

W A R T A
PENGELOLAAN PENELITIAN DAN PENGEMBANGAN
(R & D MANAGEMENT)

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**WARTA PENGELOLAAN PENELITIAN DAN PENGEMBANGAN
(R & D MANAGEMENT)**

1. Merupakan wadah komunikasi bagi masyarakat ilmuwan, para pengelola penelitian dan pengembangan pada umumnya, dan antar-alumni Widyakarya-Penataran Pengelolaan Penelitian dan Pengembangan pada khususnya.
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Tulisan dalam "Warta" dapat dikutip dengan menyebutkan sumbernya.

KATA PENGANTAR DEWAN REDAKSI

Memasuki tahun 1983 Dewan Redaksi mengucapkan Selamat Natal kepada para pembaca yang merayakannya dan Selamat Tahun Baru 1983 kepada semua pembaca.

Penerbitan pertama Volume 4 ini terdiri dari No. 1A dan No. 1B. Nomor 1A memuat serangkaian tulisan mengenai evaluasi, suatu fungsi pengelolaan yang masih kurang mendapat perhatian. Tulisan pertama, "Rencana Pengembangan Sistem Evaluasi di Lembaga Litbang" mengemukakan bahwa untuk dapat menyusun suatu sistem evaluasi perlu diadakan analisis dan langkah tertentu. Langkah itu meliputi: (1) menentukan kebutuhan informasi, (2) menentukan siapa yang menggunakan informasi, (3) menentukan derajat kepercayaan yang diperlukan, dan (4) pemilihan sistem evaluasi.

Tulisan kedua mengemukakan bahwa untuk dapat melakukan evaluasi perlu difahami proses dan langkah evaluasi. Langkah itu meliputi: (1) menentukan ruang lingkup evaluasi, (2) mendisain program evaluasi, (3) melaksanakan evaluasi, (4) analisis dan interpretasi hasil evaluasi, (5) penggunaan hasil evaluasi dan perbaikan dan modifikasi. Proses evaluasi meliputi: (1) menentukan pokok-pokok yang akan dievaluasi, (2) menentukan kriteria, (3) menentukan instrumen, (4) pengumpulan data dan analisis, dan (5) melakukan interpretasi. Dengan mengikuti langkah dan proses evaluasi itu diharapkan bahwa hasil evaluasi dapat digunakan untuk merumuskan usaha peningkatan kemampuan teknis dan produktivitas lembaga litbang.

Untuk dapat menetapkan sistem evaluasi dan langkah untuk melakukan evaluasi perlu dikenal dan difahami jenis evaluasi. Pengenalan dan pemahaman itu diperlukan karena setiap jenis evaluasi memiliki kegunaan, karakteristik dan persyaratan yang harus dipenuhinya. Tulisan ketiga mengemukakan mengenai berbagai jenis evaluasi: pemantauan, evaluasi proses, evaluasi pelaksanaan, evaluasi dampak dan penelitian evaluasi.

Setiap laporan hasil evaluasi memerlukan kejelasan mengenai materi yang dilaporkan, sehingga laporan tersebut benar-benar bermanfaat dan dapat dipergunakan sebagai bahan untuk menentukan langkah lebih lanjut. Tulisan ke-empat mengemukakan mengenai jenis laporan hasil evaluasi dan beberapa hal yang perlu diperhatikan dalam penyampaian hasil evaluasi.

Tulisan kelima mengemukakan mengenai metoda evaluasi penelitian dan pengembangan di Masyarakat Eropa. Evaluasi itu terdiri dari penilaian internal dan eksternal. Penilaian itu diharapkan dapat membantu Komisi Eropa dalam dua hal: pertama, menilai efektifnya pengelolaan, struktur operasional dan mekanisme; kedua, untuk merumuskan kembali strategi penelitian dan pengembangan.

Dewan Redaksi ingin mengundang para pembaca untuk menulis pengalamannya dalam melakukan evaluasi kegiatan atau lembaga litbang, dan penggunaan hasil evaluasi dalam kebijaksanaan pengembangan lembaga maupun perumusan strategi penelitian dan pengembangan. Pengetahuan dan pertukaran informasi mengenai pengalaman itu akan sangat berharga dalam usaha kita bersama mengembangkan sistem evaluasi di lingkungan kerja masing-masing. □

R & D EVALUATION IN THE EUROPEAN COMMUNITY: ITS STRUCTURE AND METHOD *)

By:
C.P.F. Luhulima.

