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MR POWELL

Bonn Economic Summit: TGE Reports

I attach copies of the two Technology, Growth and Employment Working Group reports. Both were published on 23 April; the Environment one in the United Kingdom and the general one in West Germany.

2. I am sending copies of this minute and the reports to the Private Secretaries to the Foreign and Commonwealth Secretary and the Chancellor of the Exchequer.

Carol Bowdery.

C A BOWDERY

26 April 1985

Final

REPORT OF THE TECHNOLOGY, GROWTH AND EMPLOYMENT WORKING GROUP TO THE BONN ECONOMIC SUMMIT 1985

I. Introduction

1. The Technology, Growth and Employment Working Group, set up by the Heads of State and Government at their Versailles Summit meeting in June 1982, submits its report for consideration at the Bonn Summit in May 1985.

   The mandate given at Williamsburg was to provide a stimulus to additional and improved international cooperation in science and technology without developing additional permanent collaborative or administrative structures. Results and experience from the originally proposed projects, outlined for the first time in the 1983 report, are now beginning to emerge, permitting conclusions to be drawn from the analysis formulated at Williamsburg in 1983 and London in 1984.

2. The first tasks of the Working Group, i.e.

   - to identify the contribution of research and technology to economic growth and employment and thus to stable economic and social development in the participating states;

   - to submit proposals which could lead to wider international cooperation in important areas;

   - to indicate ways and means for the realization of such proposals;

   were to a large extent accomplished with the two previous reports. In view of experience gathered since inauguration of

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the programme, the Working Group considered it timely to start the assessment of the status of the 18 areas of co-operation and to propose guidance for the future. (Summaries of the progress reports on the individual areas of cooperation are attached in the Annex.)

The progress achieved within the different areas varies greatly in terms of both the intensity and the scheduling of co-operation. This reflects not only the differences in the definition of the starting points of the various project areas, but also the varying approaches developed in specific fields in order to establish appropriate action and responses to the needs identified.

3. After two years of work in the different areas the Working Group is convinced that international cooperation in science and technology has benefitted substantially from the Summit initiative.

The work done so far in the different areas underlines the main advantages of international cooperation:

- the promotion of high quality basic research as an inherently international task;
- the maximising of the benefits of technological development for world economic growth through the reduction of barriers to international trade and competition, especially those arising from the use of different standards and norms;
- the joining of forces in order to take up technological challenges and to benefit from technological changes;
- the solution of problems common to industrialised societies through joint efforts in research and technology;
- the provision of options for the solution of some basic problems encountered by developing countries.

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4. The Working Group wishes to underline that there is clearly increasing realization, among Summit Countries and others, that research and technology are a motor and motivating force for increasing performance in industry and in the service sector. Industries utilize and enhance opportunities offered by technological innovations. They strive for new ways to mobilize the creativity and imagination of their scientists and businessmen in order to assure growth and employment. For their part, Governments have emphasized their responsibilities by supporting basic research on which new advances will be based. They have a fundamental role in the training of young people to meet the challenges, and benefit from the opportunities provided by new technologies in the future.

5. Progress in the areas for cooperation has been achieved against a background of changing political, economic and social conditions which have influenced research and technology policy, as well as changing public perception of the priorities accorded to particular problems. Scientific concern about environmental problems and bioethics has, since the Versailles Summit, also become a major public concern, and this has rightly been reflected in the growing emphasis on national programmes and international cooperation in these areas. However, the objectives of long-term scientific and technical programmes may transcend short-term fluctuations. For instance, whilst concern over the possibility of energy shortages has somewhat decreased since the Versailles Summit, it would be dangerous to reduce the scientific and technological attention, at national or international level, given to the solution of these problems. These examples show that there is a need to distinguish between short-term trends and perceptions and the long-term needs of science and society and to monitor developments in order to provide political and economic guidance.

6. The Working Group was entrusted by the London Summit with preparing a separate report on the investigation of environmental problems and possible solutions by means of further international cooperation in research and technology. The Report on Environment is being submitted separately to the Bonn Summit. The Working Group refers to its observations and recommendations in the final chapter of the present report.

II. Conclusions from the 18 Collaborative Projects

A. General Observations

7. The Working Group welcomes the fact that cooperation in the individual areas has developed in a flexible, unbureaucratic and pragmatic way, using the existing bilateral and multilateral arrangements to the fullest extent, and thereby avoiding the creation of duplicate international institutions.

The Working Group confirms its general policy of enabling the participation of non-Summit countries in areas of cooperation wherever appropriate. The scope for wider participation is considered by the participants in the respective areas of cooperation and, in doing so, account is taken of the potential mutual benefit. This approach is also evident in those areas in which training facilities have been provided to experts from developing countries and research of direct relevance to these countries' needs has been accelerated.

In its review of the individual areas the Working Group noted, in particular, the following achievements and requirements:

- the attention of the Summit to the subject of technology has stimulated international cooperation and has, thereby, given new momentum to national activities in research and technology;

- cooperation has led to a considerable step forward in the exchange of information on national programmes and underlying science policies;

- of particular importance is the increasing awareness among scientists and administrative officials that the funds from public and private sources, which are internationally available for large scale and long-term R+D projects, are limited. Thus, a better coordinated strategic planning on an international level is considered necessary, taking into account alternative approaches to reach the same goals. In a number of areas of cooperation some improvement in this respect can already be noted. The early involvement of high-level scientific and administrative officials on policy discussions was considered particularly useful.

