was amended in 1994. It provides a wide range of incentives (investment grants,

interest subsidies, tax allowances and increased depreciation rates) aiming simultaneously at promoting regional development. In Belgium the federal government has plans to revise the fiscal regime in order to encourage the reinforcement of the enterprises' own resources. Self-financing within the SMEs will be made more attractive. Higher fiscal deductions will also be linked to the deposit of patents. In Luxembourg, fiscal incentives for material investments in enterprises have been developed in such a way as to promote indirectly innovation in firms.

In Finland general tax deductions on R&D efforts came into use in the late 1980s but no longer belong to the fiscal instruments. In Ireland, among the recommendations from the STIAC was an integrated set of tax measures to stimulate business R&D, including dividend relief for owner managers, R&D tax credits, reduction of costs for R&D personnel and R&D service companies, and tax changes to encourage multinational companies to establish their regional headquarters and strategic functions in Ireland. In the Netherlands ECU 23 million per year will be given to improve depreciation flexibility of innovative technologies drawn towards the Netherlands. Since 1994, funds under the Act to promote research and development (WBSO), through tax incentives, have been increased; WBSO is offered either as a reduction in personnel costs through a reduction of taxes and premiums paid by the employer, on salaries for R&D personnel; or, as an extra income tax reduction added to the tax forfeit for the self-employed who themselves develop R&D activities in SMEs. In Spain fiscal incentives came into force at the beginning of 1996. Forty per cent may be deducted of the R&D costs of enterprises that exceed the average of the costs incurred during the preceding two years.

## **C. R&TD and industry**

Many countries have seen some changes of ministerial portfolios, in several instances following a change of government. The common trend has been to achieve a more powerful coordination of policies for industry, research and human resources. Objectives coincide and all countries prepare or implement actions with

large similarities, most visible with regard to information society initiatives. Priorities differ among countries according to the current situation of the science, technology and innovation system in each country. The size of individual economies, industrial structure, and specific economic problems are likewise factors that

determine priorities at national and regional level. Below characteristic examples of the latest developments are summarized.

### **C.1. Technology foresight**

In 1995 the first results of large-scale technology foresight exercises using the Delphi technique were published in the United Kingdom, France and Germany. Already the follow-up is seen in the form of impact on the government R&D expenditure plans. In Austria the technology information and policy advice programme will be extended to 1998. Technology foresight networks are at work in the Netherlands where the Consultative Committee for Explorative Studies (OCV) involves the major research organizations in its studies. Ireland has also developed a strategy for its technology foresight exercises. In Finland, the Science and Technology Policy Council (chaired by the Prime Minister) monitors the emerging technological needs of the economy. In Denmark a new Technology Assessment Council has been created to give advice to parliament and government with special emphasis on initializing public debates on various emerging technologies. In Spain the National Evaluation and Assessment Agency also carries out studies and prospective analyses. In Luxembourg a technology watch initiative is developing by the Ministry of Economy and CRP-Henri Tudor.

### **C.2. Multiannual programming**

Comprehensive multiannual programming at government level, in addition to statutory yearly budgets and finance acts, is a common exercise in several Member States. In most of the following examples the plans outline the overall aims, the budget lines and the institutions concerned.

Examples of annual expenditure plans with almost equal details concerning innovation are those of Trade and Industry by the Cabinet Office in the United Kingdom and of the Ministry of Economic Affairs (BMW), Germany. In Finland a major exercise is performed every five years in order to establish new generations of national technology programmes. In Germany the Bundesbericht Forschung 1996 represents a three-yearly review. Greece is in the middle of the second operational programme for research and technology

(EPET II) (1994-99), while Italy is implementing a third three-year plan for research and innovation (1994-96). In Portugal multiannual financing of the best R&D institutes is part of the new government's programme. In Spain the third national plan for R&D (1996-99) was introduced in June 1995. In accordance with established practice in Sweden, a three-yearly proposal for research is due in September 1996, following a proposal for industry in 1995.

### **C.3. White Papers**

White Papers and national strategies or development plans harness the political authority for further coordination over time and over otherwise separate budget lines. Examples of innovation vary in detail and scope. A national strategy for science and research is being established in Denmark. In Finland a strategy for innovation was published in 1993 and a White Paper entitled 'Industrial policy vision' was published in 1996 and is expected to be followed by a technology strategy. In France the Ministry of Industry has announced a plan for innovation. Ireland and the Netherlands both produced, in 1995, White Papers on the theme of the knowledge society. In 1996 Forfás in Ireland launched a new 15-year strategy document, 'Shaping our future: A strategy for enterprise in Ireland in the 21st century', prepared for the Minister for Enterprise and Employment. Finally, the United Kingdom, from where the terminology of White Papers originates, has made the exercise an annual institution.

### **C.4. New national organizational forms**

Reallocation of government portfolios and departmental responsibilities are another indicator of policy development. The trend in several countries has been to maintain or raise the level at which R&D expenditure is coordinated with other industry relevant budgets.

In Austria the two main ministries are now the Ministry of Science, Transport and the Arts and the Ministry of Economic Affairs. In Belgium the Interministerial Science Policy Conference is the forum for cooperation agreements involving the competencies of federal, regional and community authorities. In Denmark research and information technology has been, since

1994, combined in one ministry and new legislation on the advisory system was passed in 1995 and 1996. In Finland the Science and Technology Policy Council (chaired by the Prime Minister) monitors emerging technological needs of the economy.

In Germany the federal government provides most of its research finance through the reorganized Ministry of Education, Science, Research and Technology (BMBF). By creating, in 1995, the Council for Research, Technology and Innovation under the Federal Chancellor, a platform has been made for directing the dialogue between science, industry, unions and politics towards central questions for the future. In Greece a new Ministry of Development has been created by merging the Ministries of Industry, Trade and Tourism. In Italy the three-yearly plans will be updated annually under guidelines from the Interministerial Committee for Economic Planning; a parliamentary committee is examining a bill that would entrust an external observatory with the evaluation of universities and public research bodies; Agitec, the agency for innovation, has been set up under the initiative of the Minister for Industry.

In Portugal, the new government has stated its aims concerning several issues central to innovation policy (PEDIP II, multiannual financing for the best R&D organizations, the information society, vocational training, and the Institute for Support of Small and Medium Firms and Investment (IAPMEI), for example); important changes have been made in the Ministry of Economy and the Ministry of Science and Technology. In Spain the new government's proposals have carried forward an approach already introduced in the third national plan for R&D (1996-99) since June 1995. In the United Kingdom the Office of Science and Technology (OST) was transferred to the Department of Trade and Industry in 1995.

### **C.5. Directing R&D towards innovation**

A number of characteristic examples of Member States' programmes and instruments to better direct research efforts towards innovation and international competitiveness follow.

In Austria the two main instruments are the Research Promotion Fund (FFF), which, in

1994, shifted its focus to areas such as micro-electronics, environment protection, information technology and software development, and the Innovation and Technology Funds (ITF). In Belgium the university-industry interface structures and the science parks have multiplied during the last 10 years in addition to sectoral joint research centres, jointly financed by the federal government and the regions. In Denmark the government's latest research package has allocated money to strengthen research in universities and approved technological institutes as well as new strategic programmes; THOR (technology by highly oriented research) which is scheduled for 1997 will consist of a limited number of big research grants awarded to excellent scientists for basic research projects with paramount industrial relevance; and a new action plan towards entrepreneurs focuses on the establishment and survival of new enterprises, especially SMEs.

