Innovation & Technology Transfer

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Special Issue

European Commission launches Green Paper on Innovation

inside

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INTERVIEW

GREEN PAPER: A SUMMARY

Taking the pulse of innovation

Green Papers are intended to prime a debate, out of which will emerge a plan of action.

This is why the Green Paper on Innovation, adopted by the European Commission on 20 December, is so important. It analyses in detail the climate for innovation in Europe, concludes that improvement is essential, and presents a comprehensive set of proposals. The Commission is inviting reactions to both the analysis and the proposals.

This special issue of *Innovation & Technology Transfer* kicks off with an interview with Edith Cresson, Member of the Commission for research, education and human resources, who introduces the Green Paper.

The rest is devoted to a detailed digest. It follows the Green Paper's structure, with chapters on the challenge of innovation for Europeans, on the state-of-play for innovation in Europe today, and on 'innovation in a strait-jacket' - the handicaps and obstacles to innovation.

The final chapter summarises the proposals.

The promotion of innovation is a multi-faceted endeavour. The Green Paper has things to say to people working in a wide variety of areas. The special issue can, however, only provide a flavour of the contents. This is particularly so as regards the proposals - only a selection can be presented here.

Readers who are encouraged by this digest and want to know more are urged to read the Green Paper itself. Details of how to obtain copies are given on pages 6 and 24. ■

ABOUT INNOVATION & TECHNOLOGY TRANSFER

Innovation & Technology Transfer is published six times a year in English, French and German by the European Commission's Innovation Programme, which aims to strengthen Europe's innovation infrastructure and disseminate research results to industry.
The emphasis is on timely news relevant to these objectives and in-depth 'Case Studies' of successful projects. Each issue also includes a major Dossier on one topic. Subscription is free - please fill out the request form on the back page and fax or post it back to DG XIII/D-2.

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Towards a European innovation policy - the debate begins

Innovation financing, intellectual property rights, administrative complexities and a dispersed research effort are critical areas to be tackled by a European innovation policy, according to Edith Cresson, Member of the Commission responsible for research, education and human resources. In this interview, Mrs Cresson discusses the Green Paper on Innovation, launched in cooperation with Commissioner Bangemann, Member for industry and information and telecommunications technologies.

Speaking in this interview: Edith Cresson, Member of the Commission responsible for research, education and human resources.

■ What is the basic purpose of the Green Paper?

The purpose is to foster a debate on innovation in Europe. What are the factors that encourage - and discourage - innovation in Europe? Following on from that, what can be done in practical terms to make the European Union a place where innovation flourishes, to the benefit of all our citizens?

This debate is vitally important. There is no doubt that in terms of scientific achievement Europe is among the leaders. In some areas we clearly are the leaders. But when it comes to commercial performance, in many high-technology sectors our position has deteriorated and continues to do so. This is what is sometimes called the 'European paradox' - we are good at research but not at transforming these skills into a competitive advantage. And I am afraid that unless we act now, this situation will get worse. Only 2% of European GDP is being spent on research, while in the United States and Japan the figure is 2.7%. This represents a difference between Europe and the United States of more than 40 billion ECU per year. The gap is not getting any smaller either. So not only are we comparatively weak at making use of research, but we are putting proportionally less effort into research to start with.

But I would like to stress that the Green Paper is not limited just to high technology products. Innovation can also mean new services, new methods of production and distribution, new management techniques and ways of organising work. It is the generation of new ideas, followed by their assimilation and successful exploitation in the economic and social sphere generally.

The Club Méditerranée is a good example of an innovative concept that did not depend on technology, unless you count the progress in aviation that makes it easier for people to reach the Club's resorts.

■ What do you see as the main obstacles to innovation in Europe?

I see four main obstacles. Firstly, the financing of ●●●

The Green Paper was launched in cooperation with Martin Bangemann, Member of the Commission responsible for industry and information and telecommunications technologies.

●●● innovation is the obstacle most often cited by firms. We don't have the financial mechanisms to fulfil the needs of innovative 'growth firms', at least not to the extent of our rivals. For example, although we have seen strong growth in the availability of venture capital in the past decade, the share of it going to high-technology investment has dropped from 34% of investments in 1985 to 10% in 1994. The lack of a stock market specialising in high-tech companies, like NASDAQ in the United States, is an instance of a serious problem which needs to be tackled.

Secondly, the protection of innovation is made less use of here than in our main competitors. It is more costly, and not as well understood, especially by smaller companies.

Thirdly, the administrative environment is more complicated here than it need be. It costs European firms money. Even more important, especially in young SMEs, it takes up precious time that could be much better spent on being first on the market. Just one example - depending on which Member State you are in, it can take more than 20 separate formalities, and more than 300 days, to set up a new company, whereas in the United States one day can be sufficient.

Finally, there is Europe's insufficient research effort. This is also reflected in the lower number of R&D scientists and engineers in the workforce - 4.5 per thousand in the EU compared with 7.6 in the United States and 8 in Japan. Research in Europe is also more dispersed, less coordinated. From the point of view of encouraging commercial performance, we tend to stress fundamental research at the expense of research that helps us put new products on the market.

■ How does this Green Paper relate to other recent initiatives from your portfolio - the Task Forces and the White Paper on Education?

They are closely related. I have mentioned the handicap that Europe is devoting less of its GDP to research than its main rivals. In the current economic climate we cannot be optimistic that this situation is likely to change in the near future. All the more important and urgent, then, that research funds are well spent. Instead the European effort is fragmented. I am afraid that we are wasting resources by spreading them too thinly over too many fields. This is why, together with my colleagues Commissioners Bangemann and Kinnock, I introduced the Task Forces. Their aim is to strengthen cooperation and coordination between research and industry, and to target our research efforts more precisely.

Education and training are obviously critical if we want to instil the spirit of creativity and enterprise into our culture. One of the starting points in the education White Paper is that know-how will become increasingly important for both the individual's employability and for an enterprise's competitiveness. The link with innovation is clear. The White Paper includes recommendations aimed at lifelong learning, vocational training, and for better links between schools and the workplace. In it we also urge the Member States to give equally favourable tax treatment to investment in training as to tangible investment in buildings, machinery, etc. These factors are important in the innovation context too. For instance, in the innovation Green Paper we are proposing actions to develop training and to foster the mobility of students and researchers.

■ What are the relative roles at the national level and at the European Community level?

The Green Paper puts forward for debate about 130 possible action lines classed into thirteen areas. Some of these actions are best done at Community level, for example because they involve exchange of experience or dissemination of good practice. The choice of the appropriate level is critical, bearing in mind the subsidiarity principle. The regional level is often very important because it is at this level that firms can more easily form links in order to pool their strengths. In many places the Green Paper suggests the level - local, regional, national or Community - which seems to us to be appropriate for each action. The debate will then help clarify what level is right for each action line.

■ What about cost? How much public funding will the proposals involve?

The question at this time is not so much what they will cost. The trend in the EU is towards reducing public expenditure, in line with the EMU criteria. At the moment we are not proposing an overall increase in public expenditure. Rather we are seeking a redirection of present efforts. We should aim to make more efficient use of current spending. This applies both to the measures at region-

al and national level, and actions to be undertaken at Community level. Beyond that, we will have to see what comes out of the debate.

■ Does Europe have enough risk-takers, and if not, what can the public sector really do about it?

Certainly innovation ultimately depends on individuals themselves, and their enterprises. This is where the innovative spark must come from in the first place. I don't doubt that the creative spark is present in Europe. There are plenty of examples of innovations which arose here and became world successes - the laser disc and the smart card to cite just two famous examples. What the authorities must do is to provide an environment where the spark can, as it were, catch light, and to remove any obstacles that can dampen the flame.

Let me give some examples of what the authorities could do to help, firstly individuals and secondly their enterprises.

More mobility between professions, between research institutes and enterprises and so on, would encourage innovation. But in Europe the practical problems of moving house or transferring from one tax or social security regime to another can be complicated for individuals. Mobility is hindered. This is an area where the public sector could act.

I have already mentioned training, where our proposals again impinge directly on the individual. We would also like to see the public more aware of the benefits that innovation, and innovators, bring to society. We suggest that there should be some form of European prizes or distinctions awarded to creative individuals, to recognise this.

At the level of the enterprise, we are stressing measures to help SMEs. They account for 66% of jobs and 65% of turnover in the European Union. Since 1988 net job creation in SMEs has outpaced job losses in large companies. But all is not well in the SME sector. SMEs often suffer from financing difficulties and insufficient management capacity. Often the head of the firm is alone in taking on all the management functions. The protection of industrial and intellectual property rights is an example of an area where we are proposing measures to help SMEs - helping them with patenting and making it easier to take action against counterfeiting and infringements.

Improving the financing of innovation is a top priority. The Green Paper puts forward a series of measures at national and Community level for discussion, including the creation of stock markets for 'growth enterprises'. Possibly these markets should be pan-European.

We should also look at tax measures that favour innovation, especially for the SMEs. This is a sensitive area, though, where we have to bear in mind the need to keep public expenditure under control. Obviously it's the Member States' responsibility to devise strategies in the tax and social security areas. The Green Paper sets out a number of possibilities, and proposes that to begin with there should be an exchange of information and in-depth study of them.

■ What do you expect to do in the short-term at European level?

The preparation of the Fifth Framework Programme begins this year, and will take innovation fully into account. This will be done by making the programme more focused - reducing the number of our priorities - and by putting more weight on criteria such as impact on employment and on the daily life of citizens of the Union, in addition to scientific excellence. On top of that, we will continue to develop the work of the Task Forces and look at ways of getting SMEs more involved.

I also want to go further in simplifying the Commission's own administrative procedures. The administrative load is a brake on innovation, as I have mentioned. I intend to tackle this problem where it exists on our own doorstep, by streamlining the procedures for access to European research programmes. This is one of my personal priorities for 1996.

I would like to add that one of the Green Paper's areas for action is the development of technology foresight and monitoring. The European Commission's Institute for Prospective Technological Studies was recently set up in Seville exactly for this purpose.

■ What happens next?

