INTRODUCTION

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The International Conference on »Scientific Policy in the Service of a Greater Europe« was organized on behalf of the Council of Europe by the Ost-WestWirtschaftsAkademie Berlin at Schloss Cecilienhof in Potsdam on 28-29 January 1993. Special thanks are expressed to Dr. Hinrich Enderlein, Minister of Science, Research and Culture for the State of Brandenburg, who made the meeting passible.

Twenty-six countries, including the United States, were represented at the Potsdam Conference, of which six were represented by Ministers or State Secretaries, and 14 by Presidents, Vice-Presidents or Secretaries-General of academies. The participants included representatives of major intergovern-mental organizations, such as the Council of Europe, the Commission of the European Communities, NATO, the OECD, and UNESCO. The non-govern-mental scientific community was represented by the ICSU, Academia Europaea, European Academy for Sciences and Arts, European Science Foundation, International Amaldi Conferences of National Academies of Sciences and National Scientific Societies, and Collegium Budapest, as well as by the Deutsche Forschungsgemeinschaft, Max-Planck-Gesellschaft, and Alexander von Humboldt-Stiftung.

Introduction

It has long since been realized in the industrialized countries that science and technology are extremely powerful tools in the pursuit of national objectives. More than any other single factor, it is the ability to produce and apply

scientific and technological knowledge that distinguishes the developed countries of the world from the developing countries. The income gap between countries or regions is, therefore, identical with the knowledge gap[1]. It is estimated that in 1990 more than 85% of the scientific and technnological potential of the world was concentrated in the industrialized countries, and less than 15% in the developing countries where 80% of the world's population lives.

A large proportion of this scientific and technological potential - whether expressed in numbers of qualified scientists and engineers or in monetary terms - resulted from the build-up of the arms race during the Cold War between the NATO and the former Warsaw Pact countries. A new policy approach aimed at redirecting the science and technology enterprise is a necessity for both groups of countries, and not just for the Commonwealth of Independent States (CIS) and Central European countries alone. However, while the countries of Western Europe are proceeding smoothly with the inevitable readjustment of science and technology, as part of ongoing overall restructuring processes prompted by the changing needs and capacities of industrialized countries, scientific and technological research in the eastern part of Europe is heading towards a crisis.

In association with the grave economic and social crisis facing Central and Eastern Europe, scientific research in countries concerned is also undergoing a variety of extreme difficulties which could lead to a complete collapse of serious and valuable scientific activities. Some of the science programs in these countries are of. international stature, and it would be a serious loss both to the worldwide scientific community and to the people of those countries if their high-quality scientific efforts were to founder.

During the period of the Cold War, pan-European efforts were scarce and often merely symbolic in nature. Only the United Nations and its specialized agencies had full representation from both parts of Europe. The UN Economic Commission for Europe had a committee of senior advisors for science and technology. UNESCO organized two rounds of ministerial meetings on science and technology policy (MINESPOLI [1971] and MINESPOL II [1979][2]. As part of the »Helsinki process*, a scientific forum of the Conference on Security and Cooperation in Europe was held in February and March 1980 in Hamburg[3].

When it became apparent that political developments in Eastern Europe would be such that one could begin to talk again about a »new Europe* - or about a »Greater Europe« - the fate of the scientific and technological community in the eastern part of Europe became the center of attention at numerous national and international meetings. For example, in addition to the Council of Europe's Potsdam Conference, the following international meetings took place:

- the Trieste Conference on Scientific Cooperation with Eastern Europe, 26-27.3.1990[4]
- high-level UNESCO colloquium on »Science and Technology for the Future of Europe - New Forms of Cooperation between East and West«, Berlin 25-27.9.1990[s]
- »The Role of Academies as Learned Societies in the New Europe«, organized by the Royal Academy of Sciences, Stockholm, March 1992
- an »Intemational Seminar on Organizational Structures of Science in Europe« UNESCO - ROSTE, Venice 27-29.4.1992'
- and the ICSU Conference on »The Role of Science in Rebuilding Central and Eastern Europe«, Leeds Castle, April 1993 (see Appendix, pp. XXX)

The present report attempts to highlight and summarize the main suggestions and concrete recommendations stemming from past meetings on a national or regional scale.

