THE EUROPEAN COMMUNITY'S SCIENTIFIC AND TECHNICAL STRATEGY WITH SPECIAL REFERENCE TO SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

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The purpose of the presentation is to place the Community's efforts in the field of science and technology for development in the context of its overall scientific and technical strategy. Thus in a first section the evolution of Community scientific activity since the earliest days is described. A second section sets out the new community R & D strategy, a third section deals with development aid policy while the final section discusses how the policy is implemented.

Part I – The Evolution of Community Scientific Activity Since 1951

In fact Community Scientific Activity has built up from relatively modest beginnings in the earliest days of the Coal and Steel Community, 1951. The treaty establishing this, and the EURATOM treaty of 1958, reflected a preoccupation with energy and raw materials. This was only reinforced by the 1973 energy crisis, which gave added impetus to the development of alternative energy programmes. At the same time research programmes were started which reflected current concern with the harmonisation of norms and standards, in the interests of a truly European Market, and with the protection of the environment.

Thus a great deal of valuable work has been done, much of it with a world wide impact. In the case of energy for example the work done in the field of new and renewable sources has acted as a stimulus and catalyst for national efforts.

This is clearly the case in respect of solar energy where the work which laid the bases for cooperation between industrial companies and collaboration between laboratories gave the Member States of the European Community the opportunity to acquire a scientific and technical capability in the field more quickly than if they had been limited to isolated or dispersed initiatives.

The same thing is also true of the Fusion programme, which has the Member States working together for long term benefits. In JET the Community has a facility which puts it on a par with, perhaps even ahead of the United States, the Soviet Union or Japan.

Taking the Environment sector as another example the effectiveness of the Community's catalysing and coördinating approach can be seen in the way that Community R & D activities in support of selected priorities, such as the effect of pollutants in petrol, have directly stimulated national efforts, 20% of which are now community coordinated.

The work done on norms and standards by the Community's Central Bureau for Nuclear Measurement and by the Community Reference Bureau has gained widespread recognition, emphasising the need to undertake specific actions (e.g. on reference materials and techniques) and to provide a public service for laboratories and for European Industry.

These and many other achievements were the result of painstaking work over a period of years and are the fruits of a pragmatic approach which has built up community scientific activities from a position in 1974 (the year in which the Council of the European Communities formally recognised the value of joint action in all fields of Science and Technology) when the budget was the equivalent of approximately \$70 M. (70 MioEcu), to a position where, in 1982, the budget was the equivalent of \$590 M.

To put this expenditure into perspective one should remember that it is about 1.5% of what the Community Member States spend on research, and around 2% of the overall Community budget.

Part II – The Development of a New Community R & D Strategy

II – A – Analysis

In 1981 the Commission decided to take stock of its scientific activities, since the feeling was growing that, despite the value and effectiveness of the programmes and the coordination which the Community had carried out, they were in some ways no longer fully adequate to make a sufficient response to the new challenges which confront the Community or to rally national efforts in the light of that response.

This feeling was reinforced by a sequence of analyses that were undertaken on the Commission's behalf by experts and by consultative Committees, which set out the problems confronting European science in the 80's. These can be summarised thus:

- 1) The economic crisis and the inflation and unemployment that go with it
- 2) The declining competitive capacity of most Member States in relation to major non community trading partners
- 3) The continual need to improve the management of energy and raw materials resources
- 4) The vital need to build up relations and cooperation with developing countries
(It is increasingly appreciated that it is as much out of a sense of solidarity with the third world and an appreciation of its worsening problems as for mutual economic benefit that the Community should help to build up R & D within the developing countries themselves; it should also continue to build up its own R & D capacity in response to developing countries' needs)
- 5) The preparation of society for the changes arising from or likely to arise from the development of new technologies (both locally and community wide)

II – B – Changes to be expected

Following on in a little more detail from point five, the changes that the Community should be prepared for include:

- a major rearrangement in the way service industries are organised with recognition of the full extent of their importance as generators of employment and ways in which they boost competitiveness etc (in 1980 the service sector accounted for 51% of jobs in the Community and 56% of value added).
- the rationalisation of production methods by means of new technology where appropriate. This would seem to be the essential basis for new growth, but it must not be assumed that new products will automatically be accepted by consumers or that management will readily assimilate new procedures.
- the ever increasing need to make optimum use of land and to develop integrated land use management techniques which embrace water and natural resources. This must replace the existing destructive conflict between the land use requirements of industry, agriculture, transport, urban development etc. . . .
- the changing balance between work and leisure activities, the development in the way that urban systems are arranged, the cultural impact of communication technology and other important evolutions in the way people live and influence the course of their lives.