In Finland the abovementioned Finnish technology strategy will act as a guideline for the Technology Development Centre (TEKES) which has a central funding role for both university research and industrial research, as well as for other implementation bodies, for example the Technical Research Centre of Finland (VTT) which is the single largest research institute; both TEKES and VTT have been through a process of evaluation in order to improve effectiveness. In France the Ministry of Industry has announced a plan for innovation with a major shift of its interventions towards the development of key technologies-related issues (ECU 155 million will be devoted to a call for proposals) as well as of the ANVAR schemes. The SME, Trade and Handicraft Ministry has announced the creation of a new public agency (ANVAC) devoted to the development of innovation within the services and trade sectors. The Ministry of Research has among its priorities the labelization of 'centres de ressources technologiques' now existing in six regions. As from 1997, a bonus aid of 5 to 10% will be given to those big companies which will include partnerships with SMEs in their projects. Medical research action lines will be modified to increase mobility between research and clinical activities, and to focus research on medical research and bio-sciences.

In Germany the introduction of model projects (Leitprojekte) will help in an early understanding by researchers and users of how to exploit

the existing R&D potential; and the Ministry of Economic Affairs (BMWi) has, since unification, stepped up its commitments to programmes for R&D personnel, innovation support, and research support in the new *Länder*, for example in the form of *Innovationkollegs* involving different scientific departments and innovative enterprises, each for a period of five years. In Greece the management of existing schemes and the launch of new ones continue to be based on the implementation of the Community Social Funds; a number of programmes require the active participation of enterprises: programme for the development of industrial research (PAVE), research consortia for improving industrial competitiveness (EKVAN), co-financing programme (SYN) and programme of targeted research fellowships (YPER).

In Ireland an additional ECU 5 million allocation for science, technology and innovation programmes was announced in March 1996 whilst the overall government response to the Science, Technology and Innovation Advisory Council (STIAC) report is yet to be finalized; the programmes in advanced technologies (PATs) represent a medium to long-term strategy for the development of a technological infrastructure to serve Irish industry. In Italy the three-year plan for research and innovation 1994-96 considers that the interuniversity consortia which have been successful and offer prospects for a greater efficiency in the use of resources should be categorized as institutions, and gives directions for the CNR (greater integration of its activities with those of other public and private entities), ENEA (since the 1980s diversifying into new technologies, energy and the environment) and research bodies of other ministries; under the Ministry of University and Scientific and Technological Research (MURST) new contracts have been signed in the framework of the national research programmes on technologies for the construction and the protection of buildings, environment, and cardiology.

In the Netherlands the policy initiatives outlined in the White Paper 'Knowledge in action' are being developed, for example: subsidies for project-based cooperation will be given to promote cooperation between businesses themselves and between private sector and research institutes in a range of technology fields. The Cabinet will establish leading technological institutes (Topinstituten). In Portugal the above-

mentioned administrative restructuring aims at more efficiency, including for the two main, EU-supported, incentive programmes PEDIP II and Praxis XXI. In science policy the focus will be on the support to the excellence of research teams, as well as on the training and employment of researchers, instead of physical infrastructure. Industrial innovation policy will include a stronger commitment to encourage intangible investments. In Spain the national programme for the promotion and linking-up of the science-technology-industry system (PACTI) concentrates on and improves existing instruments and creates new mechanisms.

In Sweden 28 competence centres at eight universities started their activities in 1995 with support from the National Board for Industrial and Technological Development (NUTEK) aiming at creating concentrated research environments in which industrial partners participate actively; R&TD consortia for regional development is a temporary five-year programme under which 22 consortia have been launched. In the United Kingdom the major influence of the Foresight programme is seen for example on the S&T priorities of the research councils and government departments: since March 1995, 13 new LINK programmes have been targeted on promising key areas of research relevant to business and will be taken into account when funding universities.

## **C.6. SMEs, innovation-support infrastructures and regional dimension**

Reorganization at government level has been accompanied by restructuring of institutions as well. Intermediary institutions for the support of technology transfer and the cooperation among major research institutions are often organized as private non-profit-making entities outside the public sector. The regional dimension of making this network of intermediaries more efficient and better connected with national initiatives is illustrated in some of the following examples.

In Austria the Austrian Institute for the Promotion of the Economy (WIFI) has developed a comprehensive management consultancy service and the Ministry of Economic Affairs intends to start a firm-to-firm visit scheme; the Austrian Industrial Promotion Fund has

launched an innovative technology transfer programme with 'contact projects' including the possibility of grants or subsidized loans for marketable products; the European Recovery Programme Fund (ERP) has shifted its emphasis from investment promotion to innovation, regional development, infrastructure and internationalization. The Innovation Agency, in addition to other activities mentioned above, is the general secretariat for the Association of Austrian Technology Centres. In Belgium the Flemish Government, for example, fosters the establishing of collaboration clusters among enterprises concerned mainly with R&D and the supply of technological services.

In Denmark the action plan towards entrepreneurs for 1996 and 1997 aims at strengthening the entrepreneurial culture, reducing administrative burdens, improving access to financing of innovation, strengthening and rationalization of the regional advice and support services, and making special efforts to support high-tech and innovative entrepreneurs. In Finland centres of expertise have been established in connection with the best laboratories of universities and research institutes as one of the links between R&D and the regional policy.

In France the new strategy foreseen for ANVAR in the innovation plan will imply a better follow-up of fast growing companies, introduce project evaluation criteria concerning the impact of the projects on growth and employment, reinforce the role of regional delegations, and offer new financing instruments, as already mentioned, for SMEs. Further plans to reorganize the support for the creation of new companies and their survival are expected in the autumn. The regional dimension in national STI policies is strengthened by the ORATE (Observation régionale de l'appui technologique aux entreprises) initiative, taken by the Ministry of Education and Research. This initiative links the innovative growth layer of SMEs with the responsibilities of regional authorities to assure a coherent set of measures. ORATE also focuses on human resource requirements and on the medium-term economic impact within the region of technology diffusion.

In Germany three current programmes of the BMWi will be merged into one federal programme with a considerable increase of funding; programmes under the BMBF for the new *Länder* provide enterprises with support for

labour costs when new scientists or engineers are recruited, give support to small enterprises for the use of external R&D contracts, support key technology fields and support the establishment of new firms. In Greece the decentralized establishment of sectoral technological development companies, science and technology parks and liaison offices is in addition to the Stride-Hellas programme. Programmes for demonstration projects (PEPER) and technology brokerage are being launched. In Ireland, in addition to existing programmes, 37 county enterprise boards have been established to encourage formation of new firms and to assist micro enterprises already in existence to develop; there is a proposal to assist companies to form company networks.

In Italy the rationalization of the technological infrastructure for SMEs is one of the aims in the three-year plan for research and innovation 1994-96. A number of local initiatives (incubators, research laboratories, information society experiments, etc.) have been taken involving local industry, chambers of commerce, universities and regional authorities. In the Netherlands a range of innovation facilities for SMEs and which operate as tax and credit incentives has been mentioned above. Among new projects can be mentioned enterprise houses to improve cooperation between intermediary technology transfer organizations. Also, national instruments for generic technologies have facilities for SMEs.