A synopsis of the relevant activites and programs undertaken by the international community dealing with pan-European science and technology issues is contained in a report prepared by the Council of Europe, entitled *Major scientific and technological initiatives in Europe,* for the Potsdam meeting (ASCIENCE 0405 - 11.1.93). Additional information was provided by intergovernmental organizations (Council of Europe, Commission of the European Communities, OECD) and by the nongovernmental international organizations (ICSU, European Science Foundation, Academia Europaea, European Academy for Sciences and Arts, International Amaldi Conferences of National Academies of Sciences and National Scientific Societies).

The Magnitude of the Problem

At the time of the abolition of both the Soviet Union and COMECON, the numbers of research and development (R&D) scientists and engineers recorded in official statistics for the OECD countries (total 2,283,000) and for the former COMECON countries (total 2,317,100) were of the same order of

magnitude. Even if in many fields the level of competence did not correspond to the size of the numbers, the research system in the socialist countries apparently functioned well. It attracted the best talents the countries had to offer, and it produced in many disciplines results which were comparable, and in some fields even better, than the scientific results achieved in the OECD countries.

Estimated total number ofR & D scientists and engineers (1989/1990)

North America	1,011 000
Japan	582 000
Western Europe (including united Germany)	690 000
OECD Total	2,283 000
Eastern Europe	304 000
CIS countries	2,013 000
Developed countries total	4,600 000
Developing countries	700 000
World Total	5,300 000

Sources: 1. OECD main science and technology indicators (Paris, November 1992)
2. UNESCO R & D resources in the former USSR (FSU) and Central and Eastern European Countries (Paris. June 1992)
3. Adjustments made by the author.

The vast majority of the Soviet Union's R&D potential was concentrated in Russia and in the Ukraine (85%). The combined R&D strength of all the Central and Eastern European countries together equalled slightly more than that of the Ukraine and Belarus together. It is thus not surprising that the entire COMECON scientific system was by and large modeled after the Soviet scientific system, which had a very strongly ideological orientation. Three quotations may suffice to indicate this:

»It is no exaggeration to state that the outcome of the struggle between socialism and capitalism depends to a large extent on which of the two systems could assure the faster speed of science and technology and the effective implementation of these results.*[7]

»The Soviet Union was the first country in the world which really put the achievements of science at the service of all the people.*[8]

»The powerful growth of science in areas which formerly symbolized backwardness, ignorance and lack of rights offers a most vivid example of the truly inexhaustible resources of socialism and iu ability to solve successfully, within a short period, social problems which proved absolutely insoluble under capitalism."[9]

The reforms recently introduced in the former Soviet Union and in the countries of Central and Eastern Europe also call for a new assessment of the countries' scientific and technological enterprises,

At the meeting in Potsdam, it was stressed that approximately 60% of the work of the USSR Academy was devoted to military applications of science. The conversion of this research potential to civilian applications is, therefore, one of the most important challenges for a new science policy in the service of a greater Europe. And there are others.

Some of the calamities which currently plague the research system in the CIS countries and in the Eastern and Central European countries became apparent well before the break-up of the Soviet Union and COMECON. The following trends were already clearly discernible in the early 1980s:[10]

- a leveling-off of growth rates in scientific personnel
- diminishing returns on investment in science
- a striking heterogeneity in the quality of science and technology
- great difficulty in introducing innovation into production
- maldistribution of researchers
- ageing of scientific staff
- poor communication and isolation
- equipment and service infrastructure
- conservatism and inertia.

These earlier tendencies were all confirmed as still existing at the Potsdam meeting.

The situation has changed drastically since political, economic and social reform processes were introduced into all of the countries concerned. These processes represented de-facto revolutions which were deep, but nonetheless peaceful. For the countries' scientific research systems, which for many years enjoyed by and large a rather privileged role, the situation has worsened rapidly. First and foremost, predictable funding for R&D activities has disappeared. For example, the Russian Academy reported a month-by-month allocation of funds, which hampered any serious research planning. All countries report drastic reductions in research money and research posts, coupled with a

sharp increase in rents, and energy costs, a scarcity of printing paper, and an absence of foreign exchange for purchasing literature and equipment and for travel purposes. In Russia alone, the volume of unfinished construction work in the scientific and technical sphere is estimated at about 1.5 billion roubles (at 1991 prices). A fast disintegration of the scientific infrastructure is feared. In addition to the massive »brain drain« to foreign countries reported without any exception by all 17 CIS and Eastern and Central European countries present in Potsdam, there is an even bigger danger in the large-scale departure of scientists and engineers, who for survival reasons, are leaving R&D activities for occupations in a variety of other fields outside the research system.

