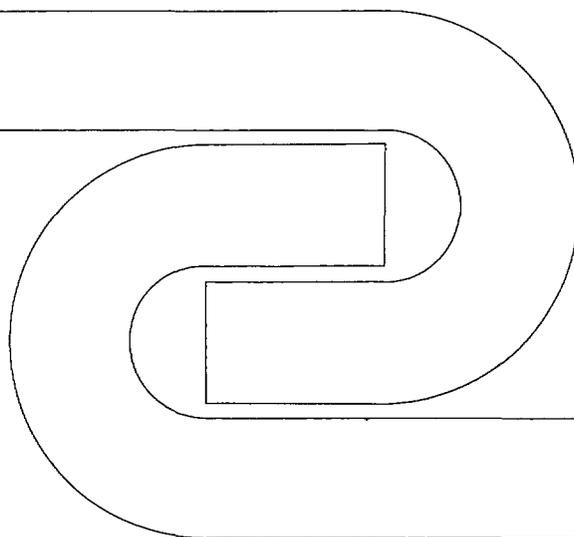


ECONOMIC AND SOCIAL COMMITTEE
OF THE EUROPEAN COMMUNITIES

**AIMS AND PRIORITIES
OF A
COMMON RESEARCH AND
DEVELOPMENT POLICY**

STUDY



Brussels 1982

This Study, presented by the Rapporteur, Mr Jean COUTURE, was adopted unanimously by the Section for Energy and Nuclear Questions at its meeting on 8 January 1982 chaired by Mr Paul HATRY.

At its 194th Plenary Session on 27 and 28 January 1982, the Economic and Social Committee, under the chairmanship of Mr Tomás ROSEINGRAVE, decided to forward this Study to the Council and the Commission of the European Communities.

ECONOMIC AND SOCIAL COMMITTEE
OF THE EUROPEAN COMMUNITIES

S T U D Y

Aims and Priorities
of a
Common Research and Development Policy

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This publication is also available in :
Danish, Dutch, French, German, Greek and Italian.

A bibliographical slip can be found at the end of this volume.

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Catalogue Number : ESC-82-001-EN

ABBREVIATIONS

ASEAN	Association of South-East Asian Nations
JRC	Joint Research Centre
CERD	European Research and Development Committee - A Committee of independent experts which advises the Commission on scientific matters
COPOL	Committee for comparing national and Community policies
CORDI	Advisory Committee on Industrial Research and Development - this Committee was established to advise the Commission on Industrial R & D
COST	European Cooperation in the Field of Scientific and Technical Research - An organization comprising 19 nations involved in research project programmes
CREST	Scientific and Technical Research Committee - Committee made up of senior officials of national authorities in charge of scientific policy
EURONET	A data transmission network set up by the Commission in conjunction with the Postal and Telecommunications Services of the Member States
FAST	A Commission sponsored five-year experimental programme entitled Forecasting and Assessment in the Field of Science and Technology.

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I. PREFACE

The Economic and Social Committee has for many years attached great importance to the formulation and application of a viable research and development policy within the European Community, and in particular to the role of an EC-level common policy in this sector. In 1976 this concern was expressed in a Study (Rapporteur : Mr NOORDWAL) which defined a number of objectives and priorities for such a common policy.

In the following years, a number of initiatives and actions were taken by the Commission and the Council regarding research and development at Community level and in the Member States. In the light of experience obtained during this period the Committee decided to draw up the present own-initiative Study to review objectives and priorities and to bring its contribution to defining the role of the European Community and its institutions in the future development of the common policy.

The Study also deals with the ways in which the objectives and priorities can be translated into action and the particular role of Community-based research centres. It also considers efforts to link research and development policy with other Community policies such as regional policy, agriculture, small and medium-sized businesses, and relations with developing countries.

The economic and social development of the Community is presently hampered by unemployment and the effects of the energy crisis. Research and development is one of the ways in which both these obstacles can be combated, but success presupposes the setting of precise objectives and providing the means to achieve them, especially at Community level. It is to be hoped that this Study will

provide a useful contribution towards the establishment of such objectives and will thus further improve the competitive position of European economies vis-à-vis the other industrialized countries through a vigorous and efficient development of science and technology.

II. INTRODUCTION

Scientific and technological development have played a crucial role in the history of mankind. Despite the objections of a minority who are alarmed at the speed of scientific advances, public opinion is, on the whole, firmly convinced of the potential benefits of these developments, provided a prudent, resolute approach is adopted at all times, in order to curb any adverse consequences. Furthermore, if the EEC aspires to keep a front-rank place in the international community of the future, it is virtually obliged to follow this course of action: if the Ten were to lag behind in the international scientific and technological race at this stage, its economic strength, and by the same token its independence, would soon be jeopardized.

It is therefore not surprising that the Economic and Social Committee deals regularly with matters relating to this field. In order to consolidate its work, the Committee has decided to set out its views on the scope for a common research and development policy. Before embarking on such a study, it is important to specify the areas to be covered, as well as defining objectives.

With reference to the first of these requirements, it is of course difficult to establish clear boundaries. There is not even a consensus on the terminology employed in this field. We could begin by examining "fundamental" or pure research which aims to enrich man's knowledge. By and large, the international scientific community recognizes no restrictions in this area of research, and its objectives are not directly related to the economic and social, or political, life of the countries involved.

The second type of research includes scientific activities upstream of economic and social matters although the links between the two are fairly informal. There are two fairly distinct categories here : (a) research which is primarily motivated by social factors, such as health and the environment, and (b) research which is directly economic in outlook, relating perhaps to agronomy and industry (1).

Further downstream we have applied research, which has clearer economic implications and is intended to yield practical innovations. The next stage is development, which is concerned with the commercial feasibility of a process. Finally there is industrialization in the full sense of the term : this deals with the marketing of the end products of the industrial process (including the agro-food industries).

The distinction between the various stages is largely arbitrary. The European Community can take action at all levels, and this Study will endeavour to examine the strategy to be followed.

(1) For the sake of brevity, the term "industry" will be taken as embracing all agro-food activities, with the exception of the actual process of cultivation. Likewise, the expression "R & D" covers all the activities referred to above. The exact interpretation of this abbreviation will depend on the context.

It must be borne in mind that our work is concerned with a "common policy" (1) in the field of research and development. Thus any discussion of what is in the best interests of the Community as a whole can only be seen as a prologue : the main themes of the common policy will be developed subsequently. Naturally, we will also take a look at the role of the various Community bodies and of the Member States and how these roles interlock.

The Study is divided into the following chapters :

Chapter 1 : Background and General Comments.

This consists of a review of all the Community measures taken in this field over a number of years; Appendix I provides the relevant factual information.

Chapter 2

This chapter sets out to define the possible objectives of Community R & D, these being normally based on the general objectives of the European venture. In addition to the long-term objectives, this chapter takes a look at the areas which should be concentrated on in the medium term and the various constraints to which they are subject.

Chapter 3

The guidelines and priorities of R & D are examined in greater detail here, with a review of the various abovementioned stages from pure or fundamental research to technological innovation and industrial development.

(1) This expression, which has various legal interpretations, is used here in its broadest sense.

Chapter 4

Chapter 4 discusses the different types of Community action and how they relate both to each other and to measures taken by the Member States. The special role of the Joint Research Centre is also examined.

Chapter 5

This chapter deals with the links between R & D and certain horizontal or sectoral policies for the following areas : LDC's, regional development, small and medium-sized undertakings and agriculture.

Chapter 6

This is a summary of the recommendations and general conclusions reached in the Study.

This Study cannot lay any claim to being exhaustive or even to dealing with every subject in sufficient detail. Moreover a brief look at the past shows the enormous strides which have been made in R & D. We hope nevertheless that, on the whole, the Study will be of some use.

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1. BACKGROUND AND GENERAL COMMENTS

Research and Development was not a top priority in the planning stages of the European venture (1) or during the first few years of its operation. R & D was barely mentioned in the Treaty of Paris and the Treaty establishing the European Economic Community : The EURATOM Treaty alone gave it a prominent position by setting up the Joint Research Centre.