In Portugal the abovementioned IAPMEI will be more closely involved in providing advice and service to SMEs; the science park Tagus-park has launched so-called anchor projects with the involvement of large R&D institutes, companies and banks; the potential of science and technology parks in the Lisbon area and incubation centres is being studied. One of the three instruments of the technological policy in Spain under the Ministry of Industry is the Institute of the Small and Medium-sized Industrial Enterprises (IMIP).

The 22 new R&TD consortia for regional development in Sweden, mentioned above, are helping SMEs in supported regions to cooperate and to regard institutes, universities and larger companies as resources for competence. Other new instruments are, for example, a pilot programme for technology transfer to SMEs from industrial research institutes which aims at creating longer lasting networks, ALMI

Business Partners which is a government-owned consultancy with 40 offices, and support for trade in technological services between SMEs and public technology providers. In the United Kingdom the Cabinet Office foresees a further increase in the number of 'teaching

company scheme' programmes, as well as the growth of a similar 'college-business partnership', launched early in 1996, and a rapid uptake by companies of the new services from 'design counsellors' which are an addition to the business link scheme.

# Recent White Papers and launch of strategic plans of Member States

## Denmark

'Research in perspective, White Paper on a national research strategy', Ministry of Research and Information Technology, 1995.

'From vision to action, Info-society 2000', Ministry of Research and Information Technology, 1995.

'Erhvervsredegørelse 1995', Ministry of Industry and Business, 1995.

'Open dialogue on Danish research for the future, Research policy 1996 report to the Danish Parliament', Ministry of Research and Information Technology, June 1996.

## Germany

'Bundesbericht Forschung 1996', BMBF, 1996.

'Forschungsleistungsplan 1994 des Bundesministeriums für Wirtschaft', BMWi, 1994.

## Greece

Second operational programme for research and technology (EPET II).

Operational programme for the industry (1994-99).

## Spain

'III Plan Nacional de I+D 1996-1999', CICYT.

'Libro Blanco de la industria: Una política industria para España'.

'Estrategia Tecnología Energética de Largo Alcance (Estela)', Ministry of Industry and Energy, 1995.

## France

'Les 100 technologies clés pour l'industrie française à l'horizon 2000', Direction générale des stratégies industrielles, 1995.

'L'innovation dans les PME', rapport Chabbal, 1995.

## Ireland

'Making knowledge work for us — A strategic view of science, technology and innovation in Ireland', STIAC, 1995.

'Shaping our future: A strategy for enterprise in Ireland in the 21st century', Forfas, May 1996.

## Italy

'Ricerca e innovazione per lo sviluppo, Piano triennale della ricerca 1994-1996', MURST, 1994.

## The Netherlands

'Kennis in beweging, Over kennis en kunde in de Nederlandse economie', EZ, OC&W and LNV, 1995.

'SWAP 2000', EZ, and OC&W, 1996

## Austria

'Technologiepolitisches Konzept der Bundesregierung (draft)', WIFO, Seibersdorf & Joanneum Research, May 1996.

'Informationsoffensive, Bundeskanzler Vranitzky stellte in Alpbach die Weichen für den Informations-Highway', in *Innovativ*, 3/1994, October.

'BMöWV — Informationsgesellschaft — Telekom Initiative Österreich, Grüßworte von Bundesminister Mag. Viktor Klima', from webmaster@iis.joanneum.ac.at (4/7/1995).

## **Portugal**

'Program do XII Governo Constitucional', 1995.

## **Finland**

'Towards an innovative society — A development strategy for Finland', Science and Technology Policy Council of Finland, 1993.

'Finland's way to the information society — The national strategy', Ministry of Finance, 1995.

'National innovation system and employment', Science and Technology Policy Council, November 1995.

'Industrial policy vision', Ministry of Industry, May 1996.

## **Sweden**

'Näringsdepartementet', Regeringens proposition 1994/95:100 Bilaga 13, 1994.

'Åtgärder för att bredda och utveckla användningen av informationsteknik', Regeringens proposition 1995/96:125, 1996.

'Samverkan mellan högskolan och näringslivet', Ministry of Industry, 1996.

'Forskning och pengar', Ministry of Education, 1996.

## **United Kingdom**

'Competitiveness: Forging ahead, White Paper', DTI, 1995.

'Trade and industry 1996, The government's expenditure plans 1996-97 to 1998-99', presented to Parliament by the President of the Board of Trade and Industry, 1996.

'Developing a winning partnership', a report of a joint city/industry working group established by the innovation unit of the DTI.

'Foresight, First progress report', OST, 1996.

'Competitiveness, Creating the enterprise centre of Europe', HMSO, June 1996.

'Forward look of government-funded science, engineering and technology 1996', HMSO.



## Annex 2.3. Statistical tables

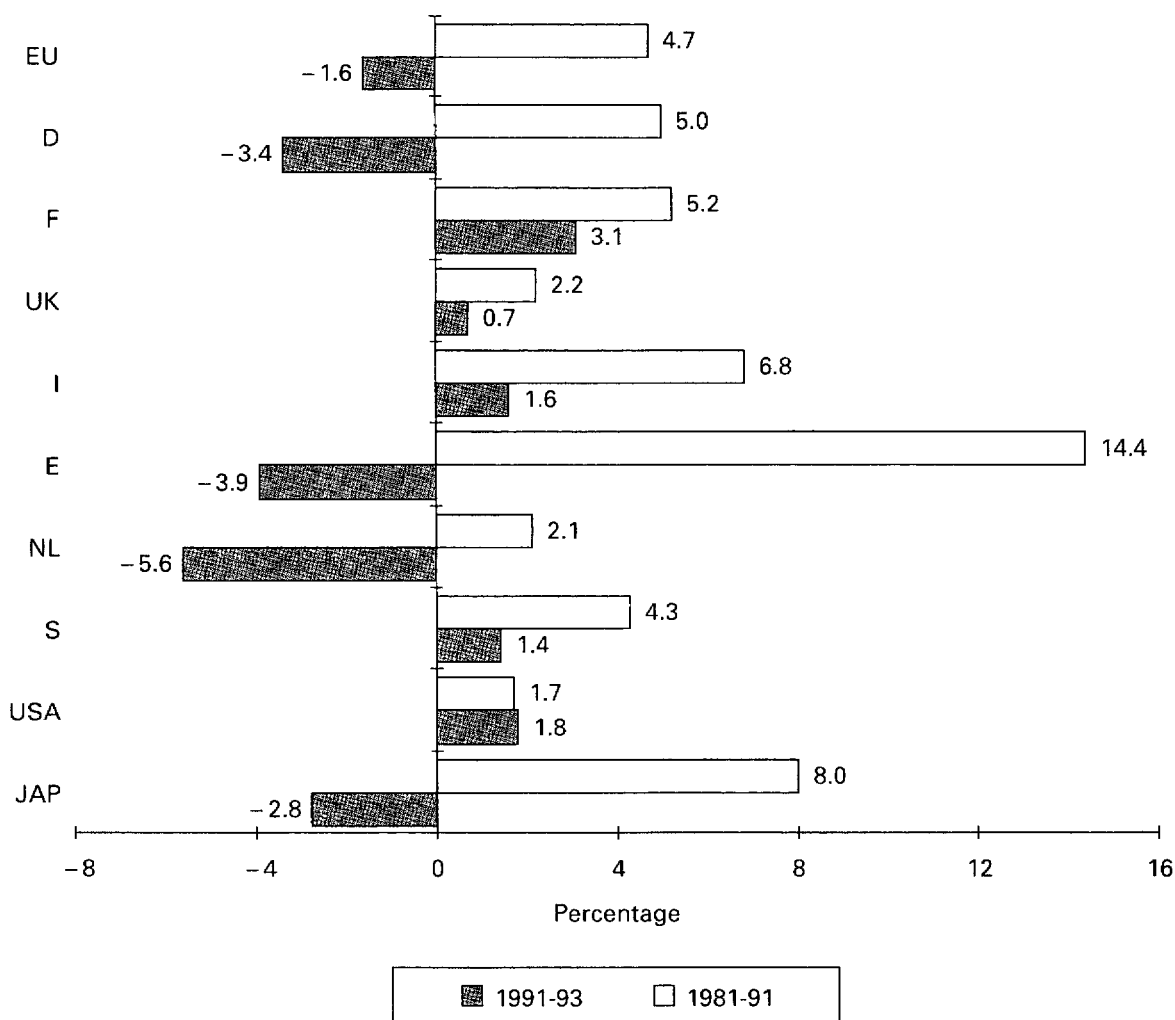
Table 1 — Europe in worldwide research: R&D indicators for the triad