The experience of Western industrialized countries shows that, in spite of all similarities, there are vast differences in the way national research systems are organized. Besides cultural influences and historic reasons, the sheer size of a given country has an effect on its scientific and innovative performance. When one analyzes research systems in the eastern part of Europe, the same differences become apparent. Only Russia, and to a lesser extent the Ukraine, have extensive scientific infrastructures. Poland is an exception that falls into the category of medium-sized countries. Practically all other countries involved share the preconditions implied by their smaller size. Smallness does not, of course, in itself represent a disadvantage, but it demands a different set of science policy instruments from those available to large countries.

In addition to the natural geopolitical factor of size, there are two other factors originating from the political heritage of the post-war situation. These factors are still influencing to a considerable extent the quality and composition of the science and technology potential of countries in Central and Eastern Europe, as well as in the Commonwealth of Independent States:

a. For four decades, all of the countries in this region belonged to the Council of Mutual Economic Assistance (COMECON) and to the Warsaw Pact. The division of labor among the COMECON countries with regard to industrial production also had a strong influence on the priorities for the research system in any given country.
b. During the existence of the USSR Academy of Sciences, Academies in the various republics of the Soviet Union were gradually built up - with the exception of the Ukraine and possibly Belarus - as more or less regional branches of the academy in Moscow.

In consequence, all the countries in the region, - including Russia, - were not accustomed to participating freely in the world science and technological system in general and - perhaps more important - in that of the western industrialized countries. The politically imposed economic autarky also affected aims of science and technology and the opportunities for international cooperation. It must be realized that the political, social, and economic reforms that are leading the former socialist countries towards democratic political systems and toward market-oriented economies are difficult enough. For the scientific community, which itself is part of this process, the situation is even more complicated, for the reasons mentioned above.

Structural Reform and the Need for Evaluation

In almost all the countries concerned, new legislation has been passed aiming to introduce structural reforms in the scientific technological, and education system: »The easiest and simplest definition of the goal of the transformation is to achieve - with some modification - the same structure as that in some of the developed countries.*

It has been reported, however, that the new role assigned by these structural reforms to intellectuals in general and to scientists in particular, has been difficult to adapt to. The vast contrast between the constraints of daily life and the high expectations that the »intelligentsia« - which is ill prepared for the task - will foster the process of movement toward democracy, lead to frustration and deception.

In order to maintain scientific and technological standards comparable to those of Western European countries, and to adapt their research systems accordingly, the countries represented at Potsdam are ready - to varying degrees - to undergo thorough international evaluation of their present performance and capacity. A number of models have been introduced:

- Hungary has been evaluated by an ICSU team.
- The former Czechoslovakia was evaluated by the OECD.
- The Baltic countries have undergone thorough international evaluation by Denmark and Sweden respectively.
- The Russian Academy has undertaken a preliminary evaluation effort with UNESCO.
- East Germany has gone through the most sweeping evaluation process seen in any of the countries concerned, carried out by West German scientific institutions.

There is general agreement that what is called for »is not a mere reduction of research and development staff, but a serious evaluation of modern demands aimed at prioritizing research areas, raising them to international standards, maintaining unique research facilities, and, last but not least, achieving linkage with the educational sector.«

It is vital for the evaluation of research structures to be undertaken by international governmental or non-governmental organizations, or by foreign scientific institutions. Through such an independent mechanism, it is hoped that some counterbalance can be established against »fast administration orders« by the national authorities which, while they are dictated by pressing and immediate economic needs, may have as their inevitable consequence the destruction of the country's scientific infrastructure. In addition to the danger that vital parts of the national culture may be sacrificed, there is also a danger that a viable technical industrial base cannot be created or even maintained without a functioning scientific base.

On a national scale, a grant system based on peer reviews, both in the research system (including the academies of science) and in higher education, has to a large extent replaced the previous centrally planned general allocation system.