Initially, attention was focussed primarily on rebuilding Europe's battered economy after the Second World War : this easily accounts for the role of R & D. Policy-makers, impressed by the American model, concentrated mainly on rebuilding industry and infrastructures and raising living standards along largely pre-set lines. In time, however, the model itself gradually came to be questioned. The role played by the public authorities in the process of acquiring knowledge and putting it into practice was increasingly recognized as being useful, not to say essential. Research Ministries were set up in many EEC Member States.

(1) The term "the European venture" occurs frequently throughout this Study. It covers the whole gamut of official instruments and the various measures stemming from the Treaty of Paris (establishing the European Coal and Steel Community), the Treaties of Rome (establishing the European Economic Community and "EURATOM"). The term "the construction of Europe" implies a certain confidence in the future of the secular process thus set in motion.

At the summit of 1972 it was decided to expand Community activity in R & D beyond the specific areas set out in the Treaties, and in 1973 the first Community programmes were started. In the period from 1973 to 1980 expenditure on Community research grew from about 70 m EUA to 300 m EUA; this expenditure was broadly balanced between Direct Actions (where the research is carried out by Community staff at the Joint Research Centre) and Indirect Actions (where the Community makes a financial contribution to research carried out on its behalf in other laboratories and establishments). A third type of action (Concerted Actions) was also developed over this period : in this case the work is carried out by Member States at their own expense, with the Community bearing the cost of coordinating it.

In 1972 the Commission established four main objectives for Community R & D (1) :

- 1) Extension of scientific and technical knowledge;
- 2) Social progress;
- 3) Development of advanced technologies for economic ends;
- 4) Mastery of progress.

These very general objectives were followed in 1974 by a Council Decision (2) agreeing to adopt a common policy for science and technology based on the coordination of national policies and the carrying out of certain Community actions.

(1) Doc. COM(72) 700 final.

(2) O.J. No. 7, 29.1.1974.

This was to be achieved by an analysis of Member States' R & D programmes, budgets and objectives, and by identifying those areas where a Community approach would be most valuable, thus stimulating efficiency and better cost effectiveness. These Council decisions formed the background for the Commission guidelines for the years 1977-1980 (1), which identified four main priority sectors for Community R & D :

- 1) Long-term security of supply for natural resources : energy, raw materials, agriculture, water;
- 2) Promotion of Community competitiveness in the world economy;
- 3) Improvement of living and working conditions;
- 4) Protection of nature and the environment.

The 1976 Study of the ESC (Rapporteur : Mr NOORDWAL) (2) was undertaken at a time when the direction and extent of Community R & D was restricted to certain sectors, but when the Commission was already beginning to move away from general to more specific objectives. A summary of the recommendations of the Study and how far they have been achieved is shown at Appendix I. This movement away from general objectives may have been precipitated by the energy situation and by preoccupation with more immediate economic problems. In any event, the Council of Ministers in 1979 approved the following five major priority areas for Community R & D :

(1) Bulletin of the European Communities, Supplement 3/77.

(2) CES 589/76

- 1) energy;
- 2) raw materials;
- 3) environment;
- 4) agriculture;
- 5) certain industrial R & D.

At the same time the Council requested the Commission to consider the possibility of setting indirect and concerted action programmes in a multiannual framework, the rationalization of management structures, and policies for evaluation and exploitation of the results obtained.

The Commission's reply took the form of three Communications :

"The Common Policy in Science and Technology : Priorities and Organizations" (1),

"Common Policy for Science and Technology : Exploitation and Evaluation of Research Results" (2),
and

"Common Policy for Science and Technology : Impact of Community R & D on horizontal policies" (3).

Specific reference should also be made to the Commission's Communication "Scientific and Technical Research and the European Community" (4), which relates to the 30th May Mandate and its connection with science and technology policy. In this

(1) Doc. COM(80) 412 final
(2) Doc. COM(80) 889 final
(3) Doc. COM(81) 66 final
(4) Doc. COM(81) 574 final

paper the Commission restates a number of earlier priorities and specifies certain new ones e.g. biology, information handling, communications and automation. It is also significant in that it proposes a general framework programme to embrace all research, within which Member States and Community Institutions will be able to discuss national policies, rearrange priorities and decide on joint actions.

To conclude this chapter, mention can be made of the deliberations of the Council of Research Ministers on 9 November 1981, during which a convergence of views on the role of the Community was noted (cf. Appendix II).

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2. OBJECTIVES

In such a broad field it is necessary to set certain limits in order to avoid getting lost. The main thing is to define guidelines in the light of what is desirable and feasible. In this chapter we will consider the objectives which can be set in the light of the aims which the European venture has set itself. The latter aims are of course very general and are open to diverse interpretations depending upon the views and points of reference of the parties concerned. The comments made below are based on the premise that the overall aim should be to achieve both qualitative and quantitative progress. This implies a

recognition of both (a) the need to increase the overall volume of resources available to the Member States for their internal and external use and (b) the constraints on growth referred to inter alia by the Club of Rome.

The first objective is to survive and in order to do this we have to meet the urgent requirements of the era in which we live. Europe is undoubtedly going through a very difficult patch and centrifugal forces are threatening the construction of Europe. We must therefore consider the potential contribution of R & D in this area so that we may be able to take up the challenges.

The vast majority of the population is interested mainly in improving their standard of living. The environment, working conditions, leisure facilities and culture are assuming more and more importance. Nevertheless, it is generally recognized that progress in these areas is largely contingent on progress in the economy as a whole. On another front, the question of links between the industrialized countries and the developing countries is also of growing concern to Community citizens.

It is quite clear that the Community dimension of R & D work must be guided chiefly by the opportunities which it provides and its potential contribution to the achievement of the Community's objectives. Needless to say the closest possible cooperation between European States in the field of

R & D can only have a positive effect in view of the fact that an amalgam of the different elements of the Community, which is attractive for a variety of reasons, is particularly propitious for R & D work. We must also take account of the fact that cooperation between the Member States is a rather new phenomenon. Up to 1973 Community R & D was confined to (a) the large-scale activities provided for by the EURATOM Treaty, and (b) the much more modest programmes under the ECSC Treaty. While the planning and implementation of R & D in new fields was sluggish, R & D in the nuclear sphere continued to be of considerable relative importance.

A large number of documents have assessed the Community's important achievements in the R & D field and set out possible guidelines for future work in this field. The latest of these documents, which was issued on 12 October 1981 is entitled "Scientific and Technical Research and the European Community - Proposals for the 1980s" (COM(81) 574 final). The Committee approves the points made in this document. The comments set out below are designed to clarify certain issues; there is no intention of undertaking a detailed critical assessment of the document.

Without wishing to open a debate on budgetary aspects, we are obliged to point out that the very scale of the Community's contribution sets rather narrow limits on any ambitions which might be held. Whether we take the ratio of Community funds to national expenditure or simply the proportion of the Community's general budget earmarked for R & D, the figure is still between one and two per cent. Despite rapid expansion

since 1974, the overall budget for 1981 is approximately 300 million ECU. Of course, part of the money spent may have a considerable multiplier effect as a result of indirect action. Nonetheless, the overall expenditure remains extremely modest. It is therefore obviously impossible to achieve all the desirable objectives and a choice must be made. The priority measures are considered in the following chapter. In this chapter we will simply set out the main criteria for determining the priority measures.

First of all it is clear that we must select objectives which are of primary importance to the Community and are beyond the scope of any individual Member State. In this field, the Community dimension comes into its own and Community-level cooperation is also necessary in view of contacts with other economic areas. The fusion programme is a case in point.

Secondly, there must be cooperation in those areas in which it would bring considerable advantages for all involved, either by backing up existing Community measures in other fields or by playing a role in fields in which the Community is already making itself felt (e.g. a number of environmental issues).

Thirdly, R & D objectives must take account of the priorities for Community action dictated by largely medium-term considerations. In this respect there is a need for a thorough appraisal (1) of the structural difficulties which are currently affecting the economies of all the Member States and are leading to increasingly intolerable levels of unemployment.

(1) The programme of forecasting and assessment in the field of science and technology (FAST) (1978-1983) is already a considerable step forward.