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- the exchange of views in the different areas of cooperation has led to a better understanding on the respective rôles of government and the private sector in the field of R+D promotion in market economies;

- administrative procedures can and should be improved in order to facilitate exchange of scientific and technical staff and cross-participation in the construction and exploitation of research facilities as well as effective international data transmission and exchange of scientific and technical equipment in cooperative basic research activities;

- symposia and seminars, convened in several areas of cooperation, have helped to increase awareness of technical and socio-economic aspects of scientific and technological development, but much remains to be done, in particular with a view to the public at large;

- the work in areas of cooperation dealing with issues of a general nature, such as public acceptance of new technologies or education and training implications in a technological society, has shown that there is a need to include these questions into the policy considerations of quite a number of other areas of cooperation.

B. Basic Research and Large-scale Projects

8. Science, and in particular fundamental scientific research, have a long tradition of international cooperation. Efforts to enlarge existing knowledge and to make new discoveries have always ignored national boundaries. This is reflected in the traditional freedoms of the scientists' way of life as well as in the many institutionalized structures of exchange and cooperation in fundamental scientific research. Unnecessary restraints to free circulation of ideas and to free movement of scientists could seriously hamper the acquisition of knowledge.

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New benefits of, and incentives for, cooperation have emerged over the last few decades. The problems encountered are becoming ever more complex, the methods applied to their solution ever more refined, and experiments and equipment ever more expensive and specialised.

9. Initiatives taken at and since the Versailles Summit

   - have confirmed that fundamental scientific research not only reflects a basic human urge to search for deeper and wider knowledge in such areas as High Energy Physics, Solar System Exploration, Biological Sciences, but also provides a basis for future technological developments, e.g. in the areas of Controlled Thermonuclear Fusion and Photosynthesis;

   - have encouraged intercontinental and global cooperation beyond the regional and bilateral relationships existing already before.

   Because of the competitive nature of the development of new technologies, collaborative large-scale projects which are familiar in fundamental scientific research are rather the exception in applied research. Such exceptions may be found where an objective can be defined as being internationally desirable in the public interest and its achievement requires, because of large financial and political dimensions, concerted efforts by major industrialized economies. Remote Sensing from Space, High Speed Train Systems and Fast Breeder Reactors are collaborative projects within this category. Another example is cooperative research and possibly joint development of technologies for the preservation and restoration of the environment where the problems are of an inherently transfrontier nature.

10. The advantages of cooperation are especially evident in cases requiring a major financial and logistic effort which individual countries have difficulties in funding alone. In these cases it is only such cooperation which leads to the formation

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of a "critical mass" for the realization of a specific project through cost sharing, risk sharing, division of labour (specialization), and reciprocal utilization of research results and facilities.

In the case of new technologies of emerging importance and with a multiplicity of decentralized applications (such as in the Biotechnology and Aquaculture areas of cooperation), however, the first requirement is an analysis and evaluation of the real needs and of realistic possibilities for efficient division of labour and cooperation.

C. The Significance of Norms and Standards

11. Maximum economic, human and social benefit of technological development is only generated when conditions within and between large economic regions are sufficiently compatible and therefore the same technological innovations can be introduced in the different countries at about the same time. The achievement of this objective requires cooperation in the exploitation of research results.

12. A critical and important example of the foregoing is norms and standards. Different norms and standards in our different countries can suppress the full economic benefit of technological development through fragmenting the market for the developed product or process and cause waste and duplication of scarce resources. Three areas of concern can be identified.

- In the research stage, there is a need for the joint development and validation of measurement methods and testing techniques, definition of test samples and accumulation of critical data, which will accelerate the testing, comparative assessment and subsequent adoption of the best new materials, processes and devices. Amongst the 18 areas for cooperation, this type of collaboration has been a major feature of Advanced Materials and Standards, Photovoltaic Solar Energy and Advanced Robotics.

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- In the development and acceptance stage of a new product, there is a need for mutual recognition of the validity of results from previously agreed testing procedures in our different countries so as to avoid unnecessary duplication of tests. This is especially important in the field of toxicological testing where there is a need for the creation of appropriate conditions and measures for the elimination of repetitive animal experiments.

- In the exploitation stage of a new development, the establishment and enforcement of internationally agreed common standards in our countries will allow uninhibited trade in new products and services. This is essential if the originator of the development is to be fairly rewarded and if the maximum potential from the development is to be realised. Amongst the 18 areas of cooperation, this type of collaboration has been a major feature of Advanced Robotics. Another example - although not immediately derived from the 18 areas of cooperation - is the world-wide exchange of information and data through new technological systems.

13. We cannot be satisfied with the current situation in any of these areas. Common standards in research are largely a matter for scientists and technologists, and we hope that the emphasis placed on this subject in some of our areas of collaboration will be noticed and taken up more widely by appropriate organisations such as national professional and learned societies and the International Council for Scientific Unions. But common norms and standards in the development and exploitation of new products and services are a matter for urgent attention and consideration by governments.

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III. Impacts of Technology on Growth and Employment

14. The Group wishes to underline that it is difficult to determine quantitatively the complex relationship between research and technology on the one hand, and economic growth and employment on the other. Also, scientific and technological research is not, generally, capable of correcting economic or societal dislocation in the short term. Technological change also leads to sectoral and geographic changes in labour demand. The introduction of information technologies, process automation, robotics, and other emerging technologies causes, on the one hand, a decline in traditional methods of production and generates, on the other hand, new products, new processes, new services, hence new job opportunities.

15. The key to understanding this compensatory process is competitiveness. This is above all a challenge for industry to meet.

    Governments should recognise the importance of creating the right conditions for technological dynamism through the encouragement of wide diffusion of emerging technologies, international agreement on common norms and standards to avoid artificial barriers to trade, the use of public procurement as a catalyst for world-wide innovation, and the stimulation of risk-taking and enterprise.