SARI KARANGAN

Evaluasi penelitian dan pengembangan di Masyarakat Eropa mulai berkembang sejajar dengan berkurangnya dana bagi pembiayaan program-program kemasyarakatan, terutama sejak apa yang kini dikenal dengan krisis energi. Berkurangnya dana ini mengakibatkan bahwa berbagai program penelitian harus membenarkan kembali pengeluaran-pengeluarannya dan permintaan akan dana untuk melanjutkan program-program itu atau memulai program-program baru. Evaluasi di Masyarakat Eropa terdiri dari penilaian internal dan penilaian eksternal. Pada umumnya penilaian internal dianggap cukup efektif. Akan tetapi dirasakan untuk memperbaiki sistem penilaian ini dengan penilaian eksternal dan mandiri. Penilaian eksternal ini dianggap memberikan kepercayaan terhadap pelaksanaan suatu program. Penilaian ini diharapkan dapat membantu Komisi Eropa dalam dua hal: pertama, menilai efektifnya pengelolaan, struktur operasional dan mekanisme, dan membuat penyesuaian atau perubahan yang diperlukan; kedua untuk merumuskan kembali strategi penelitian dan pengembangan. Tulisan ini mengulas secara panjang lebar metoda evaluasi yang dipergunakan di lingkungan Masyarakat Eropa oleh Komisi Eropa.

INTRODUCTION

R & D programmes evaluation or the evaluation of R & D programmes had allegedly first been applied in the United States in the early 1960's and has since developed to become a very valuable tool for programme management and decision-making. It has also become an built-in feature of R&D programmes.

Evaluation has essentially two main clients, the decision makers and the managers. Evaluation helps decision makers to supervise and control the implementation of R&D programmes and it helps managers to more effectively manage programmes and to propose to decision-makers on revisions or extensions of programmes.

From the United States R&D programmes evaluation gradually entered Western Europe and reached its peak in the 1970's. The spectacular growth of

*) This article is a further elaboration of a report on a briefing and discussion on evaluation of R&D programmes in the European Commission given in Brussels on 19 October 1982 to Senior Officials of the ASEAN Committee on Science and Technology drawn up by the author. The author has also drawn on papers submitted to the Conference on Methods for Evaluating the Results of European Community R&D Programmes, held in Brussels, 25-26 January, 1982 and later published by D.Reidel Publishing Company, Dordrecht, Holland, 1982, specifically on the paper of J.P. Contzen, G. Boggio and R. Gallimore, "The Commission Approach to R&D Evaluation". The proceedings were edited by G. Boggio and R. Gallimore.

R&D evaluation in the European Community during the 1970's especially in the public sector can be brought back to three major reasons. To start with, the areas in which the European Governments are getting involved to deal with the expanding societal problems are increasing. This augmented government's involvement is matched by a decrease in resources available to finance those societal programmes and particularly so after the energy crisis of 1973. This decrease in funds led up to the fact that various research programmes have to re-justify and re-structure their expenditures and demands for funds to continue programmes and more so to initiate new programmes. As a consequence, decision-makers had to require more detailed information and justifications on the competing demands for funds to meet the increasing societal needs in order that they can make the correct judgement or the correct choices.

Despite the increasing demand for evaluation, the development of evaluation as a discipline in the European Community has so far been relatively slow. Some five reasons may be pointed out as major factors for the delay. Firstly, there is so far no universally accepted definition of programme evaluation. Programme evaluation has been equated with *cost-benefit analysis*, *auditing*, *programme monitoring*, *programme analysis*, even with *policy analysis*. Moreover, the method of evaluation will differ according to the area or type of activity that is being evaluated. This has led up to evaluation being made on the quality of research, on the effectiveness of the management and/or organization of the programme and on the potential impact of the R&D programme results. Thirdly, evaluations are supposed to assess the R&D output on the basis of the original objectives of the programme. The evaluation is also supposed to assess their impact which may manifest itself only in the very long term. This time-lag has added further difficulties to the development of a systematic evaluation methodology, because it has to encompass the various possible time frames. Fourthly, the increasingly frequent interaction and overlapping of policy sectors will certainly add to the difficulty of identifying and assessing the impact of certain outputs in the long-run. Lastly, evaluations quite often serve different clients such as decision-makers, managers, administrators, researchers, etc. and that, therefore, the development of the evaluation methods has to encompass these various variables.