This leads us to consider the potential role of the humanities in Community R & D work. There is no doubt that at the present time their role is almost non-existent except for the work of the University Institute of Florence whose role could be expanded. The chain of events set out above offers a ready explanation for this situation. Furthermore there is no reasonably consistent scientific community for the humanities, as there is for the physical sciences. The political objectives of the individuals and groups are inseparable from the contributions which they may make in the field of the humanities. The difficulties which befall all significant innovations when they come before the Council are in themselves a considerable deterrent to any Commission initiatives. Nonetheless, it is fair to say that there is a shortcoming in Community R & D which deserves attention.

Finally, Community R & D should be given a number of tasks which are complementary to the various activities requiring a community approach. These include the sectoral policies considered in Chapter 5 below and also what might be termed the "general services" of Community R & D. The latter are mainly concerned with researching the information which the Commission and other Community bodies need for their work. The Joint Research Centre (JRC) is the principal instrument in this field.

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3. PRIORITIES

The 1974 approach was designed to cover all areas, but it soon became necessary to concentrate the Community's activities and in 1979, the Council of Ministers defined five priority target areas (1), which were endorsed and updated in the Commission Communication of 12 October 1981. Before these targets are discussed, it would appear useful to discuss, one by one, the various levels of R & D which have been defined briefly in the Introduction.

Fundamental research

This refers to pure science, i.e. its sole aim is the acquisition and expansion of human knowledge without any prior regard to its application. Cosmology and basic molecular biology are examples of this. Naturally this does not mean that any advances made will not necessarily be applied later on in science or industry. Indeed, the possibility of practical application is one of the factors which must be taken into account by the overall strategy to be adopted towards pure research. It is also an established fact that the most powerful nations have particularly extensive and highly efficient facilities for carrying out pure research. There are therefore firm grounds for maintaining that this type of research must receive Community priority. However, when defining a common

(1) 20 December 1979, 619th meeting of the Council (Research)

policy, the question arises of whether the Community is a particularly suitable platform for this type of activity and whether ambitious programmes stand a chance of being adopted at this level.

The answer to both questions seems to be no. Firstly, fundamental research goes far beyond the frontiers of the Ten and in addition the European Science Foundation does not cover the same countries as the Community; secondly, it would probably be very difficult to get sufficient agreement within the Community on a programme of any real significance; and last but not least, international links in this field are particularly strong and desirable.

However, the scale of some basic research programmes is such that one may question the wisdom of grouping Member States' action either by projects involving all the Member States, by programmes whose international impact goes beyond the Community, or by projects involving only some of the Member States.

Under the circumstances it would be a pity not to take advantage of the Community dimension to boost the importance of Member States' action. On the other hand, it must be admitted that the aims and procedures do not in themselves necessitate a Community dimension. Probably there is no one solution to this problem and the answers may vary considerably depending on the case in point. At the very least the Community authorities should be informed whenever such a possibility occurs and the Member States' answers should be discussed in advance.

However, as stated above, the different levels of research and scientific activity are not totally isolated from each other and any developments initiated or assisted by the Community will, in the final analysis, assist the spread of knowledge. It would therefore seem wise to adopt a more moderate line and say that if any direct or indirect Community action opens up new possibilities in pure science, this chance should not be allowed to slip and modest funds should be siphoned off in such cases, which will remain exceptional.

Applied research

The purpose of applied research is to determine the scope for exploiting established or embryonic scientific knowledge. This is of course an extremely vast field. Clearly, priorities must be fixed at this level also. It is moreover possible to distinguish two phases, which are quite distinct despite some overlapping. These are : long-term research, which involves exploring several avenues (where they exist) in order to obtain a desired result, and technical applications research, which checks the "technical feasibility" of an operation (e.g. the manufacture of a new plastic product) though not the "economic feasibility", which is dealt with at the development

stage discussed below. Research at this level is carried out by major industrial or trade research institutes and, to some extent, by large-scale private laboratories.

Economic considerations do not play a dominant role at this stage but their influence is often felt. A very large proportion of research work - in terms of both quality and quantity - is concentrated on this extremely large field. The ESC endorses the priorities which the Council fixed in this vast complex in 1979. All the same, it must be said that the balance between the five chapters is not by any means ideal in abstract terms. Thus, the enormous chapter on thermonuclear fusion should be kept separate from the rest. This chapter forms a self-contained whole and it is practically impossible to prune its size, if it is to have any chance of success. One particularly striking feature is the very small proportion of the budget allocated to research into raw materials and agriculture. These two areas are certainly of considerable importance for the Community's economic equilibrium, and Community endeavours here could usefully be stepped up. Research here should be focussed on the openings with the best prospects for reducing the Community's dependence on imports : some measures should probably be sufficiently profitable to justify Community support.

On the other hand, the Commission's departments are interested in an unusual mix of subjects. Even if each of these subjects has a definite value, there is no justification for such a wide range and this is moreover the view taken by the

Commission in its October 1981 document. The policy which the Commission now intends to pursue deserves unqualified approval. It involves :

- firstly, defining the Community's R & D strategy in an overall context;
- secondly, tightening up activities across-the-board and concentrating on a number of topics which are particularly important in the medium term (e.g. energy conservation, biotechnology, information handling and computerization);
- thirdly, boosting Community activities in strategic areas such as agriculture and some sectors of industry;
- and finally, tackling the major imbalances both inside and outside the Community by mastering the relationship between technological progress and social change and establishing constructive links between industrialized nations and LDCs. The Commission's latest attempt to concentrate its activities and thus improve their effectiveness should be welcomed.

Development

This aspect of scientific and technological activity is designed to demonstrate the commercial feasibility of projects by examining the economic factors governing production and the prospects for marketing the product or products concerned. This

is clearly a matter for businesses and consortia and it would be futile to discuss whether development falls under R & D policy rather than under industrial or agricultural policies.

The Commission's recent statements are particularly interesting, insisting as they do on the need for an overall approach to aims and resources. R & D must not be a law into itself concerned mainly with economic applications : on the contrary it must play a permanent role and be a source of inspiration to Community action.

Prior to any decision in this area, account would have to be taken of (a) "upstream" factors, i.e. the present state of scientific and technological knowledge, and (b) "downstream" factors, i.e. the benefits of the proposed developments in terms of their socio-economic profitability.

Thus, especially in this case, a common policy cannot lay down hard and fast guidelines in advance. However, it can and must provide ways and means to enable the Community to give support to the most effective and most promising projects.

Reference should also be made to "variable geometry" programmes. These would involve the carrying out of certain predevelopment studies on the basis of a Community decision. Development proper would be taken care of by the Member States concerned, preferably within a Community framework.

Obviously the ability to react swiftly is of a paramount importance, flexibility being the key word. To this end, an operational structure with reasonable resources must be set up and must be given extensive decision-making powers. It would be accountable for its decisions, although it could not be denied the "right to make a mistake".

Aid to enterprises

It is difficult to calculate precisely the amount of aid innovatory enterprises in the major rival economies of the Community receive from the public authorities on which they depend. There is no doubt however that this direct or indirect aid plays a very important role in the international struggle waged by these protagonists. One may therefore legitimately question the position of our enterprises in this respect. It is not certain that national and Community aid puts them on an equal footing.

Naturally the arrangements for such aid are extremely varied. Firstly they may involve the possibility of direct or quasi-direct aid in the form of research programmes conducted by public institutions, the results of which are made available to enterprises, or research contracts carried out by these enterprises and financed wholly or in part by public funds.

Secondly, a large number of indirect measures may be relevant : such as contracts concluded between institutions and enterprises where there is no direct link between the objectives of the contract and the commercial interests of the enterprise, but where the latter could benefit from the repercussions.

This is an area where the Commission, DG XII in particular, could usefully draw up if not a complete set of rules, at least a series of measures providing enterprises with sufficiently easy access to various facilities for obtaining Community aid for innovation. There is no need to dwell on certain particularly sensitive aspects of this problem : for example, how is a choice to be made between different enterprises with similar aims, given that it would not be wise to encourage both unconditionally. There is also the question of the excessive profit which some enterprises could reap from such measures without any quid pro quo for the Community.