Proposals for Action

A. Considerations for a science policy in the service of a Greater Europe

»Science policy* is a relatively new phenomenon that emerged during the 1960s and is still in its formative stages. It can encompass both »policy for science« and ^science for policy*. It increasingly includes technological development as well as basic science and research. The classical definition of »science policy*, coined after the first meeting of the OECD ministers responsible for scientific research and technological development in 1963, still sounds relevant today: »The term >national science policy< refers to a deliberate attempt by a government to finance, encourage, and deploy the country's scientific resources - trained research workers, laboratories, equipment - in the best interests of national welfare. Such a policy concept presupposes a recognition that science has a powerful influence on some or many aspects of national life - cultural, social, health, defense, economic, etc.«"

During the 30 years since this first OECD ministerial meeting, the philosophy behind science and technology policy, as it is now usually called, has undergone several changes. In the western industrialized countries, science and technology policies are today aimed »at increasing competitiveness rather than the quality of life«.[12]

In its »First Report on the State of Science and Technology in Europe«, the Commission of the European Communities identified similar targets for a new science and technology policy. The report concluded that Europe faces three main challenges:

- To increase its capacity to develop and pursue, where necessary, its own technological and economic options.
- To strengthen its international competitiveness, especially in fields that will have increasing importance in the future.
- To meet for society's requirement for an improved quality of life."

In spite of their massive record in developing scientific and technoloigical manpower, which resulted in impressive achievements in science and technology, science policy issues and technology policy issues were not prime concerns in the former socialist countries. In a UNESCO world survey of science and technology policy units covering 84 countries of the world, 720 were located in the OECD countries, and only 112 in the former COMECON countries.[14]

The countries of Eastern Europe now have a historic chance to give their science policy an entirely new direction. They have a chance to motivate scientists especially young ones, to give their best - ultimately for the reconstruction of their countries. They have a chance to reform the organizational framework of science and higher education, and thus to promote the idea of intellectual competition and international cooperation. The new national science policies in Eastern Europe, like national science policies in Western Europe, must from now on converge with pan-European plans with regard to:

- scale and mechanisms of funding;
- setting new priorities; and
- interactions between the science base and industry.

Again, as in the case of Western Europe, this convergence must still allow for purely national needs, taking local conditions into account.

When we aim to develop a »science policy for a greater Europe«, that is to say Western and Eastern Europe combined, it should be realized that no such

unified policy exists for the western part of Europe, or even for the European Community. »What has been achieved is a political commitment in the Single European Act to increased coordination of national policies as a means of saving money overall, increasing the returns from R&D investment, encouraging the broadest use of >best practice< in research management, and ultimately leading to greater complementarity in national programs*.[15]

In Western Europe, there is increasing awareness that upheaval in Eastern Europe is expected to have a major impact on science and technology policy in the OECD countries, particularly through aid and cooperation schemes now being set up under both bilateral and multilateral agreements (with the European Community, for example). This support is important for the transformation of R&D systems, in which entire sections are ill-suited to a market economy and there is a cruel lack of resources. Indirectly, there might be complex and unpredictable repercussions from any reduction in military R&D in OECD countries, where it forms a considerable share of the total R&D effort.[16]

As stated at the Potsdam meeting, there is a need, in addition to the new national science policies required, to elaborate an »all-European scientific policy, determining priorities, and in particular including problem areas that cannot be solved by one country alone«. However, there should be no illusions as to the difficulties involved in such an undertaking: since Western Europe has not been able to agree on a unified policy, the equally heterogeneous East European countries will face similar obstacles.

The following set.of ideas attempts to combine the role of science and technology with a development concept for a greater Europe.

Some Proposals for a European Science Policy"

The majority of the citizens of Europe do not live in its most highly industrialized heartland. In the future, this situation is unlikely to change very drastically, given current demographic trends and the addition of the relatively poor, pollution-burdened and industrially faltering countries of Eastern Europe. Under these circumstances, it is reasonable to examine whether or not a policy for R&D can be structured in such a way as to encompass the regional differences and centripetal tendencies inherent and increasingly apparent in the current evolution of Europe into rich and poor regions. The proposal for a new world economic order adds an especially interesting aspect to any initiatives that might be undertaken by Europeans in this area. It would probably be possible to use the investigation suggested here as a comparative source of ideas for the development of concepts of appropriate technology policies in the world as a whole.