To round up, efforts to develop evaluation methodologies for R&D programmes should encompass the effectiveness of the programme management and/or the organization, the time factor in impact assessment and the various target audiences as major components.

BACKGROUND OF THE EUROPEAN COMMISSION'S EVALUATION ACTIVITIES.

The R&D expenditure of the European Community*) (i.e. the Europe-

*) The legal basis, the way institutions of the European Communities work as well as science and technology coordination in the European Communities is appended to this article.

an Coal and Steel Community, the European Economic Community and EURATOM) has increased tremendously over the last seven years, from less than 70 million ECU to more than 346 million ECU*) in 1981. European Community research currently covers fields as widely apart as energy, environment, raw materials, agriculture and food, radiation protection, industrial research, health, etc. It is the increasing demand for resources and for making choices among competing fields and programmes that has led to the European Parliament and the nine member states of the European Community requiring greater attention to programme evaluation.

The European Commission (i.e. the coordinating arm of the European Community) realized this need long ago and organized a seminar on *R&D Evaluation* in Copenhagen as early as June 1978. The major objective of this seminar was to assess the various evaluation methods and procedures which were being developed and applied in the member countries and elsewhere and to consider how and by what means these methods could be used to evaluate European Community R&D programmes. The seminar was very successful in that it came out with an impressive number of practical conclusions which have guided the European Commission in the application of its current strategy of evaluation. These practical conclusions can be structured as follows:

- o Evaluation should comprise both the process and the output of the programme;
- o The need to add an *ex-post* evaluation of the programme output to the existing European Community *internal* evaluation procedures conducted *during* the execution of a programme;
- o Current evaluation methods should be applied to meet the specific characteristics of the European Community R&D programmes;
- o The evaluation procedure which is to be adopted should be flexible so as to suit the particular management and organizational structures of the European Commission as well as the users' needs;
- o The adaptation of the method of *peer review* to evaluate European Community programmes;
- o The importance of informing political decisions-makers and the general public on the nature and potential impacts of European Community R&D programmes.

These recommendations were very instrumental in the formulation of the European Commission's methods of approach to evaluate the whole range of the European Community R&D programmes. The following pages will deal consecutively with the evaluation approaches and the evaluation methods.

*) 1 European Unit of Account (ECU) equals roughly 1 US\$

THE EVALUATION APPROACH OF THE EUROPEAN COMMISSION

There is a general consensus in the European Community that the existing *internal* evaluation during the execution of a programme were working most effectively. However, it was felt that it was necessary to supplement this procedure with an equally in-depth *external* and *independent retrospective* evaluation of the R&D programmes output. This independent assessment was considered to be crucial in ensuring an independent evaluation and providing credibility to the execution of the programme.

These assessments are supposed to assist the European Commission in two ways: first, in assessing the effectiveness of its management, operational structures and mechanisms and make the required modifications or changes; second, in re-orienting and reformulating its research strategies. The above assessments are also supposed to assist the European Council of Ministers, European Parliament and the Scientific and Technical Research Committee (CREST) in taking decisions on the revisions or extension of R&D programmes which are proposed by the European Commission and secondly, to assess the utility, contribution and potential impact of the programmes on the European Community policies and to solve societal problems and needs.

However, it was simultaneously realized that the specific objectives and types of evaluation procedures to be followed should be adjusted to the type of R&D to be evaluated (direct, indirect, concerted).*

THE METHODS OF EVALUATION

1. The methods of evaluation which have been developed for the direct action programmes are still evolving. The present *external* evaluation practices at the Joint Research Centre (JRC) of the European Commission, i.e. at Geel (Belgium), at Petten (Holland), Ispra (Italy) and at Karlsruhe (Federal Republic of Germany) are conducted essentially at three levels. At the so-called global multi-annual level, the responsibility lies with the General Advisory Committee (GAC). Its membership consists of three experts from each member country. GAC necessarily acts in an advisory capacity to prepare and implement programmes. At the lower level, the programme and project level, the evaluation is conducted by individual Advisory Committees on Programme Management (ACPM's). These *external* evaluations are carried

* **Direct action:** research funded entirely by the Commission and carried out in the Commission's own research laboratories at Ispra (Italy), Geel (Belgium), Petten (Holland), Karlsruhe (Federal Republic of Germany).