Let me answer that by going back to the beginning. Commissioner Bangemann and I launched the Green Paper as the starting point for a wide debate across the European Union, involving everyone with something to say on innovation. It affects researchers, enterprises, workers and employees, investors, economists, governments, and so on.

We also want to put innovation higher up the political agenda. The Green Paper will help do this. It will also make the public more aware of the importance of innovation to their future.

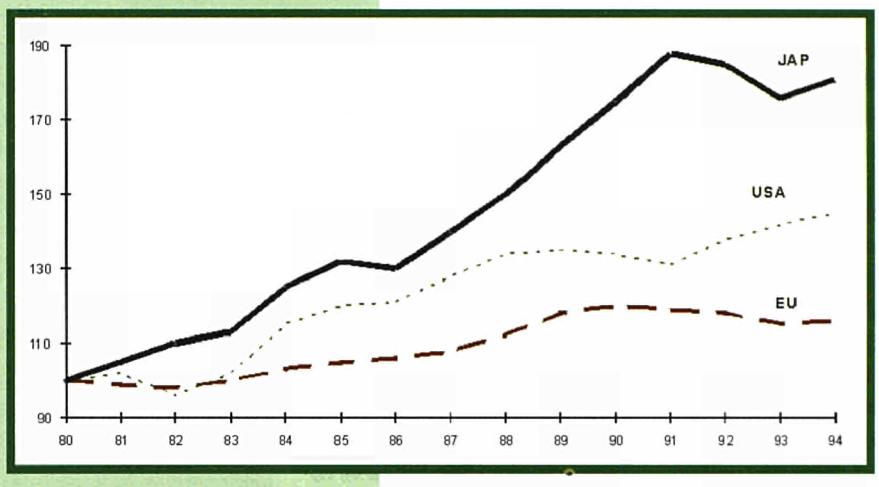
I hope it will be possible to organise a series of seminars or conferences in the Member States to help provide a forum for discussion.

In any case, the Commission invites and welcomes opinions from all interested parties. We want to know what you think of our analysis of innovation - what hinders it and what fuels it - and of the measures which we propose.

At the end of the consultation period we will draw up a synthesis report, together with an Action Plan. This will be submitted to the other European institutions. With the benefit of your opinions and contributions, at that stage we will know where the most important challenges are. We will also know the ways and means to tackle them most effectively, and what the appropriate level should be in each case - the region, Member State, or Community. ▭

Keeping Up With Our

The European Commission's new Green Paper on innovation concludes that Europe needs to take decisive action to avoid falling further behind the USA and Japan. The next 18 pages explain why and provide a detailed summary of the Green Paper.



Output in manufacturing, 1980=100 (gross value added at 1985 prices)
Source: European Commission

Innovation in Europe is marking time. There are not enough new businesses, not enough openness and co-operation - both within and between organisations - and widespread reluctance to seek information.

Costly research is under-used, there is too much bureaucracy, and engineers and technologists are seen as poor relations of "real" scientists. Something needs to be done.

So why is innovation important? In the context of the Green Paper innovation is the successful production, assimilation and exploitation of novelty in the economic and social spheres. It points firms towards ambitious long-term objectives, it leads to the renewal of industrial structures and it is behind the emergence of new sectors of economic activity.

In concrete terms this means new vaccines and medicines, safer cars (anti-lock brakes and airbags), easier communications (mobile phones and video-conferencing), more open access to know-how (CD-ROM and the Internet), new marketing methods (home banking), better working conditions, more environment-friendly techniques and more efficient public services.

In brief, innovation means the renewal and enlargement of the range of products and services; the establishment of new methods of production, supply and distribution; and changes in management, working conditions and skills among the workforce.

Getting the Green Paper

The Green Paper on Innovation was approved by the Commission on December 20, 1995. The Commission is inviting comments until 10 May 1996. For a copy of the Green Paper, contact (specifying required language):

Directorate XIII/D - European Commission
Jean Monnet Building, B4/099
L-2920 Luxembourg
E-mail :fabienne.lhuire@dg13.cec.be
WWW: http://www.cordis.lu/grnpaper. htm

After the consultation period the Commission will draw up a report on the comments received and an action plan.

Money, Co-operation and Application

"In the Commission's opinion, Europe's research and industrial base suffers from a series of weaknesses. The first of these weaknesses is financial. The Community invests proportionately less than its competitors in research and technological development... . A second weakness is the lack of co-ordination at various levels of the research and technological development activities, programmes and strategies in Europe. ... The greatest weakness, however, is the comparatively limited capacity to convert scientific breakthroughs and technological achievements into industrial and commercial successes."

(White Paper *Growth, Competitiveness, Employment. The Challenges and Ways Forward into the 21st Century*, Chapter 4, European Commission, 1994).

Global Neighbours

Innovative Firms, Innovative Environments

Innovative firms have two main groups of skills: strategic and organisational. Strategic skills include the ability to take a long-term view, to identify and even anticipate market trends; and the ability to collect, process and assimilate technological and economic information.

Organisational skills include a taste for risk and the knowledge of how to handle it; knowing how to achieve co-operation, both within and outside the company; and the ability to involve everyone in the process of change.

Research, development and the use of new technologies - in a word, the technological factor - are key elements in innovation, but they are not the only ones. To use technology effectively the firm must also adapt its methods of production, management and distribution. Human resources are thus just as important as technology, and indeed studies show that a better-educated, better-trained and better-informed workforce helps to strengthen innovation.

Neither is there a hermetic seal between the innovative firm and its environment. It is the sum of all the firms in an industry, plus the fabric of economic and social activities in a region - or even in society as a whole - that makes up the complex "innovation system". The quality of the educational system, the regulatory, legislative and fiscal framework, the competitive environment and the firm's partners, the legislation on patents and intellectual property, and the public infrastructure for research and innovation support services, can all impede or promote innovation.

Innovation: Process or Product?

"Innovation" has two meanings. The first is concrete - a new product such as a vaccine or a banking service. The second, abstract, meaning denotes a process - the combination of creativity, technology and marketing that leads to new or improved products.

It is this second meaning that best expresses the desirability of innovation in all aspects of business life. Innovation certainly includes technology, but thinking of innovation as a process emphasises that it can be just as important to take account of changes in public tastes or the general business climate.

Many innovations are not primarily based on new technology but stem instead from new combinations of familiar elements. Examples are video recorders, mountain bikes, sailboards and personal stereos.

Innovation and Public Action

The Commission has identified - first in the White Paper on Growth, Competitiveness and Employment, and then in its 1994 communication on *An Industrial Competitiveness Policy for the European Union* - that firms' capacity for innovation, and support for innovation from the authorities, are essential for maintaining and strengthening competitiveness and employment.

The new Green Paper makes use of, adds to and extends that work with a view to arriving at a genuine European strategy for promoting innovation. While respecting the principle of subsidiarity, it proposes measures to be taken at both national and Community levels.

Strengthening the capacity for innovation involves policies relating to industry, RTD, education and training, tax, competition, support for regions and SMEs, and the environment.

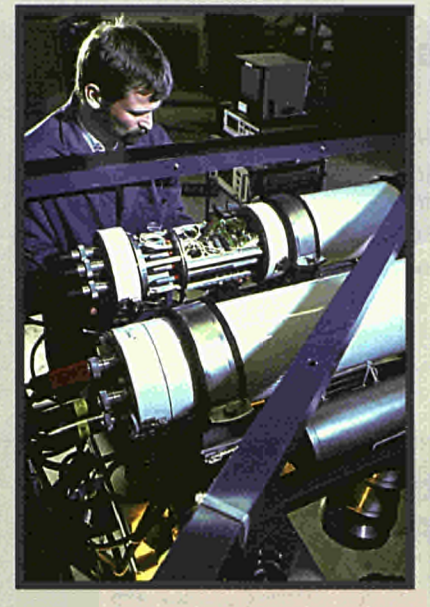
To do this successfully the authorities must establish a common strategy. This is a matter of ongoing monitoring and consciousness-raising. The Green Paper contributes to these objectives through the debate which it aims to encourage amongst the economic and social, public and private players.

It touches upon the following:

- the challenges of innovation for Europe, its citizens, its workers and its firms, against a background of globalisation and rapid technological changes;
- a review of the situation of innovation policies and the many obstacles to innovation;

Its proposals aim to remove these obstacles and contribute to a more dynamic European society that is a source of employment and progress for its citizens.

The Challenges



In a rapidly changing world, innovation has become one of the most important factors in business competitiveness. The European Union's excellent performance in scientific research is not enough: when it comes to bringing products to market we lag behind our main economic rivals.

The generalisation of markets and the increasing importance of strategic alliances, the emergence of new competing countries in the technological field, the growing internationalisation of companies and of research and innovation activities, the interpenetration of science and technology, the increase in the cost of research, the rise in unemployment and the increasing importance of social factors such as environmental concerns - all these are phenomena which have radically changed both the conditions under which innovations are produced and disseminated and the underlying reasons for intervention by the authorities in this field.

The "European Paradox"

Compared with the scientific performance of its principal competitors, that of the EU is excellent, but over the last fifteen years its technological and commercial performance in high-technology sectors such as electronics and information technologies has deteriorated.

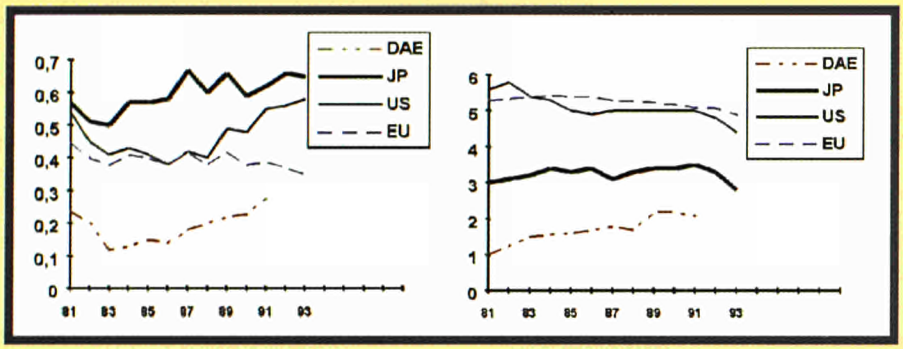
The financial structure of European firms has become healthier, their capacity for financing productive investment has grown and their methods of production, distribution and organisation have improved markedly. Nevertheless, major and disquieting weaknesses remain: a lower degree of specialisation in both high-tech products and sectors with high growth rates; a lower presence in geographical markets which show strong development; productivity which is still inadequate; a research and development effort which remains disparate and fragmented; insufficient capacity to innovate, to launch new products and services, to market them rapidly on world markets and, finally, to react rapidly to changes in demand.