The development of harmonious economic and social relationships between the regions of Europe in so far as these are related to science and technology policy depends upon:

a. providing aid to reinforce and extend the scientific and technological infrastructure of the less developed or marginal regions;
b. providing a considerable increase in aid to science and technology pro grams directly concerned with regional development, whether these are carried out autonomously, in the region itself, or in the context of a collaborative program along existing lines, or in national laboratories;
c. examining the specific characteristics of the various regions of Europe in these respects;
d. evaluating the best long-term balance between policies for science and technology based on existing lines and policies developed from the enhancement of regional differentiation as a strategy.

Some general propositions can be made that illuminate the possible development of such an extended science and technology policy for Europe.

- Recognition of the necessity for European objectives to be so formulated that particular attention is paid to the needs of the regions.
- Science and technology can and must play a more direct and important role in reducing the real inequalities that exist between regions.
- As it does this, it must be recognized that development paths may well be different from region to region, depending upon local conditions. Development should include not only economic and production growth aspects but also social, political, and cultural considerations.
- The result of any such policies that are developed should be a fostering of indigenous capabilities and resources, and the creation of locally appropriate technologies.
- It should also be ensured that the benefits (and disadvantages of science and technology-led development are distributed throughout the whole population of a region in as equitable a manner as possible.
- International cooperation will be necessary to resolve many of the problems of regional development, especially those related to science and technology, particularly in view of the finite nature of resources and the

heavy pressures exerted upon them in many developmental approaches.

Many environmental effects, for example, cross national frontiers.

This schedule implies that science and technology should not be seen as independent agents in society, but rather as integral elements of development. This in turn entails encouraging changes in the orientation of national and international policies, and the reform of administrative structures, so that science and technology can be exploited as efficiently as possible.

Obstacles to the technological development of particular areas are often not of a scientific or technological nature (e.g., lack of specific knowledge) but are institutional, cultural, or psychological. The choice of technologies (using the word in a very wide sense) does not rely only on scientific knowledge, but upon a comprehensive understanding of local situations based on many nonscientific factors, often historically determined ones, as is argued above.

A deep examination of this network of factors, which might be called the »ethos« or the »culture« of a region, is difficult. It calls for the multidisciplinary approach currently used extensively in regional development. Based on the above considerations, the aim should be to determine:

i. the common features of development in »marginal« regions throughout Europe, which may be physically marginal, or marginal in terms of historical development;

ii. the immutably unique factors in particular regions; iii. the conceptual framework for appropriate development; iv. a profile of aspects requiring improvement; v. a profile of aspects of comparative advantage for the region, which, left alone, will perpetuate themselves; vi. the opportunities for transferring of successful indigenous techniques or technologies between regions.

The current intense interest in the enhancement and harmonization of development around the world has led to a certain rigidity of the classification into developed and underdeveloped countries. This is not always reflected in objective measurements, whether these be national statistics or views of the likely evolution of certain countries. Thus it could be profitable for Europe to view its own contribution to world development in terms of its current internal patterns of development. While the worst living conditions are not paralleled anywhere within the region, the range of regional conditions is very wide and certainly overlaps that of the developing world.

The cheek-by-jowl existence of the most advanced technological systems with very primitive lifestyles is striking, even in Europe. The coming inclusion of the former Eastern-bloc countries in wider European associations complicates matters, particularly where open frontiers may develop, and new kinds of division may arise. Given the historical evolution of Europe and its long written and oral history, concentrating on appropriate technologies would offer a fascinating arena for the implementation of truly innovative institutional and structural adaptation.

Western experience has been the guide for much of the development planned or implemented in the world. There may still be lessons to be learned within the new boundaries of Europe.

B. Proposals for a coordinating mechanism

In response to the survival difficulties for the scientific and technological community in Central and Eastern Europe as well as in the CIS countries, many west European countries have developed special bilateral assistance programmes. Similarly, all relevant intergovernmental organizations offer, assistance in various forms to interested countries in the eastern part of Europe. The non-governmental scientific community has also developed a variety of assistance schemes. In addition, there are many other initiatives, usually linked with the names of some concerned key individuals of international standing (Baker/Genscher , Curien/ Rubbia, Soros, etc.) that aim to mobilize funds and public opinion.

Even for well-informed Westerners, it would be difficult if not impossible to assemble information on these many well-intentioned activities. For individuals living in the eastern part of Europe, such a task would be impossible.

