UPDATED VERSION OF THE TECHNICAL SHEETS ATTACHED TO THE SURVEY REPORT ON "SCIENTIFIC AND TECHNICAL COOPERATION BETWEEN EUROPEAN COUNTRIES: POSSIBILITIES IN SEVEN SECTORS", INCORPORATING THE FINDINGS PUBLISHED IN THE SUPPLEMENT TO THIS REPORT

1. INFORMATION SCIENCE

The problems which Europe has to face up to in the field of information science concern both the production of the equipment and its utilisation.

With regard to production, the situation is marked by the fact that the market is dominated by subsidiaries of American companies. Even if this has not so far prevented customers from being provided with the most modern or powerful machines, it nevertheless has several drawbacks. The European economy always runs the risk of receiving the most modern hardware and software with some delay and it is deprived of considerable export opportunities. These consequences are all the more serious as information science tends to occupy a strategic place in all economic activities: the absence of a genuine European production and technology in this field risks having severe repercussions on the technology, and hence the competitiveness, of all the other industries.

The efforts to encourage the development of an information processing industry independent of the American giants cannot be completely successful if they remain on a national basis since they would require frequently prohibitive financial backing and would founder on the limited nature of the national market. The need for cooperation in this field is thus obvious.

Consequently, the aim as regards hardware is the formation of an industrial unit (undertaking or group of undertakings) which would be technically and commercially capable of gradually covering a considerable part of the European market. For this it is necessary to have a sufficiently wide range of products, a well-organized

marketing network and an avant-garde technology. Project 10 aims at these various targets simultaneously. The high-power system available by about 1975 and compatible with other products of the same period would provide the necessary "top end of the range", and the system to be produced by about 1980 would make use of a revolutionary technology. The procedure to be adopted for this project have still to be fixed in order to verify whether the desired objectives could be reached in this way. Research in this new technology would also be supplemented by a project devoted to components, and in particular to the development of new memories (Project 22). Finally it is to be hoped that the major project described above will have a generally favourable effect on increasing the compatibility of the machines.

As regards the utilization of information processing, the general problem is to enable the whole economy to make the best use of the existing facilities and to exploit quickly the technological potential opened up to the available equipment. Three priority items seem to be: preparation of software, data transmission and manpower training.

Often, insufficient use is made of the possibilities for employing computers owing to the lack of the necessary programs. It would therefore be valuable to undertake a wide-ranging scheme to encourage the preparation of software for industrial, scientific or administrative uses. Pilot schemes have been proposed under Project 15.

It is as yet too early to know if an attempt should be made to set up a large software undertaking capable of supplying not only European customers, but also of exporting on a large scale

to non-member countries, or whether more decentralized methods should be aimed at, use being made of public undertakings or public laboratories already in existence. This development of software would be propitiously backed up by Project 12, the program library, which aims at enabling better use to be made of existing software by providing potential users with greater information on the existence of proven software, and by Project 13, which is directed towards a certain amount of standardization.

The existence of a satisfactory data transmission network, on the other hand, will become more and more important in the future and this has given rise to two proposals, (11 and 20).

Finally, the possibilities opened up by information science will only be fully exploited if the people likely to use them receive adequate training (Project 14).

Even if these various projects are technically independent, they should in fact be considered as a whole in which the separate items support each other.

Field: Information processing

Project 10: HIGH-POWER DATA PROCESSING SYSTEMS

1. Nature of project

Design and construction of a high-power data processing and storage system leading to the marketing of a European system along completely original lines which would be competitive on a world-wide scale.

The system will be partly used for requirements guaranteed by the public authorities, but will in the main be made commercially available to the private sector.

Work on the project must be very close to the industrial stage, as the project is geared to design and production and not to research as such.

2. Objectives

There are three objectives in view:

- the first, of a commercial nature: to meet the demand which will arise on the European commercial market in the years to come and will otherwise be met by non-European products;
- the second, of a technological nature: to encourage the creation of a highly advanced European technology affecting the whole field of information processing and leading to the training of an independent European output potential;
- the third, of an industrial nature: to facilitate the structural transformation of the European information processing industry and the setting up of an industry of sufficient scope to compete on a world scale. The industrial structures which Europe needs would be established more easily if common objectives were

---

NB. drawn up on 15.9.1969.

With reference to the alternatives originally put forward (medium-term or long-term project), the manufacturers are only envisaging the long-term project. Hence this paper has been prepared from that standpoint.

defined and if the States provided financial backing for those objectives. This effect on the reorganizing of a section of the electronics industry is regarded as of major importance; from that angle, the advantage of the project will be heightened by its significant effects on the upstream and downstream branches.

3. Advantage of cooperation

- To open up a market wide enough to warrant the development of a large system.
- To group together financial efforts relating to projects which cannot be undertaken by individual manufacturers.
- To encourage the creation of new industrial structures on a European scale.
- To reduce and finally to close the gap which exists between Europe and the United States in the field of information science.

4. Programming and supervision of project

The programming is a highly complex operation, comprising the choice of the project to be carried out, detailed technical programming of the project as adopted, and administrative and financial programming.

In this context, it is necessary to start immediately on the study, in collaboration with industry, of:

- the market prospects;
- the procedures for organization from the legal, administrative and financial standpoints;
- the technical feasibility of the project, together with an assessment of the cost and the drawing-up of a time schedule.

It is also necessary to set up without delay a group for coordinating and supervising the project, operating abreast of current activity and associating manufacturers in the work.

5. Performance

The project must of necessity be carried out under the industry's responsibility and at its centres, although subcontracting to certain public or private laboratories is not to be ruled out.

In addition, two major requirements must be fulfilled:

(a) as it is a complex project, there must be a single project superintendent;

(b) the various phases of research and development must be integrated, as also must this composite phase and that of series production. This link-up must be actively pursued so as to prevent the research, especially during the first years, from assuming a semi-academic aspect.

This process would be facilitated by the Member States' giving an undertaking to proceed automatically to the following phase as soon as the one before it had been successfully accomplished.

For the purpose of the project, consideration must be given to grouping the participating firms into a joint-subsidiary type or organization.

The manufacturers have already intimated their preferences for having the development and management of the project carried out in a joint organization with centralized control and supervision. On the other hand, implementation of the project, as regards both R & D and production, would be effected by subcontracting, preferably to the parent companies, on a wide scale.

6. Industrial utilization of research findings

- Integration of the R & D phase and the production phase would be necessary (see above).
- There are major problems in the marketing phase, particularly as regards the introduction of the machine into the range of hardware manufactured by the various participating firms.

If it were found desirable for there to be a large volume of government orders, it would be necessary to determine:

- the appropriate time for dovetailing such orders;
- the volume of such orders;
- the extent to which such outlets in the public sector will be guaranteed (price, delivery conditions, etc.).

7. Financing and costs

- It would be necessary to have substantial funds, which could only be achieved by combining private or public resources. Since the project in question is one the results of which would be directly extended to industry, the public sector should only share in its financing, this share nevertheless being essential to start it up.
- As regards government participation, joint financing is the appropriate method because this is a single, highly integrated project, beyond the scope of firms. In certain forms, financing on a national basis is not to be ruled out.
- Various procedures for financing from public funds may be considered, namely:
  - subsidies;
  - appropriations;
  - purchase guarantees in the form of a substantial volume of government orders (see above).

These forms of financing may be combined, in proportions differing according to the characteristics of the system.

- A prior commitment by the Member States to share in the financing of each phase of the project would further both the implementation of the overall project and the integration of the various phases.
- The total for the feasibility study mentioned under heading 4 as the first stage of action has been estimated, for the three sections together - market, organization and technical feasibility - at about 500,000 u.a.

8. Participation of non-member countries

Desirable.

9. Additional remarks and links with other projects

- Links with other projects:

This project requires close cooperation in the carrying out of advanced studies in all related fields such as components (in particular large-scale integrated circuits, memories), peripheral equipment, software and data transmission. These projects will be "ordered" by the large system project itself; their cost will have to be taken into consideration when working out the cost of the "large system" project from which they cannot be separated.

Field: Information processing

Project 11: INFORMATION PROCESSING NETWORKS

1. Nature of project

Project aimed at setting up information processing networks linking European and national research centres.

2. Objectives

This project aims at promoting a public service activity and developing a technical facility enabling use to be made of services such as program libraries, data banks, etc.

More specifically, the first stage would be a pilot project allowing an experimental link to be established between existing centres by using the normal telephone lines in order to pinpoint the organizational problems arising from the introduction of an inter-computer network and to ascertain the quality of the service from a technical and a tariff point of view.

This first stage should therefore include a period for studying the interface problems posed by connecting up computers which have to be linked together. Then, in the second stage, a mesh data transmission network could be set up, possibly including special line high-speed sections. This project could include the development of certain new equipments (see note No. 20 of the Telecommunications specialist group).

Project 11

3. Advantage of cooperation

International cooperation is necessary from the point of view of the standards to be adopted in respect of transmission procedures as well as the characteristics of the equipment used.

4. Methods of operation

This pilot project could be based on the link between the central program library and certain national centres.

5. Cost and time scale

- First stage:
  - Cost: personnel: there should be a team of 15-20 people to be responsible for coordiantion and the design of the system - 0.5 million u.a.
  - cost of equipment and hire of lines - 0.5 million u.a.
  - cost to the states in terms of staff in the event of an interconnection between six national centres may be estimated (three persons per centre) at 0.7 million u.a. for the first stage (two years).
  - Time required: the first stage could stretch over a period of two years.
- Second stage:
  - Cost: to be determined on the basis of the results of the first stage.
  - Time required: two to three years, on the basis of the results of the first stage.

6. Participation of non-member countries

Desirable

7. Classification, additional remarks and links with other project

- Classification: category A.

- Link with other projects:

This project should be considered as being linked with the one concerning the setting up of a European program library (see note No. 12) and with those planned in the field of user software (note No. 15), as well as with the project for European standardization committees (see note No. 13).

It must be stressed, moreover, that the solution of the problems relating to the high-speed mesh network would be likely to encourage the development of high-power systems.

Field: Information processing

Project 12: EUROPEAN PROGRAM LIBRARY

1. Nature of project

The setting up of a body consisting of a central institute and a union of national centres.

2. Objectives

Automated documentation on program descriptions to serve all European users.

Collection of programs in the various fields of application, followed by the possible specialization of the various centres.

Threefold purpose of the project as a whole: information, collection/distribution, technical assistance, insofar as that does not apply to the work of specialist advisory bodies.

3. Advantage of cooperation

Direct information on request on the existing store leading to a considerable reduction in duplication.

Access by users to programs concerned with their activity; delineation of advisers' responsibilities.

4. Methods of operation

- Pilot project: automated documentation system for programs.

Project 12

- Public service: collection, testing, technical assistance by national centres for programs of national origin, by the central institute for other communications and information through the central institute.

A coordination committee responsible for the operation of the project (*).

5. Cost and time scale

Cost: total cost: 4.8 million u.a. to be divided between:

- joint budget: 2.4 million u.a.
- budget to participating states: 2.4 million u.a.

Time required: pilot project and setting up of coordinated structures: three years.

6. Participation of non-member countries

Desirable

7. Classification, additional remarks and links with other projects

Classification: category A.

Link with other projects: this project should be considered as being linked with that concerning the setting up of information processing networks between research centres (see note 11).

(*) NB. Setting up of a remote information processing network between centres. See note No. 11, "Networks", 1st phase.

Field: Information processing

Project 13: STANDARDIZATION COMMITTEES

1. Nature of project

The setting up of European standardization committees.

The standardization project should initially be mainly concerned with software.

It should be developed in three fields:

- programming languages;
- interfaces (data transmission procedures);
- structure of supports (card indexes).

2. Objectives

- To standardize software with the participation of the representatives of European manufacturers, within a period of time compatible with its general application.
- To encourage its application by selecting it for use in computer installations dependent on the public sector.

3. Advantage of cooperation

The lack of standardization of computers at all levels can only be overcome gradually; as there are not many manufacturers, action on a national scale would have little effect. Action should therefore be undertaken in all cases within a Community framework and if possible on an even wider scale.