    Scientists will have to venture into new territory and to assume their share of responsibility for the socio-economic effects of their work.

    Entrepreneurs will have to show vision and courage in supporting research and development activities and in taking the risks of innovation.

16. The long-term nature of the interaction between research and technology, on the one hand, and growth and employment, on the other, calls for a three-way partnership between government, the scientific community and industry and for their determined and sustained efforts.

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IV. The Contribution of Young Researchers

17. In this context, it is especially important to ensure that young scientists and engineers are encouraged to pursue careers in research and development and that they obtain access to ongoing educational and training opportunities. During the 1960's and 1970's, our countries expanded their scientific and technological base at a very high rate. Since the new opportunities were then taken by young scientists and engineers who still hold their positions today, and since at present the system is no longer expanding or changing significantly, the new generation's access to scientific and engineering careers is reduced considerably.

    By distorting the age equilibrium in research institutions, in particular by interrupting the supply of the dynamic driving forces represented by young scientists, the situation leads not only to a less than optimal utilization of individual capabilities, but may also lead to longer-term damage to the innovative system of our countries as a whole.

18. Moreover the position may become even worse in the next two decades when the present problem of lack of opportunities for young scientists may be supplanted by a problem of inadequate supply. Demographic expectations of dramatically lowered birthrates may make the replacement of currently employed scientists and engineers extremely difficult. But the objective of stimulating growth and employment through technology in the future will continue to depend upon the active contribution of young scientists and engineers.

19. The Group calls the Summit's attention to the urgent task of Governments, science and industry to relieve the present problem by encouraging greater mobility and flexibility in employment procedures to restore a creative age structure and to anticipate possible future problems. To assist in this task the Group proposes to endeavour to improve the international exchange of relevant information.

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V. Environmental Research and Technology: Conclusions from the TGE Report on Environment

20. Following the request of the Heads of State and Government at the London Summit, the Working Group has prepared and separately presented a Report on Environment. The Report describes some of the most important lines of scientific and technical enquiry in six key areas of environmental research, i.e. atmospheric pollution, toxic and radioactive wastes, marine pollution, pollution of soils and waters, appropriate land husbandry and climatic change. It considers the scope of current international collaboration in these areas, and where gaps in our knowledge might usefully be filled by further international cooperation. This assessment has been set in the broader context of the relationship between environment protection and economic growth and employment. The Report emphasizes that economic and environmental policies can be brought closer together through the medium of science and technology, and that long-term economic growth depends on protecting and conserving environmental resources.

21. The Working Group reaffirms the Report's conclusions and recommendations and, in particular, the specific recommendations regarding priority topics for research, where greater international cooperation is warranted. International bodies dealing with science and technology cooperation in the environmental area will be invited to incorporating these priority topics in their forward plans.

22. The Report also identifies the importance of having available appropriate internationally recognized measurements and considered the setting up of a study-group to investigate the improvement and harmonisation of techniques and practises of environmental measurements in particular where use should be made of new and sophisticated methodology. The Working Group believes that a harmonisation would benefit scientific research, would contribute to the setting and monitoring of environmental standards, and could lead to the mutual recognition of test results.

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In view of the urgency of this issue, the Working Group proposes to establish an ad hoc group to be convened by the Federal Republic of Germany and the United Kingdom. This group should consult with the appropriate international bodies about the most efficient distribution of the work outlined in paras. 32 and 33 of the Report on the Environment and its Annex A. Subject to the results of consultations with international bodies, it should take the proposed terms of reference in this Annex A as a basis for defining the precise modalities of any remaining work to be undertaken. The group should report to the Working Group after consultation of the international bodies referred to above.

23. The Working Group will review the environmental issues raised in this report as soon as reactions from international bodies and the report of the ad hoc group are available, in order to consider whether any further action is to be taken.

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Annex

Summary

The Working Group started a review of activities in the 18 areas of cooperation, particularly with the objective of determining whether already now or at what time the special arrangements set up under the Economic Summit have, or will have led to the establishment of sustained international contacts and cooperation and to the development of appropriate structures for such cooperation, preferably in the context of existing international organisations.

While the Group concludes that in most areas of cooperation the impetus given at the Versailles, Williamsburg and London Summits has successfully served as a catalyst for international exchange and cooperation, it could not complete its review in time for inclusion of the results into the report for the 1985 Summit. The Group undertakes to pursue its review in order to be able to conclude in time for the 1986 Summit for each individual area of cooperation whether the activities in the specific context of the TGE Group can be brought to an end already at that time or at what time such conclusion may be expected.

At any rate, the Group wishes to underline that they consider their efforts of stimulation in the areas of cooperation to be of a finite nature and not designed for an indefinite period of time, the main objective being to set up appropriate international cooperation in a self-sustaining manner and not requiring permanent assistance and monitoring under the specific Summit structures. Already now the Group expects that their actions in a number of areas of cooperation, e.g. High Speed Trains, Housing and Urban Planning in Developing Countries, Public Acceptance of New Technologies, Basic Biology, and Solar System Exploration, may be brought to a successful conclusion before the 1986 or 1987 Summits, usually following the publication of a report summarising results achieved and outlining future activities for each area of cooperation.

Area for Collaboration	Photovoltaic Solar Energy
Lead Countries	Italy, Japan
Participants	European Communities, France, Federal Republic of Germany, United Kingdom
Observers	Canada, United States of America
Invited International Organizations	International Electrotechnical Commission

Aims

1. To exchange information and experiences on photovoltaics, including government incentive policies, basic materials research activities, and national strategic options.
2. To develop proposals for common research.
3. To establish common evaluation methods for photovoltaic cells and modules.
4. To set up a list, to be regularly updated, of photovoltaic research centres open to visiting scientists and exchange programmes.
5. To mount on-site joint studies.