The OECD, through its Center for Cooperation with European Economies in Transition, has a unique position in this context. It is encouraging to learn that the idea of launching a "Productivity Agency«, similar to the OEEC's Marshall Plan European Productivity Agency, as an effective way of improving collaboration between the eastern and western parts of Europe, seems to be gaining some ground.[18]

What emerged at the Potsdam meeting was a strong plea for the creation of a mechanism allowing for.

- information on all intra-European support devices aiming to safeguard the scientific research system in Eastern Europe;

- permanent provision of a strategic overview of all European science-based research;
- coordination of multilateral and bilateral cooperation efforts. Ideally, such a coordination could be undertaken through ^concerted action* among all international and national organizations. One of these, e.g., the Council of Europe, could be designated to be the lead agency. For the scientific community, ICSU, for example, could carry out a similar task.
- Several participants at the Potsdam meeting proposed the creation of a special Marshall Plan for Science and Technology in Central and Eastern Europe; i.e., in addition to the above-mentioned information and coordination function, there would be a strategic planning function and, most importantly, a funding mechanism.

C. 60 + 9 Concrete Suggestions

Exchange Programs, including Brain Drain Problems

- Increased exchange of graduate students between East and West (two-way flow).
- Scientists in Central and Eastern Europe should be given frequent opportunities for short stays in western laboratories to assist the preservation of research groups in their own countries. Very long-term stays and emigration should be discouraged.
- Invitations to senior scientists to spend up to three months in a West European country.
- Postdoctoral fellowships for young, talented researchers (12 months).
- Establishing a special process to encourage innovative ideas and approaches in basic research generated by young scientists.
- Invitations to postdoctoral scientists for varying periods (two weeks to six months)
- Developing favorable conditions for young scientists in their own countries, to overcome the braindrain.
- Western administrators of science and technology programs with central and eastern Europe and the former Soviet Union should periodically assess the results of the various programs (e.g., on how many visiting scientists have returned to their home countries, to what extent they are engaged in scientific activity in their home countries).
- Research authorities in Central and Eastern Europe and the former Soviet Union should be encouraged to provide hard data on the brain drain in their countries, with attention being given to specific disciplines, age groupings and geographical areas.

Infrastructure

- A science and technology-oriented Marshall-type plan.
- Creation of international advisory teams for each country, assisting it to gain access to Western scientific information in order to define the direction of national R&D efforts.
- Establishment of European Research Houses to accommodate visiting
- scientists while implementing East-West research projects.
- Increasing joint research activities and other collaborative research.
- Participation of industrialists and business people in meetings on applied research.
- Creation of East-West joint ventures in research and development.
- Creation of joint international research centers.
- Screening achievements in the basic sciences and linking them with market-related mechanisms.
- All countries in Europe should be able to participate fully in projects (with appropriate funding) or simply have a watching brief (with zero or reduced funding).
- International facilities and research centers should be well distributed throughout Europe to encourage mobility among scientists.
- Efforts should be directed towards identifying research areas suitable for a pan-European approach. The single European market may throw up ideas.
- Communication and consultation among scientific communities should be encouraged, and facilitating mechanisms introduced. The Conference of European Academies is a step in this direction.
- Creation of a European Confederation of Academies, representing all the Academies of Europe.
- Creation of a »clearing house« for European Academies.
- Creation of a Council for Assistance to Higher Education and Research in Central and Eastern European Countries.
- The universities of Central and Eastern Europe should be encouraged in their desire to build bridges between European countries and should be helped to develop their research potential.

- Establishing research and training centers for interaction between scientists of East and West.
- Promotion of joint projects between research groups (including limited funding for essential commodities).
- Creation of international science and technology parks near leading scientific centers and universities.
- European scientific cooperation within the framework of the European Community, and other programs created by intergovernmental or non governmental organizations.
- Research communities of Central and Eastern Europe and the former Soviet Union should come forward with proposals for regional (inter-academy, transnational) research initiatives for western support. This could involve workshops, training programs, etc., and would be useful in demonstrating the potential of science and technology as an integrating force.
- Where coordination between different funding and sponsoring bodies has to be ensured, a simple, ad hoc procedure (and secretariat if necessary) should be used.
- Regional cooperative schemes should be developed where appropriate.
- Attempts should be made to link basic research activity and its values to the cultural traditions of the country or region. It is essential that science be defended by the politicians in the former eastern-bloc countries against the antiscience reactions that have followed liberalization.

