Towards a European research and science strategy

European File

The Member States of the European Community possess considerable research potential. The personnel, the teams, the equipment, the financial resources (even though sometimes inadequate), the mechanisms for transforming knowledge into innovation represent powerful factors for progress with a potential capacity virtually without peer in the world.[1]

The Community has 350 000 research workers and accounts for one fifth of world expenditure on research, development and demonstration (R, D and D). Defence projects aside, the Community's research capacity is double that of Japan and only 27% less than that of the United States.

Over the past few years, however, there has been a measurable decline in the scientific productivity of European research. There are gaps in multi-disciplinary research, insufficient coordination between applied and basic research, inadequate industrial take-up and international discrepancies in patent law. The inevitable consequence has been a reduction in the range of Europe's contribution to scientific and technological knowledge.

To hold its own against fierce international competition, Europe must take action. Our future is at stake. Renewed research efforts are vital to cope with the challenges posed by the modern world: the economic crisis means that millions of new jobs must be created; the decline and fall of European competitiveness in both new and traditional industries must be halted; dependence on imported sources of energy must be reduced; society must

[1] This leaflet updates and replaces our No 11/79.

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be prepared for changes arising from the new technologies, which have called traditional life and work patterns into question, but could provide the springboard for a new resurgence of industry and services; finally, action must be taken to end hunger and underdevelopment in the Third World, Europe's principal external partner.

Member States are already conducting a variety of research programmes in these fields.[1] There is no point in the Community 'Europeanizing' these efforts simply for the sake of it. But there is a strong argument – and need – for a substantial improvement in Community research activity proper. Increased research effort at the European level would exploit the advantages offered by activity on a continental scale. By sharing research work and findings, Member States can tackle larger problems and face up to fierce international competition. It is significant that Europe has remained at the forefront of world progress in sectors such as nuclear energy and aerospace where cooperation between the Member States has been intense. It has lost ground in sectors where there has been limited research cooperation, such as computers, biotechnology, motor cars and chemicals.

It therefore follows that Community research should concentrate on objectives which may be beyond the reach of independent national action. This might involve schemes which need enormous financial or human resources or require a huge market to make them financially viable. On the other hand, it might involve programmes which have, of their very nature, to be tackled internationally, such as action to combat sea pollution. But other justifications for joint Community efforts can be found. Member States often face identical problems and it clearly makes sense to tackle them jointly. Common research programmes could also assist the development of Community policies.

Up to now, it cannot be denied, Community efforts in this direction have been inadequate. It is certainly true that the Community has taken an interest in research from the outset. This involvement began with the 1951 Coal and Steel Treaty and continued with the Euratom Treaty of 1957. It eventually led to the creation of a joint research centre which employs 2 000 people at Geel in Belgium, Karlsruhe in Germany and Petten in the Netherlands but mainly at Ispra in Italy. In 1974 new research programmes were launched in a variety of areas, including industry, the environment, energy and health. The work is carried out either at the joint research centre or in national laboratories with coordination and partial financing by the Community. Useful results have been obtained but these efforts do not amount to a genuine European science and research policy.

The share out of Community funds in 1982 – just under 600 million ECU[2] or about 2% of public research spending in the Member States – is shown in the last column of our table. It can be seen that Community scientific and technological activity is heavily concentrated on energy problems, such as reactor safety, a long-term project on thermo-nuclear fusion and new forms of energy and energy saving. There has also been a certain amount of activity in the field of industrial competitiveness, notably in the steel sector and new technology industries, such as computers. But these efforts fall well short of matching up to the importance of the issues involved. Other areas where work is in progress are

[1] For national policies, see *European File* No 15/82: 'The current state of European research and development'.
[2] One ECU (European currency unit) = about £0.63, Ir. £0.68 or US $0.95 (at exchange rates current on 11 March 1983).

health and safety and the environment (where 20% of research in the Member States is coordinated by the Community). On the other hand, far too little attention has been given to assisting the Third World and promoting better use of raw materials and agriculture. The latter omission is striking, given the large proportion of Community money spent on the common agricultural policy.

The European Commission believes that the scale of the Community research effort and the priorities chosen must be radically reviewed in the light of the problems posed by the 1980s, the needs of European society and the requirements of Community policies.

The Commission has therefore proposed a new scientific and technological strategy to build the foundations for a Community research policy. As a first step, it sought the assistance of numerous experts who helped to define what the objectives of such a policy should be. These objectives are to be approved and periodically re-examined by governments. The Commission recommends that 3 750 million ECU (at 1982 values) should be devoted to this strategy between 1984 and 1987. The money would be allocated as shown in the first two columns of our table. If the Commission plan is adopted, 4% of the Community budget would be devoted to research by 1987, compared to 2.6% at present. Community research policy could then make real strides in improving agricultural, scientific and industrial competitiveness and assisting development cooperation. New initiatives could also be taken to achieve specific objectives in the more efficient use of energy and raw materials and the improvement of living and working conditions.