Project 13

4. Methods of operation

Setting up of three permanent committees, one for each subject (see 2), composed of government representatives, in particular the national representatives at the ISO and the technical advisers seconded by the European manufacturers.

5. Cost and time scale

At the rate of six meetings per year, each lasting a week, for each committee, annual budget of about 0.1 million u.a. Permanent activity.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification: category A.

Link with other projects: this should be considered as being linked with the project concerning the setting up of information processing networks (see note No. 11).

Field: Information processing

Project 14: EUROPEAN INSTITUTE OF INFORMATION SCIENCE AND TECHNOLOGY

1. Nature of project

Training and research

- Setting up of a European institute of information science and technology.

2. Objectives

The European institute shall carry out the following three objectives:

- training
- research
- coordination.

Training: - post-graduate training subdivided into five sections:
- management training
- training of engineers
- training of analysts
- advanced theory training
- teacher training.

Research: - in information processing:
- software
- hardware

Coordination: - of training and instruction programmes in the field of information processing
- of research and development programmes in information processing.

Project 14

3. Advantage of cooperation

- To concentrate scattered efforts and avoid duplication in research and development.
- To create a European training scheme of a high standard and independent of the solutions submitted by computer manufacturers.
- To facilitate exchanges of information at all levels.

4. Methods of operation

- Institute	1st year	2nd year	3rd year	4th year
Administrative personnel	20	25	30	35
Research and training personnel	40	70	100	130
Coordination service	20	25	30	35
Total	80	120	160	200

5. Cost and time scale

- The setting up the European institute should be spread out gradually over a period of three years. From the fourth year onward, the programmes should operate regularly.
- The cost should be shared out as follows:

  1st year: 3,000,000 u.a.

  2nd year: 4,500,000 u.a.

  3rd year: 6,000,000 u.a.

  4th year: 7,500,000 u.a.

Project 14

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification: category B.

Field: Information processing

Project 15, 16 and 17: USER SOFTWARE

1. Nature of project

The development of user software for industrial, scientific and administrative purposes.

In the first stage, carrying out certain pilot projects.

2. Objectives

Substantial savings possible by coordination of the long and costly software establishment studies. Establishment of system and software prototypes for general and special application.

3. Advantage of cooperation

- Coordination of work with a view to satisfying a wide range of requirements not dependent on any particular type of computer.
- Unification of procedures.
- Elimination of duplication.

4. Methods of operation

To be determined (a "user software" specialist group will supply the details of certain pilot projects and the methods of operation within two months).

Projects 15, 16 and 17

5. Cost and time scale

To be determined.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification: category B.

2. TELECOMMUNICATIONS

The immediate problem which the telecommunications administrations have to face arises from the almost explosive character of the increase in demand in all forms of transmission, especially in the field of telephony. In spite of the number of methods in use, deficiencies in both the quality and the quantity of the services provided have been observed in most of the countries of the Community. These deficiencies are not due to factors of a technical nature but are essentially financial in origin.

The present acute needs in classical telecommunications in Europe lead to the possibility of new requirements being pushed into the background, especially in the field of data and picture transmission. Such an attitude would be extremely dangerous, since the periods of time which inevitably elapse between the beginning of research and the large-scale satisfaction of new requirements are always considerable.

The phenomena of economic and social transformation, such as the increasing concentration of populations in towns, the extension and transformation of large urban centres and the increasing mobility of people and goods within each country and within the Common Market will continue to necessitate extensions and adaptations to telecommunication systems which cannot be carried out on a short term basis. It is therefore essential to anticipate these developments, not only to define their implications for telecommunications and to provide for them, but also to avoid allowing to continue over a number of years a situation where the provision of telecommunications services is following

demand instead of anticipating it and therefore does not make the greatest possible contribution to social and economic development. It is only on the basis of such a forward-looking view of new requirements and their repercussions in terms of research and development that an overall programme of cooperative projects could be worked out into which could be fitted certain research and development plans in various countries in the Community.

From a technical point of view, telecommunications systems are not lagging behind. The equipment supply industries are also not lagging behind, and the industrial companies of the Community have considerably increased their share of world exports. But this has only been possible with the help, at least in part, of American technology, especially in the field of components, which are assuming increasing importance in the systems used by telecommunications administrations. Owing to the present easy access to this source of supply, this situation does not have repercussions on the quality of the systems in operation. But it has obvious implications at the level of economic and industrial development in the Community: the European component industry is suffering from restriction, by the compartmentalization and lack of organization of national markets as well as from the prohibitive cost of research carried out exclusively on a national basis.

It is thus possible to lay down a few lines of approach along which scientific and technical cooperation in the field of telecommunications could be tackled:

(a) A forward study of requirements, which would constitute the

overall framework for the definition of cooperative projects, especially the setting up of international networks, and would enable certain plans of the administrations to be coordinated;

(b) Projects in connection with the supply industries, and particularly the supply of components. These projects can be either at the standardization level or at the research and development level;

(c) Cooperative projects in the field of research and development on transmission, propagation and reception phenomena, such projects being already recognized as having priority.

The proposals submitted attempt a first step in each of the three directions indicated (respectively 20, 21-23, 24-25).

If these proposals are at present limited to the working out of an overall framework and to five immediate projects, this is due to the desire to draw up a detailed procedure for examining an overall programme of cooperative projects, which it has not been possible to do within the time available, whilst at the same time ensuring a quick start for projects whose feasibility is already sufficiently established.

Field: Telecommunications

Project 20: FORWARD STUDIES ON TELECOMMUNICATIONS SERVICES

1. Nature of project

I General study of telecommunication services to be set up around 1985

Economic investigation of telecommunication requirements and of the possibility of their being met by existing and new techniques.

II Special study of data transmission services to be set up around 1972-1973

Special economic investigation of data transmission requirements in the field of teleprocessing of information.

2. Objectives

Study I: Definition of the directions in which, from the point of view of long term requirements, research efforts are particularly urgently required and promising. The preparation of the choice of new cooperative research and development projects on this basis, as well as the coordination of certain projects drawn up by the postal and telegraph authorities.

Study II: The preparation of decisions on the possible setting up by 1972-73 of a separate data transmission network and the determination of its characteristics.

3. Advantage of cooperation

To encourage programme coordination it is highly advisable that work of this kind, which paves the way for decisions by the public authorities regarding cooperation, development and technological research, be carried out on a common basis.

4. Programming and supervision of project

General study

- This is to be assigned to an existing international body competent to undertake such studies, such as the Commission or the CEPT (European Conference of Postal and Telecommunications Administrations), the Commission having already undertaken initial exploratory work on pinpointing the problems to be tackled during subsequent stages.

In the selection of the method to be adopted, account must be taken of the following points:

- close association of the national postal and telegraph authorities in this work is essential to its success; collaboration in studies, which is a preparatory stage for other projects, should facilitate joint utilization of their results;
- the manufacturers' standpoint must be considered at each phase of the work;
- unified administration of the entire study is highly desirable.

The data transmission study is the province of the national authorities. The results can only be utilized if the latter can coordinate their work, which presupposes that the study secretariat should be run on a joint basis by the body already mentioned or by the specialist group.

5. Performance

The general study will be assigned under contract to specialized institutes for this type of forward research embracing technical and economic aspects.

The exploratory work done at the Commission's behest will make it possible to decide what paths the forward study should follow and perhaps to outline proposals for cooperative schemes.

The data transmission study will be carried out directly by the national administrations with a comparison of records and joint preparation of decisions.

5. Cost and financing

Study I: total cost: 30,000 u.a. not including the national authorities' participation;
time required and phases: total time required: two years, first phase: six months.

Study II: cost: negligible
time required: total: two years,
first phase: 10 months
second phase (possible): about one year.

Only the general study calls for financing, which, moreover, would be on a small scale and from non-repayable funds. Joint financing is undoubtedly the proper course, having regard to the fact that this project is of general interest and to the use to which it can be put by the decision-making authorities of the international cooperative group.

6. Participation of non-member countries

Desirable

7. Classification, preliminary remarks and links with other projects

Classification A.
Link with other projects: Study II on teleprocessing of information is an essential part of the second phase of Project 11, relating to data transmission between research centres.

Field: Telecommunications

Project 21: CREATION OF EUROPEAN CONFORMITY CERTIFICATES FOR ELECTRONIC COMPONENTS

1. Nature of project

Establishment of common standards and rules for approval certificates for electronic components.

2. Objectives

This is a project of a public service nature which aims at widening the European market for components and enabling component reliability experiments to be coordinated. It will serve both the public interest and that of industry and concerns the actual industrial production stage.

3. Advantage of cooperation

Essential in view of the objectives.

4. Programming and supervision of project

Programming comprises two levels:

- national level: programming of the measures and planning of the structures necessary in each country for the application of harmonized systems for ensuring quality standards in electronic components, currently under study by a standardization committee initially consisting of representatives of France, Germany and the United Kingdom and subsequently extended to include representatives of other countries.
- European level: work to be organized within a coordination group, an enlargement of the committee, so as to provide links with the national bodies, the secretariat being fairly small. These units would also be responsible for supervision of the project at the appropriate level.

5. Performance

The study would be performed mainly in the national standardization bodies already in existence or to be set up within the framework of the project. The manufacturers must be closely associated with the work.

At the European level, information would be collated and activities coordinated through the agency of the above-mentioned secretariat.

Reliability tests may be carried out either in official centres of the countries concerned or in approved industrial centres and under the supervision of the standardization body. Some experiments could, if appropriate, be performed in joint centres.

6. Cost and financing

(a) at national level:

Financing of the expenses involved in setting-up the bodies responsible for issuing approval certificates and performing reliability tests must be done at the national level, and discussions on the procedures governing industry's participation must be conducted at the same level.

(b) at European level:

The coordination secretariat must be financed on a joint basis.

7. Participation of non-member countries

The UK is already taking part in the work being undertaken in this direction; extension to other West European countries is desirable.

8. Classification and links with other projects

Classification A.
Project of equal interest to information science.

Field: Telecommunications

Project 22: NEW COMPONENTS FOR COMPUTERS

1. Nature of project

Design and development of new features intended to improve the performance of computers:

- comparative examination of new techniques which now appear promising;
- development of appropriate technologies;
- production of prototypes for the evaluation of industrial performance which is of interest (especially in the case of memories).

2. Objectives

Two subjects for research have been proposed:

- Development of high-speed memories for computers

The characteristics of present memories will limit, within the near future, the operational speed of electronic computers. New solutions should be developed which will allow cycle times of about 100 nanoseconds.

- Study of opto-electronic elements

Opto-electronic elements today seem to offer very interesting possibilities for the development of logical functions and interconnections with high decoupling. Their technique, compatible with present technologies for the production of microcircuits and integrated circuits, should be developed.

Project 22

3. Advantage of ccoperation

Cooperation will avoid duplication of haphazard and costly research.

4. Methods of operation

To be determined.

5. Cost and time scale

The approximate total expenditure which would be required for these studies has been estimated as: for studies on high-speed memories - 8 million u.a.; for studies on opto-electronic [illegible] elements - 10 million u.a. This research should last 2-3 years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks, and links with ohter projects

Classification B. Project of equal interest to information science.

- It will be undertaken if Project 10 is launched.
- In case of Project 10 being rejected, this project will be reconsidered as an independent scheme.

Field: Telecommunications

Project 23: BASIC RESEARCH ON SEMICONDUCTORS

1. Nature of project

Basic research aimed at improving the properties of semiconductors.

2. Objectives.

This concerns two types of completely different studies:

(a) Research on diagnostic techniques using semiconducting materials

This concerns the study of the correlation between the crystalline structure of the semiconductor and the electrical and physical characteristics of the devices. When a diagnostic technique is developed, it will allow the quality of the starting material to be checked and will thus give information enabling the manufacturing processes for this material and these devices to be ignored.

(b) Doping of semiconductors by ion bombardment

This avant-garde technique is not yet being used, although numerous laboratories have in recent years shown very great interest on it, the advantages anticipated are as follows:

- introducing of predetermined concentrations of elements, possibility of obtaining very rigid functions (hence production of faster devices), limitation of the phenomena of rediffusion and diffusion of impurities, development of integrated circuits with "vertical structure" and high component density.