Activities

The second joint co-ordination meeting took place in Tokyo in November 1984. Participating countries have exchanged information and experience on photovoltaic solar energy. Round Robin measurements of solar cells for the establishment of common evaluation methods are being performed as scheduled and the results will be circulated for comparison before the 2nd expert meeting. Lists of host laboratories willing to exchange research scientists in member countries have been presented. New proposals for common activities (the Round Robin testing of PV modules, a case study of PV applications in developing countries, a study of the medium-long term perspectives of PV technology) have been examined.

Outlook

The results of the Round Robin test of PV cells and the possibility of a Round Robin test of PV modules will be discussed at the 2nd expert meeting in Ispra, in Sep. 1985. Member countries will submit to the Italian delegation before the 3rd joint co-ordination meeting their analysis of the medium and long term perspectives of PV technology for a comparative review. Member countries interested in building a case study of PV applications in developing countries will formulate proposals for future action. The 3rd joint co-ordination meeting will be held in Nice, Oct. 1985.

Area for Collaboration	Controlled Thermonuclear Fusion
Lead Countries	European Communities, United States of America
Participants	Canada, France, Federal Republic of Germany, Italy, Japan, United Kingdom
Observers	-
Invited International Organizations	-

Aims

1. To accelerate world development of a new energy source using practically inexhaustible fuels and possessing potential advantages from an environmental point of view.
2. To avoid unnecessary duplication of costly equipment and installations, and to enhance collaborative exploitation of existing devices.
3. To study the possibility of carrying out joint projects in the medium term.

Activities

Since the London Summit in 1984 the Fusion Working Group met in July 1984 and January 1985.

Three sub-panels were established to examine long-term perspectives, short and medium-term common problems in physics, technology and reactor concept improvements, and administrative obstacles to effective international collaboration. Their reports were discussed and their conclusions provide the basis of further activities.

Outlook

Joint planning and collaboration on major fusion research facilities will be pursued in order to avoid duplication and to optimize the utilisation of resources in the spirit of Article 22 of the Report of the "Technology, Growth and Employment" Working Group to the London Summit that urges cost effectiveness in this area of fundamental research. In the same spirit collaborative activities will be undertaken in specific areas of physics, reactor concept improvement and technology. Such collaborative activities presuppose that Summit Members will continue to support their individual programmes at adequate levels. Progress Reports will be submitted within a year.

It is hoped that a Summit endorsement of an in depth review of administrative obstacles to effective international collaboration in science and technology will lead to coordinated action to eliminate them or mitigate their negative impact.

Area for collaboration	Photosynthesis and Photochemical Conversion of Solar Energy
Lead Country	Japan
Participants	European Communities (Federal Republic of Germany, Italy), France, United Kingdom, United States of America
Observers	-
Invited International Organizations	-

Aims

To promote basic research concerning photosynthesis and photochemical conversion and to develop artificial photosynthetic systems through exchange of information and scientists, and through research cooperation.

Activities

The expert meeting (November 1982, Tokyo) and the liaison meeting (July 1984, Tokyo) were held to decide, among other things, on the production of the list of researchers and institutes engaged in photosynthesis and photochemical conversion of solar energy. The list is being prepared for publication in March 1985. Priority fields for and desirable forms of future cooperation in the biological area were on the agenda of the International Workshop on Photosynthesis (November 1984, Japan) and other occasions. Several symposia were held to exchange scientific knowledge under such themes as: Photosynthetic Water Oxidation and Photosystem II, Photochemistry, Photochemistry of Metal Complexes, Photosynthesis 1984/Fundamental Studies and Their Applications. In addition to these meetings, a collaborative research has been initiated with the participation of scientists from member countries.

Outlook

The list of researchers and institutes will be completed in March 1985. An expert meeting is envisaged in the fall of 1985 to review the progress and to identify the areas of future cooperation, such as genetical and artificial control of biomass production, molecular physio-chemical biology of photosynthetic oxygen evolution, photochemical and photoelectrochemical systems for artificial photosynthesis, and molecular design of novel photocatalysts and energy-storage compounds. For the future research cooperation, two international symposia are planned by March 1986. Considering the above work programme, it is proposed that this cooperative project be continued through early 1986, and that a report on future international cooperation will be submitted to the Summit meeting in 1986.

Area for Collaboration	Fast Breeder Reactors
Lead Countries	France, United States of America
Participants	European Communities, Federal Republic of Germany, Italy, Japan, United Kingdom
Observers	-
Invited International Organizations	-

Aims

1. To help provide stable and supportive atmosphere for facilitating orderly breeder development.

2. To encourage international cooperation in breeder development.

Activities

The Working Group recognizes that, at the time of its creation, there were numerous international cooperative arrangements and commitments existant on fast breeder reactors. In 1984, expanded governmental understandings were reached within Europe for breeder cooperation and numerous other agreements and arrangements are under consideration between members of this Working Group. The U.S., in particular, is critically assessing specific options and strategies that may be open for enhanced collaboration. The Summit group has made a useful encouraging contribution in these developments in international breeder reactor cooperation.

Outlook

The Working Group believes that it should continue to examine how best to benefit from international breeder cooperation in research and development programs, and ultimately in joint projects. Progress has been made during 1984 and further decisions will be considered in 1985. The group should be available to assist in this process. The co-leaders will meet in April to consider the current status and the possible contribution of a meeting of the group later in the year.