In view, however, of the relentless struggle faced by the various parties involved, the Committee is convinced that dynamic action is more important for the overall objectives of the Community than the difficulties just mentioned.

4. ORGANIZATION AND IMPLEMENTATION OF R & D

Strictly speaking, this paper should confine itself to the above definition of a common policy's priorities. Nevertheless it is essential to give a brief description of the way R & D is structured in the Community, and to investigate the scope for implementing the measures involved.

The Structure of R & D

Community involvement can assume various forms. At the one extreme, all public resources earmarked for R & D in the Member States could come under a single organization, subdivided into increasingly diversified groups. Such a structure is obviously impractical and criticism is superfluous. At the other extreme, the Community would only be providing back-up for specific projects where this appeared to be warranted. Although the resources of a common policy are limited, such a structure is not wholly desirable either, and the present structure would certainly seem preferable.

It must be remembered that the Community takes both direct and indirect action. In the former, the Community manages the work usually through the Joint Research Centre. Although the JRC went through a difficult period, the balance has now been redressed and it seems to be carrying out its tasks satisfactorily.

The nuclear fusion programme is a prime example of Community indirect action. Funds are regularly assigned to this programme and the last revision of the 1982-1985 programme was endorsed by the ESC (1).

(1) O.J. No. C 297 of 28 November 1979, page 9

Indirect and concerted Community action takes two forms:

- the Community coordinates national programmes by encouraging cooperation between research organizations interested in a specific subject;
- it complements action already taken by the various parties involved.

Useful though the distinction between direct and indirect action may be, the Commission's efforts to achieve an overall, concentrated approach deserve fullest support. Certain cut-backs may have to be made in return : given the limited resources currently available, the Commission will almost certainly have to cut off support, or at least not renew it, for several programmes whose intrinsic value is beyond question, but which would simply be incompatible with streamlining.

The Committee warmly welcomes the Commission's intention to expand not only its R & D activities but also its work on pilot projects. It would be worth financing pilot projects in many areas, as is currently being done in the field of energy.

The Committee also approves the Commission's intention to develop a "policy of stimulation and of projects" (1) conjointly with the "policy of individual programmes" around which its strategy has been centred hitherto.

Implementation

A number of difficulties have come to light, and should be examined : there are far too many Commission-sponsored Committees involved in directing, proposing, monitoring and assessing R & D programmes. The people in charge are in no doubt about this and the ESC has, on various occasions, expressed its concern on the matter. Like the moves to adopt an overall approach to Community policy, great perseverance present arrangements are to be simplified. Any one of the R & D programmes amply illustrates the cumbersome procedure involved in getting a programme past the planning stage. A particularly notorious example was the considerable delay in deciding on a site for JET. The importance of the issues at stake partially explains the delay but such arguments are less convincing in the case of more modest programmes.

(1) Doc. COM(81) 574 final.

Community procedures must make for greater flexibility in line with practice in at least some of the Member States where the Government is entitled to transfer funds allocated by Parliament within the same budgetary heading. Without wishing to enter into detail, the ESC believes that it is essential to simplify procedure. The concept of a research "block vote" should in particular be given careful thought. Prior authorizations could in many cases be replaced by ex post facto checks.

Budget

As has already been mentioned, Community R & D has a very tight budget. In a recent statement, the Commission noted the need to double the present overall Community R & D budget in real terms by 1986. In the light of the abovementioned moves to strengthen and concentrate Community action in the most needy sectors, the Committee can only endorse this proposal which, if accepted, at present would mean that as little as about 3% of the total Community budget would be allocated to R & D. However, it

is obvious that at the present time any move to substantially adjust the budget would undermine the Community's foundations. While not ignoring this aspect, the ESC cannot allow such considerations to hamper the successful implementation of measures which were deemed necessary after much careful reflection. The ESC firmly believes that R & D's importance and the results to be expected of it in the medium and long term must take precedence over any objection.

The "ageing" of research workers ... and of the Institutions

One of the most serious problems facing those responsible for R & D cropped up frequently while this Study was being prepared, i.e. the present and, more to the point, future problems created by the age pyramid of research workers employed both in national organizations, and in Community Institutions. R & D activities expanded in the Community as a result of the considerable impetus provided by nuclear research. This was followed by a period during which recruitment was confined to the bare minimum needed to maintain staff complements. While this is not the case in the universities, which by definition attract the rising generation, the problem has become acute and could have very unfavourable consequences for the major specialized research institutes.

Research institutes themselves have "age" problems : their entire structures are endangered by the bottlenecks in the higher grades which stifle the initiative of younger research staff and even sap their motivation.

This paper is not concerned with finding a miraculous solution, nor even with discussing the subject in any great depth. Nevertheless it was felt necessary to mention these very difficult issues which, especially in the long term, will inevitably have a significant impact on R & D policy as a whole.

Obviously, partial remedies have already been applied, especially as regards encouraging mobility amongst research workers. The ESC endorses such measures, and hopes that the Community will take vigorous concerted action on career prospects and the Institutes' efficiency.

Assessment, distribution and exploitation

The importance of the subjects under these headings need hardly be emphasized : basically the aim is to ensure that R & D activities produce an impact on the economic and social sector, by assisting their development and the attainment of Community objectives in the most effective way possible.

These three aspects are largely interdependent. An assessment must take into account the use made of the results obtained by the programme in question, and this would usually depend on how widely these findings had been disseminated. However, in the interests of clarity it is necessary to examine these three headings separately.

The aim of assessment is to decide whether studies were worthwhile and to evaluate the work involved. A systematic assessment should be undertaken when work has been completed, if not before. In the case of long-term programmes, regular progress reports should be undertaken in order to confirm the programme's validity and to check that the results already obtained or to be reasonably expected are in proportion to the resources assigned to the programme.

Such an assessment can only be carried out by experts who have no connection with the programme itself but possess first-class scientific knowledge and technological experience in the area concerned. Such conditions are not always easily fulfilled. On the one hand the feeling of comradeship between research staff could lead to the "assessors" being overindulgent, and at the other extreme, since science is not exempt from such things, factional rivalry may lead to disputes between two or more schools.

In order to minimize these problems, high-ranking non-Community experts could be called upon where the issue at stake warrants such a step. Nevertheless, even though this is a sensitive point, it might be preferable for the Commission assessors to have had no actual part in drafting the programmes. In addition DG XII could possibly draw up "standards" which would serve as a guide for assessment.

The Commission has already taken steps in this direction (1), and the ESC endorses its attempts. A cost-benefit analysis must obviously be undertaken before such measures are generalized. But it seems reasonable to assign a few per cent of budgets to such checks.

One of the basic principles of Community R & D is that results must be made available to everyone, subject to the protection of legitimate rights. Nevertheless it is not sufficient to pay lip-service to this rule, nor even to provide interested parties with the requisite documentation. R & D findings should be made readily available and all serious impediments to their dissemination should be removed, subject, of course, to the need to protect inventors' legitimate rights. It is therefore the Commission's duty to take all necessary measures to accommodate potential users, and ensure that they are able to derive maximum benefit from the knowledge which has been acquired.

Significant resources should be devoted to the dissemination of information and the Community departments, Institutes and representatives of economic activity should thrash out what form these should take. Any arrangements should be flexible enough to adapt to the rapid changes which are taking place in the vast array of information technology available : data banks, real-time data access, etc.

(1) Document EUR 6902.

It would be useful to organize symposia and training schemes for workers in small and medium-sized businesses and for users and consumers so that they can :

- learn more about the operation of information networks and the services they can provide, so as to overcome any psychological or technological barriers, and
- keep up-to-date with the most recent advances in their particular field.

The Governments of the Member States and the Commission could profitably work together to survey existing facilities in this area, exchange useful information, and encourage and assist those initiatives already taken and any new ones which seemed appropriate; the aim would be to provide, as far as possible, an all-round stimulus to the Community's economic activity.

As noted above, the application of scientific and technical progress would be largely taken care of through the channels just referred to. But there is an important role for Community organizations in another direction : steps to enable natural and legal persons involved in research to exploit their findings to the full will not only have a multiplier effect on downstream benefits but will also encourage upstream activities, i.e. R & D itself.