Project 23

3. Advantage of cooperation

The basic research, the result of which may revolutionize present manufacturing techniques for materials and equipment and lead to patents of considerable importance, carries a fairly large risk which it would seem reasonable to spread over the whole Community.

4. Methods of operation

To be determined.

5. Cost and time scale

The following figures can be given, but it should be noted that they are of an approximate nature owing to the haphazard nature of the research:

(a) Diagnostic technique for materials:

Cost: 4 million u.a.: time: three years.

(b) Doping of semiconductors by ion bombardment:

Cost: 10 million u.a.; time: five years.

6. Participation of non-member countries

Desirable.

Project 23

7. Classification, additional remarks and links with other projects

Classification B.

This project would be of equal interest to information science. It is linked with Project 57, submitted for metallurgy.

Field: Telecommunications

Project 24: STUDY OF SOLID STATE DEVICES FOR HYPERFREQUENCY USE

1. Nature of project

Development of devices for generating, amplifying and converting hyperfrequency signals.

2. Objectives

Creation of hyperfrequency telecommunications systems which would be of considerable use to ground and satellite communications because of the great number of channels which can be used and of the small size of the aerials required. Solid state elements are proving indispensable for applications which require small bulk, low voltage, high output and high reliability.

3. Advantage of cooperation

Cooperation would avoid the loss of time and money due to the duplication of costly studies. Coordination of national programmes would be essential in this field.

4. Methods of operation

To be determined.

Project 24

5. Cost and time scale

The approximate cost of this research is estimated at 11 million u.a., spread over a period of three years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification B.

This action is complementary to the studies on the propagation of hyperfrequency waves outlined in note No. 25.

Field: Telecommunications

Project 25: RESEARCH ON THE PROPAGATION OF HERTZIAN WAVES

1. Nature of project

Basic research on high frequency and very high frequency waves from the point of view of:

- aerials used for these frequencies;
- propagation in the troposphere;
- propagation in the ionosphere.

This research is connected with the following seven subjects:

1. Aerial networks with phase control;
2. Aerials with reduced side lobes for ground stations with satellite links;
3. Reflector aerials with high surface yield and low noise temperature;
4. Influence of absorption by hydrometeors and maximum usable gain in aerials for frequencies above 10 GHz;
5. Determination of optimum emission of the aerial beam in point-to-point links;
6. Transhorizon propagation curves for non-temperate climates;
7. Improvement of methods for short term ionospheric forecasting.

2. Objectives

This basic research project is aimed at improving short-wave radiocommunications, widening the field for the use of hertzian beams on the ground and by satellite, and decreasing the cost of the necessary plant and equipment.

This work should result in new specifications for the equipment required by the public authorities from industry.

3. Advantage of cooperation

This concerns basic research of general interest. Only by breaking up the cost and coordinating the work will it be possible for these to be undertaken simultaneously and the results compared.

4. Programming and supervision of project

The task is to plan a programme of general-interest projects within a framework of concerted action in order to arrive at a complete pooling of results.

Determination of this programme would be the responsibility of the governments, acting through a coordination group which would consist of representatives of the various countries' postal and telegraph authorities.

The research projects would be under the supervision of the national authorities, who would be in close contact with each other through the coordination group, which would attend to the pooling of results.

5. Methods of operation

The programme will be carried out in a decentralized basis by the various countries' public, or possibly private, research centres.

6. Cost and financing

To carry out these research projects funds totalling 5,300,000 u.a. (see breakdown below) will have to be made available to the centres.

- Research No. 1: 700,000 u.a.
- Research No. 2: 650,000 u.a.
- Research No. 3: 650,000 u.a.
- Research No. 4: 1,800,000 u.a.
- Research No. 5: 300,000 u.a.
- Research No. 6: 1,000,000 u.a.
- Research No. 7: 220,000 u.a.

Certain results might be obtained after a year's experimental work (research projects 4 and 6) but most of the researches would take three to five years.

Financing will be from non-repayable public funds, which will have to be provided by the countries in which the work is being performed. The study of transhorizon propagation curves in countries with non-temperate climates will have to be financed jointly by the countries concerned.

Each country may finance certain work carried out in other countries with which it wishes to be more closely associated; the cooperation procedures will have to be determined case by case.

7. Participation of non-member countries

Desirable

8. Links with other projects, classification

Project 24 "Study of Solid-State Devices for Hyperfrequency Uses" complements this research project. Classification: A.

3. NEW MEANS OF TRANSPORT

The development of industrial societies entails increasingly varied, complex and numerous transport requirements and the meeting of such requirements is in itself a sizeable factor of development. Europe is in this respect faced with considerable problems which will continue to increase in the years to come under the effects of population growth, changes in production and distribution circuits, the need for land development, the consequences of urbanization, improvement in the standard of living and, of course, more intensive trade brought about by the disappearance of frontiers.

European countries will therefore have to make rapid and difficult choices in creating new infrastructures, new equipment and new systems. This will mainly affect transport requirements in urban areas, where the situation is frequently very serious already. But it will also concern links between large conurbations, where traffic flow, speed and comfort not only need to be increased on the most crowded routes, but also account must be taken of the desirable development of certain economic centres.

Faced with these new requirements, the existing transport facilities present numerous inadequacies and deficiencies or are beset by serious problems. It is thus essential to resort to new methods, either by improving present transport facilities or by developing new facilities to replace or supplement existing ones.

Research and new developments seem therefore of major importance, particularly since the state of technological

knowledge indicates a wide range of possibilities in respect of several basic principles: suspension (air cushion, magnetic fields, perpendicular suspension), propulsion (turbines, linear induction), energy sources (fuel battery), control of missiles (intervention of radar, sonar, infrared rays; use of electronics).

Although it is extremely desirable that new ideas whould come forth, it is equally necessary to avoid an excessive number of concrete developments which might bring about a waste of efforts and an increased number of results for which there would only be inadequate outlets.

This explains the relatively limited scope of the proposals made, four of which relate to preliminary studies. One of these concerns the expected evolution of passenger transport between the major European conurbations, while the other three cover concrete points. Four other suggestions are also put forward but have so far only been gone into very summarily.

While the proposed projects do indeed satisfy urgent needs, they only cover some of the present problems in the field of European transport. Urban transport, for instance, merely forms the subject of suggestions to be looked into at a later date while problems which must be solved are critical in all European countries, the need for cooperation having been shown with regard to several aspects of this question.

It therefore seems essential that the work started should be continued, so that cooperation may be organized every time it proves necessary or even only useful.

Field: Transport

Project 30: ELECTRONIC TRAFFIC AIDS ON MAJOR ROADS

1. Nature of project:

Development of a comprehensive system of traffic aids on motorways and on major roads in towns.

Public service activity (traffic aids system);

2. Objectives:

- development of the system involves:
  - studies (systems analysis, simulation, signalling, profitability);
  - research and development on new equipment (data collection)
  - standardization operations (signalling).

The object of the proposed system is to bring about:

- Improvements of road safety, the majority of accidents on the motorways occurring as a result of collisions by vehicles travelling in the same direction;
- Improvement in the smooth flow of traffic;
- General improvements in safety, smooth flow of traffic and the use of motorways.

3. Advantage of cooperation

- Similar situation and similar problems to be resolved in the various countries;
- Interpenetration of road traffic from one country to another;
- No solution possible without standardization;
- Need to offer equipment as cheaply as possible through mass production;
- Research already carried out in certain member countries on some particular aspects of the project.

4. Programming and supervision of project

(a) programming carried out by a coordination group, which will have to be set up as soon as the project is launched; this is because research is being undertaken in certain member countries on a number of aspects of an integrated system, which must therefore be taken into account for the purpose of the new research. It is also essential to have a unified design, the desired result being a single system.

The coordination group will consult the appropriate manufacturers during the development of the system. Whenever the research concerns new equipment, manufacturers will be closely associated in the group's work.

(b) Supervision of work

This will be carried out by the coordination group.

5. Performance of research

- Studies: carried out in the public services' (road research) laboratories (or centres). For each study or group of studies a main laboratory will be appointed, which will work in cooperation with others (researchers being seconded, if necessary, to the main laboratory).

- Research and development on new equipment: determination of types of equipment will be followed by selection of the enterprises to be responsible for development of prototypes. The experimental work on prototypes, as on the signalling and profitability studies, will be performed by the main laboratories (on motorway sections already chosen for the purpose in Germany, France and Italy).

As regards certain high-cost types of equipment, there are two possible alternative courses for the designing and production of prototypes:

- setting up a European consortium in order to enable the industries of the various countries to participate and to ensure access to the various markets;

- awarding the contract to an enterprise in a participating country, it being understood in either case that the production run would be long enough to make for reduction of costs (cf. size of market and size of enterprise).

In the case of low-cost equipment, it will be sufficient to lay down uniform specifications; contracts could be awarded and production carried out within a national framework.

6. Industrial utilization of research results

- The joint invitation to tender for prototypes and the influence of the large market on the lowering of costs of some types of equipment (certain detectors, for instance) makes it necessary to group government orders in certain cases.
- For the production and marketing of high-cost equipment, groupings of firms may be recommended (cf. Section 3 above).

7. Financing and cost

- Value of project: about 1,200,000 u.a.
- Type of financing: definitive financing grom public funds, except for certain new types of equipment, in which case the R & D will be financed by industry.
- Case for joint government financing, where called for:
  Such financing is necessary:
  - for the studies, in view of the fact that institutes will be working in association with a main laboratory, and in particular seconding researchers. If a study were to be undertaken by one institute only, there would be a case for having it financed by an individual country. However, for the purposes of overall coordination of the project, this type of financing - of an exceptional nature in the present instance - does not appear desirable;
  - for research on certain types of equipment (where the R & D would not be financed by industry), the fact that a joint call for tenders is to be issued necessitates financing on a joint basis.

8. Participation of non-member countries

Desirable.

9. Links with other projects, classification

The PREST group decided (see doc. of 9.7.69) to merge part of project 37 with project 30 so as to have a comprehensive project for an electronic aid system for road traffic, urban areas included.

On the other hand the group decided to take the part concerning the vehicle-mounted equipment out of project 30 and make it the new project 37, but without lowering its classification.

Classification: A.

Field: New Means of Transport

Project 31: STUDY OF ELECTROMAGNETIC "LIFT" TECHNOLOGY FOR GUIDED MEANS OF TRANSPORT

1. Nature of project

Assessment of the possibilities of electromagnetic "lift" (sustentation) for guided means of transport.

2. Objectives

Electromagnetic "lift" may be a technical component permitting high speeds over long distances and offering numerous advantages for urban transport (comfort, no nuisances).

Since none of the Member States has gone far enough with work on this principle, the proposed project aims at determining the advantage, the nature and the extent of the research and development required.

3. Advantage of cooperation

- The investigation of this principle being something new, cooperation would enable research to be fully effective.
- Cooperation starting at this preliminary stage would facilitate the subsequent selection of the best techniques to be adopted for high speeds and for collective urban transport.
- Certain non-European countries are conducting extensive research on this principle (Japan in particular).

Project 31

4. Methods of operation

Project to be organized, financed and carried out jointly.

The work will be entrusted to a main national centre (or institute), in association with other centres (or institutes).

5. Cost and time scale

45,000 u.a. over one year.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: New Means of Transport

Project 32: STUDY OF A MARINE HOVERCRAFT OF 1,000-2,000 TONS

1. Nature of project

Preliminary study of a R & D project to be decided upon later in the light of the study findings.

This project is mainly of industrial interest by reason of its possible extension to industry (R & D project); it is also of general interest to the extent that buyers of the future hovercraft will be companies operating regular lines (State or private companies).

2. Objectives

The advantage of using marine hovercraft for ferry traffic is considerable in view of the speeds to be expected and the present-day and future traffic between the islands and the Continent of Europe. For this traffic, however, craft in the region of 2000 metric tons are necessary and present techniques involving the air cushion cannot be used beyond 300 metric tons.