Information and communication issues

- Setting up of western liaison offices to provide information to East Euro pean scientists and promote collaboration.
- Exchanging information related to research results, publishing completed and ongoing research projects.
- Improving access to modern research facilities and scientific and techno logical information sources.
- Overall improvement of information exchange at all levels.
- Organizing an exchange of scientific and technical achievements with the ultimate aim of creating a uniform system of European scientific information on the basis of the already developing computer network.
- Creation of a clearing house for European Academies which should make more generally available information of common interest on moves towards greater cooperation among scientific academies.
- Creation of international advisory teams for each country, assisting it to gain access to Western scientific information in order to define the direction of national R & D efforts.
- The surmounting of language barriers.
- Communication and consultation among scientific communities should be encouraged and facilitating mechanisms introduced. The Conference of European Academies is a step in this direction.
- Supplying science journals to named scientists in libraries and major research institutions.

Funding

- Working out a fundamental science support program in Eastern Europe *(International Foundation for Science in Central and Eastern Europe).*
- All countries in Europe should be able to participate fully in projects (with appropriate funding) or simply have a watching brief (with zero or reduced funding).
- Creation of an East-West Fund to promote specific projects in vital areas of basic research.
- Part-funding of Eastern European subscriptions to international scientific societies.
- Putting Eastern European scientists in touch with DG XII of the EC and other possible funding sources.
- Easier financial access to international organizations such as CERN, EMBO, ESA, etc.
- Completion of, and perhaps joint management of, large-scale research centers at present under construction for which national funds for completion are not available.

Special Interest Areas

- Promoting combined research efforts in relation to virology, the human genome, and Chernobyl-type accidents.
- Coordination of conversion in science with conversion in industry.
- Exploration of how the scientific potential of the former socialist countries could also be used increasingly for problem-solving in developing countries.
- Environmental issues should be taken into account.

Evaluation and Management

- Creation and/or continuation of panels to assess, in their respective sectors, the human capital available and the mode of support most appropriate (setting up an action plan including the numbers of scientists or groups to be supported and the resources required).
- Extension of the successful OECD series of »Country Examinations* on science and technology policy to the Eastern European nations.
- Organization of East-West meetings comparable to UNESCO's Berlin high-level colloquium and the Council of Europe's Potsdam conference at regular intervals of two to three years in order to assess progress.
- For scientific cooperation, management and evaluation should be carried out, as far as possible, by working scientists.
- Courses for young science managers to acquaint them with grants and peer-review systems, science administration, licensing and patents, etc.
- The European peer-review system would help Eastern European countries establish project funding priorities.
- Strengthening existing modes of bilateral cooperation within the frame work of multilateral cooperation.

Nine Suggestions to the Commission of the European Communities

- Opening of Western programs such as Eureka or COST to firms in Eastern Europe.
- EUREKA should be seen as a model for future industrial cooperation between all European countries, possibly with non-European nations.
- The EC should be encouraged to increase the scale and scope of mecha nisms designed to give scientists from Central and Eastern Europe the opportunity to collaborate with scientists elsewhere. This will involve go-east and go-west fellowships, networks, conferences, joint projects and greater access to EC programs. Emphasis should continue to be given to young scientists (generally below the age of 40) and to stimulating activity (through go-east fellowships, conferences and joint projects) in Central and Eastern Europe.
- Signing of a bilateral treaty with the EC on scientific and technical cooperation to ensure the equal participation of Eastern European scientists in European research programs, with cost sharing between the EC and the individual country concerned.
- Signing of a treaty with the EC to establish concrete programs (.COST; **PHARE; ACE; TEMPUS).**
- Establishing contacts with the European organizations for science and technical development, as well as with the managing staff of the EC's specific programs.
- Information transfer to the scientific institutions and universities on ways and means of joining the EC programs, including information in the Eastern European language concerned about the concrete programs.
- Organization of consultation meetings with representatives of Central and Eastern European organizations on points of interest concerning possible participation in scientific EC programs.
- Cooperation with EC Commission DG XII in using Central and Eastern European organizations as subcontracting partners in EC programs, as well as including Central and Eastern European scientists for expert assignments.

Conclusions

The political changes in Central and Eastern Europe and in the CIS, the emergence of democracy, and development toward market economies present not only one of the largest economic and political challenges to the West. They also mean scientific and cultural challenges. Western Europe should thus not only support the economic development assistance of Eastern European countries, but should also attempt to maintain and possibly renew the scientific research base in order to promote the spread of democracy.