	EUR 15	USA	Japan
Total R&D expenditures (million ECU) 1994	121 882	142 047	104 069
Total R&D expenditures as % of GDP 1995	1.91	2.45	2.95
Total R&D expenditures per inhabitant (ECU) 1994	329	545	833
% of total R&D expenditures financed by governments 1993	39.6	39.2	19.7
% of total R&D expenditures financed by industry 1993	53.5	58.7	73.4
Number of researchers 1993	774 071	962 700	526 501
Number of researchers per 1 000 employed 1993	4.7	7.4	8.0
Number of researchers in industry 1993	376 000	765 000	367 000
Number of researchers per 1 000 employed in industry 1993	2	6	6

Source: European Commission, DG XII from OECD data.

Table 2 — Recent trends for R&D undertaken by firms

(US prices 1987, billion ECU, average annual growth rates)



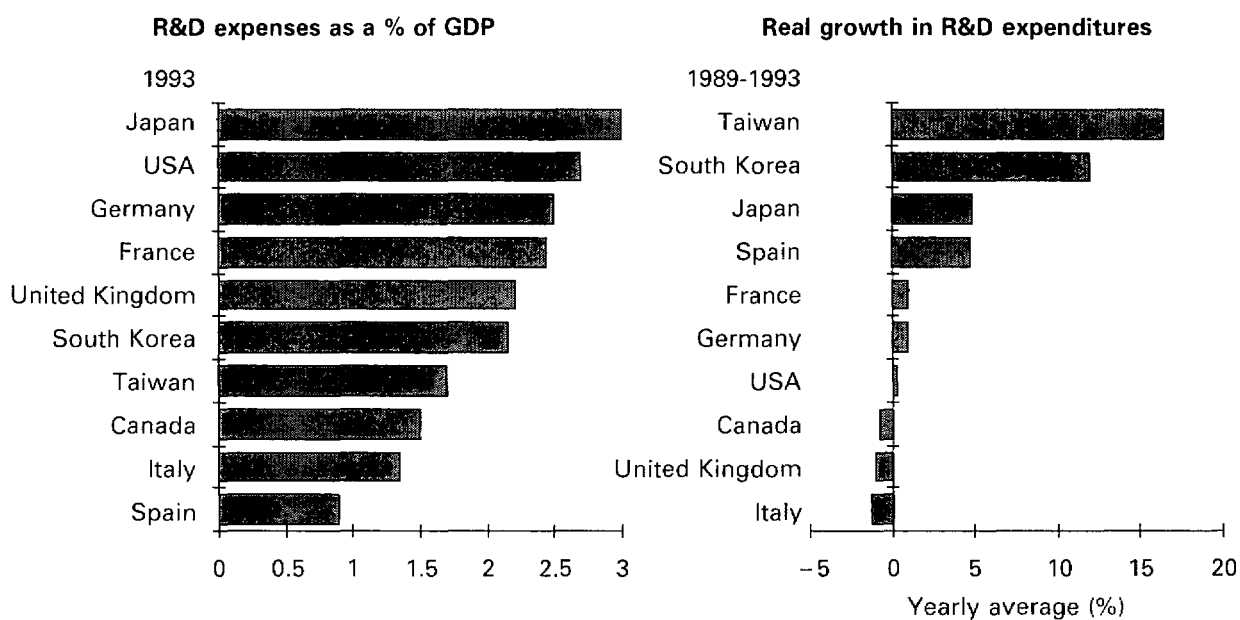
Sources: MERIT, data: OECD, Eurostat, IMF, UNIDO and Unesco.

*Table 3 — Positions of the triad by technological area, measured in patents, 1993*

Europe	Share (%) of European patents in the world			Share (%) of US patents in the world		
	EU	USA	Japan	EU	USA	Japan
Electronics/electricity	34.2	30.0	31.8	11.5	46.7	35.4
Instruments/optics	37.8	32.4	23.4	14.9	50.8	28.0
Chemicals/pharmaceutical products	40.3	33.7	20.0	28.2	51.0	19.7
Industrial processes	50.1	25.6	16.6	22.3	50.5	19.3
Mechanical engineering/transport	58.5	19.2	15.5	23.6	45.4	22.5
Consumer goods	64.0	16.9	8.0	19.1	50.1	12.5
All areas	46.4	27.3	20.9	16.6	48.7	25.0

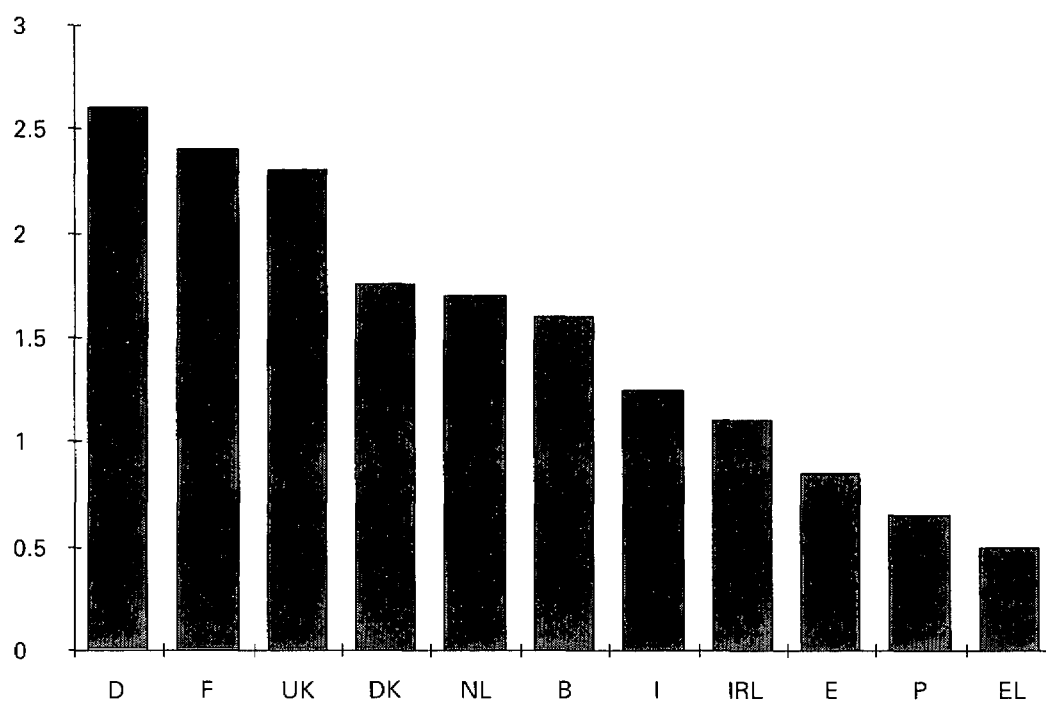
Source: USPTO; data: treatments STO and CHI-Research, 1995. Unesco report on science in the world.