The project envisaged consists in carrying out a preliminary study; subject to the study findings, a decision to put in hand a project for research and development of one or more prototypes would be taken later. The purpose of the preliminary study in question is to obtain:

1. a definition of main parameters, and on the basis thereof an assessment of the possible cost;
2. market study;
3. a feasibility study.

3. Advantage of cooperation

- Very substantial traffic needs between islands and the Continent.
- Techniques already developed for hovercraft under 300 metric tons, but could be stretched to higher tonnages.
- Research already undertaken in the United States on hovercraft of 2000-4000 metric tons and consequently danger of non-European competition in future.
- Concentration of the necessary means, with due allowance for the scope of the final project.

4. Programming and supervision of project

(a) programming will be undertaken by a coordination group on the basis of preliminary projects submitted to it by firms, possibly combining for the purpose, and, if necessary, by national centres or institutes;

(b) the work will be supervised by the coordination group.

5. Performance of research

This will be done in industry, and if appropriate in national institutes or centres, the study being compiled by the firms mainly concerned, in collaboration with one or more national institutes or centres as well as with users. A main institute or centre will have to be appointed, either from among the national institutes or centres or from among the enterprises concerned.

6. Industrial utilization of results

- from the preliminary studies stage, the grouping of enterprises must foreshadow the consortium which, at the R & D stage, will be commissioned to construct the prototypes (possibly through the agency of a joint subsidiary);
- at the marketing stage, the combining of government orders must be considered wherever companies under the control of a public authority are concerned.

7. Costs and financing:

- Value of project: 1,200,000 u.a., divided up as follows:

(1) Preliminary draft project, including some tests in water tanks (200,000 u.a.).

(2) Technical feasibility study, including more searching tests with small-scale models in order to determine the systems to be adopted (1,000,000 u.a.).

These two stages are connected and the passage from one to the other is automatic. The market study is included in the total sum.

- Either joint government financing of part of the project only, the rest being done by industry, or joint government financing for the entire project, but with provision for repayment of a portion of the funds employed. (In either case, government financing would irrevocably cover the entire project if the findings from the study were such as to mean abandonment of the R & D project.)
- Joint government financing in one form or the other is necessary having regard to the following facts:
  - at study level, the right which the Community must have to make a choice with respect to other fast marine transport techniques. (The results of the study will have to be taken as the factors on the basis of which the Community will be able to decide in favour of a particular technique.)
  - at R & D project level, the overall scope of the undertaking (construction of prototypes). At this stage, however, the results of the study will make it possible to determine the proportion in which the market conditions would permit incorporation of the R & D expenses in the selling price; depending on these findings, it might be possible to arrange simply for jointly financed repayable credits to be opened, which would go hand in hand with the combining of public contracts.

8. Participation of non-member countries

Desirable, in particular in respect of Great Britain, which has developed a marine hovercraft of up to 300 metric tons.

9. Classification

Classification A.

Field: New Means of Transport

Project 33: FORWARD STUDY OF PASSENGER TRANSPORT BETWEEN LARGE CONURBATIONS

1. Nature of project

This will consist of an analysis of the requirements with a view to defining the possible uses of new methods and techniques for high-speed collective transport between large European conurbations.

2. Objectives

On the basis of an analysis of the demand likely in 1985 and 2000 and with due allowance for developments in the field of transport, determination of:

- possible techniques;
- possibilities for R. & D;
- desirable trends at Community level.

Final objective: the drawing up of a Community R & D policy in respect of the new techniques in the field of transport applied to links between large conurbations.

3. Advantage of cooperation

- Links between large conurbations can only be studied on a multinational scale (international links at least as important as those existing within a national framework).

Project 33

- The conclusions drawn in the proposed study must make it possible to map out the course of research and the choice of techniques appropriate for European networks.

4. Methods of operation

Study to be carried out by the OECD. Subsequent procedure to be defined.

5. Cost and timescale

- 200,000 u.a.;
- two or three years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: New Means of Transport

Project 34: STUDY OF CLOSED-CIRCUIT GAS TURBINES FOR USE ON RAILWAYS

1. Nature of project

Technical and economic feasibility study (in particular comparison with the open-circuit gas turbine).

2. Objectives

Research on turbotrains has until now been restricted to the use of open-circuit turbines (aeronautics). The closed-circuit gas turbine (helium) would offer the following advantages over them:

- elimination of air pollution and reduction of noise;
- improved performance;
- reduced maintenance costs and longer service life;
- high reliability;

3. Advantage of cooperation

- This is research into something which is new to all European countries, since only the open-circuit gas turbine has been developed until now.
- In view of the high cost of development, cooperation makes it possible to concentrate the available means and spread the risk.
- All railway companies are aiming at high speeds and would therefore be interested in the results obtained.

Project 34

4. Methods of operation

To be defined.

5. Cost and timescale

50,000 u.a. over two years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: New Means of Transport

Project 35: RESEARCH AND DEVELOPMENT WORK ON THE LINEAR INDUCTION MOTOR

1. Nature of project

The question of the linear induction motor is an important one and its examination must be taken up again subsequently with a view to determining whether cooperative action is desirable.

2. Objectives

The linear induction motor constitutes a means of propulsion possessing remarkable advantages:

- outstanding acceleration and braking power;
- ability to propel vehicles whilst retaining perfect grip;
- very high reliability (no moving parts);
- no nuisances (silent);

However, certain aspects need to be better known so as to improve the performance and power. Also, it has so far been used for relatively low speeds (urban transport, travelling cranes); the use of the linear motor for high speeds should therefore be studied.

3. Advantage of cooperation

- Research carried out in several European countries on various aspects.

Project 35

- Similar advantages in improving collective urban transport along the lines made possible by the linear motor.
- Concentration of the available means to utilize this new principle and an easier selection of the most interesting practical results.
- Possibility of obtaining cheaper material through the mass prodection made possible by a vast market.

4. Methods of operation

To be defined.

5. Cost and timescale

To be defined.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification B.

Field: New Means of Transport

Project 36: AUTOMATION OF OPERATION OF SHIPPING

1. Nature of project

Research on full automation in the control of ships and shipping, carried out by means of apparatus on board and infrastructure on land.

2. Objectives

- Rational distribution of ships, taking into account the density and conditions of traffic in busy areas (improved safety).
- Direct management of ships by their companies (increased profitability).
- Improvement of working conditions on board and of crew's productivity.

3. Advantage of cooperation

- Increased competitive power for European shipping companies and shipyards.
- Introduction of one system only and most economical production of equipment.

4. Methods of operation

To be defined.

Project 36

5. Cost and timescale

To be defined.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification B.

Field: New means of transport

Project 37: VEHICLE-MOUNTED DEVICE TO REGULATE THE GAP BETWEEN VEHICLES

1. Nature of project:

- public-service activity (traffic aids)
- preliminary feasibility study on technical and economic aspects.

2. Objectives:

The study is to lead to:

- either specifications for a device whose introduction on the market would be encouraged subsequently
- or the launching of a R & D programme.

In either case, it is a matter of developing a vehicle-mounted device to regulate the spacing between vehicles, particularly on busy motorway sections.

With this device the safety and flow of traffic on motorways would be improved generally, as the majority of accidents on such roads are due to pile-ups of vehicles following one another.

3. Advantage of cooperation:

- same situation and same problems in the different countries
- interpenetration of road traffic from country to country
- need to market the devices at the lowest possible price by means of mass production.

4. Programming and supervision of project:

(a) Programming will be carried out by a coordination group. As it is a case of research on new equipment, the manufacturers will be closely associated with the work of the group.

(b) The work will be supervised by the coordination group.

5. Performance of research

- Studies: carried out in the public services' (road research) laboratories (or centres). A main laboratory would be appointed, which would work in association with others (researchers being seconded, if necessary, to the main laboratory).
- Research and development of new equipment: determination of types of new equipment will be followed by selection, on a joint-tender basis, of the enterprises to be responsible for development of prototypes.

6. Industrial utilization of research results

The objective being to market a device at the lowest possible cost (in order to facilitate its adoption by users), groupings of enterprises may be recommended. Such groupings could be encouraged only at the prototype construction stage, as production in this case cannot enjoy the advantage of combined government orders.

7. Cost and financing

- Value of project: 700,000 u.a.
- Type of financing:
  - for the preliminary study, definitive financing from public funds;
  - for the R & D on the vehicle-mounted device, financing by industry. However, financing would be from repayable public funds should it be necessary to have prototypes constructed and to experiment with them in order to decide on a type of device.
- Case for joint government financing

Such financing is necessary:

- for the studies, in view of the fact that institutes will be working in association with a main laboratory, and in particular seconding researchers;
- for the equipment, if it is necessary to construct several prototypes and make a choice among them.

8. Participation of non-member countries: desirable

9. Classification: category A

The version of project 37 given in the PREST group's report was classed in category B. Its object was to devise a data-collecting system to control the flow of motor traffic in urban areas.

The PREST group later decided (cf. complementary documents) to transfer that project 37 to project 30, so as to have a comprehensive project for an electronic aids system for road traffic, urban areas included.

On the other hand, the group decided to withdraw the section dealing with the vehicle-mounted device from project 30 and make it the new project 37, without lowering its classification.

10. Links with other projects: with project 30.

Field: New Means of Transport

Project 38: RESEARCH ON THE USE OF ELECTRIC VEHICLES IN URBAN AREAS

1. Nature of project

Systematic analysis of the conditions for the introduction of electric vehicles in urban areas.

2. Objectives

At first, electric vehicles could only be used in urban areas, their range of action - on the basis of an accumulator as a source of energy - being very limited. The problems presented by nuisances and congestion requiring urgent solution in urban areas, the use of electric vehicles in cities should be assessed and encouraged.

3. Advantage of cooperation

- Similarity and urgency of the problems to be solved in member countries.
- Research and development work already undertaken by several industrial companies in the member countries enable the chances of introducing an alectric vehicle to be evaluated.
- The need for coordinated regulations to encourage the widespread use of electric vehicles.

4. Methods of operation

To be defined.

Project 38

5. Cost and timescale

To be defined.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification B.

4. OCEANOGRAPHY

Oceanography is a field in full process of development. After a long time during which this discipline was considered as being scientific research of purely academic interest, providing at most a few results which might be of use to fisheries and maritime navigation, attention is now being concentrated on the immense resources to be found in the ocean. This increased awareness, promoted by intensive prospection for oil in the neighbourhood of coasts, and by the world's growing need for food, has led many countries to become more and more interested in this field.

The United States, and to a lesser degree the USSR, have adopted increasing sums to oceanography during recent years, and have decided to increase these sums substantially in the years to come. In comparison with these two countries, and particularly with the former, European efforts in this respect are still very modest. Thus for 1968 it can be estimated that Europe's expenditure was of the order of 50 million dollars, compared with 500 million dollars for the United States. Several Community countries have in fact taken account of this disparity in drawing up medium-term orientation programmes.

Inasmuch as the sector concerned is relatively new and work is on a geographical terrain open to all nations, it certainly seems that this field is a favoured one for international cooperation. Furthermore, international bodies concerned with oceanography are fairly numerous, but real joint projects are still on a very small scale, being mainly limited to scientific research.

It may be felt that the final objective is reasonable exploitation of the ocean's resources. The aim of this exploitation should be to procure, under economically satisfactory conditions, the natural

resources which we are in need of, but exploitation should be of a reasonable kind in order to avoid careless waste or resources which are not renewable (petroleum, mineral ores, etc.) or of which natural renewal runs the risk of being seriously disturbed, or even halted, by unfortunate measures (destruction of marine fauna and flora by pollutants).

Essential lines of action may be as follows:

- actions of general interest, aimed at a better basic knowledge of marine phenomena and protection against pollution;
- technological actions in preparation for exploitation of natural resources, by the development of equipment, instruments and techniques.