In this connection the introduction of a European patent was clearly very important. Its effectiveness will be enhanced as it becomes easier to obtain and the protection it affords is reinforced. CORDI (1) has suggested the establishment of a Community fund to provide Member State nationals with assistance towards the cost of taking out and maintaining a European patent. This proposal should be looked at in a favourable light.

The Community has faced a difficult economic situation for some years. The result is that firms are generally less inclined than in the past to embark on ventures based on innovation and at the same time less well equipped with the requisite resources. Yet the transition from R & D to industrial innovation and commercial success is the very essence of application of results. The difficulties involved should therefore be closely scrutinized so that all appropriate measures can be taken. None of these will be easy to apply, but no effort must be spared in this direction. By way of example, one might recommend the introduction of measures to help "venture capital" companies in the private sector, such as exemption from certain taxes. Public corporations could also be encouraged to promote innovation, both in their own activities and in those of their suppliers and customers.

Without wishing to dwell on one topic, albeit one deserving further attention, we may mention in conclusion that one factor conducive to the exploitation of R & D is the Community's very size and economic importance. Everything which helps the common market function properly and makes goods and services freely available is liable to encourage innovation.

(1) Doc. CORDI 11/81 rev. of 14 May 1981.

A similar comment could be made with regard to relations between the Community and third countries, insofar as trade can be facilitated and simplified by the harmonization of the rules applied by the Member States.

5. SECTORAL POLICIES

As part of its policy guidelines decision of 20 December 1979 the Council requested the Commission "to assess the possible impact of Community R & D on horizontal policies (such as regional policy, future structural economic and industrial policies with particular reference to small and medium-sized enterprises and policies on aid to developing countries)" (1). The Commission is at present seeking ways in which its R & D policy can be related to the needs of these other policies, so that an overall approach linking R & D with the general development of the Community can be maintained. In addition to the three areas mentioned above, agricultural research is also a vital sectoral policy in this context (2).

Agricultural policy

The research programme is approved by the Commission on the basis of recommendations of SCAR (a committee of directors of agricultural research in the Member States). The current programme consists of 10 subjects grouped within four categories, viz. : socio-structural objectives, elimination of market barriers in agriculture, production efficiency and alternative products. It is possible that future research areas

(1) Quoted in Doc. COM(81) 66 final.

(2) See "Towards European Research - Coordination of Agricultural Research in the European Economic Community", EUR 6720.

could be directed towards energy saving or environmental considerations, or improving the situation of disadvantaged farm families in certain regions. This kind of research would fit in with other Community policies and thus attack a particular problem from two fronts. One of the constraints in much agricultural research is the long biological cycles which impose limits on the achievement of a five-year programme, and some solution has to be found for this.

Developing countries

The needs of the developing countries are often directly related to the development of science and technology, and while most R & D programmes at Community level are conceived and managed in the interest of the Community, the obligations flowing from the EDF, Lomé, Mashreq and Maghreb agreements all provide for R & D in the interest of the countries concerned. While there are possibilities for developing Community R & D for the benefit of the developing countries, there are limits to what can be achieved. Above all, the Community has to ensure that any research effort in this direction does not merely duplicate programmes being carried on elsewhere, and it has to eliminate the conflict of interest in such programmes carried out in Community research laboratories for the benefit of developing countries. R & D to aid developing countries should ideally be planned in cooperation with those countries and carried out there. Expansion of this kind of R & D in the Member States is of relatively limited value, save in exceptional cases.

Regional policy

The Commission is of the opinion that research institutions in the less prosperous regions of the Member States receive a fair proportion of contracts but that the quantity of work that this represents makes little impact on the economic development of those regions. R & D planned in relation to regional policy could help both develop regional R & D infrastructure and contribute to the regional objectives themselves.

In the past, research institutes have tended to become concentrated in the more prosperous central regions of the Community. While it would be a help to the less developed regions to establish more R & D facilities here, there is a danger that in the pursuit of regional aid the original R & D objectives may be lost sight of. For this reason any attempt to carry out "positive discriminations" in favour of peripheral Community areas should be monitored carefully to ensure that the end result is not a minimal impact on regional development and inefficient R & D.

Quite clearly, Community R & D programmes in the field of energy, environment, agriculture and fisheries can aid the regions. But the key to their results in regional development may be to direct attention to the diffusion of information on results, development projects and practical applications, rather than to try to displace research activities into those regions.

Small and medium-sized enterprises

There are two main aspects to consider - R & D for the SMEs and R & D by the SMEs. SMEs (business organization with less than 500 employees) represent between 60% and 80% of total Community production, but they are often unable to carry out research themselves because of lack of facilities or finance. Community actions could be directed in a number of ways :

- a) Programmes of research to aid those industries which are characterized by their SME-based structure;
- b) Provide access to venture capital as a stimulus to innovation in SMEs;
- c) Ensure that SMEs get a large share of research contracts - but here the danger of the double objective has to be watched;
- d) Aid SMEs in "science-intensive" or growth sectors of the economy via financial help for their development.

The main problem here is how to pick the winners. Whatever criteria are adopted, it should be ensured that the funds available really go to worthy projects and are not just divided up "fairly" between the Member States.

Quite obviously there are synergies and multiplier effects to be trapped via an R & D policy which takes sectoral considerations into account. However, attention has already

been drawn to the danger of a double objective in certain areas: by arriving simultaneously at two objectives, neither is achieved. The need for coordination can be an excuse for delays in decision making as well as the means to balanced policies.

6. CONCLUSIONS

There are no frontiers to science and its applications. It advances irregularly but along the whole front, with break-throughs which are impossible to predict. If, however, we are to arrive at a common policy in this area it is essential to make certain distinctions and to define priorities. This is all the more necessary as the Community's resources are necessarily limited, both in budgetary terms and by inevitably cumbersome procedures.

International cooperation on basic research (the acquisition of knowledge without economic or social objectives) must in general remain the province of the European Science Foundation, which goes beyond the bounds of the Ten, on the understanding that the Commission remains in close contact with this body.

All long-term applied research must be coordinated and discussed by the national governments and the Commission as part of the common R & D policy. The Committee approves the list of priority sectors to which the Council agreed in 1979 and the Commission proposals of October 1981 emphasizing the new technologies. The Committee also welcomes the consensus achieved at the Council of Research Ministers on 9 November 1981.

The Committee would, however, draw the attention of the governments and the Commission to the fact that the present situation in several Member States is disquieting not only from the economic angle : the very foundations of the "social contract" are frequently being threatened in the wake of under-employment. For more and more people the quality of life is becoming more important than ever-increasing consumption. In fact, these two objectives are not incompatible, since economic growth is crucial to efforts to improve the environment and working and living conditions. Thought should be given to the role of R & D in helping to understand and respond to such trends.

In the areas of medium and short-term applied research, the common policy should follow two main lines of action :

- measures to encourage the priority sectors;
- general aid to institutions and businesses.

No one would dispute the need to restructure economic activities in the Community despite the wide differences of opinion about the precise objectives and ways of attaining them. There is also agreement on the fact that this restructuring is a precondition for progress towards European integration. Any common R & D policy must therefore take account of the various aspects of the present situation and, as far as possible, help bring about the necessary changes.

Account must also be taken of the enlargement of the Community and of the ambition which the Community can and must nurture to play a major role in international relations, the North-South dialogue in particular. For this reason it is important to highlight those recommendations in the Study which are most likely to make the common R & D policy a more effective instrument in the service of the European Community.

The "nuclear fusion" programme merits special attention because of its specific nature and importance. Needless to say it must be continued over the coming years with the hope that the feasibility of this reactor family can be proved. The need for perseverance is self-evident.

The modest scale of the Community R & D budget is striking. Certainly a great deal can be done by coordinating the efforts of the Member States and cooperating with third countries and international organizations. The fact remains that, even for launching a programme, the possibility of contributing a fraction of its budget gives the Commission an instrument whose impact is often out of all proportion to the amounts involved. Therefore increasing the proportion of Community resources devoted to R & D must be regarded as a major priority for progress in the European venture.