*Table 4 — R&D expenditures (as a % of GDP) and their evolution for selected countries*



Source: Worldwide report on competitiveness, world economic forum, IMD.

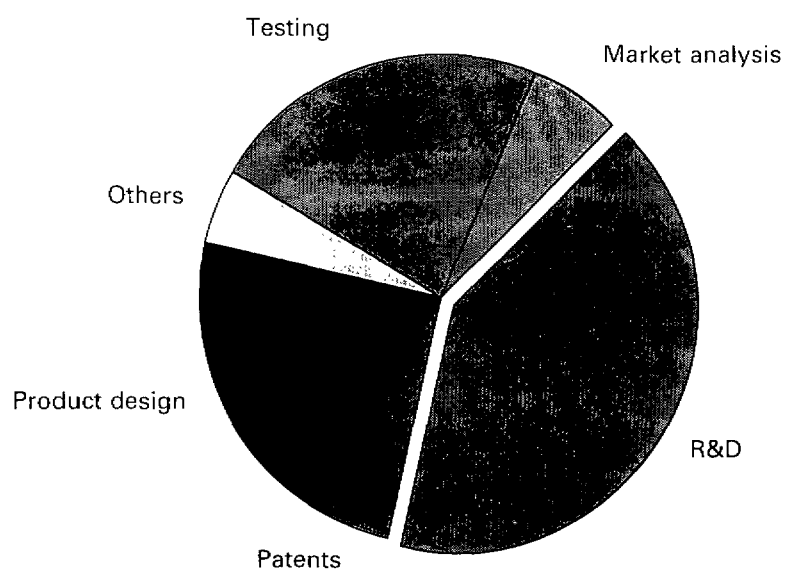
Table 5 — Gross domestic R&D expenditures as % of GNP by Member State



NB: Reference years: 1991 (B), 1992 (D, F, IRL, P), 1993 (DK, EL, E, I, NL, UK).

Source: Eurostat, research and development, annual statistics 1995.

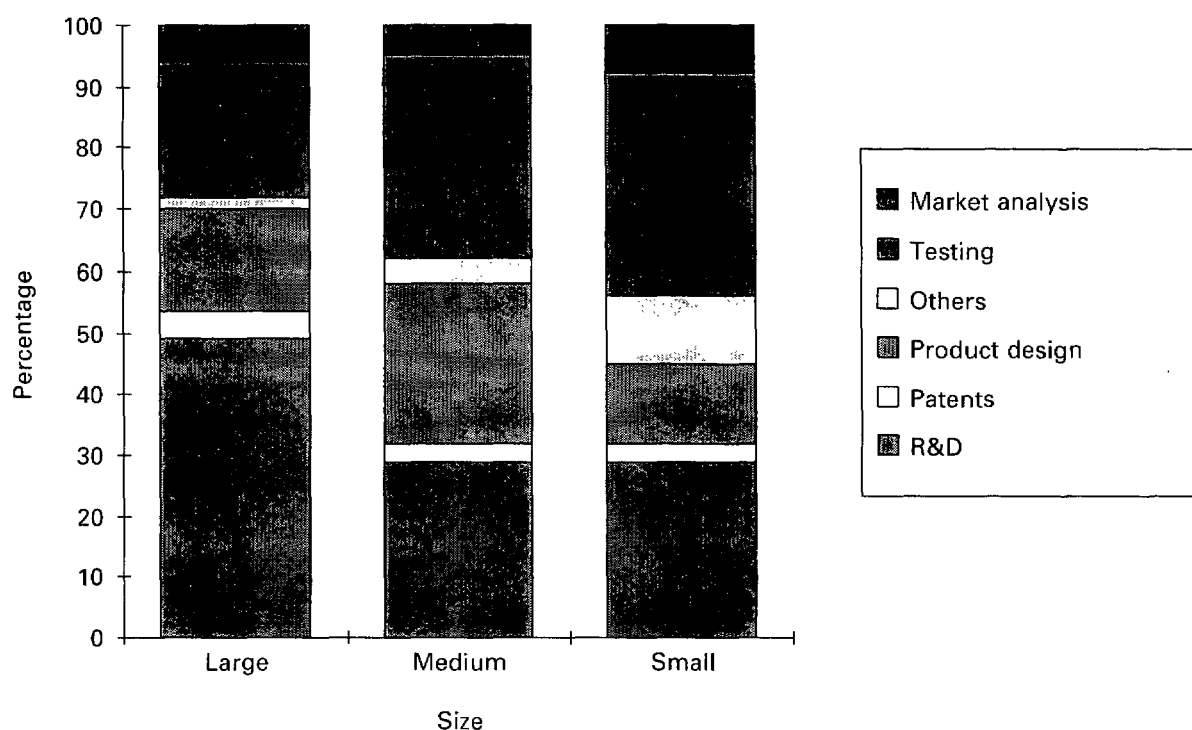
Table 6 — Distribution of innovation expenses in 1992 in some Member States<sup>1</sup>



<sup>1</sup> In 1992, in the 12 Member States of that time except Greece, France, Portugal and the United Kingdom.

Source: CIS, preliminary results.