The two types of action must go together. Although oceanographical research is already of long standing, the field to be explored is so wide and the difficulties involved in this exploration so great that the basic knowledge is still not nearly sufficient to allow full-scale exploitation of the oceans to be undertaken. On the other hand, even before exploitation of oceanic resources is undertaken, it is absolutely essential to avoid disturbing, perhaps irreversibly, the conditions of life in the oceans. It would be ridiculous to wait for some great catastrophe before deciding upon action which can only really be effective if it is undertaken by as large a number of countries as possible. But these projects of general interest will only be fully effective if they do in fact open the way to a programme of exploitation of resources, this programme being on a sufficiently large scale to justify its being launched on a cooperative basis. The exploitation of marine resources will necessitate the development of new equipment. The

of new equipment. The development of information science and new sources of energy will lay open very wide technological possibilities in this respect, but at the same time very substantial expenditure will be called for.

In this respect, the present proposals in no way provide a satisfactory reply. We have limited ourselves to a few proposals for action of general interest, but this is because it will only be possible to put forward projects of a technological nature when the precise objectives of exploitation of natural resources have been defined. This means that work must continue in the coming months in order to be able, in a few months' time, to put forward a programme of oceanographical action which is appropriate to the possibilities opened in this field and to what has already been done by various foreign countries.

Field: Oceanography

Project 40: ESTABLISHMENT OF SCIENTIFIC AND TECHNICAL BASES FOR CUMMUNITY MEASURES IN THE FIGHT AGAINST POLLUTION OF THE SEAS

1. Nature of project

(a) During one year, regular taking of samples (water, sediment, particles in suspension, test organisms) in estuaries of European rivers (strategic points of marine pollution) and analysis of these samples.

(b) Drawing up of continuous measures to combat and control pollution of the seas: information on the sources of pollution and of the legal provisions in force, fixing of acceptable levels of toxicity, studies on measures of control.

2. Objectives

Establishment of the bases for standard legislation in the fight against pollution of the seas, provision of safety measures to be taken in the event of a disaster.

3. Advantage of cooperation

Advantage of standard legislation. Better use of the personnel and facilities available by division of labour.

Project 40

4. Methods of operation

(a) Taking of samples and analysis according to the different criteria in the national institutes and at Euratom's Joint Research Centre.

(b) To be determined.

5. Cost and timescale

(a) Total cost of the sampling and analysis carried out during one year: about 600,000 u.a.

(b) The cost of technical measures and control can only be evaluated when the methods of operation have been fixed.

6. Participation of non-member countries

In view of the alluvial deposits of the Thames, the cooperation of British bodies is desirable.

7. Classification, additional remarks and links with other projects

Classification A

Additional remarks:

Links with other projects: the proposed measures are supplemented by Projects 41 and 42.

Field: Oceanography

Project 41: DEVELOPMENT OF A DEVICE FOR STUDYING THE DEGREE OF TOXICITY OF DIFFERENT POLLUTANTS ON DIFFERENT ORGANISMS

1. Nature of project

Joint development of a device for studying in vitro the degree of toxicity of different substances on different organisms. Joint purchase of the device by laboratories (immediate requirement 15-20 of these devices).

2. Objectives

Creation of the conditions necessary for acquiring fundamental knowledge of the effect of toxic substances on organisms. Promotion of technology.

3. Advantage of cooperation

Allows uniform measurements which might be used in establishing uniform standards. High cost of development.

4. Methods of operation

Joint fixing of specifications, development of a laboratory prototype (in a national institute), development contract placed with industry, construction contract placed with industry.

Project 41

5. Cost and timescale

Development of prototype

- 1st year: 200,000 u.a.;
- 2nd year: 200,000 u.a.,
- 3rd year: 100,000 u.a.;

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A

Additional remarks:-

Links with other projects: development of this device is closely linked with Project 40.

Field: Oceanography

Project 42: DEVELOPMENT OF AN APPARATUS FOR TOXICOLOGICAL AND BIOLOGICAL STUDIES IN THE SEA (UNDERSEA ECOSTAT)

1. Nature of project

Development of a device for continuous measuring in situ of chemical and biological parameters (at the bottom of estuaries and on a platform). Immediate requirement 15-20 of these devices. This device is to be used:

- for toxicological examination under conditions close to natural ones;
- for studies of the accumulation of toxic substances in the biological food chain;
- for telemetric investigation of the present saprobiological situation in the sea.

2. Objectives

To acquire fundamental knowledge of pollution of the sea. Promotion of technology.

3. Advantage of cooperation

Allows uniform measurements which might be used in establishing uniform standards. High cost of development.

Project 42

4. Methods of operation

Joint fixing of specifications, development of a laboratory prototype (in a national institute), development contract placed with industry, construction contract placed with industry.

5. Cost and timescale

Development of prototype: about three years; cost: about 500,000 u.a.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A

Additional remarks:

Links with other projects: development of this device is closely linked with Project 40 and forms part of Project 43.

Field: Oceanography

Project 43: SETTING UP OF AN OCEANOGRAPHICAL AND METEOROLOGICAL MEASURING NETWORK IN EUROPEAN WATERS

1. Nature of project

Joint development of a complete automatic measuring station for the making and transmission of oceanographical and meteorological observations along the coasts and in the open sea, and setting up of an oceanographical and meteorological measuring network in European waters and organization of the appropriate land services.

2. Objectives

- Because of the facilities it will offer for recording and transmitting important data, the measurement network is of general interest. It will allow of improving meteorological forecasting, safety in navigation and protection of the coasts, the fight against pollution of the sea and fisheries research. The development and construction of an automatic measuring station will also serve the interests of the industries operating in this sector.

3. Advantage of cooperation

(a) Measuring station

- reduction of the cost of development through elimination of duplication;
- reduction of purchasing cost through large-scale ordering.

(b) Measuring network

- a single national measuring network cannot provide the necessary information;
- possible Community participation in the setting up of a world measuring network within the framework of IGOSS.

4. Programming and supervision of project

The measuring network will be set up in three stages: development of a complete automatic oceanographical measurement station; Installation of an experimental network; installation of the operational measuring network.

In order to draw up the programme for these three phases, it is necessary to set up a coordination group which will also have to be responsible for supervising the proper use of the funds made available and, if appropriate, for ensuring continuity of the work on development of the measuring station. During the third phase, it will also be necessary to consult representatives of industry.

This group, underpinned by an administrative infrastructure which would be as light as possible, will be required to carry out the following tasks at the various phases:

I. Development of a measuring station:

Determination of the technical specifications for the constituents involved in the construction of a measuring station and its accessory equipment, with due allowance for the specific environmental conditions. Granting of development contracts, financial supervision and, if necessary, supervision of the development work.

II. Experimental network:

Study and selection of the site and of the type of measuring station and experimental network instrumentation; financial supervision.

III. Setting-up of a measuring network in European waters:

Determination, coordination and supervision, with due regard to the experience acquired during the setting-up of the experimental network, of the necessary preparatory work on the setting-up of an operational measuring network from the technical and organizational standpoints.

5. Performance

I. Development of a measuring station.

The measuring station will be developed by the building block system and equipped, according to requirements, with various elements (measuring probes), electricity supply plant, anchoring systems, transmitting units). The development work will be assigned to several firms in different branches of activity (electronics, buoy construction, equipment construction), which, moreover, will be able to combine so as to form a multinational consortium.

The development contracts may be awarded on the basis of tenders or by any other appropriate selection method. They will be concluded by the coordination group. There are two alternative

procedures:

- Awarding of a contract for the development of a complete prototype automatic oceanographical measuring station. In this case, the development expenses will be borne by the principal. The advantage here is that the principal will have the research results and will subsequently retain complete freedom in the awarding of production contracts, with due regard to geographical distribution. The drawback is that it will be difficult to assess the amount of the development costs (Hypothesis 1).

- Awarding of a contract for the development and supply at a fixed price of 10 initial complete automatic oceanographical measuring stations for the setting-up of an experimental network. In this case, the development costs will be included in the production costs. The advantage here is that the principal will not have to contend with any development risk and will be able to make an overall assessment of the development and production costs. The drawback is that he will be more dependent on the supplier (Hypothesis 2).

II. Experimental network

After having examined the technical and financial conditions and the organizational aspects, the coordination group having programming, decision-making and supervisory powers will commission either an existing or a new joint institute to set up an experimental network, using the jointly developed and controlled measuring stations. In the case of Hypothesis 1: Through the agency of the coordination group having powers of programming, decision-making and supervision, a contract for the supply of 10 initial measuring stations for the setting-up of the experimental network will be awarded on a joint basis (after an invitation to submit tenders or the application of any other appropriate selection method). In the case of Hypotheses 2 this contract has already been awarded in stage 1. The measuring network will be managed by the institute in question.

III. Measuring network in European waters

Hypothesis 1: Either a contract will be awarded on a joint basis or public calls for tender, coordinated between the various countries, will be issued. In the event of a contract being awarded on a joint basis, consideration may be given either to the firms which have already carried out the development work or to other enterprises having the necessary qualifications.

Hypothesis 2: A contract will be awarded jointly for the supply of measuring stations for the setting-up of operational measuring network.

The contract will be concluded with the firm or firms which have already designed and constructed the 11 experimental network measuring stations.

Orders will be placed (after an invitation to submit tenders or the application of any other appropriate selection method) for the equipment necessary for organizing the appropriate land services (e.g. data processing plant). Orders for equipment to be used jointly may be awarded at Community level or, subject to coordination, at the national level.

After the measuring stations ordered have been delivered, the measuring network will be installed and the appropriate land services organized. The measuring network set up in European waters will call for the creation of a permanent agency for coordinating the various parts of the network and for processing and disseminating the recorded measuring data.

6. Industrial utilization of the research findings
Costs and financing

The project will be financed from public resources.

I. Development of measuring station:
Hypothesis 1: Joint financing of the development of the prototype measuring station (more than 500,000 u.a.). This would be a non-repayable subsidy.

II. Setting-up of experimental network:
Joint financing of the setting-up of the experimental network (more than 2,000,000 u.a.). This would consist in non-repayable subsidies. Joint financing of the setting-up of the experimental network management expenses.

III. Setting-up of operational measuring network:
- joint financing of the measuring network set up in European waters and of the organization of the appropriate land services;
- joint financing of the measuring network set up in European waters and national-level financing of the organization of the appropriate land services;
- national-level financing of these parts of the network which are located off the coasts of each country and of the organization of the appropriate land services.

Management of the measuring network may be financed either at Community level or at national level.

8. Participation of non-member countries:
Desirable.

9. Links with other projects, classification:

Possible link later on with project 71 (meteorological satellites: question of stations for measurements by satellite). Classification: A.

Field: Oceanography

Project 44: DEVELOPMENT OF AN OCEANOGRAPHICAL CHEMICAL SONDE

1. Nature of the project

Development of a sonde for determining the chemical parameters of sea water.

2. Objectives

To improve knowledge of the importance of dissolved organic substances for vital processes in the sea. Promotion of technology.

3. Advantage of cooperation

Allows uniform measures. High cost of development.

4. Methods of operation

Not yet fixed.

5. Cost and timescale

Not yet fixed.

6. Participation of non-member countries

Not yet discussed.

Project 44

7. Classification, additional remarks and links with other projects

Classification B

Additional remarks:

Links with other projects: this sonde may be used in the oceanographical measuring network (Project 43).

Field: Oceanography

Project 45: DEVELOPMENT OF AN APPARATUS FOR JOINT SAMPLING OF THE SEA BED

1. Nature of project

Development of an apparatus for the joint sampling of marine soil.

2. Objectives

To improve the possibilities for geological prospection of the sea bed.

3. Advantage of cooperation

High cost of development.

4. Methods of operation

Not yet fixed.

5. Cost and timescale

Not yet fixed.

6. Participation of non-member countries

Net yet discussed.

Project 45

7. Classification, additional remarks and links with other projects

Classification B

Additional remarks: The development of this apparatus is linked with projects to be proposed later in the field of techniques for exploiting the sea.

Links with other projects:

5. METALLURGY

The availability at economic prices of materials with a sufficient level of certain physical, chemical, mechanical, electrical, etc., properties is an essential condition in the development of advanced technology. But in studying subjects for research which would be worth selecting in the field of metallurgy, the Working Party came up against a double difficulty in the sense that their terms of reference did not include the broad nuclear and spatial fields nor iron and steel making, and that until now the prospects for technological and industrial development have not been fully studied on a Community level.