Indirect action: research funded to approximately fifty percent by the Commission and carried out in universities, industries and research organizations in the Member States.

Concerted action: research fully financed and carried out by participating Member States on the basis of programmes which are commonly defined and which are coordinated by the Commission.

out in addition to the continuous *internal* evaluation implemented by the JRC management. The combination of the two evaluation methods at the various working levels is considered to work satisfactorily. Yet, it is felt that the socio-economic impact of the R&D output could be better identified by way of complementary action in the form of an *external* ex-post evaluation of R&D conducted at the JRC.

2. In the case of concerted actions (i.e. research which is fully financed and conducted by participating member states on the basis of programmes which are commonly defined and coordinated by the European Commission) the focus of evaluation is on cooperation, coordination and stimulation of national research activities in the field. The method selected to evaluate concerted actions is called *hearings*, which is a lighter form of evaluation. This kind of evaluation can be described as follows:

A panel of independent experts was organized to interview a number of people who are active in an R&D programme, both managers and researchers. Test runs were held in the field of medical and public health research (1978-1981), i.e. on *cellular ageing*, *congenital abnormalities*, and *extracorporeal oxygenation*. For these test runs a panel of seven external experts were selected; they included experts in the field of research, an economist and potential users of output. This evaluation should assess, first, the value and impact of concerted R&D and, second, the effectiveness of the management and coordination of the actions.

The team met for two days. The first day was primarily used for describing the programmes, for defining parameters and the scope of the R&D in the medical and public health field. Then the team had a series of interviews with project managers, chairmen of relevant advisory committees, some leading researchers and the appropriate staff of the European Commission. The last part of the second day was taken up by round table discussions to analyze the interviews and to agree on the structure and substance of the report. The report itself was drafted by the Chairman and later approved by the other six panel members.

The European Commission, however, is of the opinion that it is too early to assess the impact of the *hearings*, but its first impression is that this method of evaluation will be suitable and appropriate for concerted R&D.

3. The most elaborate method of evaluation is the one applied to the indirect actions (i.e. research funded to about 50 percent by the European Commission and conducted by the various R&D institutes and universities in the member countries).

The internal evaluation applied here covers a range of procedures. First the programme management reviews the periodic progress reports which are submitted two to three times annually and the final reports submitted by the

contractors. The second mode of evaluation consists of seminars or meetings at which the contractors discuss their progress of work in the presence of the responsible officials of the European Commission. The last procedure is by way of the Advisory Committees on Programme Management (ACPM), which are organized to assist in the management and supervision of each R&D programme in the European Communities. The ACPM consists exclusively of officials of the member countries including experts in the fields to be evaluated. They advise the European Commission on the programme implementation, its revision and extension, if necessary.

The external evaluation of these programmes is conducted by *peers* (experts) not involved in the programme. The European Commission also tries to include sociologists and economists in these evaluation panels of mixed expertise. The process is therefore called *peer evaluation*. Test runs have been made using this method on four programmes, i.e. a) the energy conservation and solar energy sub-programmes (ERET 1; 1975-1979); b) the geothermal energy; production and utilization of hydrogen and systems analysis; development of models sub-programmes of the European Community first energy R&D programme (ERET 2); c) the Community Bureau of Reference indirect action programme. (1975-1978); and d) the management and storage of Radioactive Waste Programme (RADWASTE; 1976-1980).

These external evaluations were conducted to achieve the following objectives:

- o assessment of the R&D programme outputs;
- o assessment of the effectiveness of the programme management and utilization of the resources;
- o determination of the contributions of the R&D programmes output towards the objectives of the European Communities;
- o elaboration on recommendations and suggestions on the optimum ways of exploiting R&D output, on the areas requiring further research and improvements of management, manpower and financial support.

For these test runs of *peer evaluation* teams varying from three to six experts – depending on the size of the programme – were established. The quality of the experts was undoubtedly the most important contribution to the success of the evaluations. Various procedures for the selection of experts were tried out here.

The experts selected by the European Commission were chosen on the basis of their expertise in the relevant fields and, what is more important, on the basis of their independence as regards the programmes they have to evaluate. However, bearing in mind the still undeveloped status-of-the-art of evaluation methodologies in the European Community, experience in this

field could not be over-rated. The evaluation process as well as its organization were an interesting learning process for both panel members and the Commission alike.