Area for collaboration	Food Technology
Lead Countries	France, United Kingdom
Participants	Canada, European Communities, Federal Republic of Germany, Italy, Japan
Observers	-
Invited International Organizations	-

Aims

1. To collaborate on areas of research and training in the field of food technology relevant to the Third World.
2. To support international initiatives in the field of safety evaluation of novel foods and food additives and to coordinate fundamental research programmes in this field.
3. To collaborate on food research programmes and to encourage the transfer of existing research knowledge to the stage of application.

Activities

A workshop has already been held in Paris on raw materials and factors affecting food quality with the aim of identifying areas for collaboration and the mechanism of collaboration. The workshop has led to the establishment of an international training network in this area and to the identification of research topics on which collaboration is desirable and feasible. Similar workshops to be held in France and the United Kingdom are planned for the coming months to cover the control of processes, automation and technology transfer, safety evaluation, and Third World aspects.

Outlook

Decisions about a future work plan will be made following the workshops. It is expected that, if these are successful, the collaborative arrangements will build on current national programmes in the participating countries.

Area for collaboration	Aquaculture
Lead Country	Canada
Participants	European Communities, France, Federal Republic of Germany, Italy, Japan, United Kingdom, United States of America
Observers	-
Invited International Organizations	-

Aims

1. To document the present production and R&D programmes and estimate the economic trends to 1990.
2. To review and analyse trends leading to changes in technology and in the economic and legal elements of broad application.
3. To stimulate thinking on the research and development resources that will be required.
4. To strengthen collaborative efforts and foster initiation of new ones.
5. To provide a forum to consider the contribution that Science and Technology can make to aquaculture, to economic growth and employment opportunities, and to outline paths to achieve advances.

Activities

Two workshops were held in 1985, one on optimization of salmon smolt production, the other on optimization of shellfish production. Study groups summarizing the extent of present knowledge in several technical areas, and identifying cooperative research and experimental development programs that can be strengthened. Data on existing production, research efforts, roles in international aid programs, and means of funding collaborative research in aquaculture are being assessed. The next meeting of the planning group will assess the results of these initiatives, and prepare recommendations to member governments.

Outlook

Aquaculture is being practised in most countries of the world. However, the scientific bases for its structuring is limited and fragmented. It is attracting new investment in the fisheries sector, providing growth opportunities through innovation in both food production and recreational oriented industries.

The Planning Group on Aquaculture has an unique role in providing leadership for cohesive and orderly development in this industry. Security of food production is a most basic problem of all countries and wise use of aquatic habitats for aquaculture also complements environmental protection initiatives.

Area for collaboration	Remote Sensing from Space
Lead Country	United States of America
Participants	Canada, European Communities, France, Federal Republic of Germany, Italy, Japan, United Kingdom
Observers	Other countries participate, as appropriate, either actively or as observers, in specific projects within the scope of the panel's purview, in accordance with specific project ground rules.
Invited International Organizations	European Space Agency

Aims

1. To exchange information on remote sensing programmes and plans in participating countries.
2. To coordinate remote sensing programmes and plans with a view to avoiding duplication of efforts and fostering compatibility of activities to enhance the value of these programmes in addressing critical global phenomena.
3. To promote bilateral or multilateral collaboration and cooperation in remote sensing activities in order to enhance scientific return of programmes and use budget resources more efficiently.

Activities

A multilateral meeting of the Panel was held April 4-5, 1984 in Brussels. The panel established a streamlined remote sensing coordination group, CEOS (Committee on Earth Observations Satellites), which met September 24-25, 1984 and a group on Meteorological Satellite Cooperation, IPOMS (International Polar-orbiting Meteorological Satellite Group), which met November 19-20, 1984. Follow-up activities, including meetings of two working groups CEOS and one under IPOMS, have been agreed and scheduled for the next one to two years.

In October 1984, the countries involved in the satellite search and rescue program, COSPAS-SARAT, signed an agreement which assures services through 1990. Also during 1984, discussions were held among Summit countries regarding provision of new remote sensing instruments for flight on the shuttle or satellites. Summit members are planning to meet during the first half of 1985 to discuss coordination of remote sensing training and consider relevant recommendations of a meeting with developing country users hosted by France in October 1984.

Outlook

Bilateral and multilateral consultations are scheduled to be held January-March 1985. From these discussions, a final report will be prepared for review by the working group prior to the Bonn Summit. CEOS is scheduled to meet next in April/May 1986 hosted by ESA. The two CEOS working groups will meet prior to the next plenary. The IPOMS technical working group will meet in May 1985, and the plenary in October 1985. The IPOMS plenary will be hosted by France.

Area of Collaboration	High Speed Trains
Lead Countries	France, Federal Republic of Germany
Participants	Italy, Japan, United Kingdom
Observer	European Communities
Invited International Organisation	UIC (International Union of Railways)

Aims

1. To intensify the exchange of scientific, technical and economic data of the development and construction of high speed systems.

2. To elaborate the methodical basis for the socio-economic assessment of high speed systems.

3. To carry out feasibility studies on high speed systems.

Activities

Two separate working groups have been set up, one for the technological, the other for the socio-economic aspects of high speed systems.

A first symposium was held at Munich and Lathen, from October 25 to 27, 1983. At this symposium, the international state-of-the-art of the development of high speed technology was documented and further cooperation between industries, institutes, railway companies, and ministries concerned has been initiated.

A second symposium on the socio-economic aspects took place in Paris from November 5 - 8, 1984. Framework conditions and criteria for the introduction of high speed systems were discussed.

The main conclusions of the two symposia are presented in a report.