This did not, however, prevent at attempt being made to pick out possible subjects for research within certain broad outlines which seem to meet consumers' requirements fairly rapidly. From the time that the work was begun effective participation was sought from industry. As a result of proper handling of problems relating to the protection of industrial property rights and procedures for cooperation, industrial concerns showed a lively interest in the cooperative projects and submitted more than 80 concrete proposals within a few weeks. Some declared themselves ready to cooperate even further provided that the overall project evolved favourably.

To overcome the difficulties raised by the procedures for carrying out such cooperative projects, the Working Party has considered it advisable to submit a general proposal in this field, aimed at the setting up of a "combined European project"; work has already begun on this. The mainspring of this project would be the allocation, on

the recommendation of a joint European body, of national funds to national undertakings or laboratories.

The projects listed below, the carrying out of which is urgently required and for which it seems that cooperation can easily be organized, could therefore serve as a basis or example for drawing up the programme for the combined European scheme:

- metals and alloys for gas turbines. The market for these machines for use in the production of electrical energy and for propulsion purposes, both in the Community and outside, could be considerably expanded if advanced materials were available to enable their performance to be improved considerably.
- metals and alloys used in the construction of sea water desalination plant. Meeting the demand for fresh water for human, agricultural and industrial needs is already a vital problem in certain regions of the Community and in many developing countries;
- materials for use in the manufacture of large items of equipment (reaction tanks, etc.) used in the chemical and petrochemical industry;
- high performance materials for electric and electronic engineering.

The limitation of the proposals to these four broad outlines is the result, as has been stated, of the desire to submit only projects which are of indisputable interest. But the first investigation on which has already been carried out with the help of industry and which disclosed a large number of other subjects shows that it would be possible to submit many other proposals in respect of metallurgy.

Field: Metallurgy

Project 50: TECHNOLOGICAL STUDY AND DEVELOPMENT OF TITANIUM ALLOYS AND SUPERALLOYS FOR GAS TURBINES

1. Nature of project

- Technological studies aiming at:

(a) increasing the insufficient reliability of the best Ni and Co alloys recently developed;

(b) improving alloys by developing production and shaping processes.

- Development of new alloys of the "superalloy" type: dispersion-strengthened alloys with oriented structure and pseudo-fibrous texture.

- Development of titanium alloys and shaping processes.

2. Objectives

Gas turbines constitute a means of producing energy which is characterized by a high powr/mass ratio and is therefore suitable for mobile use, e.g., in aeronautics, ships, trains, commercial road vehicles. The ease with which they can be started up also makes them particlarly suitable for supplying peak demands for electrical energy. Their output, however, which is linked with the temperature of the heat source, which is at present only 850°C, could be improved by about 50% by raising the operating temperature to 1,400°C.

Project 50

The field of application of gas turbines would then be extended considerably to include all types of energy-producing machines, including large electric power stations.

This progress is entirely dependent on materials whose characteristics are at present insufficient for the operating temperatures contemplated. The major part of the research and development on this subject is being done by countries outside the Community, in particular the USA and, on a smaller scale, Britain. Europe cannot depend on outside countries in such a vital field, nor can it avoid a problem which is so important to its industrial and economic future. Superalloys, for this purpose, can be used at up to 1,000-1,100°C for long periods.

3. Advantages of cooperation

All European countries are devoting a certain amount of research to these advanced materials. The small size of the national markets is such that it is impossible even to conduct enough research to prevent the gap between each of these countries and the technologically advanced outside countries, from where almost all innovations in this field have come, from widening even further. These various studies have the further disadvantage that they partly overlap one another.

European cooperation, with the work being spread out over several countries, is the only means of improving the return on the outlay on research in each country and of accelerating technological developments in the Community.

Project 50

The long-duration high-temperature trials required far exceed the capacity of the largest laboratories; in order to make rapid advances the work must be divided up between several countries and the results pooled.

4. Methods of operation

To be specified within the framework of combined European action. The work is to be undertaken mainly by industry, possibly backed up by the research centres and universities.

5. Cost and timescale

An amount of the order of 12,000,000 u.a. seems reasonable for a five year programme.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Metallurgy

Project 51: DEVELOPMENT OF FIBRE-REINFORCED MATERIALS FOR GAS TURBINES

1. Nature of project

- Development of fibres with a high melting point.
- Study of the binding of fibres with the matrix and their compatibility with it.
- Development of reliable composite materials capable of functioning continuously in gas turbines at temperatures of the order of 1,200°C.

2. Objectives

Cf. Project 50.

Fibre-reinforced materials combine the remarkable mechanical properties of fibres, single crystals or whiskers with the characteristics of the matrix in which they are distributed. In a different field, the use of these materials may offer the same advantages as those gained from the change-over from simple mortar and concrete to reinforced and subsequently prestressed concrete.

Being a new family of products, fibre-reinforced materials are intended for use over a very wide range of temperatures.

Project 51

3. Advantage of cooperation

Cf. Project 50.

Little work has been done on these materials in Community countries. A few brilliant successes by outside countries - plastics reinforced with glass or carbon fibres - have caused several research centres to become interested in the problem. Before proceeding to the industrial applications of materials for use at high temperatures, many fundamental questions on the problems of fibre production, compatibility and interface must be dealt with and solved. Active international cooperation is particularly desirable in this first phase.

4. Methods of operation

To be specified within the framework of combined European action.

During the first fundamental phase work must be carried out in close cooperation with universities, research centres and development departments in industrial companies.

5. Cost and timescale

An amount of the order of 2,000,000 u.a. is envisaged for a period of five years, the programme being revised after three years. If this first stage is a success, larger amounts would be required for technological trials.

Project 51

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Metallurgy

Project 52: DEVELOPMENT OF REFRACTORY METALS AND OTHER MATERIALS (CEMENT, CERAMICS) FOR GAS TURBINES

1. Nature of project

- Technological development of refractory metals and alloys, in particular based on niobium and chromium, with regard to shaping, mechanical properties and their behaviour in oxidizing atmospheres.
- Study of protective coatings.
- Shaping and properties of ceramic materials, and in particular silicon nitride.

2. Objectives

Cf. Project 50.

The field of utilization of refractory metals and alloys is above 1,100°C, which is the upper limit for the use of superalloys over long periods. Their principal limitation comes from their intrinsic low resistance to oxidation. A study should therefore be made of how they may be provided with protective coatings which are compatible with the basic material and continue to provide satisfactory protection when damaged. The industrial stage is not envisaged for some time. These materials are particularly well suited to turbines using helium.

Project 52

Certain ceramics, such as silicon nitride, seem capable of long-time use in this temperature range above 1,100°C. The problems of shaping and mechanical behaviour have still to be studied. Their use is envisaged in the not too distant future.

3. Advantage of cooperation

Cf. Projects 50 and 51.

4. Methods of operation

To be specified within the framework of combined European action.

During the first fundamental stage work must be carried out in close cooperation with universities, research centres and development departments in industrial companies.

5. Cost and timescale

An amount of 3,000,000 u.a. is envisaged for a period of five years, the programme being revised after three years. If the first stage is a success, larger amounts would be required for technological trials.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Metallurgy

Project 53: MATERIALS FOR THE DESALINATION OF SEA WATER

1. Nature of project

Development of low-cost materials for the desalination of sea water. Studies of materials, corrosion studies, development of manufacturing technologies, prototype testing.

2. Objectives

Exchanger tubes account for about 30% of the cost of a desalination plant. There are major advantages in developing materials which are not only highly resistant to corrosion by hot sea water, but are also cheap.

There are two objectives:

- Reduction in cost of tubes for desalination plant operating by distillation at 120° max.;
- Raising of the operating temperature with a view to reducing the price of desalinated water.

The development of desalination materials enjoys considerable support in the United States. European manufacturers are therefore facing stiff competition.

Project 53

All Community countries are very interested in the desalination of sea water, either through the need for fresh water or because of the export possibilities that will be opened up by the development of this technology (in particular to the emerging countries).

3. Advantage of cooperation

- Reduction of total expenditure on research and development.
- Increase in the efficiency of research carried out on a national scale.
- Accelerated development of materials so that European firms constructing or exporting sea water desalination plant are quickly placed in a favourable competitive position.

4. Methods of operation

To be specified within the framework of combined European action. The work is to be undertaken mainly by industry, possibly backed up by research centres and universities.

5. Cost and timescale

6,000,000 u.a. over five years.

6. Participation of non-member countries

Not particularly desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Metallurgy

Project 54: HIGH-GAUGE STEEL TANKS FOR THE CHEMICAL AND PETROCHEMICAL INDUSTRY

1. Nature of project

- Study of the heterogeneity of the properties of heavy-gauge metal and remedies therefor.
- Development of techniques in shaping, welding and heat treatment to achieve optimum properties.
- Behaviour under multiaxial stress.
- Study of the safety of thick-walled apparatus with regard to brittle fracture.
- Propagation of cracks; technological qualification test.
- Study of the phenomena of embrittlement and prevention thereof, in particular hydrogen embrittlement.

2. Objectives

The development of the chemical industry is hampered by the dimensions of the tanks which can be built nowadays. In order to increase their size and in accordance with the tendency towards an increase in the unit capacity of production plant, use must be made of higher strength steels with a tensile strength of 60 kg/mm^2 in place of those of 40 kg/mm^2 currently employed. The saving in weight achieved by decreasing the thickness of the walls would enable the diameter of the tanks to be increased, thus leading to a reduction in the number of parallel units and a saving in production costs.

Project 54

The outlets for engineering companies are not only on internal markets but also on export markets in a branch of industry which is rapidly expanding.

3. Advantage of cooperation

Cooperation in this particular field is necessary in order to reduce the high cost of research and to speed up developments. Furthermore, it is obvious that sooner or later the available knowhow must be exploited jointly. Coordination of effort can only facilitate contacts at the level of the supervisory bodies empowered to approve installations.

4. Methods of operation

To be specified within the framework of a combined European action. Work is to be undertaken mainly by industry, possibly backed up by research centres and universities.

5. Cost and timescale

5,000,000 u.a. over five years

6. Participation of non-member countries

Not particularly desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Metallurgy

Project 55: METALS FOR THE CHEMICAL INDUSTRY

1. Nature of project

To determine the possibilities of using noble metals in the manufacture of equipment for the chemical industry.

2. Objectives

The problem of resisting corrosion by the particularly aggressive substances used in the chemical industry may be solved by coating the steel with materials such as lead, tantalum or platinum.

Other noble metals which are cheaper than tantalum or platinum, such as titanium, zirconium and niobium, show great chemical inertia against certain highly aggressive substances. These metals or their alloys already lend themselves to the construction of entire pieces of equipment, including large chemical reaction tanks. Their appropriate use could lead to substantial savings in the construction and maintenance of installations.

3. Advantage of cooperation

The cooperation of metallurgists and customers in the chemical industry could lead to a rapid increase in the use of these noble metals and at the same time bring about a fall in their price, thus widening their use for other applications, such as aeronautics, mechanics, etc.

Project 55

4. Methods of operation

To be specified in the framework of a combined European action. The work is to be undertaken mainly by industry, possibly backed up by research centres and universities.

5. Cost and timescale

2,000,000 u.a. over five years.

6. Participation of non-member countries

Not particularly desirable.

7. Classification, additional remarks, links with other projects

Classification A.

Field: Metallurgy

Project 56: SUPERCONDUCTORS

1. Nature of project

Development of industrial superconducting materials.

2. Objectives

The development of superconducting materials is limited in the Community to applications in physics apparatus and instruments and has been government subsidized.

The industrial prospects of superconductors do not appear to have been explored in the Community, although they have aroused great interest in Britain.

The technology for manufacturing superconducting wires, in particular for alternating current use, poses many problems the solution of which would enable prices to be brought down and would facilitate future developments in the electrical industry.

3. Advantage of cooperation

To increase the efficiency of the limited research carried out on a national scale. Opinions on the advisability of cooperation are divided.

Project 56

4. Methods of operation

To be specified in the framework of a combined European action. The work is to be undertaken mainly by industry, possibly backed up by research centres and universities.