In comparison to the two activities mentioned earlier, the work of these panels lasted much longer, from six to eight months comprising monthly meetings of two days each.

The evaluations *an sich* were divided up into four notable phases. To start with, the panel familiarized itself with the programme's organization, structure, its resources, including financial resources, management procedures, etc. Then they sought to reach agreement on the evaluation parameters and methodologies to be applied and on the various ways to organize the evaluations. The substance of the research and its quality as well as its potential impact on society was the next phase of the panel's evaluation and finally, the drawing up of the report and its recommendations.

To the three methods of evaluation described above was added a specific method of evaluation in the field of fusion research. Here the exercise resembled a strategic analysis and with special emphasis on possible future developments in the field. A panel of independent high ranking experts was tasked with evaluating the existing programmes in the field and making recommendations on the choices and course of the European Fusion programme in the context of current and future fusion research and of the possibilities in developing networking arrangements for international cooperation. No further details are available on the evaluation exercise in this field which is mainly due to its strictly confidential character.

CONCLUSION

This paper has tried to outline the European Commission's approach to the development of an evaluation system for her four categories of R&D programmes. The various exercises in evaluating R&D programmes conducted so far have given the Commission an insight into the possibilities of harmonizing the internal and external methods of evaluation. This article has not dealt with an analysis of the applied evaluations. That will be discussed in another article. □

Appendix 1

THE EUROPEAN COMMUNITY

The European Community has ten Members States – Belgium, Denmark, France, the Federal Republic of Germany, Greece, Italy, Ireland, Luxemborg, the Netherlands and the United Kingdom – with a combined population of 270 million, having an average income per capita of about US\$ 8,800 a year.

The scope of the European Community is shown by the three treaties which form its legal basis:

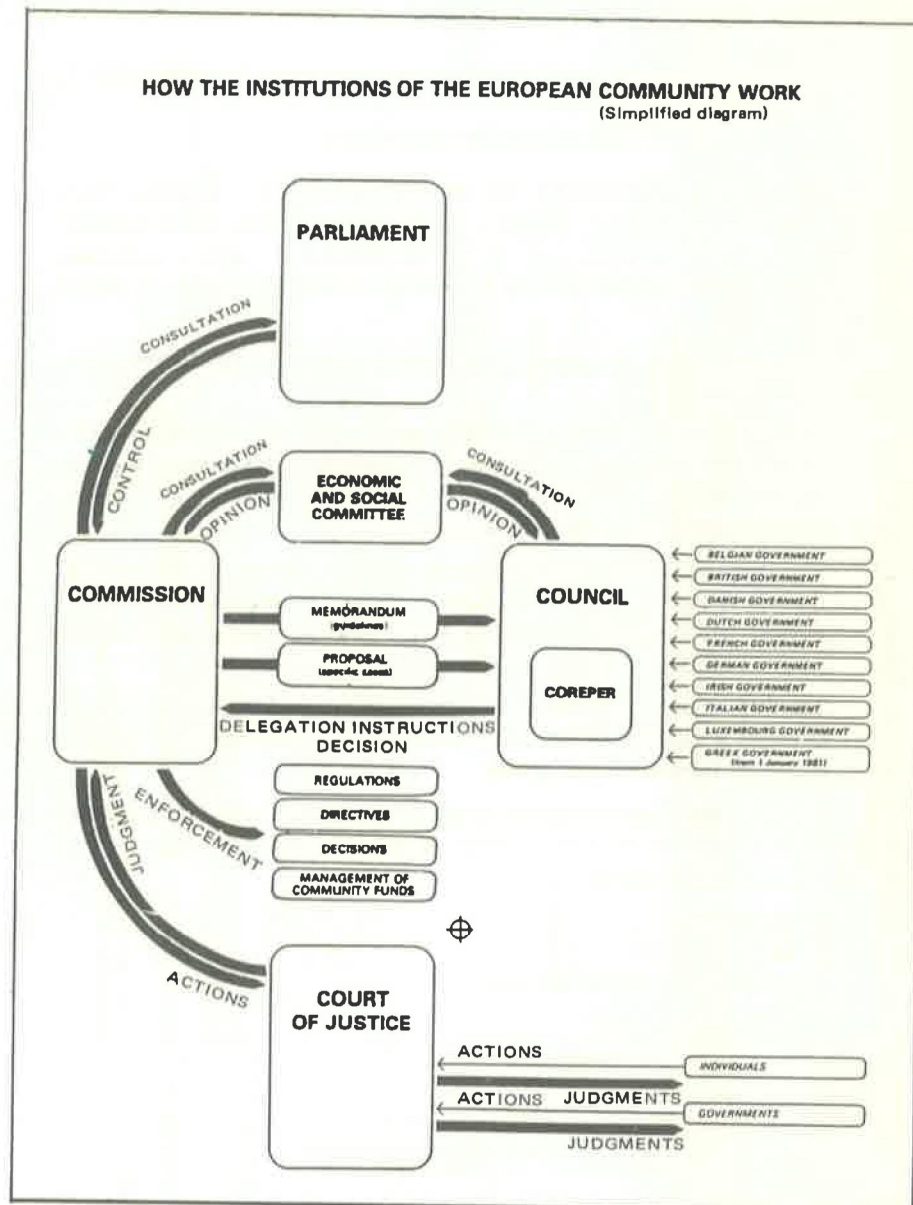
The European Coal and Steel Community (E.C.S.C.) Treaty of 1951 created the pilot project for European economic integration by pooling the member countries' coal and steel resources in a common market unhampered by national barriers.