Outlook

The Federal Republic of Germany and France have henceforth decided to actively pursue the study of the high speed line projects Paris - Brussels - Cologne and Brussels - Amsterdam in cooperation with Belgium and the Netherlands. A report of these projects will be presented to governments concerned before the end of 1985.

Area for collaboration	Housing and Urban Planning in Developing Countries
Lead Country	France
Participants	European Communities, Italy, United Kingdom
Observers	Canada, Federal Republic of Germany
Invited International Organizations	-

Activities

Following the meeting on May 10, 1984 between representatives of the Housing and Urban Planning for Developing Countries program the majority of participants confirmed their agreement upon investigating means of mutual cooperation in information, training and research.

Concerning the first point, a questionnaire applied to the organism's cooperation activities underway on developing countries has been launched in France and Italy. French actions are already processed in an computerised data bank and a first document presenting French cooperation activities has been circulated. European Communities and United Kingdom have already supplied an initial series of answers. A complete document will soon be published. As concerns training, France's pilot group is preparing a brochure describing the training facilities available in member countries for developing countries executives. Parallel to this presentation, the pilot group is engaged in a study of the adequacy of training systems in industrialised countries to professional needs in developing countries.

Outlook

France has proposed last December some short and medium term actions relating to the creation of an international training meeting point (bid for innovative training courses, short sessions for discussion of selected experiments in developing countries). During the month of February, France and Italy met and decided to carry on a few short term actions. A meeting is planned in Spring 1985 to discuss these proposals. A general concluding report will be drafted for the end of the year on the results achieved and, if necessary, future steps envisaged.

Area for collaboration	Advanced Robotics
Lead Countries	France, Japan
Participants	Canada, Federal Republic of Germany, Italy, United Kingdom, United States of America
Observers	European Communities, Austria, Netherlands, Norway
Invited International Organizations	-

Aims

1. To hold a "Joint Coordinating Forum" at least once a year in the participating countries in turn, with the attendance of a limited number of officials from each participating country responsible for R and D policy in advanced robot systems.
2. To exchange data/information, researchers/study missions on R and D activities for advanced robot systems undertaken by appropriate organizations.
3. To suggest common standards (robot components, interfaces, communication and languages).
4. To establish common criteria for evaluation.
5. To do joint evaluation (in particular of technical aspects) and joint experiment.

Activities

The Joint Coordinating Forum (JCF) was held three times so far, in Japan in September, 1983, in France in January, 1984 and in Italy in September, 1984. At the first JCF, the framework of collaboration was determined. Under the framework cooperative activities are proceeding in three phases, which comprise the definition of collaboration program (Phase 0), exchange of information and study mission through workshops and joint site study (phase 1), and joint evaluation and joint experiment (phase 2).

The activity in phase 0 was completed by the end of 1983. At the second JCF, application areas for collaborative research, and initiating countries and member countries have been nominated for each as well as the necessary technologies.

The activity in phase 1 began just after the second JCF and is making progress through workshop and study mission activities planned by initiating countries for each application area. The fire fighting and rescue operation group carried out the first workshop in August, 1984 in Japan. The first workshop on system architecture, man-machine and intelligence was held in September, 1984 in Italy. The first study mission has been performed by Japan in the nuclear application area in European countries, France, Federal Republic of Germany, Italy and United Kingdom, in November, 1984.

At the third JCF, member countries agreed that initiating countries for each application area will suggest workshops and study missions.

Outlook

The fourth JCF will be held in the United Kingdom in May 23, 1985, at which plans of the workshops for each application area will be prepared by the initiating countries for the next one year and joint site studies will be discussed. The workshop on mining robotics will be held in France on May 21-22, 1985. Also, the workshop on nuclear robotics has been decided to be held in Japan around September, 1985. Before the end of phase 1, each country will determine the concrete form of collaborative research for phase 2.

Area for collaboration	Impact of New Technology on Mature Industries
Lead Countries	France, Italy
Participants	Australia, European Communities, Federal Republic of Germany, Norway, United Kingdom, United States of America
Observers	-
Invited International Organizations	-

Aims

The aims of the project clearly defined during the first phases of the work have led to the definition of a common working methodology. This approach aims at stimulating the innovation of the traditional sectors, either by the introduction of new technologies specific to those sectors or orginating from elsewhere, or by the promotion of new services directly or indirectly connected to production. An evaluation of the impact of new technologies in general as well as a comparison of difficult national approaches will be carried out.

Activities

Three countries are presently members of the working group involved in this type of evaluation, the others are considering such evaluations in the production sectors already identified. In Italy, ENEA already works in the field of the wool textile industry at Prato. The study has already reached an advanced stage and the introduction of new technologies such as telematics, CAD/CAM, the use of laser is envisaged for 1985.

Other studies in the materials sector, such as silk in Come, tiles in Sassuolo, wood and furnishings in Trento, glass in Murano are presently in the programming stage.

It is within the same direction that the French team at CESTA is working. The chosen sectors are: the woolen textile industry in the Tarn where the experimentation of new technologies is approaching its first stages, the porcelaine tableware at Limoges, and screwcutting in the Arve Valley.

The Federal Republic of Germany is concentrating its efforts on a detailed study concerning the introduction of new technologies in the rubber industry. The team responsible for the study is the Institut für Kunststoffverarbeitung.

It was decided that Norway and Australia could also join the working group as member countries.

Outlook

There will be a general meeting on April 29, 1985 in Italy. Furthermore, a working seminar will be organised in October 1985 in France. The seminar will offer the possibility of taking stock of the studies undertaken concerning the modernisation of traditional sectors and methods of apprehending this question. Each country participating in the working group will make a detailed presentation concerning a precise case study.