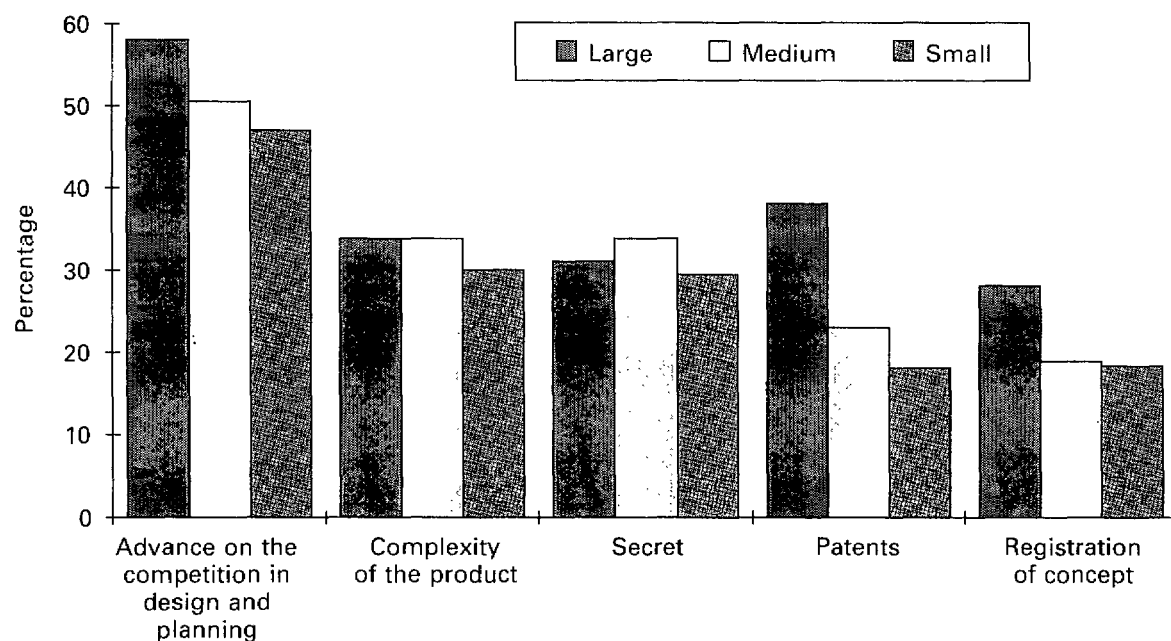
Table 7 — Distribution of innovation expenses in 1992 in some Member States<sup>1</sup>  
by firm size



<sup>1</sup> In 1992 in the 12 Member States of that time, except Greece, Portugal, United Kingdom and France. For Germany, only data relative to large firms are known.

Source: CIS, preliminary results.

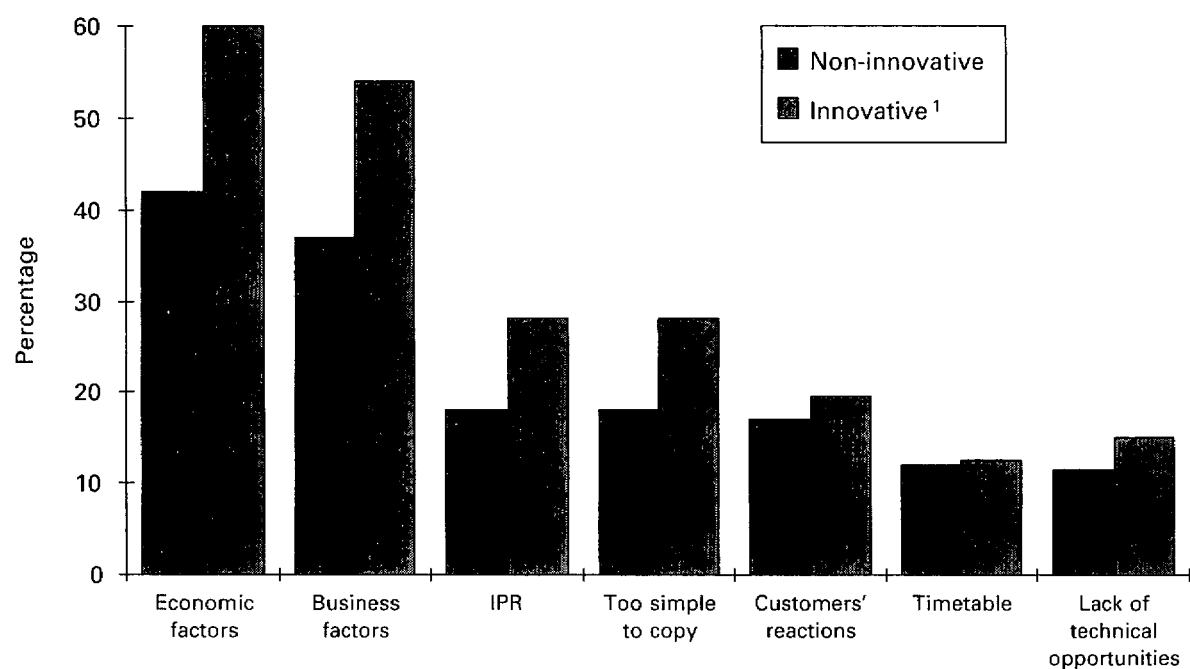
Table 8 — Ways of keeping up competitiveness in terms of product innovation  
in some Member States<sup>1</sup> by firm size



<sup>1</sup> In 1992 in the 12 Member States of that time, except Spain, France, Italy, Greece, Portugal and United Kingdom.

Source: CIS, preliminary results.

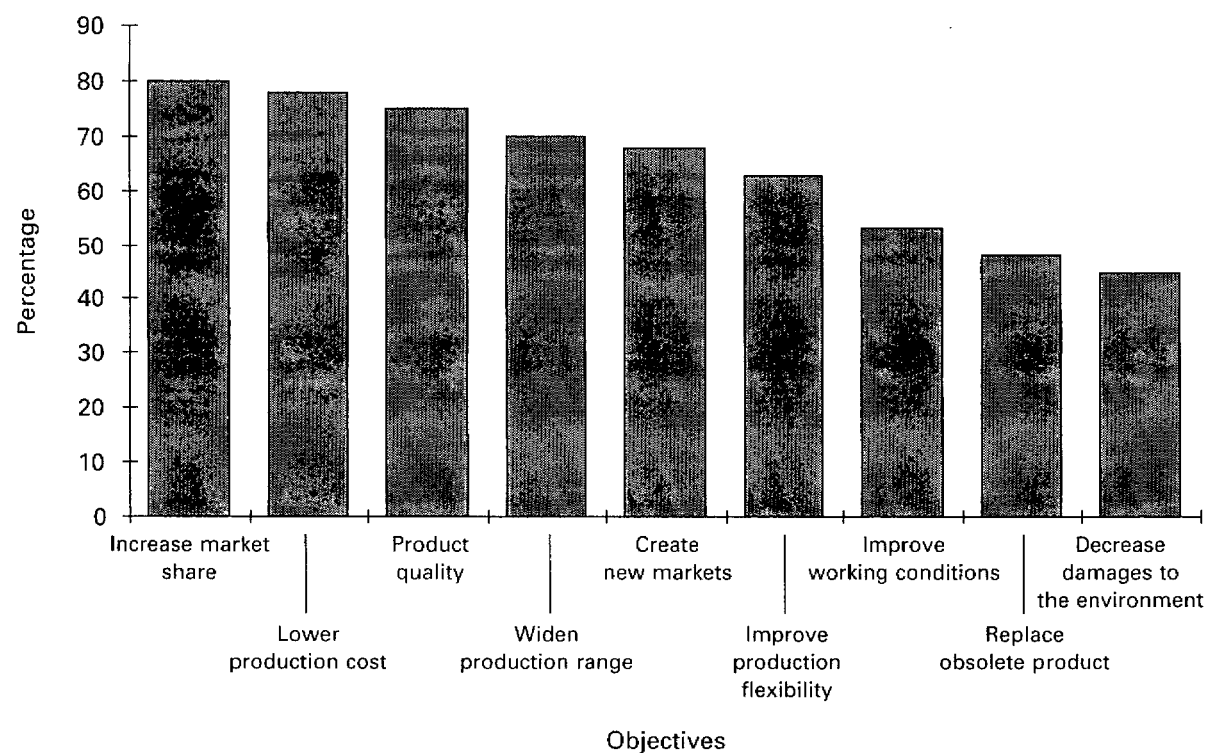
Table 9 — Importance of factors hampering innovation



<sup>1</sup> Companies having undertaken product or process innovation during the period 1990-92.