At all costs we must oppose the perennial tendency to dissipate funds; whatever the foreseeable trend in this respect it is clear that resources will not be commensurate with objectives. The need to concentrate resources must therefore

be borne in mind at all times. In this connection the Commission's attempts (which it proposes to step up) to group programmes must be given unqualified approval. Following the guidelines recommended by the Commission, this re-grouping must be accompanied by an intensive integration of the various areas of R & D, as a result of internal coordination within the Commission. It is also very desirable that this integration extend to relations between the Member States and the European research institutes. At the same time there must be greater selectivity in the choice of R & D programmes.

The unwieldiness of the consultation and decision-making procedures is a major obstacle to the effectiveness of Community R & D projects. While consultation between all the interested parties is thoroughly laudable in principle, we must avoid a proliferation of committees. This comment is not specifically confined to R & D work, although the diversification and specialization of research and research workers is a specific factor in the ever-increasing number of meetings. Without underestimating the extreme difficulty of finding effective, practical measures, the Committee endorses the measures already adopted to this end and would like to see them extended, mainly through the grouping of programmes submitted to the Council for approval.

The deep-rooted origin of the crisis besetting the Community is the long-standing unrelenting economic competition between the political superpowers. None of the Member

States can aspire to play a lone role in this conflict; following the lead given by the Community's founders, it is by joining forces that the Member States can put themselves and their achievements on a par with their competitors. Industry is in the vanguard of this campaign. Technological research supplies the resources and basic research, in its turn, nurtures technological research. Success or failure, economic and social expansion or stagnation will undoubtedly be determined by the value and effectiveness of the various stages of R & D and the way they are implemented. The various stages must be smoothly coordinated and the progress achieved must be disseminated without delay. The crucial importance of the issues at stake must never be lost sight of.

APPENDIX I

Review of the recommendations made in the 1976 ESC Study regarding Objectives and Priorities for a Common R & D Policy

The 1976 ESC Study entitled "Objectives and Priorities for a Common Research and Development Policy" contains 17 recommendations regarding the whole area of R & D policy. Some of these recommendations lay down objectives, others contain specific or general policy recommendations, while yet others relate to the operation of the JRC. Over the space of 5 years there has been a considerable development of Community R & D activity, and many of the recommendations have been followed by the Commission, while others have become obsolete.

1) Recommendations regarding objectives. Apart from general objectives such as furtherance of well-being and balanced economic and social development, which cannot be usefully monitored over a period of 5 years, the Study set out 5 principal objectives :

- i) extension of scientific and technical knowledge;
- ii) social advance;
- iii) development of advanced technologies for economic ends;
- iv) mastery of progress;
- v) raw materials' management.

It is difficult to make any assessment of the achievement of these objectives but many of the Commission programmes (micro-electronics, biotechnology, informatics, nuclear safety, raw materials) are commensurate with them. Since 1979, however, objectives have become more precise and Community policy directed to certain specific areas.

2) General Recommendations. The recommendation regarding a long-term forecasting instrument has been followed by the Commission in setting up the programme "Forecasting and Assessment in Science and Technology". This programme is intended to help develop a long-term Community R & D policy, and covers 3 main themes :

- (1) work and employment;
- (2) the information society;
- (3) the bio society.

The recommendation regarding basic research as a Community priority has however not been followed up since the establishment of the European Science Foundation : at the present time basic research at Community level is restricted to areas pertinent to certain programmes. Other recommendations of a general nature have been rendered obsolete since the Council's 1979 decision to concentrate Community research in five priority areas (energy, environment, agriculture, raw materials, certain industrial R & D). Further recommendations of the Study are of such a general nature that no real assessment of them can be made.

3) Specific Recommendations. As recommended by the ESC, the Commission has been able to maintain a "fair balance" between Direct and Indirect Actions, as is shown from the following table of expenditure

	(000 UA, current prices)			
	1977(1)	1978(1)	1979(1)	1980(2)
Direct Actions	83,960	104,493	120,018	126,844
Indirect Actions	50,614	71,185	110,185	130,211

(1) Budgets 1977-1979
(2) Budget proposal 1982

Other specific recommendations (e.g. a decision on the siting of JET) have been carried through. Coordination of national R & D work, which the ESC considered to be "an important Community task", was launched at the COPOL conference in 1979 and will be continued at a further series of meetings in January 1982. The Commission has also strengthened cooperation with developing countries via R & D programmes for their benefit and by cooperation under the Lomé and other regional agreements. As regards the application of results, this has been furthered by the establishment of the Advisory Committee on Industrial Research and Development (CORDI) and by the STID action plan (Scientific and Technical Information and Documentation), as well as by the use of research contracts guaranteeing the arrangements for disseminating the results obtained.

- 4) Recommendations concerning the JRC. The ESC's 1976 Study looked to the enlargement of the role of the JRC and its strengthening via new staff and personnel policies. In the same year, new regulations for the whole of the scientific sector were introduced which attempted to safeguard the rights of employees and at the same time promote the mobility of scientific personnel. The JRC's current programme (511 Mio ECU) is apportioned (in expenditure terms) as follows :

Nuclear safety and fuel cycle	49 %
New energy sources	15 %
Environment	10 %
Nuclear measurements	9 %
Specific support to Commission activities	7 %
Operation of High Flux reactor	10 %

The role of the JRC in the energy programme reflects the Commission's stress on this aspect of R & D as a motor for Community economic development.

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APPENDIX II

EXCERPT FROM THE PRESS RELEASE OF THE 736TH MEETING OF THE
COUNCIL OF RESEARCH MINISTERS ON 9 NOVEMBER 1981

GUIDELINES FOR SCIENTIFIC AND TECHNICAL RESEARCH

On the basis of the Commission Communication of 12 October 1981 entitled "Scientific and Technical Research and the European Community - Proposals for the 1980's", the Council held a wide-ranging policy discussion on the broad outlines for the planning and organization of Community research activities in coming years.

The discussion concentrated essentially on the need to define a Community R & D strategy and the objectives and scope of the latter and took place within the framework of the current proceedings under the 30 May Mandate. It was understood that the guidelines emerging in the course of the Council's discussions would be taken into consideration by the Working Party on the Mandate and by the Foreign Affairs Council in preparing the discussions of the European Council to be held in London on 26 and 27 November 1981.

In his summing up, the President of the Council noted that a broad consensus existed on :

- the need to develop scientific and technical research at Community level in order to support the policy objectives of the Community and the Member States, in particular in areas where Community activity offered advantages as compared with other forms of action, be they national or coordinated amongst the States;
- the encouragement to be given to the Community's plans to improve the efficiency of the Community's R & D activities and particularly its catalyzing role as regards Member States' research activities;

- a wish that the Commission develop its ideas and submit concrete proposals - which the Council might examine at its next meeting - in particular on the following areas :
- the concept of a general framework programme involving an overall strategy;
- the stimulation of the efficiency of the European research system;
- optimum utilization of the resources available;
- coordination between national policies;
- orientation of the R & D programmes towards the needs of industrial innovation;
- consideration of the social consequences of scientific developments.

The discussion also highlighted the need to improve the consultation machinery for preparing the Community's R & D policies and the Council urged the Commission to ensure that its ideas were soundly backed by the necessary scientific and technical opinions. It also stressed the importance of the Commission's continuing its efforts to improve the dissemination of information within the Community.

A major topic of discussion was mobility within the scientific Community and the Commission was asked to make suitable proposals to promote such mobility.

With respect to the funds to be assigned to scientific and technical research, the Council acknowledged that the Community's efforts to develop research activities might also have financial implications. It would take a decision on this question once it received the proposals the Commission was due to submit in the next few months.

On a general note, the Council agreed to meet more frequently in order to play an active role in defining and implementing the new scientific and technical strategy necessary for the industrial prosperity of the Community.