Innovation is at the heart of the spirit of enterprise: practically all new firms are born from a development which is innovative, at least in comparison to its existing competitors on the market. If it is subsequently to survive and develop, however, firms must constantly innovate - even if only gradually. In this respect, technical advances are not themselves sufficient to ensure success. Innovation also means anticipating the needs of the market, offering additional quality or services, organising efficiently, mastering details and keeping costs under control.

However, one of the weaknesses of European innovation systems is the inadequate level of organisational innovation. Innovation and technology management techniques - such as the quality approach, participative management, value analysis, design, economic intelligence, just-in-time production, re-engineering, performance ratings etc. - give the firms concerned an undeniable competitive advantage. These methods, which need to be adapted to the specific circumstances and different cultural backgrounds of European firms, are not yet adequately used in the European Union.

# of Innovation

Some Factors Explaining American and Japanese Success



Technological performance (number of patents per million ecus, at 1987 US prices, BERD).

Scientific performance (number of publications per million ecus, at 1987 US prices, non-BERD).

Source: First European report on science and technology indicators, summary, EUR 15929, 1994.
Note: (DAE = Dynamic Asian Economies)
(BERD = Business enterprise Expenditure in R&D)

UNITED STATES	JAPAN
• Greater research effort	• idem
• A larger proportion of engineers and scientists in the active population	• idem
• Research efforts better co-ordinated (in particular in the aeronautic, electronic and space sectors).	• A strong ability to adapt technological information, wherever it comes from. A strong tradition of co-operation between firms in the field of R&D
• A close university - industry relationship allowing the blossoming of a large number of high technology firms.	• An improving university - industry co-operation, especially via the secondment of industrial researchers to universities
• A risk capital industry better developed which invests in high technology. NASDAQ, a stock exchange for dynamic SMEs.	• Stable and strong relationships between finance and industry fostering long term benefits and strategies.
• A cultural tradition favourable to risk taking and to the enterprise spirit; strong social acceptance of innovation.	• A culture favourable to the application of techniques and ongoing improvement.
• A lower cost for filing licenses, a single legal protection system favourable to the commercial exploitation of innovations	• Concerted strategies between companies, universities and public authorities
• Reduced lead time for creation of firms and limited red tape	• Strong mobility of staff within companies

Innovation and Society

Innovation is not just an economic mechanism or a technical process. It is above all a social phenomenon. Through it, individuals and societies express their creativity, needs and desires. By its purpose, its effects or its methods, innovation is thus intimately involved in the social conditions in which it is produced. In the final analysis, the history, culture, education, political and institutional organisation and the economic structure of each society determine that society's capacity to generate and accept novelty.

Ongoing changes are required to meet the challenges posed by the dissemination of innovations: employment/training match, institutional reforms, regulatory and legal changes, rearrangement of working hours, etc. At the same time, these changes have to be perfectly assimilated if we are to avoid social division and an excessively brutal assault on the value systems which are the basis of the social bond.

Innovation is particularly important for the regions which are lagging behind in development. The effort channelled towards developing innovation as part of the Community's regional policy needs to be seen as an opportunity for two reasons. On the one hand, it is an effort targeting regions and fields which have a special need, and this therefore has to be seen as a priority in innovation development. On the other hand, it is a means by which the laggard regions can move immediately alongside the developed regions, not by attempting to imitate what the latter have already achieved but by trying to lay the groundwork, in accordance with their own features and requirements and together with the developed regions, for adapting to the conditions of competitiveness of a global economy.

In principle, technological progress generates new wealth. However, it is true that the rapid incorporation of these innovations into the productive system may result, in the short term, in job losses for certain ●●●

●●● types of qualifications which become obsolete.

The White Paper on Growth, Competitiveness and Employment consequently referred to a structural "technological unemployment". It offers several strategies for adaptation. These include cutting tax rates and employment contributions (thereby saving and also creating jobs), together with increases in taxes on the improper use of natural resources with the dual aim of encouraging more efficient production processes and protecting the environment.

Pulling in the Same Direction

Innovation may succeed if all the expertise in a company is harnessed. If such cohesion is not achieved, innovation may fail, as demonstrated by RCA, the major US electronics group. At the end of the 1970s the group's research department designed some new products. The marketing department did not share its enthusiasm and marketed the products reluctantly. Even though it was in the lead from a technological point of view, particularly with the video disk and the video tape recorder, the RCA group did not survive this internal conflict.

Governments Can Help

A policy of monetary stability is essential so that European firms can make better long-term plans for industrial and technological investments, since any monetary disorder prevents an assessment of their long-term viability and encourages enterprises to favour short-term projects. The high level of real interest rates is detrimental to investment, especially intangible investment. A gradual reduction in interest rates - in particular long-term rates - is thus the second major pillar of a macroeconomic policy favourable to innovation.

The development and liberalisation of trade and direct international investment are preconditions for improved dissemination and the more effective incorporation of innovations into the national and regional economic fabrics. It is, however important that this trade be conducted under conditions of fairness and respect for intellectual and industrial property rights. If this is not done, there is a risk of admitting "stowaways" or "free riders" who take advantage, at no cost to themselves, of costly technical advances.

There is thus a need to distinguish as clearly as possible between restraints on competition which make innovation less likely, because they involve less pressure on the parties to the agreement in question, and competition restraints which are vital for the promotion of innovation and the dissemination of technology.

Merger Control

Mergers which create or reinforce a dominant position, with, as a consequence, the significant impediment of real competition in the market(s) are forbidden. The Commission's constant practice has been to interpret the provisions of Article 2 of the "merger" regulation, especially the requirement of a significant obstacle to competition, as meaning prohibition only of dominant positions which are lasting, and not those which are going to disappear rapidly, either because markets are opening swiftly to competition from other parts of the world or because they are being affected by a strong tide of innovation.

Index of industrial specialisation for high-, medium- and low-tech industries(1)

OECD = 100	Japan		United States		European Community	
	1970	1992	1970	1992	1970	1992
High technology	124	144	159	151	86	82
Medium technology	78	114	110	90	103	100
Low technology	113	46	67	74	103	113

Source: OECD, STAN database

(1) The index of specialisation (or revealed comparative advantage) for a certain type of industry is equal to its share of the country's total exports of manufactured products divided by the same ratio for all countries of the OECD. An index of more than 100 for a given country in a certain category of industries indicates that the country is relatively specialised in exports by these industries.

Productivity is Not Everything

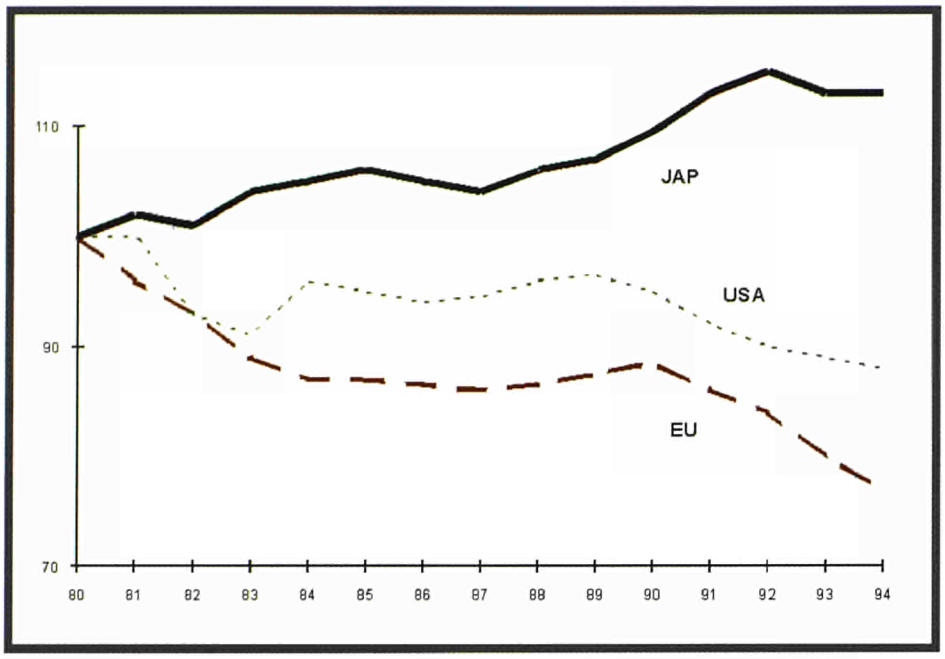
"Over the last ten years, Europe has devoted most of its efforts to increases in productivity, which have assumed what amounts to cult status. However, these increases can be negated if they are used in conjunction with a technology which is obsolete or obsolescent. (...) Innovation must be the driving force behind the entire business policy, both downstream and upstream of the actual production of goods and services. (...)" **(Edith Cresson, Compiègne, 6 September 1995.)**

State Aid

As pointed out in the Commission communication on an industrial competitiveness policy for the European Union, the system of Community monitoring of government aid rests on a set of rules accumulated over the years, with an accompanying build-up of complexity. It includes, for example, sectoral provisions originally brought in to deal with serious short-term or structural economic crises (textiles, car industry, etc.). The Commission is examining the criteria for a horizontal approach encouraging intangible investment.

In addition, coping with or even shortening the time taken in dealing with the applications for government aid is particularly important in connection with innovative projects where speed in marketing is one of the keys to success. This is why preference is given to two mechanisms which give more effective expression to the Commission's support for research and the dissemination of results:

- A clear distinction between State aid and general measures, so as to establish criteria which are more transparent to companies and government.
- A revision of the research aid provisions has just been adopted by the Commission, with the aim, inter alia, of allowing the Member States to pursue innovation policies equal to the challenge of international competition.