5. Cost and timescale

1,000,000 u.a. over five years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Metallurgy

Project 57: SEMICONDUCTORS

1. Nature of project

Development of semiconductors of the gallium arsanide and gallium phosphide type for hyperfrequencies.

2. Objectives

- To guarantee Community laboratories a supply of high quality products.
- To accelerate research in this field by making better use of the scientific facilities available in the Community.

3. Advantage of cooperation

To reduce the total cost of research, which is at present uncoordinated, and especially to make this research easier by joint use of high performance scientific material.

Opinions on the advisability of cooperation are divided.

4. Methods of operation

To be specified in the framework of a combined European action. The work is to be undertaken mainly by industry, possibly backed up by research centres and universities.

Project 57

5. Cost and timescale

3,000,000 u.a. over five years.

6. Participation of non-member countries

Not particularly desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Link with other projects: to be linked with Project 23 in the telecommunications field.

6. NUISANCES

Judging in particular from the plethora of statements and action by international bodies in this respect, the need to step up the fight against pollution requires no emphasizing. Nevertheless, what has been achieved so far is quite inadequate to cope with the problem, which becomes more acute every day owing to the exponential increase of noxious matters introduced in what is known as the "biosphere".

Two kinds of actions are needed to reduce nuisances:

- the definition of guide values, quality criteria or danger levels on the basis of which public authorities could introduce standards to be complied with and set up control systems;
- preparatory study and development of effective technical methods and equipment costing as little as possible, with a view to preventing pollution and to remedying its effects.

What has been achieved so far in Europe at both these levels is insufficient and has been done only by approaching the matter empirically and without an adequate scientific and technological basis.

In order to make further valid progress, scientific and technological research is essential. Improved knowledge of what pollution involves and of the harmful effects of pollutants must be obtained to enable quality criteria to be defined; processes must be improved and new techniques developed to prevent pollution or remedy its effects.

Putting aside Projects 62 and 67, which fulfill only the first of these two objectives, all the projects proposed by the specialist group aim at both the objectives mentioned above, whether in respect of atmospheric pollution, water pollution or acoustic nuisances.

All the proposed schemes have a definite "health" aspect, i.e., they would reduce the harmful effects of pollutants to man and his surroundings. All have therefore an obvious economic advantage, but some of them have a more clearly marked economic significance, owing to either the economic consequences of the pollution in question (e.g., desulphuration, sludge processing) or the economic consequences of the regulations and methods to be used in order to decrease pollution (e.g., gaseous effluents, thermal pollution, industrial waste water).

Whatever their connection with the objectives indicated above, the proposed projects cannot be graded according to priority and urgency, for each of them deals with a specific problem of undeniable importance.

The proposals made are only first steps. At a later stage of the work the problem of nuisances will require a more systematic and overall approach. There will first have to be a complete review of all the knowledge acquired and of the projects carried out, initiated or planned by countries or international organizations; then a survey of what is to be done will have to be made, and from there a real European anti-nuisance programme will have to be drawn up, which will no longer be limited to air, water and noise, but

will also include other nuisances such as pharmaceutical products, the polluting effects of which are constantly increasing and are often more harmful because of their insidious nature.

Field: Nuisances

Project 6: NUISANCES

1. Nature of project:

Project 6 combines in one overall programme, to be carried out by cooperative action, a number of specific projects concerning air pollution, water pollution, and noise:

Project 61: Fight against atmospheric pollution by sulphur derivatives

Project 62: Development of biological indicators for determining the overall danger level of atmospheric pollutants

Project 63: Study of fumes and dust from motor vehicles and domestic heating appliances

Project 64: Research into natural purification processes in polluted waters

Project 65: Research and development of methods of purification of waste waters

Project 66: Research on thermal pollution of surface waters

Project 67: Biological effects of biocides in surface and underground waters

Project 68: Development of sludge processing methods

Project 69: Research concerning acoustic nuisances

a long-term continuous project concerning abatement of nuisances.

2. Objectives:

All projects under the head of nuisances have as their main objective the protection of man and his environment, i.e., a "public service" objective. Some of them are to provide the basis for the adoption of harmonized standards. The majority of them involve basic research, some of which is aimed at developing processes or devices which may be of interest from an industrial standpoint.

3. Advantage of cooperation:

- saving of resources by avoiding duplication,
- need for harmonized criteria with a view to establishing standards that do not cause hindrance to trade or distort the conditions of competition.

4. Programming and supervision of projects

The compilation of programmes and supervision of the work on the projects may be carried out in accordance with either of the following procedures:

- through the agency of coordination groups, Air, Noise, Water, Pharmaceuticals, etc.);
- by assigning this task to the competent departments of the Commission (which have more than ten years' experience in the field), aided by ad hoc expert groups.

The draft programmes thus drawn up would be submitted to a general guidance and coordination agency, which would also be required to keep an overall watch on the supervision of the work.

It must, however, be pointed out that the nine new projects will only be really meaningful if carried out as part of a "European policy for the protection of man and his environment". For this purpose, consideration must be given to the creation at the earliest possible moment of a group responsible for determining the overall guidelines for the present and future programmes and for supervising the work. It would also be advantageous if this body were to be assigned certain responsibilities as regards preparatory work on the standards and fixing the time schedule for the implementation of the new regulations; for experience has shown that a statement by the public authorities of their intentions regarding the adoption of new standards will in many cases have the effect of prompting those responsible for compiling the "nuisance" in question to take action on their own initiative in the form of adjusting to the rules within the prescribed time-limits.

In the case of projects exercising an influence at the industrial level, consultation with the enterprises concerned is clearly desirable at programming level.

5. Performance

The projects now under consideration should be carried out in public or university laboratories; in some cases, involving the development of processes or equipment, the aid of industry will have to be enlisted.

Some projects or parts of them, particularly those which do not lend themselves to apportionment of tasks, will have to be performed in a single centre, working on the joint behalf of the parties concerned. This centre could be an international or national centre already existing or to be set up. Other projects or parts of them will be carried out by national laboratories working in conformity with the jointly-planned programme.

6. Industrial utilization of research results

Memorandum only.

7. Costs and financing

The funds required for carrying out the nine projects amount to 6-7 million u.a. for an estimated three-year period, i.e., 2 to 2.5 million u.a. a year.

The projects or parts of them to be performed in a single centre would have to be financed on a joint basis, the funds being made available to the authority responsible for managing and coordinating the projects. The projects or parts of them to be performed in the individual countries' centres should, in principle, be financed by procedures modelled on the European Combined Project system; nevertheless, certain tasks of limited duration and scope to be performed at such centres could be financed by contracts placed by the authority responsible for managing and coordinating the projects, by means of the funds obtained by joint financing.

As a general rule, the money should come from public funds, because the ultimate purpose of the proposed research is of general interest. However, in cases where firms might be interested in the production of marketable equipment or processes, such firms should take as large a share as possible in the financing. Where standards could be set beforehand and a time schedule drawn up for their application, the formula adopted should be that of 100% financing by the firm, possibly with a repayable loan.

8. Participation of non-member countries

See project sheets.

9. Classification

Classification of projects 61-69: A

Field: Nuisances

Project 61: FIGHT AGAINST ATMOSPHERIC POLLUTION BY SULPHUR DERIVATIVES

1. Nature of project

(a) Research on the physicochemical behaviour of these derivatives in gaseous effluents (with particular attention to the effects of the associated pollutants).

(b) Research on improved characterization of the harmful effects of sulphur derivatives.

(c) Basic research contribution to the development of desulphuration processes.

2. Objectives

- Determination of maximum permissible concentrations with a view to establishing standards.
- Development of methods making it possible to detect and reduce the content of sulphur compounds in the atmosphere.

3. Advantage of cooperation

- Saving of resources by avoiding duplication and waste of effort.
- Geographically widespread effects of atmospheric pollution.

Project 61

- Need for harmonized standards on a European scale (thereby preventing obstacles to trade).

4. Methods of operation

To be defined.

5. Cost and timescale

840,000 u.a. over three years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Nuisances

Project 62: DEVELOPMENT OF BIOLOGICAL INDICATORS FOR DETERMINING THE OVERALL DANGER LEVEL OF ATMOSPHERIC POLLUTANTS

1. Nature of project

The research is aimed at defining the overall danger level of atmospheric pollutants by means of biological indicators incorporating the harmful action of pollutants:

- search for biological indicators in the vegetable and micro-biological fields;
- research into the action of atmospheric pollutants on tissue cell cultures.

2. Objectives

To determine criteria of biological quality, making it possible to undertake a comparative study of the quality of atmospheres at various points within the Community, and giving to public authorities the necessary basis for improving standards as well as for introducing more effective measures to detect and fight pollution.

3. Advantage of cooperation

- Saving of resources by avoiding duplication and waste of effort.
- Geographically widespread effects of atmospheric pollution.

Project 62

- Need for harmonized standards on a European scale (thereby preventing obstacles to trade).

4. Methods of operation

To be defined.

5. Cost and timescale

1,200,000 u.a. over three years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Nuisances

Project 63: STUDY OF FUMES AND DUST FROM MOTOR VEHICLES AND DOMESTIC HEATING APPLIANCES

1. Nature of project

The research must cover motor vehicle fumes (in particular nitrogen oxides) and liquid or solid aerosols produced by combustion engines, with a view to determining the role played by such products in smog formation under various conditions of operation. This research will also have to investigate fumes from domestic heating appliances burning mineral oil under different conditions; it will include preliminary theoretical work with a view to the development of prototypes of continuous burners.

2. Objectives

- To make it possible to establish improved standards for the fight against atmospheric pollution on the basis of more extensive scientific knowledge.
- By widely spreading the results obtained, to provide industry with the means of improving the design of engines, motors and appliances with a view to avoiding pollution.
- To develop improved and standardized analysis instruments.

3. Advantage of cooperation

- Saving of resources by avoiding duplication and waste of effort.

Project 63

- Geographically widespread effects of atmospheric pollution.
- Need for harmonized standards on a European scale (thereby preventing obstacles to trade).

4. Methods of operation

To be defined.

5. Cost and timescale

1,440,000 u.a. over three years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Nuisances

Project 64: RESEARCH INTO NATURAL PURIFICATION PROCESSES IN POLLUTED WATERS

1. Nature of project

The research should lead to improved knowledge of the natural purification process, and in particular of the behaviour of organic polluting substances in their natural environment (sedimentation, chemical or biological mineralization, effects of inorganic pollutants, biocides, toxic substances and thermal pollution). Work will include:

(a) in situ study of several hydrological systems;

(b) certain model tests.

2. Objectives

- to preserve and forecast water resources from the point of view of quality;
- to standardize quality criteria in order to protect people and improve economic efficiency;
- to reach bases for the assessment of measures to be taken with regard to the purification of effluents in order to improve the natural purification process.

3. Advantage of cooperation

- saving of resources by avoiding waste of effort;
- need for harmonized quality criteria in respect of water.

Project 64

4. Methods of operation

To be defined.

5. Cost and timescale

360,000 u.a. over three years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Nuisances

Project 65: RESEARCH AND DEVELOPMENT OF METHODS OF PURIFICATION OF WASTE WATERS

1. Nature of project

Fight against water pollution by carrying out research and development on methods of purifying waste waters (application to certain individual industries).

The first stage of this action must include preliminary studies and the selection of industries producing effluents with a high content of organic products, metal and toxic substances.

The second stage will include, in respect of the industries under consideration, the pooling of the experience acquires and research and development work on new purification methods which are both effective and economically viable.

2. Objectives

- protection of water resources;
- development of new methods and apparatus;
- definition of basic scientific and technical foundations for regulations concerning the discharge of effluents.

3. Advantage of cooperation

- Harmonization of the crieria to be applied will enable one of the causes of unfair competition between industries in the Member States to be eliminated.

Project 65

- Saving of resources by avoiding waste of effort.

4. Methods of operation

To be defined.