Community research spending

	Million ECU 1984-87	% of total	
		1984-87	1982
Promoting agricultural competitiveness (including fish)	130	3.5	1.9
Promoting industrial competitiveness (elimination and reduction of hindrances, conventional industries, new technologies)	1 060	28.2	18.5
Improving the management of raw materials	80	2.1	1.4
Improving the management of energy resources (nuclear fission, controlled thermonuclear fusion, renewable energy, rational use of energy)	1 850	49.4	63.7
Reinforcing development aid	150	4.0	0.7
Improving living and working conditions (safety and health protection, environment)	270	7.2	10.1
Improving scientific and technical efficiency	(5% of total credits by end of period)		
Horizontal activities	110	2.9	3.8

The main objectives

☐ *Promoting competitiveness in agriculture and fisheries:* the key agrifoodstuffs sector has to adapt to increasingly difficult operating conditions. Farm incomes have to be

maintained in the face of rising energy costs, and the problems posed by over-intensive cultivation, regional disparities and the brake on public subsidies.

- In the agricultural sector, studies and research are needed to reduce surpluses by identifying new markets or encouraging the production of crops in short supply, such as maize, tobacco, animal feedstuffs, timber and other potential biomass energy fuels. The potential of less-favoured areas, especially the Mediterranean region, must be exploited to the full. Research can also help farmers to generate energy from waste products, to combat animal and crop diseases and to improve food quality and safety. At the same time, the Community should foster advanced technologies, such as genetic engineering and teledetection and encourage a wider dissemination of research findings.

- In the fisheries sector, efforts should be concentrated on the identification of potential new resources, especially in the open sea. Action could also be taken to improve fishing methods, grading, processing and conservation, notably with the aim of saving energy. There is also scope for work on the animal and human food potential of smaller species of Mediterranean fish, the development of aquaculture and the investigation of the impact of pollution on the food chain.

□ *Promoting industrial competitiveness:* if it is to cope with international competition and create and preserve jobs, European industry must face up to the multiple changes brought by the new technologies. Community research work should adopt three main priorities:

- The development of standardized measurements, specifications and certification to ensure product quality, cleanliness of materials and standard chemical analysis. Harmonization along these lines will foster the development of a Community-wide market for industrial goods.

- The modernization of traditional industries, through developing the application of new technologies such as lasers, new materials and computerized construction methods in a variety of sectors. Techniques developed for other branches of industry could be applied to textiles, steel or transport. Pilot or demonstration projects would help to speed diffusion of research findings throughout industry. The overriding aim should be to widen the range of technologies and products in sectors which still constitute the greater part of the industrial fabric of our society.

- The promotion of new technologies, such as information technology (IT), which will be the largest sector in manufacturing industry by 1990. If the Community is to keep up with its competitors, it must coordinate its national research programmes and collaborate in joint efforts to master basic technologies. Attention should be concentrated on microelectronics, especially integrated circuits, software engineering, office automation, computer translation systems and industrial robots. At the same time, the Community should attempt to create an information exchange system, linking collaborating laboratories in all the Member States.

Biotechnology provides a further challenge. The investigation of the chemistry of living systems is destined to transform activities in sectors as varied as agrifoodstuffs, fine chemicals, pharmaceuticals, energy and the environment. Research must be encouraged in the key biotechnology sectors in order to harness genes, enzymes and micro-organisms and to improve understanding of cellular and molecular pathology. Pilot and demonstration projects should explore possible uses in the field of biomass energy, waste processing, optimum land use and the improvement of European and tropical agricultural produce. Once again, efforts should be made to establish a network linking the best laboratories, information centres and data banks in the Community.

- ☐ *Improving the management of raw materials:* the Community depends on imports for three quarters – and in some cases the whole – of its non-energy raw materials. Known resources are often concentrated in a small number of countries. To reduce this degree of dependence, efforts must be made to improve techniques for prospecting for minerals at great depth and to develop offshore exploration. Advanced technologies must be developed for the extraction and treatment of minerals from marginal deposits and for the exploitation of lean and complex ores. Efforts are also needed to promote sylviculture and to improve paper-making methods. The foreign trade deficit on wood is the Community's second largest, after oil. Finally, research is needed into the recycling of raw materials, particularly into ways of improving the sorting and processing of household and agricultural waste and the recovery of strategic metals.

- ☐ *Improving the management of energy resources:* the Community must attempt to shake off the constraints imposed by dependence on oil for about half its energy needs. Community research programmes can no longer concentrate on energy alone but the potential benefits justify the continuation, even the extension, of existing research, development and demonstration activities.