APPENDIX III

GOVERNMENT FINANCING OF RESEARCH AND DEVELOPMENT 1975-1980 (in Mio EUA at current values and current exchange rates)

Total financing of Government R & D

	BR Deutsch- land	France	Italia	Neder- land	Belgique België	United Kingdom	Ireland	Danmark	EUR 9	Comm. eur.
1975	4.177,3	3.181,8	559,8	644,3	363,6	2.366,7	28,7	178,7	11.500,9	127,3
1976	4.637,8	3.373,7	628,7	800,0	457,6	2.634,8	32,8	215,4	12.780,9	147,0
1977	4.833,0	3.555,6	708,8	902,0	504,2	2.541,2	38,8	230,5	13.314,2	209,4
1978	5.574,1	3.925,3	792,6	1.010,4	426,0	2.564,9	43,7	228,5	14.565,4	242,5
1979	6.308,0	4.541,9	923,2	1.049,2	468,9	3.134,8	56,8	233,6	16.716,4	237,7
1980	6.753,1	5.299,1	1.303,1	1.125,2	519,7	4.138,9	61,0	216,9	19.417,0	284,3
1980 p	6.752,2	5.160,5	1.206,5	1.138,8	492,6	4.370,7	61,8	221,6	19.404,7	297,5
1981 p	7.069,5	6.108,6	1.680,7	1.174,1	520,7	5.985,3	81,1	248,8	22.868,7	346,4
Mean trend per year 1975-1980	10,1	10,7	18,4	11,8	7,4	11,8	16,3	3,9	11,0	17,4
Expected change (%) 1981p-1980p	4,7	18,4	39,3	3,1	5,7	36,9	31,3	12,3	17,9	16,4

Notes: p: Provisional figure based on the draft budget

Source: Government Financing of Research and Development in the Community countries 1975-1980, Statistical Office of the European Communities

Financing of Government R & D
(excluding defence expenditure)

(in Mio EUA at current values and current exchange rates)

	BR Deutsch- land	France	Italia	Neder- land	Belgique België	United Kingdom	Ireland	Danmark	EUR 9	Comm. eur.
1975	3.716,6	2.232,5	541,1	621,9	361,1	1.268,3	28,7	177,4	8.947,6	127,3
1976	4.108,4	2.326,0	600,4	774,1	454,9	1.378,6	32,8	213,7	9.889,0	147,0
1977	4.230,3	2.467,5	677,0	874,1	502,5	1.275,9	38,8	228,7	10.294,9	209,4
1978	4.896,6	2.618,6	758,6	979,5	425,0	1.243,6	43,7	227,4	11.192,8	242,5
1979	5.572,1	2.938,0	894,5	1.017,0	467,0	1.459,0	56,8	233,0	12.637,4	237,7
1980	6.067,7	3.365,2	1.268,1	1.089,7	518,3	1.894,0	61,0	216,3	14.480,3	284,3
1980p	6.063,0	3.238,3	1.155,1	1.104,5	490,4	1.941,0	61,8	220,4	14.274,4	297,5
1981p	6.446,3	3.936,2	1.647,7	1.139,2	519,3	2.862,1	81,0	248,1	16.880,1	346,4
Mean trend per year 1975-1980	10,3	8,6	18,6	11,9	7,5	8,4	16,3	4,0	10,1	17,4
Expected change (in %)	6,3	21,6	42,6	3,1	5,9	47,5	31,3	12,6	18,3	16,4

Notes: p: Provisional figure based on the draft budget

Source: Government Financing of Research and Development in the Community countries 1975-1980,
Statistical Office of the European Communities

R & D financing in the context of other economic aggregates

		BR Deutsch- land	France	Italia	Neder- land	Bel- gique België	United Kingdom	Ireland	Dan- mark	EUR 9
Government R & D financing in % of total budget	1975	4,37	5,50	1,40	3,15	2,23	2,86	0,94	1,76	3,57
	1976	4,28	5,15	1,40	3,13	2,27	3,20	1,02	1,83	3,55
	1977	3,98	5,11	1,33	3,10	2,08	2,81	1,09	1,79	3,32
	1978	4,05	5,03	1,03	2,95	1,75	2,64	1,01	1,64	3,13
	1979	4,17	5,10	1,15	2,86	1,78	2,63	1,09	1,58	3,22
	1980	4,16	5,26	1,25	2,82	1,56	2,64	0,92	1,36	3,17
of gross domes- tic product	1975	1,23	1,17	0,36	0,96	0,73	1,27	0,44	0,58	1,04
	1976	1,16	1,07	0,37	0,98	0,77	1,32	0,45	0,57	1,01
	1977	1,07	1,06	0,38	0,97	0,74	1,16	0,47	0,56	0,95
	1978	1,11	1,06	0,39	0,99	0,57	1,04	0,46	0,51	0,93
	1979	1,13	1,09	0,39	0,96	0,59	1,07	0,53	0,48	0,95
	1980	1,14	1,13	0,47	0,97	0,62	1,11	0,49	0,45	0,98

Source: Government Financing of Research and Development in the Community countries 1975-1980,
Statistical Office of the European Communities

(iv) R & D financing by chapters of NABS in 1980*

(in 100,000 EUA)

OBJECTIVES NABS		BRD	F	I	NL	B	UK	IRL	DK	EUR 9	EC	BUR 9 + EC
1. Exploration & exploitation of the earth & its atmosphere	0100	190	158	27	10	19	37	0,5	7	448,5	3	451,5
2. Planning of human environments	0200	241	215	15	64	18	69	4	7	633	0,8	633,8
3. Protection & improvement of human health	0300	409	293	71	70	83	102	6	29	1063	39	1102
4. Production, distribution and rational utilization of energy	0400	969	399	299	49	45	278	0,6	17	2056,6	199	2255,6
5. Agricultural productivity & technology	0500	126	207	54	95	25	171	16	19	713	2	715
6. Industrial productivity & technology	0600	674	494	227	70	78	258	4	29	1834	25	1859
7. Social & sociological problems	0700	260	69	29	62	57	44	6	17	544	12	556
8. Exploration & exploitation of the space	0800	290	328	81	36	29	87	0,5	8	859,5	3	826,5
9. Defence	0900	685	1934	35	35	1	2245	-	0,6	4935,6	-	4935,6
10. General promotion of knowledge	1000	2909	1179	465	628	165	848	23	85	6302	0,5	6302,5
Expenditure not itemized	9000	-	23	-	6	-	-	-	-	29	-	29
Total expenditure	9900	6753	5299	1303	1125	520	4139	60,6	218,6	19418,2	284,3	19702,5

* Nomenclature for the analysis and comparison of science programmes and budgets, 1975 version.

Source: Government Financing of Research and Development in the Community countries 1975-1980,
Statistical Office of the European Communities

R & D financing by chapters of NABS* in 1980 (in %)

OBJECTIVE NABS	BRD	F	I	NL	B	UK	IRL	DK	EUR 9	EC	EUR 9 + EC
1. Exploration & exploitation of the earth & its atmosphere	2,8	3,0	2,1	0,9	3,7	0,9	0,9	3,1	2,3	1,0	2,3
2. Planning of human environments	3,6	4,1	1,2	5,7	3,4	1,7	7,3	3,0	3,3	0,3	3,2
3. Protection & improvement of human health	6,1	5,5	5,4	6,2	15,9	2,5	10,5	13,5	5,5	13,8	5,6
4. Production, distribution & rational utilization of energy	14,4	7,5	22,9	4,4	8,7	6,7	1,0	7,7	10,6	69,9	11,4
5. Agricultural productivity and technology	1,9	3,9	4,1	8,4	4,8	4,1	25,7	8,8	3,7	0,8	3,6
6. Industrial productivity and technology	10,0	9,3	17,4	6,2	14,9	6,2	6,1	13,6	9,4	8,2	9,4
7. Social and sociological problems	3,8	1,3	2,2	5,5	11,1	1,1	10,2	7,9	2,8	4,1	2,8
8. Exploration & exploitation of space	4,3	6,2	6,2	3,2	5,6	2,1	0,9	3,6	4,4	1,1	4,4
9. Defence	10,1	36,5	2,7	3,2	0,3	54,2	-	0,3	25,4	-	25,1
10. General promotion of knowledge	43,1	22,2	35,7	55,8	31,8	20,5	37,3	39,1	32,5	0,2	32,0
Expenditure not itemized	-	0,4	-	0,6	-	-	-	-	0,2	-	0,2
Total expenditure	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

* Nomenclature for the analysis and comparison of scientific programmes and budgets, 1975 version
 Source: Government Financing of Research and Development in the Community countries 1975-1980,
 Statistical Office of the European Communities

APPENDIX IV

R & D priorities and objectives: Japan and the United States

It is commonly held that the European Community is less adept than its two major industrial rivals in the innovation process and in the development of commercially viable scientific research. Such an assertion is difficult to prove quantitatively, since national data differ in presentation and may be influenced by factors like inflation and exchange rate fluctuations.