Source: Eurostat (CIS), preliminary results.

Table 10 — Importance of the objectives of innovation<sup>1</sup>



<sup>1</sup> Percentage of firms considering these factors as very important or essential (reference years: 1990-92).

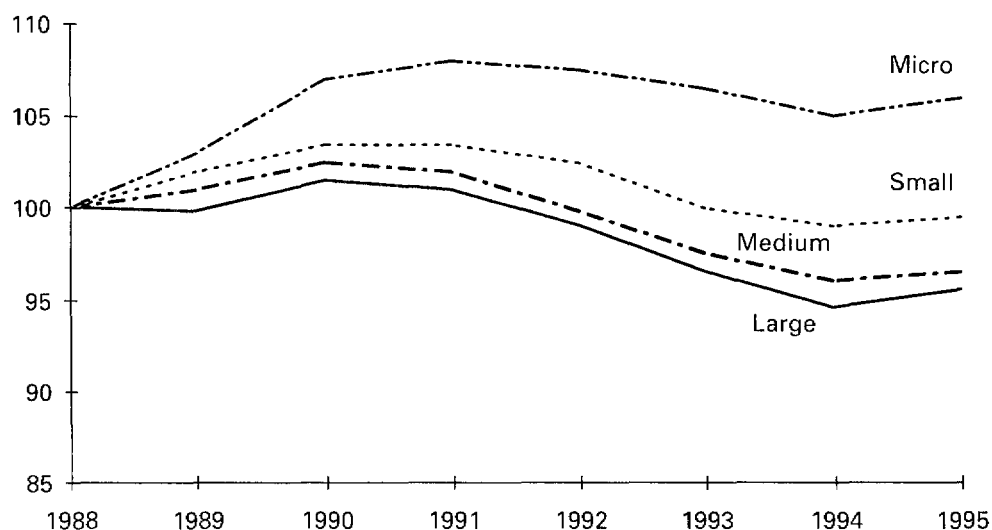
Source: CIS, preliminary results.

*Table 11* — Significant correlation coefficients between employment, product innovation and process innovation average growth rates in various European countries (1970-92)

Year	Product innovation				Process innovation			
	1970-90	1980-90	1989-92	1991-92	1970-90	1980-90	1989-92	1991-92
Belgium	+	+	+	0	+	+	+	0
Denmark	+	+	+	0	+	+	+	0
France	+	+	+	+	+	+	+	+
Germany	+	+	0	0	+	+	0	0
Italy	+	-	-	-	+	-	-	-
Netherlands	+	+	0	-	+	+	-	0
Spain	+	+	+	0	+	+	+	0
United Kingdom	+	+	+	+	+	+	+	+
Norway	+	+	0	0	+	0	0	0

Source: EIMS, 'Innovation and employment in Europe', CIS data, Licht, 1995.

*Table 12* — Changes in employment in micro-firms and small, medium-sized and large firms, EUR 15, 1988-95, 1988 = 100



Source: 'Research and studies on small firms', EIM, Vol. A, No 11/12, November 1994.

Table 13 — Company registration per country 1988-93, 1988 = 100

	1988	1989	1990	1991	1992	1993	Change in %
Belgium	100	100	95	93	97	n/a	-3
Denmark	100	117	117	143	131	n/a	+31
Germany 1	100	103	114	120	122	125	+25
Germany 2	n/a	n/a	100	110	102	101	+1
Greece	100	84	70	62	69	76	-24
Spain	n/a	100	99	107	118	n/a	+18
France	100	101	99	91	90	90	-10
Italy	100	95	94	114	103	97	-3
Ireland	100	99	98	n/a	n/a	n/a	-2
Luxembourg	100	130	137	140	149	159	+59
Netherlands	100	109	112	121	135	n/a	+35
Austria	100	115	83	79	91	102	+2
Portugal	100	112	125	119	146	141	+41
Finland	100	108	95	88	92	96	-4
Sweden	100	99	117	101	84	94	-6
United Kingdom	100	109	109	91	75	67	-33
Norway	100	n/a	76	n/a	52	n/a	-48
Median value	100	103	99	107	99.5	99	-1

NB: Germany 1 refers to the former West Germany, Germany 2 to united Germany.

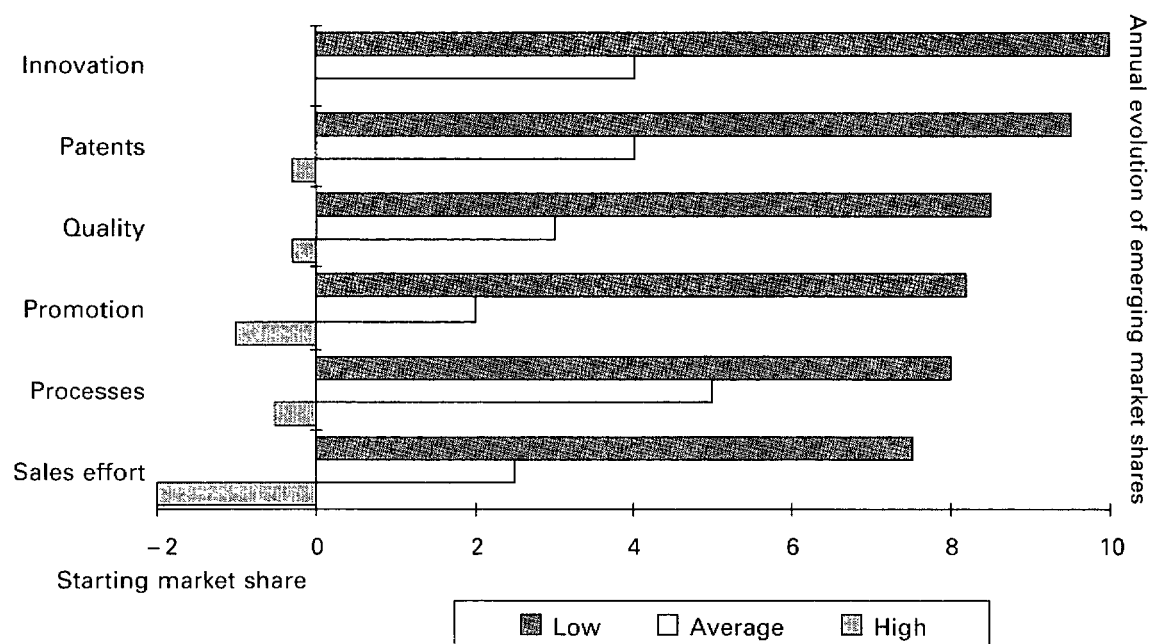
Sources:	Belgium	National Statistical Office
	Denmark	Danish Statistical Office
	Germany	IFM, Bonn
	Greece	National Statistical Office of Greece
	Spain	Office of Industry Registration and IKEI estimates
	France	INSEE, Sirene file, 1994, ANCE
	Italy	Movimprese data bank
	Ireland	Inventory of Industrial Production 1987-90
	Luxembourg	Company register
	Netherlands	Van der Hoeven, WHM and WHJ Verhoeven, 'Creatie en teloorgang van arbeidsplaatsen, 'Studies and research on small firms', EIM, 1994
	Austria	IFG data bank, Vienna
	Portugal	INE — Monetary and financial statistics
	Finland	Finnish statistics, company register
	Sweden	Swedish statistics
	United Kingdom	Estimate of company birth, National Westminster Bank
	Norway	Central Statistical Office