Employment in manufacturing, 1980=100 (at 1985 prices)

Source: European Commission

Legal Protection

Effective legal protection is a vital incentive for innovation. It offers innovators the guarantee of a rightful profit from their innovation. There is also a need for existing rules to be constantly adapted to the new circumstances introduced by technological innovation. This is particularly crucial in the field of new technologies.

After the progress achieved through the Uruguay Round, efforts have to continue on harmonising protection systems, even among OECD member countries, and on guaranteeing property rights in the rest of the world. It would, for example, be beneficial to the European Union if the United States were to adopt a patents policy closer to that of the other OECD countries.

The stakes for the European Union are threefold:

- to arrive at a system of intellectual and industrial property rights in Europe which, in a context of strong development (especially in the fields of life sciences and the information society), continues to provide individual incentive to innovate while at the same time providing for the widespread dissemination of innovations;
- to carry through, as much as necessary, the harmonisation of the various national systems while ensuring compatibility with the objective of competitiveness and continuing to guarantee a high level of protection;
- to ensure that in international trade negotiations the legitimate interests of EU citizens are not harmed, either by imposing unsuitable rules or by failing to comply with existing agreements (piracy and copyright infringements).

Re-engineering: Hospitals Too

Sweden's biggest hospital, the Karolinska, embarked on a huge re-engineering project: the hospital was redesigned from a patient's point of view, patient flow was monitored by type of pathology, bottlenecks were removed, taking waiting time as a performance indicator, and multifunctional medical/surgical centres were set up. The results announced are 15-20% cost savings and 25-30% more patients treated.

From: *La Tribune*, 1 June 1994

Europe Today: Diversity and

The situation in Europe is mixed. Performance in terms of innovation varies greatly amongst the countries, regions, firms and sectors. This is why regional or national policies in support of innovation have recently been introduced. The Community is not standing still and is making consistent efforts in favour of innovation. However, it is not enough.

The situation in Europe as regards innovation is very mixed. Expenditure on research and development varies from country to country by a factor of 1 to 11. The proportion of national R&D carried out by businesses varies from 30% to 70%. Some countries with a sophisticated financial system and strong research potential have many large firms, some of which are world leaders in their particular sector. Others are technological laggards, with an economic fabric made up essentially of SMEs, a support infrastructure only now emerging and a large public sector.

Each country in the Union has its own solutions. In the case of Italy, industrial "districts" have successfully been set up based on close co-operation links between small businesses in the same industrial sector which have pooled resources to solve techni-

SIZE DISTRIBUTION OF ENTERPRISES AND EMPLOYMENT SHARE

	Percentage of Firms		Percentage of Jobs	
	EU-12	USA	EU-12	USA
Micro entreprises (0-10 employees)	93.2	78.3	31.9	12.2
Small enterprises (11-99 employees)	6.2	20.0	24.9	20.0
Medium enterprises (100-499 employees)	0.5	1.4	15.1	14.4
Large enterprises (500 and up employees)	0.1	0.3	28.1	46.4
Total	100.0	100.0	100.0	100.0

Data: EU-12 (1990) - European Network for SME Research, 1994
USA (1990) - U.S. Small Business Administration, 1993
Source: OECD (1995)

Technology Stimulation Measures for SMEs

After successful testing in the Brite-Euram programme in 1991-1994, the measures aimed at promoting and facilitating the participation of SMEs in Community RTD programmes are being implemented in most of the programmes under the Fourth Framework Programme:

- **a procedure for submitting and assessing proposals in two stages; applicants whose draft proposals have been selected in an initial stage receive an "exploratory premium" intended to cover 75% of the cost of drawing up a full proposal and looking for partners;**
- **a new type of project: co-operative research projects (CRAFT) which allow groups of SMEs with few or no R&D resources to resort to third parties to carry out the research;**
- **an ongoing open call for proposals for CRAFT premiums and projects;**
- **a network of intermediaries (CRAFT network) to inform and assist SMEs at national, regional and local level.**

cal or commercial problems - as in Sassuolo for ceramics and in Prato for textiles. Denmark has set up an interesting scheme involving networks of SMEs. Its "Network Brokerage Scheme" has enabled contacts to be established between more than one-third of the country's SMEs, and this scheme is now being exported to the United Kingdom, Spain and the United States.

Positive experience abounds, therefore, but it is often difficult to transpose, as it is closely linked to the specific conditions under which it was acquired. However, knowledge of this experience and its dissemination are very inadequate, and there is a need for rapid progress in comparing it. The Commission's recently-established Innovation Programme should contribute to this dissemination of good practice.

Increasing Importance of SMEs

SMEs are a reservoir for the creation of jobs and a source of diversity in the industrial fabric. At the same time, the weaknesses of these firms in terms of finance, human resources and commercial contacts are a source of concern:

- 99.8% of Community firms have fewer than 250 employees (and 91% fewer than 20), whereas the United States has a higher percentage of large and medium-sized companies (firms with more than 100 employees account for 1.7% of all enterprises and 60.8% of all employees, compared with figures of 0.6% and 43.2% respectively in Europe). However, many public innovation schemes still appear to be tailored to large firms;
- Depending on the country, SMEs often suffer from both financing difficulties, at least in certain critical stages of their development, and structural weaknesses in their management capacity: the head of a firm is sometimes virtually alone in assuming management functions, and under-staffing at management level is common;
- Access to know-how and information is far more difficult and proportionately more expensive for SMEs than for large businesses;

These characteristics explain the growing interest in these firms on the part of the Member States. This is reflected in:

- Efforts to promote the creation and development of new technology-based firms;
- Consistent efforts to strengthen the technology absorption capacity of SMEs. They are aimed at creating, within the firm, a nucleus of receptive persons who understand technical developments and are capable of talking with researchers;
- Determination to simplify access by SMEs to the various support measures or outside sources of skills. The fact is that many of them get lost in the labyrinth of procedures or support services, the latter of which have mushroomed over the last few years;

During the 1980s, public or private bodies to help businesses sprang up throughout the regions (science parks, demonstration centres, transfer agencies, etc.). They differ greatly from one Member State to the other, since they reflect the national situation. ●●●

Spreading the Word on Biotechnology

Located in Cork, Ireland, BIOMERIT is a transnational network comprising some 33 partners in seven different countries. During its first three years of activity, BIOMERIT organised more than 14 workshops for training in biotechnology attended by about 900 participants. One of BIOMERIT's original approaches is that they have managed to take account not only of the needs of the students, who are familiar with working in European networks, but also of those of the businesses, so that they can introduce biotechnological innovations into agricultural holdings and SMEs.

In Brescia in Italy, for example, an agricultural firm in difficulty, employing seven people (non-viable agricultural holding despite its 265 hectares, etc.), decided to change and modernise its plant. It was faced with the need to produce foodstuffs free of chemical products and additives which satisfied consumers' needs.

The operators attended a workshop on crop protection organised for farmers in Ireland. Thanks to the quality of the workshop design, within barely a week the Italian operators had received the training they needed to meet the demands of the market and had established the international contacts which allowed them to develop this technology upon their return and disseminate it throughout their region.

●●● Many countries have recently made major efforts to set up networks of decentralised interfaces (the British "business links", the technology dissemination networks in 13 regions of France, the 18 innovation centres in the Netherlands, etc.). These local services are intended to serve as "one-stop shops" for SMEs, where they can make an initial diagnosis of companies' needs and abilities and point them towards sources of specialised support.

Sharing Economic Intelligence

Economic intelligence can be defined as the co-ordinated research, processing and distribution for exploitation purposes of information useful to economic operators.

Paradoxically, the growing supply of data, thanks to information technologies, is not reflected in a greater awareness of the technological and economic stakes nor in greater clarity with regard to strategic options.

Determined collection, sharing (co-operation between firms, pooling of resources with public authorities) and protection of strategic information are still too rare in Europe. Social and professional divides, fear of competition and deliberate secrecy make collaboration between firms and authorities a difficult matter. Individual and collective attitudes therefore need to change if economic intelligence is to gain a foothold.

The Community, for its part, is making major efforts, primarily through the Impact Programme and shortly INFO 2000, to improve the operation of the European Information market. However, Europe as a whole is still a long way behind its main rivals.

Dutch SMEs Diagnose their Innovation Capacity

The Innovation Centre of the Southwest Netherlands wanted to assist schemes aimed at innovating SMEs in the building industry. These SMEs have between 20 and 100 employees and use traditional and craft "rules of the art". However, new "off-the-peg" products are providing fierce competition. Most of these SMEs make only modest profits.

Thanks to the pilot project for the incorporation of new technologies implemented by the Dutch Innovation Centre with the support of the Commission (Innovation Programme), a group of 18 firms in this sector agreed to take part in a series of workshops chaired by specialised consultants and to undertake a bilateral diagnosis of their financial situation, their strategy and their organisation.

A rather mixed panorama emerged after the discussions and workshops. Despite the fact that the staff of these SMEs were working flat out, the absence of methodical and structured plans of action prevented the enormous individual efforts from bearing fruit. After a critical review of the necessary functions, new methods were recommended for the procurement and reception of material (75% of costs), quality, computer applications, communications, etc.

Europe is not Standing Still

At Community level, over the last few years, a number of measures have nevertheless been taken to strengthen and supplement the national or regional efforts. The following are only a few of the most significant examples:

- The research effort has increased considerably. Including the research support from the Structural Funds, nearly ECU 5 billion is now devoted to research each year, 10 years after the launch of the First Framework Programme;
- Research/industry co-operation, co-ordination and the targeting of efforts have been strengthened, and this is also the thinking behind the establishment of the Task Forces;
- The establishment of the Institute for Prospective Technological Studies in Seville, which has been given a very precise remit for technological monitoring;
- Strengthening of university/industry partnerships for training, thanks to the Leonardo programme, and in the field of technology transfer (specific research programmes).
- Support for the development of the information society, particularly through the establishment of the necessary infrastructures (e.g. trans-European networks) and for the development of socially useful applications and joint experiments.
- Increased emphasis on the dissemination and exploitation of research results;
- The pilot projects aimed at stimulating venture capital under the Action Plan for SMEs, the Structural Funds and the Innovation Programme;
- Support for the regions to enable them to draw up innovation strategies and rationalise their infrastructures and support measures for SMEs.
- The launch of the SOCRATES (education) and LEONARDO (vocational training) programmes;
- the concerted efforts being undertaken with the Member States with a view to simplifying administrative formalities, in particular for SMEs.