This Appendix contains details of the overall research effort in Japan and the United States, plus a review of the comparative position of those countries in relation to certain EC countries. However, the sums spent on R & D are not automatic indicators of the quality or results of research. One measure that overcomes some of these constraints is that of R & D expenditure as a % of GNP, and details of this are shown below. Another is the proportion of scientists and engineers in the labour force.

1. Civil and military research

In 1979 the US devoted about 25% of total R & D expenditure to defence: military R & D expenditure has been continuously a substantial part of US R & D budgets. The situation is very different in the Community and Japan, though certain Community Member States show high defence spending:

Total R & D expenditure to show percentages spent on
civil research and defence

	1975			1977			1979		
	Total (Mrd UEA)	Civil	De- fence	Total (Mrd UEA)	Civil	De- fence	Total (Mrd UEA)	Civil	De- fence
		%			%			%	
EUR 9	20,1	90	10	26,4	90	10	33,4	88	12
USA	28,0	73	27	39,2	73	27	41,0	75	25
Japan	8,3	99	1	11,9	99	1	15,3	99	1

Source: Statistical Office of the European Communities, 05/32/81

2. The role of public and private sectors

It is important to distinguish here between the financing of research and its actual performance in laboratories and research centres, since in some countries public sector research is carried out in private sector centres: in the US, for instance, about half of federal government sponsored research is performed by industry.

In Japan, research in the public sector is mainly confined to basic research in educational establishments and applied research in the establishments of the Science and Technology Agency and the Ministry for International Trade and Industry. 86% of private sector R & D in Japan is related to industrial needs, especially electrical engineering (25.3%), chemicals (17.6%) and automobiles (17.6%).

Total R & D expenditure to show percentage division between sectors

	1975			1977			1979		
	Total (Mrd EUA)	Firms %	Others %	Total (Mrd EUA)	Firms %	Others %	Total (Mrd EUA)	Firms %	Others %
EUR 9	20,2	60	40	26,4	59	41	33,4	61	39
USA	28,0	68	32	39,2	67	33	41,0	68	32
Japan	8,3	57	43	11,9	58	42	15,3	58	42

Source: Statistical Office of the European Communities

Total R & D expenditure 1979 (or most recent figures available)

	Financing (%)				Performance (%)			
	Private Sector	Public Sector	Foreign	Total	Private Sector	Public Sector (1)	Universities	Total
D	49,7	47,9	2,4	100	65	17	18	100
F	41,1	53,3	5,6	100	59	(41)		100
I	47,3	51,4	1,3	100	56	23	21	100
B	65,8	32,8	1,4	100	51	24	25	100
NL	47,2	48,7	4,1	100	70	10	20	100
UK	40,6	54,6	4,9	100	62	29	8	100
IRL	33,0	63,0	4,0	100	37	(63)		100
DK	44,7	53,7	1,6	100	51	23	26	100
EUR 9	45,8	50,7	3,5	100	60	22	18	100
USA	46,1	53,9	-	100	68	18	14	100
J	58,6	41,3	0,1	100	58	14	28	100

(1) including non-profit making organizations

Source: Statistical Office of the European Communities, 05/32/81

3. Distribution of Public Sector R & D expenditure

Full details of all Community countries are to be found in Appendix III on the basis of the NABS classification. The table below gives comparative figures for 3 Community countries, the USA and Japan, using the classification method adopted by OECD.

Distribution of Government R & D expenditure (in %)

	Natio- nal De- fence	Space	Energy	Econ. Dev.	Health	Com- munity services	Advanc. knowl.
France (1975)	30	6	9	26	4	2	24
Ger. F.R. (1975)	11	4	11	14	3	6	51
U.K. (1975-76)	46	2	7	20	3	2	20
Japan (1974-75)	2	5	8	23	3	3	55
U.S. (1974-75)	51	13	6	9	12	5	4

Source: Science Indicators 1978, National Science Board, Washington

4. Comparison of total expenditure, GDP ratios, etc.

a) Total R & D expenditure (all sectors) at 1975 prices and exchange rates (Mio EUA)

Country	1975	1976	1977	1978	1979
D	7.532	7.659	7.865	8.500	9.006
F	4.926	5.084	5.203	5.377	5.698
I	1.443	1.416	1.481	1.445	1.510
NL	1.416	1.454	1.431	1.454	1.491
B	662		722		794
UK	3.843			4.498	
IRL	56		57		59
DK	312*		363*		336*
EUR 9	20.192		21.340		23.635
USA	29.562	31.026	32.393	33.574	34.926
J	8.083	8.544	8.899	9.494	10.593

* estimate

Source: Statistical Office of the European Communities, 05/32/81

b) Private sector R & D expenditure at 1975 prices and exchange rates
(Mio EUA)

Country	1975	1976	1977	1978	1979
D	4745	4589	5109	5503	5863
F	2936	3072	3136	3212	3385
I	804	775	793	790	870
NL	759	768	739	748	798
B	425		490		525
UK	2393			2886	
IRL	17		18		22
DK	132		152		172
EUR 9	12211		13147*		14709 *
USA	19494	20702	21656	22404	23605
J	4578	4844	5141	5376	5588

* estimate

Source: Statistical Office of the European Communities, 05/32/81.

c) National expenditure for all R & D (public and private sectors) as a percentage of Gross Domestic Product

Country	1975	1976	1977	1978	1979	1980
D	2,22	2,15	2,14	2,24	2,27	
F	1,80	1,77	1,77	1,76	1,81	
I	0,93	0,86	0,89	0,84	0,84	0,92*
NL	2,12	2,07	1,99	1,97	1,98	
B	1,33		1,37		1,40	
UK	2,13			2,21		
IRL	0,86		0,81		0,77	
DK	1,02		1,09		0,97	
EUR 9	1,86		1,87		1,91	
USA	2,40	2,39	2,37	2,35	2,39	2,44*
J	2,00	1,98	1,96	1,97	2,08	

* estimate

Source: Statistical Office of the European Communities, 05/32/81

Scientists and engineers engaged in R & D per 10000 labour force population

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
United States	64,1	66,1	66,1	66,9	66,1	63,6	60,6	58,3	56,8	56,3	56,4	56,7	57,4
Japan	24,6	26,4	27,8	31,1	30,8	33,4	37,5	38,1	42,5	44,9	47,9	48,4	49,9
Ger. F.R.	22,6	22,3	23,9	25,9	28,8	30,8	35,5	35,7	37,4	38,2	39,4	40,5	40,5
France	21,0	23,0	25,3	26,4	27,2	27,3	27,8	28,1	28,4	28,8	29,3	29,9	+

Source: Science Indicators 1978, National Science Board, Washington 1979

+ : not available

European Communities - Economic and Social Committee

"Aims and Priorities of a Common Research and Development Policy"

Study of the Section for Energy and Nuclear Questions of the ESC

Brussels: General Secretariat of the Economic and Social Committee

1982 - 59 pages

Dk, D, E, F, Gr, I, N.

Since the 1976 ESC Study on "Objectives and Priorities for a Common Research and Development Policy" the Community's role in the European science and technology policy has evolved considerably. The Study therefore commences by a review of policies over recent years, and then goes on to examine the kind of objectives that could be set for Community R & D, as well as the constraints to which they are subjected. The Study continues with a review of different levels of research and the way in which Community research can be linked with that in the Member States. The role of the Joint Research Centre is also considered. After an examination of the way in which R & D can be combined with other Community policies, the Study concludes with a number of recommendations and general conclusions. The appendices to the Study contain supplementary information regarding R & D expenditure at Community and Member State level and similar expenditure in the US and Japan. The appendices also take stock of progress towards achieving the objectives outlined in the 1976 Study.

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Catalogue Number ESC-82-001-EN