Area for collaboration	Biotechnology
Lead Countries	France, United Kingdom
Participants	Canada, European Communities, Federal Republic of Germany, Italy, Japan
Observers	United States of America
Invited International Organizations	FAO, WHO, UNESCO, UNIDO

Aims

The International Biotechnology Network has two aims:

- in education, to help students, especially from third-world countries, to obtain training in biotechnologies, and promote student exchange programmes between industrialized nations.
- In research, to further co-operation on specific topics related to biotechnology, through harmonisation of national research programmes.

Activities

On training, a number of centres are participating in an International Training Network, the aim of which is to help students from third-world countries. A brochure listing training opportunities in each member country has been widely distributed.

During 1984, approximately 40 students for graduate level training in biotechnology were selected, all from countries outside the network.

Three topics have been chosen by the International Committee for possible research co-operation.

1. Downstream processing: United Kingdom - Coordinator
2. Bioconversion of cellulose: Japan - Coordinator
3. Biological nitrogen fixation: Canada - Coordinator (Italy may join later as a co-coordinator).

A conference on Downstream Processing will be held in Toulouse, France, in February 1985. Workshops on Nitrogen Fixation are also being arranged for 1985.

Outlook

The training programme will continue in the academic year 1985/86. The three collaborative research projects are expected to get fully underway during 1985 and other projects may be initiated. The duration of the projects will depend on the success of the collaboration on the individual topics.

Area for collaboration	Advanced Materials and Standards
Lead Countries	United Kingdom, United States of America
Participants	Canada, European Communities, France, Federal Republic of Germany, Italy, Japan
Observers	-
Invited International Organizations	-

Aims

1. To promote cooperation on enabling scientific and technological research in advanced engineering materials in order to support the generation of codes of practice for these materials.
2. To exchange information on codes of practice and specifications in advanced materials and on the key organisations in various countries in order to facilitate cooperation and the adoption of agreed standards.

Activities

Since the last report the Steering Committee has met in Washington and Nice. Terms of Reference have been agreed for the Technical Working Parties which will be responsible for the definition and conduct of programmes on specific topics. Technical Working Parties chaired by the scientists named have been approved in the following areas.

Wear test methods: Prof. H Czichos, F.R. Germany
Surface chemical analysis: Dr C J Powell, USA
Polymer blends: Dr L Utracki, Canada
Ceramics: Prof. P Boch, France
Polymer Composites: Prof. C Bathias, France
Bioengineering Materials: Prof. D De Rossi, Italy
Cryogenic Materials: Dr K Tachikawa, Japan
Weld Characteristics: Dr H I McHenry, USA
Hot Salt Corrosion: Dr T B Gibbons, UK

There is a wide participation in all the above topics.

The first edition of a six-monthly VAMAS Bulletin has been produced and gives general information on the project and details of contacts in the participating countries. In order to insure the ultimate incorporation of the output from VAMAS in national and international standards, an article has been produced suitable for the house journals of national standards organisations.

Outlook

The next meetings of the Steering Committee will be held in Montreal in September 1985 and Berlin in April 1986, hosted respectively by the Institut de Génie des Matériaux, NRCC and Bundesanstalt für Materialprüfung. The Secretariat will move to USA in 1986.

Area for Collaboration	New Technologies Applied to Culture, Education and Vocational Training (ANTEM)
Lead Countries	Canada, France
Participants	Italy, United Kingdom
Observers	European Communities, Federal Republic of Germany
Invited International Organizations	-

Aims

To develop international collaboration and to share experience in the field of new technologies applied to education, through the establishment of databanks, workshops, common terminology, etc.

Activities

Three different networks have been established. The first concerns instructional technology referral centres, with the assembly of information on the educational technology resources of member countries. France and Canada have committed themselves to national databanks, whilst Italy and United Kingdom are investigating the possibilities. The second network is devoted to promoting workshops experimenting with developed technologies, with three centres now established in France and one network based on suppliers of Telidon information planned in Canada. The third is intended to establish communication between users of new technologies, involving an electronic network, in which Canada, Italy and France are participating. The Interactive Audio-Visual Project is exploring the possibilities of using 'intelligent' video discs in comparative research, and France and Canada are together exploring its application to biotechnology training. Lastly, a working group from the co-lead countries is studying the development of a common terminology bank with reference to robotics and biotechnology.

It has been suggested that organisations in non-member countries be able to participate informally in certain projects.

Outlook

ANTEM has as an objective to establish and have operating the information networks by mid-summer 1985.

Area for collaboration	Public Acceptance of New Technologies
Lead Country	United Kingdom
Participants	Canada, France, Federal Republic of Germany, Italy, Japan
Observers	-
Invited International Organizations	-

Aims

1. To investigate experience in the introduction of new technologies, in particular public attitudes towards new technologies.
2. To promote research collaboration and to establish complementary research projects in particular countries.
3. To exchange information from participating countries relevant to the study of the public acceptance of new technologies.
4. To draw out implications for corporate and public policy-making in this area.

Activities

The Working Group agreed a paper which proposed a number of areas where collaborative research might be undertaken. The United Kingdom followed this up by awarding four research contracts, and international co-operation now centres on the main UK contractors (the Policy Studies Institute, Manchester University PREST Team and the Technical Change Centre). These teams have developed research collaboration with research institutions in the participating countries and have promoted international seminars and bilateral meetings. Researchers from all the participating countries have now contributed to one or more of the three major study areas.

Outlook

The UK studies will have been completed by Autumn 1985, and the results disseminated shortly afterwards. The report findings will form the basis of a major international conference planned for the end of 1985. At that stage, the Working Group will have completed its work, but in the knowledge that international collaboration and interest in the theme stimulated by its work will continue.