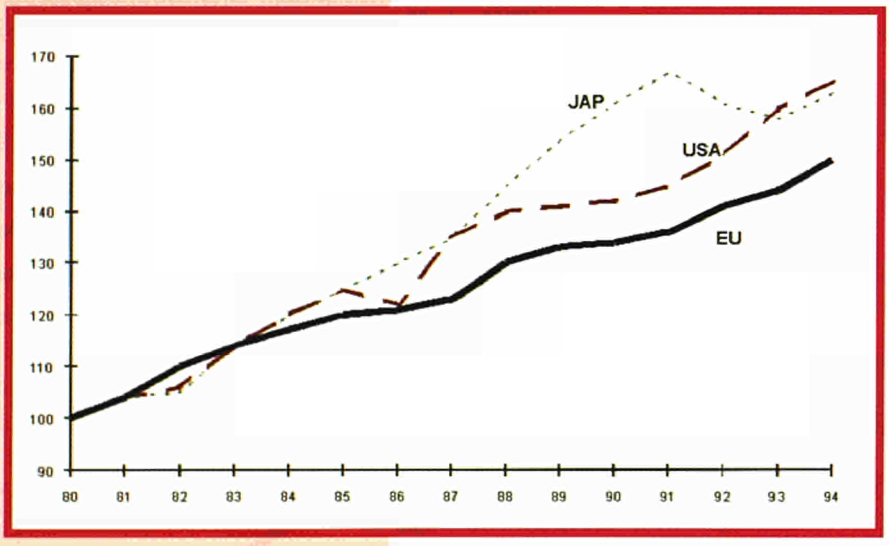
Despite all these efforts, there still remain obstacles and weaknesses.

Innovation In A Strait-Jacket

Traditional Europe is suspicious and its enterprises tend to shy away from risk. Innovators are not only vulnerable at the outset but are faced with an interminable series of obstacles to creativity. The main handicaps and obstacles are those affecting the co-ordination of efforts, human resources, private or public financing and the legal and regulatory environment.

Research and development are an essential component of innovation. Europe is faced with four severe handicaps:

■ Inadequate input. Europe devotes less of its GDP to R&D than its main rivals: 2% in 1993 compared with 2.7% in the United States and Japan. The gap between Japan and Europe is now three times what it was in 1981. The Community also has proportionately fewer researchers and engineers: 630,000 (4 out of every 1,000 of the working population) compared with 950,000 (8 per 1,000) in the USA and 450,000 (9 per 1,000) in Japan.



Productivity in manufacturing, 1980=100 (gross value added at 1985 prices per person employed)
Source: European Commission

■ Fragmented efforts. It would be better in the present economic climate to concentrate financing on a limited number of priorities essential to competitiveness. The United States and Japan are already doing this; Europe, in the meantime, is wasting its resources on too wide a range of fields. When priorities are identified, they tend to be reactions to moves by our competitors rather than genuine choices.

■ Too little industrial research. In-house expenditure by enterprises on civilian research and development (in other words research actually undertaken within firms, independently of its source of financing) amounted in 1992 to about 1.3% of GDP in Europe, compared with more than 1.9% in the United States and Japan.

■ Lack of anticipation. Europe fails to anticipate trends and techniques sufficiently well, nor does it predict the constraints and conditions connected with exploiting new technology.

Some progress has, however, been made recently in these fields at both national and Community level. Certain countries (Germany, the United Kingdom and France) have recently set up large-scale forecasting schemes (Delphi, Foresight) with the help of experts, the aim being to predict technologies which are just over the horizon, plus their potential applications.

At Community level, efforts at focusing and co-ordination and technology watch have just been re-launched. Examples of this are the Task Forces which have been set up, the founding of the Institute for Prospective Technological Studies in Seville, and the ETAN network (European Technology Assessment Network).

Impact on innovation and the transfer of results to a wider circle than those directly involved in the research ought, along with social benefits, to be one of the main permanent criteria for monitoring and assessing research and development projects.

People: Poor Training and Mobility

The level and dissemination of technical education is still inadequate in Europe. There are several reasons for this:

- Science and technology are inadequately covered in basic teaching;
- Technical disciplines are rarely given the recognition they deserve, since they are not regarded as "academic";
- There is too little technology content in the teaching of scientific disciplines; teacher training fails to keep up with advances in the sciences; there are too few women involved in science and technology courses;
- Teaching approaches which leave too little space for personal research, experimentation and discovery, the acquisition of key lateral skills (project work, teamwork, communication) and training in the new production environment in industry (understanding markets and demand, preparations for becoming an entrepreneur, quality research).
- Difficulty in rapidly supplementing training courses with hybrid subjects relevant to new vocations.
- Lastly, the relational and communication skills essential to teamwork and exchanges with partners in different fields are still too often ignored.

Continuous training of employees at the workplace is dogged by the same difficulties: too few businesses regard it as a worthwhile investment.

Cross-fertilisation of ideas and personal mobility, particularly between the research world, universities and industry, are important for creating and disseminating new discoveries. Despite the progress made in setting up the single market, there are still many obstacles to personal mobility and the transfer of ideas. This is one of Europe's most remarkable paradoxes: goods, capital and services move around more easily than people and know-how.

To quote just a few examples:

- In the European Union the need for an overall approach to taxation and social security contributions is particularly apparent in border regions where worker mobility can often be hampered by the lack of co-ordination between tax and social security schemes.
- The administrative inflexibility of educational systems makes it far more difficult in Europe to change schools or universities in mid-year (because of different scheduling of academic years, enrolment fees) and do not always make it possible to attend training schemes in another Member State.
- The predominance of the diploma as the means of recognising individual skills blocks any genuine mobility both between and within companies.
- Researchers wishing to work in different Member States encounter a wide variety of tax and social problems which block their mobility within the EU.

The White Paper on Education and Training in the European Union

The White Paper on Education and Training, "Teaching and Learning: Towards the Knowledge-based Society", follows on from the White Paper on Growth, Competitiveness and Employment, which stressed the importance for Europe of intangible investment, particularly in education and research.

The new opportunities open to individuals will require each person to make an effort to adapt and, above all, to build up his or her own qualification by combining elements of basic know-how acquired from various sources.

Given the diversity of national situations and the inadequacy of global solutions in this context, proposing a model is definitely not the answer. The White Paper, bearing in mind the subsidiarity principle, lists a number of initiatives to be taken at Member State level and support measures to be implemented at Community level. It outlines the types of response which will enable Europeans to adapt to the changes taking place: giving general culture the recognition it deserves; developing employability by, for example, making mobility easier; exploiting the potential of the information society, and giving the knowledge acquired in a lifetime its full value.

The principal objectives for implementation on a European scale in 1996 are:

- ***to encourage people to acquire new skills.***
- ***to bring schools and the business sector closer together.***
- ***to combat exclusion.***
- ***proficiency in three European languages.***
- ***equal treatment for material investment and investment in training.***

These objectives provide a clear framework for the debate the Commission intends to launch by presenting this White Paper in 1996, dubbed by the European Parliament and the Council as the European Year of Lifelong Learning.

Pilot Project "Growth and Environment"

This pilot project was set up at the request of the European Parliament and ECU 9 million were set aside for it in the 1995 Community budget. The funds are used to finance loan guarantees. These loans are for projects with beneficial effects for the environment. The initiative widens the coverage of banks providing loans to include enterprises which would not otherwise have found sources of financing for their development.

Problems with Finance

Financing is the obstacle to innovation most often quoted by firms, whatever their size, in all Member States of the European Union and in virtually all sectors.

It is companies themselves and their potential partners in the financial system (banks, collectors of long-term savings, pension funds, retirement funds, venture-capital firms, stock exchanges etc.) which have to provide the bulk of innovation finance. External investors often do more than merely provide funds: they may give new firms valuable support in terms of management and contacts, particularly international ones.

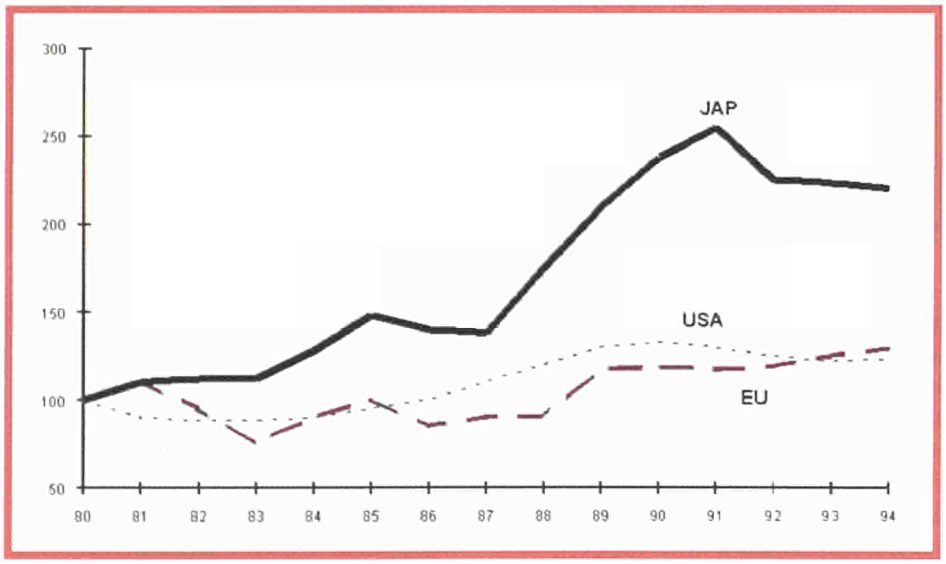
The unpredictability of innovation means that financing arrangements are up against intrinsic difficulties which have been further exacerbated by recent trends:

- The intangible component raises the problem of the increasing disparity between the guarantees demanded by investors for risk projects and the ability of firms to base these guarantees on solid foundations;
- The globalisation and deregulation of financial markets over the past 15 years exert continued pressure on interest rates and favour short-term, high-return investments to the detriment of the longer-term risk - so doubly penalising innovative SMEs;

The growth of venture capital over the past ten years has been spectacular (funds raised quadrupled over eight years to some ECU 40 billion in 1994, and investments of some ECU 20 billion in over 15,000 companies). It has nevertheless gone hand in hand with a worrying relative fall-off in high-technology investment (34% of investments in 1985, 16% in 1992 and less than 10% in 1994, despite an upturn);

Venture capital is of course just one form of innovation financing open to companies. In general, however, the results of SME surveys show that the European innovation financing system is full of holes, such as:

- The major commercial banks and institutional investors in most countries are reluctant to get involved in innovation financing. Their ability to assess the technical risks of innovation and their relationships with organisations specialising in technology or innovation are still largely underdeveloped;
- The lack of an electronics sector stock market specialising in growth or high-tech enterprise securities, similar to NASDAQ in the United States. Despite the recent launch of several competing projects, European firms do not yet have access to equivalent services;
- Lastly, there is under-capitalisation of SMEs. This is linked to national tax systems which privilege debt financing to the detriment of long-term financing and is aggravated by the frequent unwillingness of entrepreneurs to yield some say in their business and some of the financial fallout of success to partners who provide venture capital.



Investment in manufacturing, 1980=100 (at 1985 prices)

Source: European Commission

These problems are slowly but surely being recognised, and steps are being taken at national level to remedy them. Several pilot schemes (such as the Edinburgh Facility for cutting the cost of bank loans to SMEs, run by the European Investment Bank) have been launched at Community level, with due regard for the subsidiarity principle.

Public funds devoted to innovation include expenditure on education and vocational training, innovation assistance to SMEs, infrastructure building and research. Budgets are dwindling, and the future is being mortgaged as a result of cutbacks in public spending.

Firms in the USA receive three times the total volume of research funding provided in the EU, and twice the average amount. A figure provides a good illustration: the US federal government has injected into industrial research about 100 billion ECUs more than the total of Community funds (Second and Third Framework Programmes, Structural funds) and the budgetary credits of the twelve Member States paid to companies within the 1987-1993 period.

As well as giving support in the form of public funds, the United States and Japan make greater use of tax incentives than do the EU Member States. From 1986 to 1990, on average, tax concessions represented 88.8% of aid, all categories included, in the USA compared with 16.8% in France, 0% in the United Kingdom, Italy and the Netherlands, and 43% in Germany, according to the OECD.

Both the USA and Japan take advantage of the absence of ceilings to public aid in order to concentrate the funding on sectoral priorities. Japan regularly finances industrial research programmes to the tune of 100%.

Unfavourable Tax Environment

Taxation is an important factor in innovation. The European tax environment as a whole is not particularly beneficial to innovation.

The Member States have already introduced several measures designed to promote innovation by means of tax incentives. A comparative analysis of these various schemes of the measures adopted by our main competition, such as the United States and Japan, ●●●

●●● is nevertheless still needed in order to identify those which could be considered "best practices".

More basically, given that intangible investment has a high employment content (which is highly skilled in most cases), it is more readily affected than tangible investment by constant increases in tax and social security deductions.

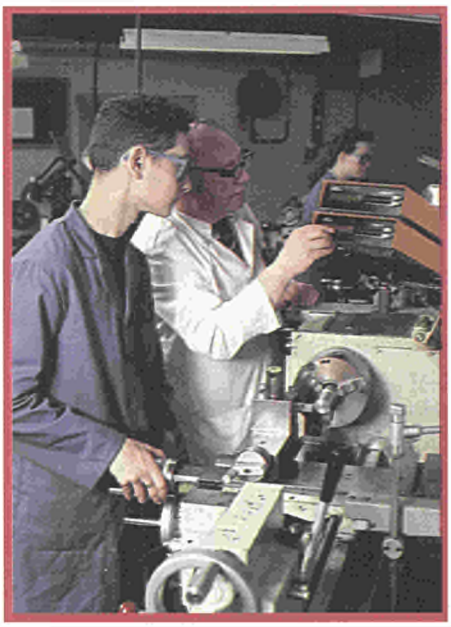
Tax systems do not as a general rule encourage investment by individuals in unlisted companies (taxation of reinvested capital gains, small or non-existent tax deductions, etc.).

Three different approaches to company taxation relating to innovation can be identified in the EU Member States. There are nevertheless certain common features:

- Tax systems in Europe tend to favour financing from borrowings rather than from capital;
- The tax treatment and accounting of intangible investments are generally less advantageous than the treatment of tangible investments;
- Europe has a wide range of risk-capital tax systems, making for complex and costly legal procedures which obstruct transnational investment.

Keeping it Simple

Excessive administrative zeal may complicate measures which are simple and effective. In France, for example, aid to unemployed persons setting up a firm was instituted in 1979, enabling a person seeking work to create his or her own job. This scheme was a great success, with tens of thousands of unemployed persons taking advantage of it each year in the mid-1980s. In 1987 the system was reformed with the laudable aim of reducing the number of bankruptcies amongst firms set up in this way. Each case had to go before an administrative committee appointed to test its viability. This added burden and the ensuing delays caused a steep decline in the number of firms and jobs created under the scheme.



Simplifying Regulation...

A suitable legal and regulatory environment would nurture innovation. Current legal forms do not really facilitate enterprise co-operation and development at the European level.

The filing of patents provides a genuine measure of technological activity. But the fact is that in the last ten years or so they have been levelling off to a worrying extent in Europe (between 85 000 and 90 000 patents per year), whereas there has been considerable growth in the number of patent applications from abroad (United States and Japan).

Part of this reluctance is due to the cost of applying for and maintaining patents. This stagnation is also due to the fact that the protection patents offer innovators is not absolute, and the cost and duration of court proceedings in the event of dispute may be enormous.

Furthermore, and for various reasons, companies do not always make maximum profits from the technologies they develop. According to some estimates, only 20-30% of technologies developed internally are incorporated in products commercialised by firms. There must therefore be a stock of under-used or unused scientific and technological know-how.

The "new approach" to product regulations - which was adopted in 1984 and supplemented in 1989 by an overall approach to assessing conformity - introduced a liberal system favourable to innovation. This no longer makes standards compulsory, but gives any manufacturer the legal option of marketing an innovative product which has no standardisation status. However, many firms and institutions are either ignorant of it or wrongly interpret its implications.

Process innovation is not regulated to the same extent as product innovation. The most important regulations here are those for protecting employees and the environment. Community directives exist, but most regulations are national. There is thus no homogeneous, harmonised concept and there are still localised obstacles to innovation.

Lastly, the dialogue needed between firms, particularly SMEs, technologists and legislators (who determine the essential requirements and binding technical regulations) is still underdeveloped in Europe.

The use of voluntary agreements is increasingly recommended. Voluntary agreements have the advantage of preventing regulations from becoming excessive. All that remains to be done is to provide a means of monitoring their application.

...and Cutting Bureaucracy

The regulatory and administrative environment in which companies find themselves is unnecessarily complex. It costs European firms an estimated extra ECU 180-230 billion, renders them less efficient and hence undermines their innovative capacity.

Moreover, because of a lack of internal co-ordination, administration often means filling in multiple declarations and producing the same information repeatedly. In most European countries, unlike the USA, the process of setting up a business and recruiting one's first staff is very much like running the

gauntlet. It often takes more than a month (other than for sole proprietorships) and costs several thousand ECUs.

True, major efforts are being made to simplify administrative procedures: service vouchers are remarkably successful in several countries and are an excellent example of an innovation with wider application potential. Assistance centres for administrative formalities or "one-stop shops" for completing them are proliferating in certain Member States (France, the United Kingdom and - in telematic form - in Denmark, for example).

Germany has set up an independent Federal commission to simplify legislative and administrative procedures. Another rule being adopted in several countries is that authorities set themselves strict reply deadlines, with failure to meet such a deadline implying approval.

The existing legal formulae do not encourage firms to co-operate or to expand on a European scale. The internal market will never be achieved unless European companies can operate more flexibly and more effectively throughout the Union.

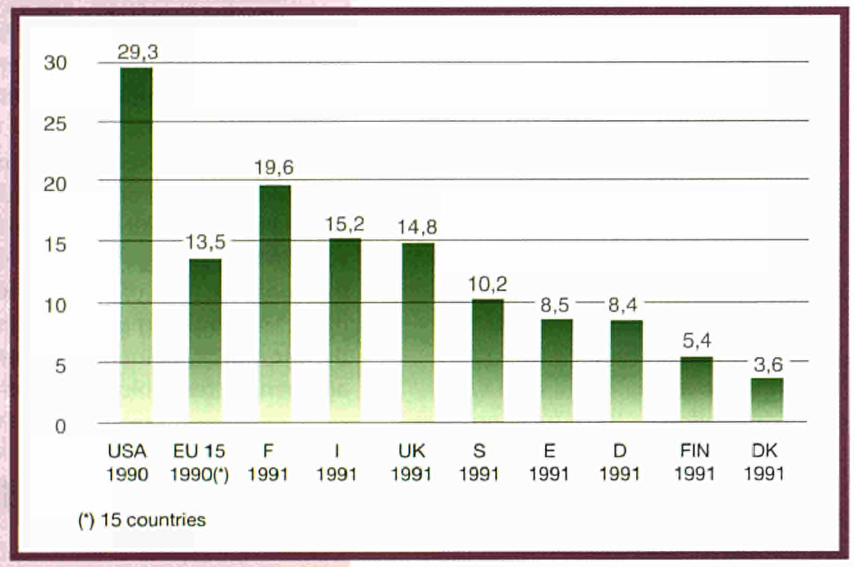
As stated in the Ciampi report [2], the European Company would be the ideal instrument to enable firms to co-operate and restructure beyond frontiers, and a means of bypassing the legislative constraints and practices of fifteen different legal systems which obstruct technological innovation.

