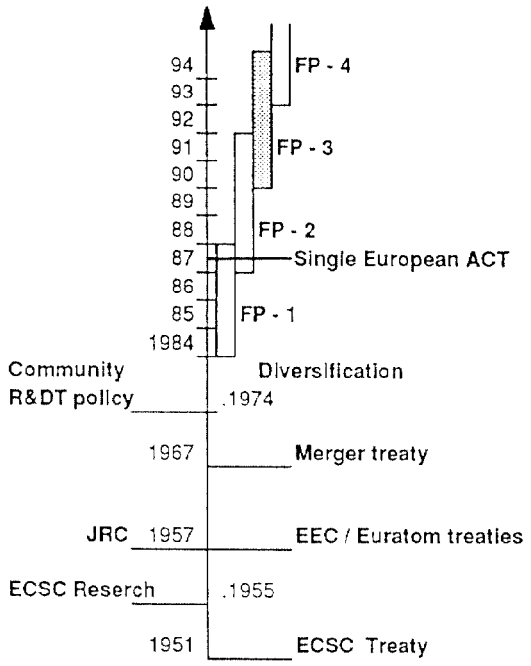
SCIENCE AND TECHNOLOGY IN THE EUROPEAN COMMUNITY

P. Fasella
Director General for Science, Research and
Development at the Commission of the European Communities

Science and technology are transforming the world in ways that were never foreseen by the Founding Fathers of the European Community. The Treaty of Rome made no mention of science and technology and did not foresee the need for the Community to support the range of research activities we do today. Thirty years on, we find ourselves in the middle of a scientific and technological revolution that is having a profound impact on the world economy. Its pace is breathtaking ; and each development is bringing about dramatic changes in the way we live and work.

This powerful wave of technological change together with the opening up of markets have created an entirely new business environment. This was recognized in the Single European Act of 1987 which amended the Treaty of Rome. It specified the now well-known goal of achieving a unified internal market in the Community by the end of 1992, and said that the Community must strengthen the scientific and technological basis of its industry, and encourage it to become more competitive at an international level.



The development of Science and Technology policy in EEC

This is because the sheer cost of research is now becoming so great that it is increasingly beyond the reach of single nations acting alone. To recover the costs of R&D a company has to capture a significant share of the world market for its products. The Community is potentially the biggest single market in the world, and together its Member States could assemble the research resources and the market to develop the technologies for Europe's future.

Creating a single market is the key to sustained economic growth in Europe. Its completion will make it easier to realize economies of scale and to mobilize within industry the "critical mass" needed for effective research and development. At the same time, competitive pressures will force the pace of innovation. There will be growing competition from our major trading partners - the United States and Japan - and from the rapidly growing Newly Industrialized Countries.

By improving competitiveness the Community will create the wealth which also makes it possible to improve the quality of life of Europe's citizens : a cleaner and safer environment, better health-care and education, safer production methods, better transport and more wholesome food. The products derived from cleaner, safer technologies will also help to penetrate and capture new markets.

Research and development policy in the European Community also has to face up to major changes in science and technology themselves. The new all-pervasive enabling technologies (information and communication technologies above all, but increasingly biotechnology and materials technologies) are penetrating deeply and broadly into the economic and social fabric of all industrial countries, both improving productivity and creating new products, processes and services.

But scientific and technological advance depend much more than ever before on the coordination and integration of different skills and expertise. In the aerospace industry, for example, electronics, materials, optical technologies and hydrodynamics have to be engineered together into new design and operating systems.

The increasing complexity and accelerating rate of change in science and technology are also making new demands for human resources. Increasing numbers of skilled

personnel must be available to carry out research and exploit its results. This means a growing need for continuously trained research scientists and engineers, a better integration of research into company management, and the development of a skilled and adaptable workforce.

The centre-piece of Community activities in research and technological development is the multi-annual Framework Programme. The second Framework Programme (1987-1991) was adopted by the Council of Ministers in September 1987, and its implementation is now well under way. It includes the well-known Programmes such as BRITE (industrial technologies), RACE (Telecommunications), BAP (biotechnology) and Thermonuclear fusion as well as programmes on health, environmental protection, nuclear safety and basic research.

The Commission has also put forward proposals for a third Framework Programme (1990-1994) which will overlap with the current one. It opted for a new five-year Framework Programme because a simple revision of the current one would be limited to the years 1990-1991 and would make the essential strategic adjustments and forecasts by the business sector more difficult.

The new proposals foresee six specific activities : information and communications technologies, industrial and materials technologies, environment, life sciences and technologies, energy, human capital and mobility (see Table 1). This choice responds to a concern for concentration, flexibility and rapidity in decision making procedures and management, as underlined by the evaluation report on the 1987-1991 Framework Programme. The new Programme was adopted by the Council of Ministers on April 1990.