  - The Community can make an important contribution to vital work on the development of nuclear fission energy, especially the crucial efforts to increase nuclear safety. Community work on reactor safety, including research into light-water and fast-breeder reactors, the management of waste, the decommissioning of nuclear plants and methods for protecting workers and the general public against radiation, have been valuable in their own right. The impartial character of Community work in this field should also exert a positive influence on the nuclear debate.

  - The Community countries have already pooled their research efforts on thermonuclear fusion into a single programme employing 1 000 research workers, employed mainly on the construction of the powerful JET experimental reactor at Culham in the United Kingdom. The project holds out the long-term promise of abundant energy supplies but research efforts will be long and costly.

  - The development of renewable energy sources could increase Europe's independence from imported energy and at the same time promote industrial competitiveness and agricultural productivity. It could also provide a new means of aiding developing countries. Research and demonstration projects should be supported in

the fields most likely to benefit from development on a Community scale. These include solar energy, biomass, wind and hydrolelectric power and geothermal energy.

- Finally, the encouragement of a more rational use of energy can also contribute to energy independence, the diversification of resources and the reduction of costs. Energy saving should be encouraged in the home, industry, agriculture and transport. Efforts are required, whilst safeguarding the environment, to promote the optimum use of solid fuels such as coal, possibly through liquefaction into synthetic oils. Progress can also be made in the generation, storage and transport of heat, notably through the establishment of district heating systems. Other projects could include the development of electric-powered vehicles and systems analysis to increase understanding of energy supply and demand.

☐ *Reinforcing development aid:* Community cooperation with the Third World must be bolstered by further research work in fields which contribute to the development process. The Community should boost its scientific and technological aid to the Third World, while taking increasing account of the specific needs and wishes of developing countries and strengthening cooperation with their own research teams. Efforts on a Community scale could help to make the activities of individual Member States more effective. They must also seek to ensure that aid is offered at a level of scientific development which is relevant to the recipient State. Scientific cooperation should concentrate first and foremost on agriculture, forestry and fisheries and action to check the spread of deserts. This fits in with the overall objectives of European development policy to promote rural development and the self-sufficiency of food supplies. Other research topics could be population and health (nutritional problems, tropical diseases, demography), geological prospecting, energy and the environment (hydrogeology and climatology).

☐ *Improving living and working conditions:* joint efforts would help to promote preventive medicine and personal safety, notably protection from environmental risks.

- Priorities in the health sector include: improving man's relationship with his living and working environment, through increasing understanding of human adaptability but also through reducing the risk of accidents in the home and dangers from industrial pollution, ionizing radiation and the spread of computers and biotechnology; the development of new techniques of diagnosis and treatment by making use of new technologies in genetic and other fields; increasing knowledge of reproductive problems and the growing and ageing processes to diminish risks associated with particular periods of life and reduce the incidence of handicaps and disablement.

- In the environmental sector, the Community should improve its coordination of research into pollution and its effect on those exposed to it. Special attention should be given to three problems: the conservation of natural resources (soils, water, the diversity of animal species); the interaction between man and his environment (the effects of urbanization, industrialization, tourism and intensive agriculture); and the

overall understanding of environmental problems (the fundamental processes in ecosystems and climate, information and public awareness, impact assessment techniques).

- ☐ *Improving the efficiency of the Community's scientific and technological potential:* It is not possible to programme all scientific work precisely. Flexibility is needed to allow the Community to follow each twist and turn in developments likely to increase Europe's scientific competitiveness. It is often necessary to straighten out bottlenecks, break down barriers between disciplines or encourage the emergence of a new line of research. Possibilities exist in a number of fields, including oceanography, the use of space-flights to produce new materials in low-gravity conditions, the development of metallic composites and biomaterials, partially linked with the physics and chemistry of surfaces, information and communication sciences and the science of complex systems (including basic biological research, earth atmosphere interfaces, fine chemicals and optics).

- ☐ *Horizontal activities:* as a corollary to all these efforts, the Community must give attention to forecasting studies, the dissemination of information and the exploitation of research, development and demonstration results. At the same time, action is needed to strengthen the legal protection of inventions. The continuous evaluation of research results is also necessary if the Community research policy is to operate efficiently and adapt itself to constantly changing scientific, social and economic needs.

△

Here, then, are the priorities outlined in the framework programme for the founding 1984-87 period of the new Community scientific and technological strategy. The Commission document lays down detailed and specific objectives, based on an analysis of social and economic needs, the range of existing research activities in the Community and third countries and a variety of sectoral and forecasting studies. The programme should place Community research in a stronger position to face up the the challenges of the 1980s and thus help to solve some of the major problems of our time ■

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