(2) "Improving European competitiveness" - First report to the President of the Commission and the Heads of State or Government - Consultative Group on Competitiveness - June 1995.

PROPOSALS

Taking Action

More and better innovation in Europe will stem mainly from the efforts of companies and individuals. But although the authorities' role is limited, they must nevertheless make efforts to encourage innovation.



Share of Industrial R&D Expenditure Financed by the State, as %

Source: Estimates of Commission services from OECD data & national sources

After analysing the situation, the Green Paper outlines how this may be achieved. Its proposals are divided into 13 main Action Lines. Within each Action Line, the Paper suggests a number of initiatives, as well as whether each should be carried out at local, regional, national or European level.

Develop Technology Monitoring and Foresight

An initial requirement is the development of "technology watch" which provides reliable access to the best reports on technological information in the world.

It was for this purpose that the Institute for Prospective Technological Studies (IPTS) was founded in Seville. The job of this institute is not to produce new studies. Its purpose is to carry out the prompt collection of the relevant available information and to process it into a codified format for subsequent use.

At the same time, regular statistical surveys of technological innovation should be organised in the Member States. Actions involving consultation and socio-economic forecasting could also be launched as part of the ETAN network (European Technology

●●● Assessment Network), following a review of recent national initiatives (e.g. Technology Foresight in the United Kingdom, Delphi actions in France and Germany and the Foresight Committee in the Netherlands).

Direct Research Towards Innovation

Member States should plan:

■ to establish ambitious objectives to increase the proportion of gross domestic product devoted to research, development and innovation;

■ to the extent allowed by cuts in public deficits and statutory deductions, to boost the proportion of government spending on intangible investment (research and development, training) and innovation, especially among enterprises, favouring indirect tools;

■ to strengthen the mechanisms linking basic research and innovation; focusing on markets with high growth potential;

■ to introduce systems for monitoring the requirements of SMEs, with the dual mission of reinforcing their capability to carry out their own research efforts and their capacity to absorb technologies regardless of origin.

At Community level it appears necessary:

■ to prepare the extension of the Task Forces to cover other themes; a major part of funding allocated to the Fourth Framework Programme should be used for this. Existing or future Task Forces should allow for clear operational mechanisms to permit SMEs prompt involvement in applying results; to bolster the mechanisms which allow SMEs to be involved in and benefit from Community research, by encouraging in particular the management of research and technological development projects by technology-minded SMEs and the incorporation by traditional SMEs of new technologies;

■ to reformulate, in collaboration with end users, industry and researchers in the Member States, the methods of defining the content of Community research and development programmes; in order to improve the exploitation of research results and innovation.

International Differences in the Use of Different State Aid Instruments, Average 1986-1990, As %

State aid instruments	USA	JP	S	D	F	UK	IRL	I	NL
Subsidies	6.8	22.6	37.0	37.3	42.3	55.4	84.0	94.0	90.5
Soft loans	3.5	21.8	18.2	1.0	3.1	-	-		7.3
Guarantees	0.9	17.0	9.8	15.3	21.8	15.3	2.1	4.0	0.6
Equity financing	-	-	1.1	1.5	15.8	24.0	-	-	1.0
Tax relief (tax credits)	88.8	19.0	15.0	43.0	16.8	-	11.8	-	-
Mixed instruments	0.1	19.7	19.0	1.9	1.0	5.3	2.0	2.0	0.3
TOTAL	100	100	100	100	100	100	100	100	100

Source: DG XII working document, 1995

Compared with the other instruments, subsidies are the most visible and most easily-calculated state aids, and subsidies are the form of public aid most used in the countries of the EU. An international comparison based only on subsidies undoubtedly favours the United States and Japan, which use more complex and more difficult-to-assess public financing instruments to a greater extent than European countries. (N.B The above figure relate to all the categories of support measures to enterprises, and not only to support to research).

Improve Training

1996 is the European Year of Lifelong Learning. The opportunity has to be taken to emphasise the importance of innovation becoming a permanent feature of initial and further training. The debate should concentrate mainly on the following objectives and on the best way to meet them.

At national level:

■ a greater effort in the education system to instil young people with the spirit of creativity and enterprise;

■ promoting a general breakdown of barriers between disciplines: introduction of training modules on innovation management and communication into scientific and technical training syllabuses and technology management courses in business training programmes, etc.;

At Community level, actions include:

■ establishing a system of certification for basic technical and vocational skills, based on a co-operative effort between higher education institutions, enterprises, professional bodies and chambers of commerce.

■ supporting the creation of sandwich courses in higher education with a view to a better integration of general and vocational training, research and industry along the lines of "campus companies", with training geared primarily to the promotion of innovation and management of technology transfer.

Increase Mobility

The Member States need to pursue, develop or implement actions to encourage various types of mobility: social mobility, mobility between professions, mobility between research institutes and enterprises, etc. For its part, the Community has to make every effort to eliminate or reduce the regulatory barriers to mobility and intensify and ex-

pand its programmes in this area.

The following actions should be debated:

- adoption of rules (directives) designed among other things to create a mortgage payment market and to facilitate the transfer from one fiscal or social security system to another;
- the development of new ways for skills recognition beyond the diploma and formal education, in the first instance at national and local levels;

Publicise the Benefits

The Community and the Member States should strive to persuade the general public of the benefits of innovation. Actions include:

The launching of a project of Community interest covering an initial phase of five years and involving the Member States could be part of this. Its object would be to exploit, at Community level, successful experiences from the Member States and to produce information programmes using various media (videos, specialist press, CD-ROM, etc.) on the positive repercussions of European innovations and innovations from other sources.

Ease Financing

Financial measures will vary between Member States, but could include at national level:

- development of mechanisms for innovation risk insurance and/or mutual guarantee, especially for new technology based firms;
- development of sources of long-term investment capital ("business angels", pension funds) and its channelling to innovation.

At national and Community level:

- creation of outline conditions for the effective development in Europe of stock markets, possibly pan-European, for "growth enterprises";
- creation of "one-stop shops" to facilitate access to national and Community financial support for innovation;
- study the existing securitisation mechanisms and the possibility to extend them at national and/or Community level and orienting them towards the financing of innovation.

At Community level:

- development of actions by the European Investment Fund in favour of innovative SMEs by granting guarantees to banking intermediaries and venture capitalists, by possibly acquiring holdings in venture risk intermediaries (implementing the possibility opened to the Fund of investing in equity);
- possible support for the creation of multi-national seed capital funds to facilitate the birth and the European development of new technology based firms;
- study possible launching of a pilot action to provide low-rate loans for short-term development work undertaken jointly by SMEs from different Member States.

Reform Taxation

The Community must encourage the Member States to adopt tax measures conducive to innovation, especially for venture capital and intangible investment, while bearing in mind the need to control public spending with a view to Economic and Monetary Union. Given the extremely sensitive nature of fiscal policies, any action will have to be taken with care.

All fiscal incentives have their advantages and drawbacks, which will differ between Member States. Actions could include:

- more equal fiscal treatment of intangible and tangible investment (e.g. possibility of creating depreciation allowances along the lines of those for tangible investments - a study is in progress);
- broadening of tax relief to encourage individual investors towards investment in innovation (e.g. the "research development limited partnership" arrangement which exists in two Member States, or tax rebates);
- promotion of fiscal transparency with regard to venture capital companies (to avoid double taxation), as indicated in the Communication of 25 May 1994;
- encouragement of further training (for individuals but also for SMEs) through the introduction of tax allowances for training;
- reduction of regulations concerning the transfer of enterprises within the European Union in cases not covered by the "merger directive"; the Commission Recommendation of 7 December 1994 on the transfer of SMEs could serve as a starting point for this study;

Protect Intellectual Property

Intellectual property could be better protected by several actions at national level:

- ratification by certain Member States of the Convention for the European Patent to allow its entry into force, which has not yet happened in spite of the 1989 agreement;
- encouragement of the use of utility models by SMEs and raising of awareness among enterprises
- assistance to businessmen in defining a strategy for the protection of intellectual and industrial property, as well as for the acquisition and granting of licences;

At Community and international level:

- the continuation of the efforts to harmonise arrangements on intellectual property, especially in the field of life sciences and technical fields related to software, telecommunications (information society) and utility models;
- reinforcement of the instruments to combat counterfeiting and copyright infringements;
- promotion of patent information services as a method of technology watch based, in particular, on the information system set up by the European Patent Office.

Simplify Administration

The Commission is trying to streamline the procedures and formalities it requires, especially for access to its programmes, the authorisations it gives or the checks it carries out.

Streamlining of administrative procedures is also a priority at national level. For example, whereas the formalities for setting up a business are straightforward in the United States, in Europe it can take several months.

The Commission thus plans to put to the Member States a proposal for a programme of concerted actions to improve and simplify the business ●●●

●●● environment, especially with regard to business formation (under discussion) and the growth and transmission of enterprises.

This will include:

- rationalisation of structures and formalities relating to fiscal matters and social protection (e.g. forms, declarations, obligation to maintain records);
- establishment of local "one-stop shops" to provide information and help with completing formalities;
- adoption of rules whereby government offices must reply by specific deadlines, failing which their agreement is presumed.

More Favourable Laws and Regulations

The debate should concentrate, in particular, on the need and means to:

- very rapidly adopt the regulation on a European company statute with the aim of removing the obstacles to innovation caused by fifteen different legal systems;
- launch a study for a simplified EEIG(3) and European company statute for innovative new enterprises;
- generalise the system of performance standards emphasising innovation in compliance with the constraints of safety and environmental protection;
- support the establishment of voluntary agreements between enterprises and the authorities with the aim of achieving, at National or Union level, through technological innovation, high performance levels in economic, environmental and energy terms, while speeding up the introduction of ways of monitoring their application;
- analyse and discuss means of stimulating demand for innovative products by existing means in the directives on public contracts;
- continue the efforts to liberalise markets, in particular in the service sector;
- continue to facilitate the transfer of technology with respect to competition rules (block exemption regulation of technology transfer agreements).