Table 1

Proposed Framework Programme of Community activities in the field of research and technological development (1990-1994)

		(in billions of Ecus)
I	Enabling technologies	
1	Information and communications technologies	2,221
2	Industrial and materials technologies	0,888
II	Management of natural resources	
3	Environment	0,518
4	Life sciences and technologies	0,741
5	Energy	0,814
III	Management of intellectual resources	
6	Human capital and mobility	0,518
	Total	5,700

This approach should allow for easier internal adjustments to meet changing scientific and technological needs, and should increase the necessary interdisciplinary nature of each area. It will also reinforce internal synergy between approaches and connected technologies.

It will follow up the work undertaken in the 1987-1991 Framework Programme especially where the activities have a prenormative dimension connected with the provision of the norms, protocols and common specifications essential for the realisation of the internal market.

The new proposals also introduce a stronger environmental aspect into Community's research activities ; industrial technologies (clean car, recovery and recycling of materials) ; new biodegradable products and sources of clean energy in the life sciences ; use of hydrogen and substitutes for fossil fuels in the energy field.

A number of important concepts lie behind the idea of Community research. The first is that initiatives are only taken at Community level when they bring added value to the European research effort. What can be done better by the private sector should not be done by public authorities ; and what can be done better at the national level should not be done at Community level.

But in a number of cases it is much more cost-effective to pursue a specific R&D objective in the Community framework rather than develop separate and competing national efforts. There are also areas where R&D is needed to support other specific Community policies, especially when it encourages technical standardization.

Other criteria include the strategic importance for the European economy and society of the areas chosen, the risk that national or bilateral efforts will be subcritical in size and impact, the prospect that a large number of Member States will benefit from the results, the likely catalytic impact on other actions throughout the Community, and the contribution to strengthening the European scientific community.

Secondly, it is in the interest of all Member States to reduce the backwardness of less favoured regions of the Community, because major disparities will limit the opportunities offered by the single market. These regions must have the opportunity to improve their science and technology infrastructures, to enjoy special efforts in education and training, and to benefit from collaboration with more developed areas.

Community research programmes have already encouraged links between researchers in these regions and their colleagues elsewhere, facilitating a transfer of "best practice" and experience. We must build on this by ensuring that all Member States have the opportunity to take a full part in all the important Community R&D programmes and by strengthening Community initiatives in the field of technology transfer.

Thirdly, Community R&D has always been precompetitive in nature, but this concept must take into consideration the continually evolving nature of research. In future a greater emphasis will be placed on demonstrating the technical and economic feasibility of emerging technologies through pilot applications.

Pre-normative research is of particular importance in the European context because of the urgent need for European harmonization and standardization for the single market. The lack of a common basis for the development of standards has proved to be a serious handicap in the exploitation of European technologies and is damaging to the competitiveness of European industries at world level.

Increased emphasis on pre-normative research in the areas of industrial and materials technologies, together with activities linked to the environment and industrial risks, has given the Joint Research Centre a renewed Community role, particularly in those fields where impartial and independent expert opinion is required.

Although EURATOM was established in 1956, the impetus for an important general role for research within the European Economic Community arose only after the economic crises of the late 1970's and the early 1980's. It is now well established, with a system of five-year overlapping Framework Programmes. It should also be emphasized that most projects are only 50 % financed, the other 50 % coming from public institutions and even from private companies. Hence this policy strengthens Research and Development in Europe and often complements actions in the Member States.

The accelerator field plays an important role in acquiring pure and applied knowledge, by providing new tools for other scientific activities such as the use of the synchrotron light. It will also be important in the future for other applications (high energy light ion therapy) and for long-term projects such as nuclear waste management and nuclear fusion.

Conclusion

The quality of European science is high, but Europe has relatively fewer scientists and researchers than our major competitors. There are already skill shortages in key areas, but a very significant improvement could be achieved by a strengthening of European infrastructures and networks for training, cooperation and exchanges of information. Two thirds of our research workers have never studied in other European countries, and initiatives to promote their mobility can be a stimulus to development, a mechanism for the cross-fertilization of ideas, and a mechanism for strengthening the European scientific community.

In order to get maximum advantage from science and technology in Europe, a sustained political will must be found to turn the recognition of their importance into something tangible. The Community has a wealth of creative talent in almost all scientific and technical disciplines, but ways must be found to overcome the fragmentation which continues to exist.

Together the twelve Member States should be able to evolve the appropriate mechanisms needed to develop technologies for the future but only if they act in a concerted fashion. The Community has already established itself as a focus for collaborative research in response to international challenges. If we continue to improve its mechanisms, we shall help to ensure that Europe's future is made in Europe.