5. Cost and timescale

1st stage: 10,000 u.a. over six months

2nd stage: 400,000 u.a. over 2 1/2 years

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Nuisances

Project 66: RESEARCH ON THERMAL POLLUTION OF SURFACE WATERS

1. Nature of project

This research, which does not include sea water, relates to the following three subjects:-

(a) natural cooling of waterdays (in situ studies and mathematical models);

(b) action of water temperature on its environment (biological study);

(c) economic and technical study on means of prevention, including the possible use of residual thermal energy.

2. Objectives

- preservation of biological resources in water environments;
- definition of siting of power stations along waterways;
- definition of technical bases for fixing the temperature level which industrial waste must not exceed;
- development of preventive methods and apparatus, and possibly methods and apparatus making use of residual thermal energy.

3. Advantage of cooperation

- saving of resources;
- desirability of harmonized criteria.

Project 66

4. Methods of operation

To be defined.

5. Cost and timescale

720,000 u.a. over three years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Nuisances

Project 67: BIOLOGICAL EFFECTS OF BIOCIDES IN SURFACE AND UNDERGROUND WATERS

1. Nature of project

The research should cover the following subjects:

- analytical methods for determining contamination of water by biocides;
- studies with a view to establishing an acceptable level of contamination.

2. Objectives

- preservation of water resources;
- protection of man and his surroundings through the fixing of quality criteria for water and measures concerning the use or production of biocides (replacing pollutants by other substances which are less toxic or less persistent);
- orientation of industry in respect of biocide production.

3. Advantage of cooperation

- international nature of biocide pollution;
- saving of resources;
- desirability of harmonized criteria (freedom of movement for products and normal competition between producers).

Project 67

4. Methods of operation

To be defined.

5. Cost and timescale

600,000 u.a. over three years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Nuisances

Project 68: DEVELOPMENT OF SLUDGE PROCESSING METHODS

1. Nature of project

Development of methods for economically processing sludge from purification plants, taking into account its sanitary aspects (drying, digestion, disinfection, irradiation), with a view to using it.

2. Objectives

- to solve problems presented by sludge accumulation, particularly in highly populated areas;
- to find economical uses for sludge by processing it.

3. Advantage of cooperation

- most countries have a sludge problem;
- saving of resources.

4. Methods of operation

To be defined.

5. Cost and timescale

240,000 u.a. over three years.

Project 68

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

Field: Nuisances

Project 69: RESEARCH CONCERNING ACOUSTIC NUISANCES

1. Nature of project

Two subjects for research are under consideration:

(i) the gathering of information on the importance of infrasonic and ultrasonic components in noises, and experiments on the effects of these components;

(ii) research on the technical means which can be used to reduce vehicle noise, taking into account its economic consequences.

2. Objectives

(i) determination of criteria and standards for the protection of man;

(ii) orientation of industries towards criteria to be complied with in the manufacture of noise-producing apparatus and vehicles.

3. Advantage of cooperation

(i)

and Saving of resources.

(ii)

(ii) Harmonization of criteria and standards (in particular with a view to trade between countries).

4. Methods of operation

To be defined.

Project 69

5. Cost and timescale

I. 100,000 u.a. over three years.

II. 500,000 u.a. over three years.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification A.

7. METEOROLOGY

Meteorology is at a turning point in its development. The possibilities for collecting and transmitting information by satellite and for information processing by computers provide tremendous scope for new methods. In particular, the use of synoptic charts involving the use of a large number of factors which take account of the dynamics of the atmosphere should result in an improvement in forecasting as carried out at present, and in particular in forecasts covering a considerably longer period. The economic advantage of such long-range forecasts is considerable, particularly with regard to agriculture, the construction industry, and, to a lesser degree, certain kinds of transport.

It is thus extremely important for the meteorological services to benefit as soon as possible and on a very wide scale from the new possibilities offered to them to make a greater contribution to the economic efficiency of their countries. But at the same time it should be realized that the introduction of these new techniques requires a very considerable financial effort, which is practically impossible for individual national European meteorological services. Cooperation is thus essential, not only in order to avoid duplication of expenditure of the same type, but also to reinforce the effective use of the new techniques. It would be no exaggeration to say that joint action is a sine qua non if European meteorology is really to commit itself to the necessary changes.

The proposals which have been made primarily involve two fairly wide-ranging projects, which would result in commitment to such changes: firstly, the establishment of a large single centre for computation and research (project 70) and, secondly, the launching of a European

meteorological satellite and the setting up of the necessary ground stations (project 71).

As well as these large-scale operations, more modest proposals have also been put forward, referring in particular to the development of single prototypes for certain types of apparatus, with a view to encouraging concentration of industrial production on a few series which would have a considerable market as a result of coordination of government contracts (project 72).

Field: Meteorology

Project 70: EUROPEAN COMPUTATION CENTRE FOR METEOROLOGICAL EXPLOITATION AND RESEARCH

1. Nature of project

The setting up of a common meteorological centre for computation and research.

2. Objectives

The envisaged centre has a dual aim, the rendering of public services and research to improve those services, in the field of medium and long-range weather forecasting. This project offers considerable economic and social advantages (agriculture, building, transport, travel, etc.).

3. Advantage of cooperation

In order to establish longer range forecast than is possible at the present time, charts of increasing complexity must be used, which can only be solved numerically with the aid of high power computers. The interpretation of available observations using these charts would result in considerable progress being made.

The financing on a purely national level of the necessary data processing installations would prove impossible for the meteorological services of small Member States and, at the very least, problematical for the larger Member States.

4. Programming and supervision of project

The drawing-up of the work programme and the setting-up of the centre are, on the whole, something entirely new. In the preparation of the work programme, however, use must be made of the experience acquired in the Member States, the United States and the USSR.

The work programme could be drawn up by a coordination group consisting of responsible persons in the national meteorological departments and including experts on the preparation of projects. This group should also have the assistance of a very-high-level Scientific Committee.

Responsibility for supervising the management and the research activities would also devolve upon this group, assisted by its Scientific Council.

5. Performance

The project embraces:

(a) the setting-up of the Centre. This includes acquiring a high-power data processing plant, making an institute available for the plant and recruiting the staff). Responsibility for these tasks could be assigned to an Executive Committee, which would be formed to operate for the duration of the work;

(b) the services and research performed by the Centre. Operation of the Centre should be assigned to a single responsible Director and the staff seconded by the member countries.

6. Costs and financing

The following expenditure should be allowed for.

- investment costs (computer and building) 10-12 million u.a.
- yearly operating costs 0.5-1 million u.a.

The setting up of the computation centre would require joint financing. (Costs category III).

- Timescale for commissioning of plant 3 years
- Running-in period before systematic forecasts are established 2-3 years

7. Participation of non-member countries

Desirable.

8. Links with other projects

The project could usefully be linked with the ones on satellites (71) and automatic meteorological stations (43 and 72).

9. Classification: A.

Field: Meteorology

Project 71: EUROPEAN METEOROLOGICAL SATELLITES

1. Nature of project

Development of meteorological satellites, together with measuring instruments, scanning and telecommunication systems.

2. Objectives

Use of satellites for measuring and transmitting data of particular interest to European meteorological services, within the context of a network of meteorological satellites on a world scale.

3. Advantage of cooperation

By pooling the knowledge acquired in this field in Europe, it would be possible to develop European satellites under favourable cost conditions (possibly with American launchers as long as European rockets are not available).

4. Methods of operation

Development of satellites under the direction of ESRO, launching within the context of a world system (GARP, World Weather Watch). Some details remain to be studied.

Project 71

5. Cost and time scale

The cost depends on the type of satellite. This remains to be specified. A European satellite could be put into orbit in five years from now.

6. Participation of non-member countries

Desirable.

7. Classification, additional remarks and links with other projects

Classification B.

Additional remarks: the project is an important one and details should therefore be specified quickly.

Links with other projects: possibility of improving meteorological forecasts, in connection with the planned computation and research centre (project 70).

Field: Meteorology

Project 72: DEVELOPMENT AND STANDARDIZATION OF METEOROLOGICAL EQUIPMENT

1. Nature of project

Standardization and joint development of 11 types of meteorological equipment:

1. balloons;
2. radio-sondes;
3. ozone sondes;
4. automatic ground station;
5. devices for measuring changes in wind direction at ground level;
6. three-component wind measuring devices;
7. radiometric methods for determining radiation balance and for measuring temperature at a distance;
8. measuring devices and rockets for probing the atmosphere;
9. visibility measuring devices;
10. devices for measuring the cloud base;
11. devices for detecting and measuring precipitation by radar.

Purchase of standardized equipment.

2. Objectives

Improvement of meteorological forecasts as a result of more precise, supplementary or new measures. Increase in air safety with regard to take-off and landing (in particular devices Nos. 5, 9 and 10 in paragraph 1).

3. Advantage of cooperation

Reduction of expenditure through
- the elimination of duplication by joint development;
- the purchase of standardized equipment.

This is essentially a public-interest project.

4. Programming and supervision of project

Not all types of meteorological equipment have attained the same level of development. The special cases contemplated range from "conventional" (but not standardized) devices of routine use in all meteorological departments and devices produced at the industrial level (balloons, radio-sondes) to experimental models of new instruments existing in one country or another (a case in point being radiometric methods for determining radiation balance and for measuring temperature at a distance). Generally speaking, however, the situation is that in several countries devices are available (if only in prototype form) which as regards efficiency are still not entirely satisfactory.

The project can be subdivided into several phases, namely:

- adoption of joint decisions concerning the measuring programme, precision standards and coordinated utilization of data);
- comparison of existing devices (experimental models, prototypes, devices manufactured at the industrial level) with the standards adopted;
- if possible, adoption of an already existing solution; otherwise (something for which a case can be made out) development of the appropriate prototype. Purchase of standardized equipment.

The drawing-up of the work programme may be assigned to a coordination group consisting of representatives in responsible positions from the various countries' meteorological departments. This group would also have the task of ensuring that the work was duly carried out and that the optimum solutions were adopted. The group's decisions must be binding on the national authorities.

5. Performance

During a certain period, construction of the laboratory models, in accordance with current practice, in the meteorological departments' workshops. Very shortly thereafter, industry will be asked to construct the prototype. The contract will be awarded, as far as possible, on the basis of tenders. Generally speaking, the various devices are not sufficiently complicated for their construction to require, on technical grounds, cooperation between several firms.

Responsibility for this phase will devolve upon industry.

6. Industrial utilization of results

The devices when developed are intended for use in public service installations. Some export potential; having regard to the fact that in the medium term there is only likely to be a relatively small market, it would appear preferable to concentrate government orders with or perhaps two manufacturers for each type of device.

Each of the participating countries could then purchase the number of devices it requires directly from the manufacturer jointly agreed upon.

It must, however, be considered whether the concerted awarding of contracts (multiannual plans) might not enable more favourable purchasing conditions to be obtained.

7. Financing

The proposed project's purpose is to coordinate the measures and plans currently being carried out in the various participating countries, with the long-term aim of obtaining the most favourable buying prices.

Since in the short term the supplementary expenses are likely to be relatively modest, the project has been classified in Category I (minimum of 1,000,000-2,000,000 u.a.).

The following possible methods of financing the prototypes may be considered:

(a) Source of appropriations:

- joint or Community financing (after reaching agreement on the type of equipment to be adopted). As this method would not appear to be absolutely necessary, consideration could also be given to:
- financing of the prototype on a national basis.

The manufacturers could be required to repay the funds used for construction of the prototype from the proceeds which they derive from subsequent contracts, more particularly in the export field.

(b) Procedure governing appropriations:

Prototype construction financed by repayable loans or subsidies in the event of a contract being awarded.

The possibility of "financing by industry provided a market is guaranteed" is not entirely ruled out. In this case, however, the principals must be particularly careful to guard against the risk of inadequate efficiency in the prototype. It is also to be asked whether, in the final analysis, this method would really prove less expensive.

Time required: extremely variable from one item of equipment to another (1-2 years in the case of balloons, several years for technologically complex devices).

8. Participation of non-member countries

Desirable.

9. Classification, additional remarks and links with other projects

Classification A.

Links with other projects: chiefly the methods included in point 7 in paragraph 1 ("radiation balance and measuring of temperature at a distance") may be of interest for "meteorological satellites".