Table 14 — Impact of innovation on employment. The case of Italy

	Employment growth rates					
	Innovative companies			Non-innovative companies		
Size	Employment growth 1992	Productivity growth	Export share 1992	Employment growth 1992	Productivity growth	Export share 1992
20-199	1.07	1.12	73.0	1.03	1.03	59.0
200-499	1.01	1.14	81.3	0.98	0.95	64.5
500+	0.98	1.10	98.3	0.94	0.86	68.1

Source: EIMS, 'Impact of innovation on employment in Italy. Analysis from CIS data', 1995.

Table 15 — Intangible factors and competitiveness

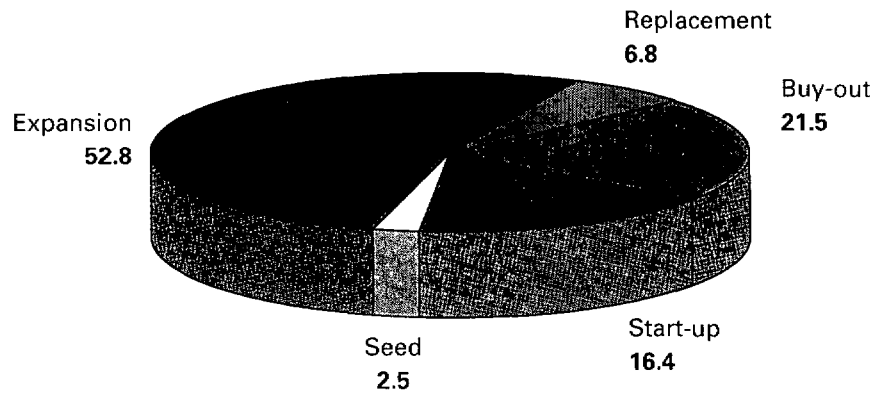


Source: PIMS 1994. PIMS (profile impact of market strategy) pioneered by General Electric and further developed at Harvard. PIMS Associates Ltd (USA) and selected academic partners including the Irish Management Institute are responsible for PIMS data-gathering research and consulting. Analysis carried out for units within large companies in Northern America (mainly the United States) and in Europe (50% in the United Kingdom).



*Table 16 — Venture capital*

Distribution of stages in percentage of investments in Europe in 1995<sup>1</sup>

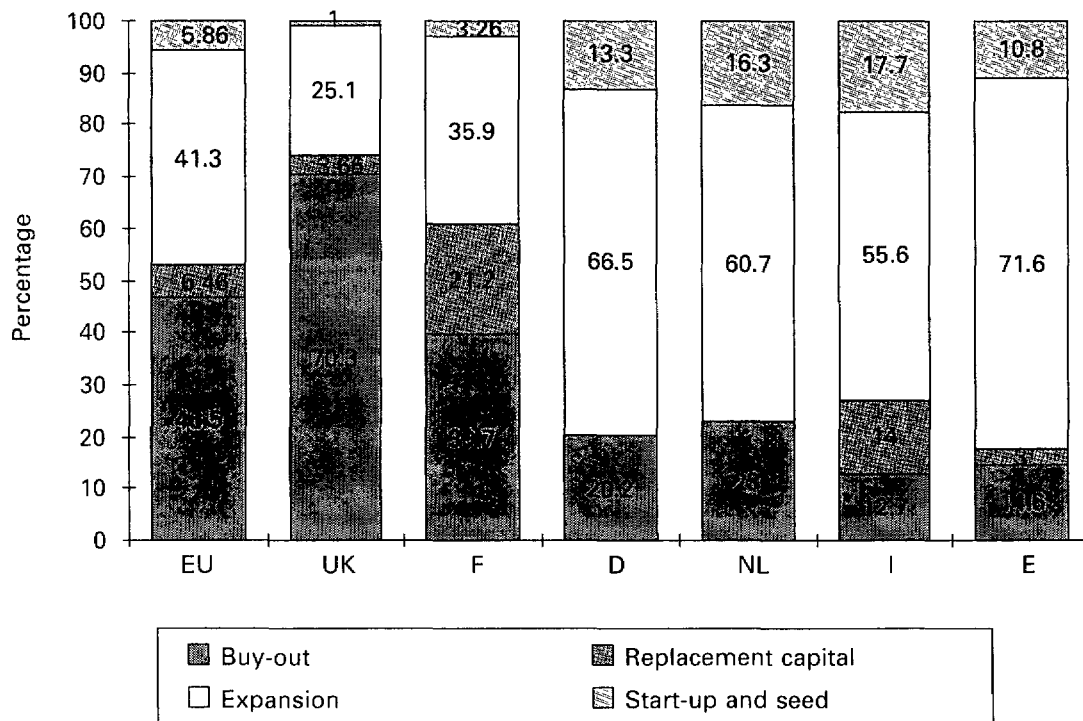


<sup>1</sup> The 15 European Member States except Luxembourg, plus Norway, Switzerland and Iceland.

Source: EVCA, Ernst & Young.

*Table 17 — Venture capital*

Distribution on investments in 1995 by invested amount



Source: EVCA, Ernst & Young.

Table 18 — Investments in venture capital in Europe and the United States (1995)

1995	USA <sup>1</sup>			EU <sup>2</sup>		
	1 000 ECU	%	#	1 000 ECU	%	#
<b>Total investments</b>	5 748 000	+50 *	1 100 **	5 546 000	+2	4 955
<b>Investments per stage</b>						
Seed and start-up	1 476 000	26	445	321 000	5.7	939
Development	3 340 000	58		2 299 000	41	
Leveraged buy-out	932 000	16		2 926 000	53	
<b>Investments per sector</b>						
Information technology	2 641 000	46		902 000	16	
Life sciences	1 398 000	24		422 000	8	
Non-technology	1 709 000	30		4 222 000	76	
<b>Average size of seed capital</b>	932			280		

<sup>1</sup> Source: VentureOne (American Company).

<sup>2</sup> EVCA.

\* 50% increase in the number of investments (1994-95 period).

\*\* 1 100 investments in the United States in 1995.

Table 19 — Taxes and social contributions in Europe as a percentage of GDP (1993)

Country	Taxes and social contributions % of GDP
Belgium	44.5
Denmark	49.0
Germany	41.4
Spain	35.9 <sup>1</sup>
France	43.2
Ireland	35.8 <sup>1</sup>
Italy	42.3
Luxembourg	43.2
Netherlands	47.6
Austria	43.7
Portugal	33.0 <sup>2</sup>
Finland	45.9
Sweden	50.6
United Kingdom	32.2
Norway	47.5

<sup>1</sup> 1992.

<sup>2</sup> 1991.

Source: Eurostat, 'Taxes and social contributions' 1982-93.

European Commission

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