II – C – The Strength of European Science

Hand in hand with an analysis of the problems and issues to be faced by European science went a stocktaking designed to put European research into a world perspective, and highlight its strengths and weaknesses. In general terms this showed that, with more than 1 million scientists and technicians (of whom 350,000 are specifically researchers) and with publicly financed research expenditure in the region of \$26.5 billion, Europe's civilian R & D capacity is only 27% less than that of the USA, and twice that of Japan. It is obvious that between them the Member States of the European Community possess a remarkable breadth, richness and diversity of scientific and financial resources, and mechanisms for transforming knowledge into innovation. Together it adds up to a force for progress the potential effectiveness of which is virtually unparalleled in the world. But analysis shows that this potential is all too often poorly realised, and that Europe appears to be inadequate (compared to its major trading partners, the USA and Japan for example) when it comes to translating the fruits of its research capacity into socio-economic progress and industrial competitiveness. When assessed realistically the reasons for this comparative weakness seem to be as follows:

- there appears to be a decline in the creativity or scientific productivity of European research systems, which can be measured by studying the number of patent applications placed, or the frequency with which publications are cited;
- European research often seems bound by traditional disciplines (as reflected, say, in departmental structures) whereas in many important new areas such as alternative energy sources, the environment or agro-food the required solutions can only be found through multi-disciplinary, multi-sectoral approaches;
- there are large "blind-spots", or areas where for example academic institutions feel that work is too "applied" in nature for their participation to be appropriate but where industry on the other hand feels it is too basic (certain aspects of synthetic materials, the use of applied mathematics in, e.g., combustion problems for example);

The strategy is expressed in the form of seven overall policy goals, which are set out below together with the changes in priority which the Commission now recommends in order to face up to the challenges of the 80's.

- 1) Promoting agricultural competitiveness (including fisheries).
Up to now this had a surprisingly low priority, only 1.86% of total R & D expenditure in 1982, given the enormous proportion of community resources that agriculture takes up otherwise. The commission now proposes that the proportion should rise to 3.5% of Community R & D expenditure, in an average year of the period 1984–1987.
- 2) Promoting industrial competitiveness has had a limited priority, at 18.46% of Community R & D spending in 1982. In the light of the increasingly disadvantageous position Europe is in vis-a-vis its main trading partners we feel the priority should reflect the seriousness of the situation, and are proposing 28.3% during 1984–1987. In particular a greatly accelerated effort in information technology and in biotechnology is proposed, these being two areas where Europe must hold its own.
- 3) Improving the management of raw materials resources is an area where a good start has been made and should be sustained. 1.36% of Community R & D spending went to this goal in 1982 and we propose a slight increase to 2.1%.
- 4) By far the greatest priority up to now has been given to improving the management of energy resources and reducing energy dependence, with 63.46% of Community R & D spending in 1982. This is not surprising given the Community's pre-occupations at the time the first common policy for research was established in 1974. But these days other issues are gaining in importance and the Community must react to them. Without reducing its effort in absolute terms the Community is therefore recommended to bring it down in relative terms to 49.3% of its R & D spending to this field in 1984–1987.
- 5) One of the major issues identified above was the plight of the developing world and the need to foster cooperation with it. However the goal of reinforcing development aid received next to no priority in 1982, in terms of specific Science and Technology efforts i.e. 0.67% of spending. The commission therefore proposes that the proportion be raised to 4.0%.
- 6) Improving living and working conditions has been a fundamental goal of the Community since it began. Thus it has developed a comparatively high priority, at 10.15%. Again this work should be sustained and it is of considerable value. The higher priority being given to other urgent issues however means that a sustained effort here is reflected as a reduced priority recommended for 1984–1987, 7.2% of R & D spending.

At the start of this phase of preparing a new strategy appropriate for the 1980's it was suggested, and broadly accepted in principle by the Member States governments that, in order to achieve the goals of the strategy and to meet the effects of readjusting scientific spending priorities to take account of pressing new circumstances, Community Science expenditure should rise from 590 million ECUs in 1982 to 937.5 Million as an annual average between 1984–1987 (at constant 1982 values). This would raise the percentage of Community science spending in the overall budget from 1.5% to perhaps 3%, although there are many who feel the proportion should be greater. In current circumstances however, when the Community is fast coming up against its "own

resources" barrier, all increases in expenditure must be very carefully examined. So far as science is concerned the Commission feels it has a particularly strong case.

Part III – Community Policy Towards Development Aid

Having briefly set out the evolution of the new community strategy more detail can be given on one aspect, namely reinforcing aid to development. This may best be done by giving some of the background to and features of current community policy.

III – A – Background and current activities

Up to now the contribution which the Community has made to the developing countries so far as scientific and technical research is concerned has been in four basic forms:

- financial contributions to international Institutes related to the CGIAR;
- finance for a "research" element in development operations;
- finance for certain investments with scientific objectives;
- contributions to the training of researchers and technicians.