Improve Economic Intelligence

At national and regional level, the proposals are for:

- intensifying the efforts to make enterprises, especially SMEs, more aware of the need for and methods of "economic intelligence";
- creating an environment favourable to the emergence of private-sector services offered to enterprises in this field;
- including in higher training for future managers, engineers, researchers and senior marketing staff familiarisation with economic intelligence to encourage ongoing motivation for this subject among enterprises;

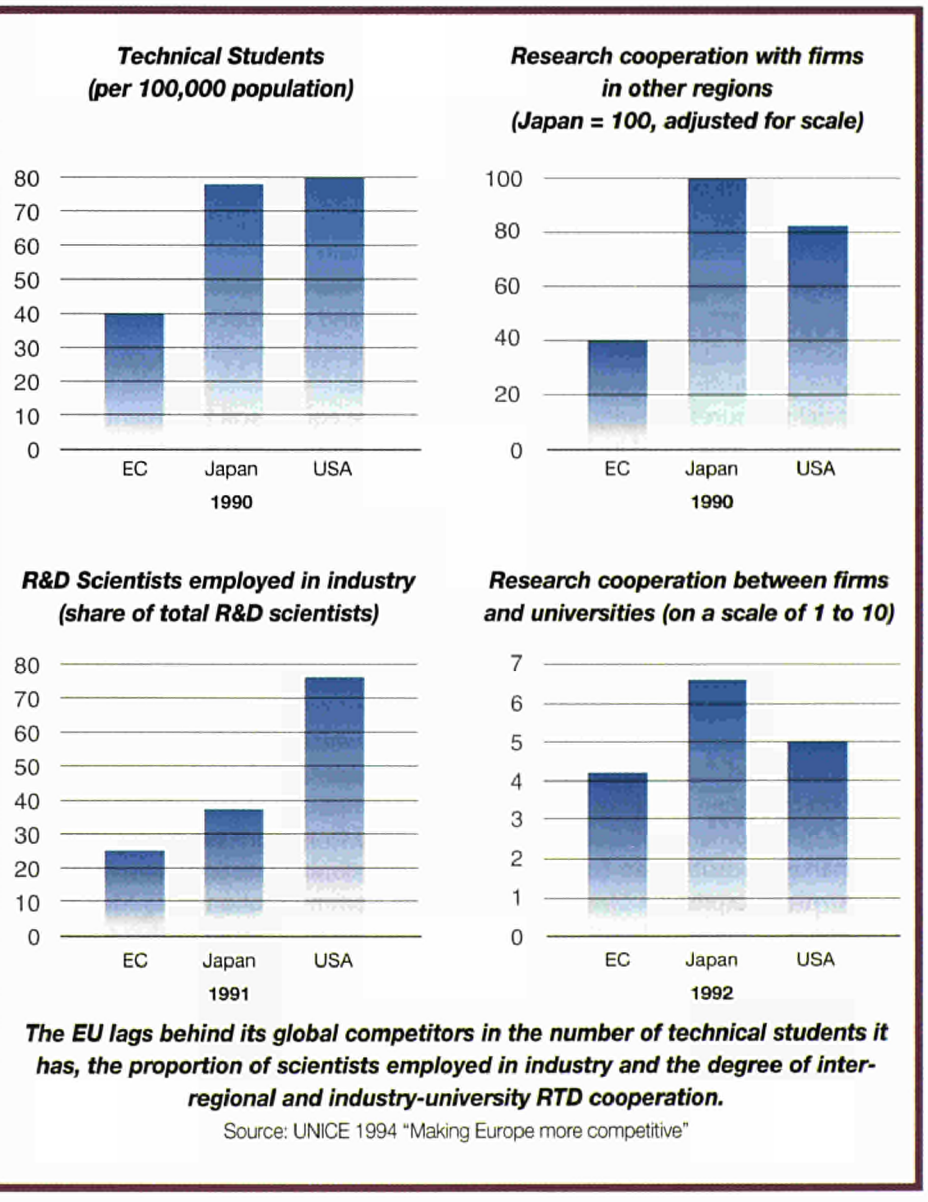
At Community level:

- facilitating the possible interlinking of national bodies for consultation and guidance in this field and exchanges of good practice between regions and countries;
- reinforcing the scientific expertise of some of the Commission's delegations in third countries, in order to accomplish a mission of technology watch and to provide to the Union analyses on the evaluation of research conducted abroad;
- launching pilot actions of assistance for SMEs using existing programmes (e.g. the SME initiative in the Structural Funds or the Innovation Programme);

Innovate by Region

The local or regional level is in fact the best level for contacting enterprises and providing them with the necessary support for the external skills they need (resources in terms of manpower, technology, management and finance). These issues are of special importance in the less favoured regions.

The Green Paper would therefore offer a good opportunity to debate:



The EU lags behind its global competitors in the number of technical students it has, the proportion of scientists employed in industry and the degree of inter-regional and industry-university RTD cooperation.

Source: UNICE 1994 "Making Europe more competitive"

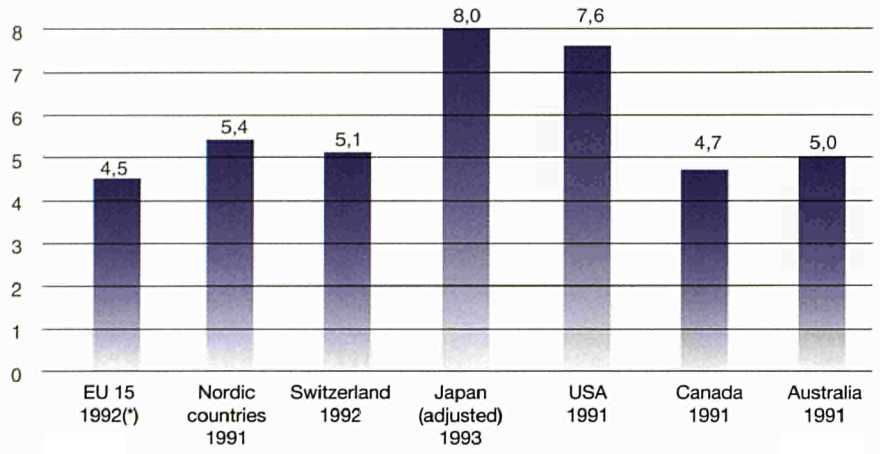
(3) European Economic Interest Grouping

■ fostering co-operation among enterprises (large and small) and strengthening groupings based on technology or sector in order to realise the potential of local know-how (in traditional activities as well as for top-of-the-range products);
■ encouraging an internationally-minded approach among enterprises (in liaison with research centres and support services), facilitating acceptance of foreign investment with high value added and introducing procedures to absorb technology from other countries;
■ reinforcing university-industry co-operation in order to facilitate transfers of technology, knowledge and skills.
■ launching a pilot action designed to encourage the formation of new technology-based firms (NTBFs), especially by researchers and engineers from research institutes and universities;
■ supporting innovation projects based on co-operation between enterprises at a European level, laboratories, intermediaries, financiers, etc., illustrating new approaches to innovation (in terms of technology, society, organisation, etc.), especially in order to take as much advantage as possible of the potential offered by the information society;
■ developing support for regional innovation strategies and inter-regional technology transfer (joint actions involving regional policies - Article 10 of the ERDF - and the Innovation Programme).

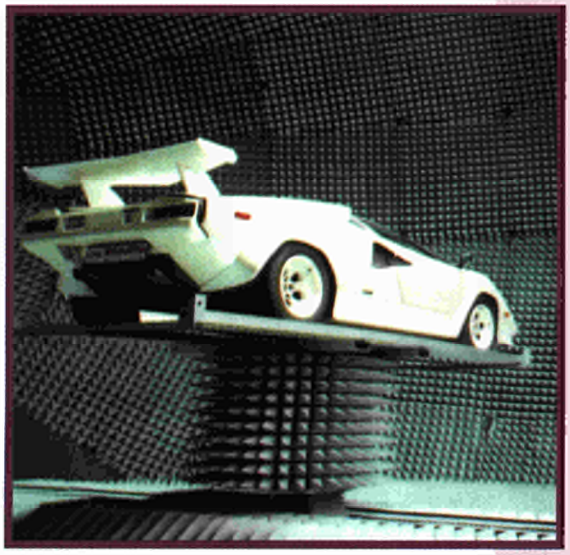
Public Action should be Well-Founded

In the Member States, as at Community level, innovation policies are usually the responsibility of several ministries, official bodies or services, which can result in some problems. It is often hard to find the right forum for discussion and even harder to find one which can provide the necessary overall view and ongoing co-ordination.

The Green Paper proposes to reinforce concertation between decision-makers in this field and ensure that those involved are consulted. At the Community level, this will involve:
■ identifying the best forum for dealing effectively with innovation policies;
■ initiating an inter-institutional dialogue on the means of better organising consideration of the horizontal nature of innovation policies;
■ improving the pooling of resources for analysis and forecasting at Community and national levels;
■ organising a dialogue at European level between decision-makers on successful cases of innovation, in order to implement concerted actions and the dissemination of good practice; on the basis of those exchanges, the Commission could draw up periodic reports on the state of innovation within the European Union, identifying the evolution and the weaknesses of the policies carried out; such a report would encourage favourable policies in the Member States;
■ developing the practice of evaluating public action, especially with regard to innovation, among local or regional authorities. □



Total R&D scientists and engineers or university graduates per thousand labour force
(*) Not including Luxembourg
Source: OECD



Getting the Green Paper

The Green Paper on Innovation was approved by the Commission on December 20, 1995. The Commission is inviting comments until 10 May 1996. For a copy of the Green Paper, contact (stating required language):
Directorate XIII/D - European Commission
Jean Monnet Building, B4/099
L-2920 Luxembourg
E-mail : fabienne.lhuire@dg13.cec.be
WWW: http://www.cordis.lu/grnpaper.htm
After the consultation period the Commission will draw up a report on the comments received and an action plan.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