Provisionally, the results obtained in the UK studies suggest that the anxieties expressed at the outset of the study have not been borne out. However, what has been called the "Fourth Industrial Revolution" has only just begun and the continuing acceptance of new technologies is by no means certain. Continued monitoring and study therefore remains essential but is unlikely to demand the regular attention of Heads of State and Government.

Area for collaboration	Basic Biology
Lead Country	European Communities
Participants	Canada, France, Federal Republic of Germany, Italy, Japan, United Kingdom, United States of America
Observers	-
Invited International Organizations	-

Aims

To keep up the efforts which have been made in this sector in recent years and to build up international cooperation taking due account of the complexity of modern biology.

Activities

The project addresses three themes: information networks, neurosciences, ecology.
According to the views expressed by the TGE Working Group at its Bonn meeting (January 11-12, 1985) future activities should be oriented towards the establishment of an international infrastructure in support to basic biology. In this connection the proposed activity on the establishment of Information Networks and Data Banks amongst the Summit partners must be pursued vigorously. Moreover a network on bionics banks and biological collections should be established; particular attention should be given to specialized organs and cell lines collections (cf. report of the meeting of the ad-hoc working group of march 1985).

In the neurosciences a conference bringing forty experts together from the Summit Countries will be held in Rome in March 1985 with the object of setting out the state of the art in the field in these countries and of defining a suitable international structure for the promotion and encouragement of this discipline internationally.

Lastly, so far as ecology is concerned, discussions are underway with the object of identifying the various possibilities for cooperation, and selecting one or several subjects which could form the subject of special agreements. Among the subjects envisaged the following might be noted: microbial ecology, biological diversity (a seminar could be organized in early 1986), tropical biology and participation in the international geosphere/biosphere programme, as well as in the US long term ecological project.

Outlook

Reconsideration will be envisaged towards the end of 1985 on the basis of a report by the working group on an assessment whether present work can be accommodated in existing international organisations - such as International Council of Scientific Unions, Biology Science Network (United Nations), European Molecular Biology Organization, Asean Molecular Biology Organization - and whether new subject areas should be pursued. Because of developments in science and technology and increasing public awareness particular attention should be given to Bioethics.

Area for collaboration	High Energy Physics
Lead Country	United States of America
Participants	Canada, European Communities, France, Federal Republic of Germany, Italy, Japan, United Kingdom
Observers	-
Invited International Organizations	-

Aims

The aim of the Summit Working Group in High Energy Physics is to further develop international collaboration to foster progress in this field of scientific research.

Activities

In regard to Article 22 of the "Technology, Growth, Employment" Working Group Report to the London Summit, the High Energy Physics Working Group has found that, since its establishment, international collaboration has increased in the use of present accelerators and in the planning for further accelerators. Moreover, continuing collaboration in long range accelerators and detector technology development will lay the ground work for further international collaboration in construction and use of future accelerators in this area of fundamental research. The Working Group has identified a number of obstacles of an administrative nature that hamper effective collaboration.

Outlook

This Working Group has provided a unique forum for discussion of this area of basic science. It is of the greatest importance to continue to review long-term plans for major facilities and related technological research activities on an intergovernmental basis. This should enable progress in this most fundamental science, rich in technical spin-offs, to continue in an orderly, cost-effective way within limited resources.

It is hoped that a Summit endorsement of an in-depth review of administrative obstacles to effective international collaboration in science and technology will lead to coordinated action to eliminate them or to mitigate their negative impact.

Area for collaboration	Solar System Exploration
Lead Country	United States of America
Participants	All Summit members
Observers	-
Invited International Organizations	European Space Agency (ESA)

Aims

1. To exchange information on Summit countries' and the European Space Agency's respective plans for solar system exploration.
2. To identify projects of mutual interest which could be conducted bilaterally or multilaterally.
3. To report on potential cooperative, long-term, high-risk projects to conduct fundamental research about the nature, origin and evolution of the solar system.

Activities

A program known as the International Solar Terrestrial Physics (ISTP) Program for comprehensive investigation and analyses of the flow of plasmas and energy from the sun and earth has been the subject of trilateral discussions among the U.S., Japan and the European Space Agency (ESA). ISTP is a multi-satellite program for operation beginning early next decade. A trilateral NASA (U.S.)/ESA (Europe)/ISAS (Japan) ISTP planning group was formally established in mid-1984. The group met in Paris in June 1984 and in Tokyo in November 1984 and in Washington, D.C. in February, 1985.

Three joint studies are underway concerning planetary and small bodies missions: (1) a joint U.S./German comet rendezvous and asteroid flyby (CRAF) mission; (2) a joint NASA/ESA mission to Saturn and its moon Titan, designated Cassini; and (3) NASA and ESA are conducting a broad-based study of possible primitive body missions. NASA and the German Federal Ministry for Research and Technology have held discussions during the past year on the CRAF mission. A feasibility study of the propulsion system to be used for the mission will be conducted by Germany during 1985. In addition, an announcement will be issued to the scientific community during 1985 soliciting experiments for the CRAF mission. Each side will follow its respective budget procedures to seek approval for start of the mission in FY 1987 for launch in 1990. The Cassini and primitive bodies missions have been the subject of four discussions over the past year by scientific study teams and the proposed sponsoring agencies NASA and ESA.

Outlook

If approved, phased implementation of ISTP could begin in 1986, and would continue through the 1990's. The CRAF mission is currently planned for launch in 1990 and Cassini in 1993. Flight time and data analyses would continue years after launch. The primitive bodies missions have only been identified in a preliminary manner and would likely be conducted in the late 1990's.