This contribution has been by no means negligible, either in the amount of aid or in the results obtained, since in addition to other sources of aid, both bilateral and multilateral, it has made possible the development or conservation of scientific activities of value to development.

But such actions have not been part of an overall policy framework. Their ad hoc nature may well partly have militated against their effectiveness. The new strategy for Community R & D should make it possible to give more coherence to this activity and make it more effective. Its particular importance lies in the chance it will give to developing countries to choose the most appropriate avenues by which to encourage their own development.

Community assistance in the scientific and technical area, as in other areas, should only support policies freely defined in the context of a dialogue between the Community and the countries concerned on the efficacy and adequacy of such policies. The new strategy will enable the Community to orientate its scientific and technical activities for the benefit of developing countries in a better way, as discussed below.

III – B – General objectives

The orientation to be given to this S/T aid should be founded upon the following considerations:

- scientific research plays an important part in the development process. The difficulties which developing countries have in making adequate efforts in this direction should make those with political responsibility in developed countries realise the importance which research had for their own development. The situation also calls for outside help so that an autonomous research capability may be built up within these countries, who would thus be able to carry out their own scientific research designed to control their own destiny.
- outside help should have two aspects:
 - 1) aid via international or Community organisations, which contribute already and which guarantee immediate efficacy and the necessary continuity. This procedure

has given good results in the past. It should at the same time be better oriented towards the needs of the recipient countries and better mobilise, for the benefit of developing countries, the heritage of knowledge which is available in the countries of the Community as well as the basic research capacities of the Member States.

- 2) aid for the development of national and regional research systems in the developing countries. This is a long job, made risky by the existence of the first form of aid. But it is the primary objective which will, in the end, make it possible to ensure the technological maturity of States and cooperation with the international scientific community.
- it is agriculture which must at first form the primary theme of the effort: this priority is compatible with the EEC's policy which puts agriculture at the centre of developing countries' development efforts and which is, as we have seen, about to increase the weight of agriculture in community scientific research spending.

III – C – Selection and resource allocation criteria

With the above general objectives in view the Commission has prepared more specific criteria for selecting activities and deciding resources.

- 1) depending on a country's level of scientific development, aid must take appropriate forms. In the countries which are least developed, barely at subsistence level, aid via foreign research workers must predominate for the time being, whilst an effort to train local researchers and to make ready a reception infrastructure should be made as a reserve for the future.

In States which have already reached a certain scientific capacity the dominant form of aid should be that directed to centres of excellence which, when boosted in this way could become centres for national and regional advancement in greatly varying forms ranging from inter-institutional cooperation programmes to the setting up of systems designed to facilitate the reintegration of national research workers who happen to be in European or other countries.

It is on the basis of such centres that a certain level of regional coordination could be undertaken with a view to making better use of available human and materials resources.

- 2) outside research must be mobilised in the case of topics which require sophisticated human and material resources, leaving local research capacity to tackle, progressively, those which can more easily be coped with under local conditions. Nevertheless, aid to research projects should undergo a rigorous evaluation of their characteristics: the extent to which objectives are relevant, the methodology appropriate and the recipient teams well thought of. In short, it is vital that criteria relating to quality prevail over considerations of local opportunity.
- 3) six sectoral orientations are suggested because of their compatibility with Community policy on development aid:
 - agriculture, forestry, the campaign against the encroachment of desert areas, fish (including fish breeding), favouring those topics relating to self sufficiency in food, and rural development,

- the environment, hydrogeology and climatology,
- health notably problems of infant nutrition and that of the mother (related to agricultural production and food aid) and tropical diseases,
- resources of the soil, and belowground: geological prospecting,
- energy: renewable sources of energy appropriate to subsistence economies,
- population: demographic studies.

Part IV – Implementation of the Policy

Having discussed the general objectives and specific criteria which lie behind the Communities Development aid policy, attention may be given to the means by which it is implemented.

IV – A – Lome Convention and European Development Fund

Most Community aid to developing countries takes place in the framework of the Lome Convention. This currently covers the following sectors:

- Trade cooperation: virtually all products from ACP countries can enter the Community without incurring customs duties.
- Stabilization of export earnings: the Community guarantees a minimum income to ACP countries for their earnings from exporting a certain number of basic products to the Common Market.
- Financial and technical cooperation: the European Development Fund contributes to four major sectors: rural development, industrialization, economic infrastructure and social development.
- Industrial and agricultural cooperation: cooperation will be stepped up in areas such as energy prospecting, new energy sources, maritime transport and fishing.

Community financial aid to ACP countries during 1980–1985 will amount to a total of 5,692 million ECU.