The European Economic Community (E.E.C.) Treaty of 1957 has as its objective the creation of an economic union in which goods, persons, services and capital would move freely and common policies would govern such fields as foreign trade, agriculture and transport.

The 1957 European Atomic Energy Community (EURATOM) Treaty provided a framework for the safe and rapid development of nuclear industries for peaceful purposes.

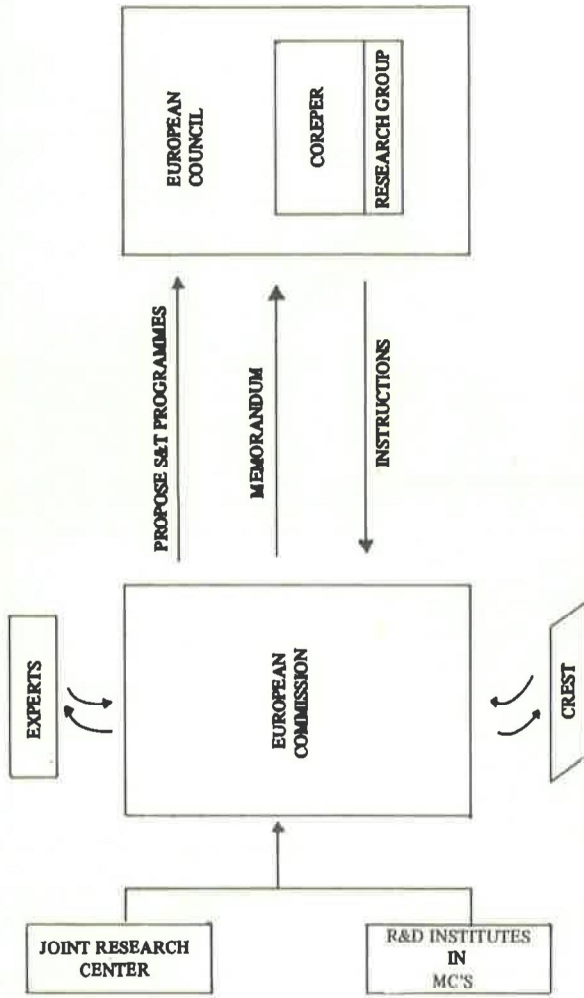
In 1967, there was a further treaty which merged the separate institutions established by the basic treaties. The four main institutions of the unified European Community are:

- the Council;
- the Commission;
- the European Parliament; and
- the Court of Justice.



Source : The European Community in a nutshell
(Second edition, October 1980)
Published by : Press and Information Office
Delegation of the Commission of the European Communities
for South and South-East Asia.

SCIENCE and TECHNOLOGY COORDINATION IN THE EUROPEAN COMMUNITY (SIMPLIFIED)



- CREST : Scientific and Technical Research Committee, an institution resembling the ASEAN Committee of Science and Technology (COST).
- RESEARCH GROUP : Science attache's of the member countries resident in Brussels who meet frequently.
- COREPER : Committee of Permanent Representatives; Ambassadors of member countries to European Community.