Following the expressed priorities of Lome signatories, much of the research which has been undertaken has been in the field of energy, since the associated countries are mostly heavily dependent on imported oil, and the increasing use of other traditional sources such as wood can have serious consequences such as desertification.

Thus, for example, the Community has provided finance which has made it possible to carry out projects worth more than 1,000 MioEcu since 1958 in the spheres of hydro-electricity, thermal power, electricity transmission grids and alternative energy sources. The latter is on a modest but increasingly important scale and consists of scientific research and cooperation leading to the setting up of demonstration schemes and pilot projects. Technologies suitable for immediate development include photovoltaic conversion of solar energy, gasification of vegetable waste by carbonisation and high enthalpy geothermal energy. Examples of new technologies still at the research stage include conversion of solar radiation into heat energy for pumping water, etc. . . ocean thermal energy conversion and low enthalpy geothermal energy.

IV – B – “Non Associated” countries

For Non-Associated countries, special emphasis is placed on making provision for the development of food production in the recipient countries encouraging the development

of rural areas, intensification of regional cooperation and trade, and emergency action in the event of disaster.

A quarter of Community aid currently goes to the non-associated countries (it amounted to 1203 MioEcu between 1976 and 1980). Aid is also given to "non associated" developing countries in Asia and Latin America. A good example is the agreement signed in 1981 with the ASEAN countries covering training, technical assistance seminars and studies and involving 2.8 MioEcu. A second agreement covering specific projects is being discussed at the moment.

IV – C – The programme of science and technology for development

The Council of the European Communities recently adopted a programme of science and technology for development which concentrates on two scientific sectors: tropical agriculture and tropical medicine.

The reason for this concentration is two-fold. Firstly it is clear that the amount required to cover all sectors of value to developing countries is of too great a magnitude to be contemplated at one time.

Secondly, the Community's scientific strategy as it affects developing countries is something new and it is felt that a proving period is required before envisaging larger scale actions.

It was also logical to favour those fields which dealt directly with the tropics.

Thus agriculture and health, which have special characteristics linked to climatic and ecological conditions and which were not catered for by any specific activity at Community level, were chosen. These sectors also happen to be ones which have become somewhat neglected in the Member States and are therefore in need of reactivation. In the developing countries, agronomical and medical research are the fields in which most has been invested and where cooperation with European laboratories will be most immediately forthcoming.

In the tropical agriculture sub-programme the following fields will be covered (at a cost of approximately 10 MioEcu).

- 1) Improvement of agricultural production
- 2) General areas of research and utilisation of the environment
- 3) Post harvest technology
- 4) Training

In the sub-programme dealing with Medicine, Health and Nutrition in the Tropics the following topics will be covered (at an approximate cost of 10 MioEcu):

- 1) Medicine and Health
 - transmissible diseases (including parasitological, bacteriological and virological research)
 - mother and child care (including methods of detecting highly prevalent diseases)
 - genetics (including new diagnosis and therapeutic approaches)
 - environmental hygiene (including water-borne diseases)
- 2) Nutrition (including malnutrition and food toxicology)
- 3) Training.

The precise direction of work in these sectors will be decided by the Advisory Committees on programme management which are responsible for issuing the contracts, normally on the basis of 50% Commission contribution.

IV – D – The programme to assist development of the indigenous scientific and technical research capacities of developing countries

The most recent element in the implementation of the Community's scientific strategy as it affects development aid, is the Commission's recent proposal for a programme intended to contribute towards the creation and the extension within the developing countries themselves of indigenous scientific research capacity. It is this capacity which will form the indispensable basis for the achievement of a research and development policy which is genuinely appropriate to these countries. Thus the programme is specifically aimed at strengthening developing countries' research institutions, and it complements the programme on Tropical Agriculture and Medicine adopted on 3 December 1982.

The proposed Community action would be mainly concerned with the operation and equipment of research centres, training of research workers and technicians, access to scientific information and dissemination of results.

As a preliminary phase the emphasis would be on agriculture, food and health, and the funds thought necessary to carry it out are in the region of 60 MioEcu, 40 MioEcu being for the agricultural and food aspect, and 20 MioEcu for health.

A noteworthy feature of the preparation of this proposal is that it was undertaken in collaboration between the Commission's Science Research and Development Directorate General, and the Development Directorate General, and that it corresponds closely to views that the European Parliament expressed on the question.

Conclusion

In conclusion, it should be emphasised that the Community's policy on science and technology for development is based on two complementary guidelines:

- 1) aid via the international or community level organisations already involved, which guarantees both immediate effectiveness and the necessary continuity;
- 2) aid for the emergence of the developing countries' national and regional research systems.

I hope I have shown that these principles are being respected in the activities I have briefly described, and that the Community attaches considerable importance to developing these to the magnitude expressed as a target in its new strategy for Community scientific and technical activities 1984–1987.

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