The scientific community constitutes one of the most important assets of the cultural heritage of Europe. The severe economic difficulties which most countries in the eastern part of Europe are currently suffering, call for immediate and drastic remedies. Otherwise the scientific research system, as one of the more vulnerable segments of society, faces the danger not only of temporary disruption but also of lasting damage.

In Western Europe, both on a national scale as well as on the Community level as a whole, science and technology have become key factors in ensuring international competitiveness. In addition, science and technology should rapidly be able to deliver solutions for society's main concerns, such as economic prosperity, health, the environment, and so on. It can be said that

science and technology are part of the growing convergence of ideas and purpose binding the countries of the Community together. As concluded at the Potsdam meeting, this idea could be taken further to embrace a »greater Europe*. Industrial nations cannot maintain expertise in all disciplines, but Europe as a whole must. Western European assistance to safeguard the scientific infrastructure of Eastern Europe as much as possible is not an act of charity, but an act of solidarity, and moreover it is also an act of enlightened self-interest.

The central problems for a science policy in the service of a greater Europe - and thus the central theme of the Potsdam conference - are how to create new structures and prevent the disintegration of the science base and of science institutions in the eastern part of Europe at a time when demand for scientific output is in severe decline.

The countries of Eastern Europe are participating to various degrees, though unsystematically, in a variety of Western European intergovernmental and nongovernmental science and technology programs. They are also involved in bilateral initiatives. However, many countries are not aware of the existence of programs that are at their disposal, and therefore cannot make full use of the cooperation structures and funding mechanisms available. At the same time, these countries have to renew, or to build up from almost zero, their national science and technology bases. Constant advice and information is therefore needed to ensure that the countries concerned should:

a. Have all possibilities at their disposal for speedy integration into the international science and technology network and the international coop eration schemes.
b. Benefit from the experience of Western European countries in building up their national science base.

It was felt at the Potsdam conference that a pan-European coordination mechanism was needed in which Eastern European countries could participate as equal partners. This mechanism should have a clearing-house function, matching needs to existing opportunities. It should also be in a position to provide policy advisory services to build up national science and technology capacity.

At present, there is no intergovernmental framework that includes the whole of Europe and is devoted to the promotion of a European science policy. The question therefore arises whether the Council of Europe, which has the largest number of European states among its members, might not be in a position to fulfill such a function in close cooperation wilh all the other organizations concerned. The contributions made in this context at the Potsdani conference by the representatives of the Commission of the European Communities and of the OECD are attached here as Appendix 1 and Appendix 2.

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Appendix

Conference on the Role of Science in Rebuilding Central and Eastern Europe

Conference Statement

The International Council of Scientific Unions (ICSU) with UNESCO and the Commission of European Communities convened a Conference on the Role of Science in Rebuildung Central and Eastern Europe at Leeds Castle, Kent, U.K., in April 1993. The 2-day Conference was attended by 33 persons from IS countries and 6 international organizations, including a number of leading international scientists, ministers, parliamentarians and officials responsible for policy-making. The purpose of the conference was to draw high-level attention to the serious problems facing science in Central and Eastern Europe (not on this occasion including the countries in the former Soviet Union) and to explore strategies for solutions.

After extensive discussion, participants were unanimous in stressing the important role of science and technology both in achieving economic progress and prosperity, and as part of a nation's cultural heritage. It was emphasized that it is essential to include science in national policies, utilizing existing talents and involving a full range of partners, including industry, academic and professional bodies. Science should have a central place in educational curricula from the earliest level and university science teaching must be combined with strong research activity.

It was recognized that priority-setting among different needs of society entails difficult decisions, especially at a time of economic restructuring and financial stringency; nevertheless, it is vital that governments make adequate provision to safeguard science, since it is very difficult to re-establish the necessary human capital and infrastructure once these have been dissipated. Scientists must constantly seek to influence decision-makers and the public using all available channels. As regards the balance between basic research and its application in a market setting, it was recognized that both must be supported and that increased interaction between scientists and industry is imperative if the full benefits are to be realized for society. Recommendations of a more specific nature included:

- **establishment of a clearing-house or a network to provide information on existing international opportunities to assist science and scientists in Central and Eastern Europe;**
- **setting up of a programme of chairs and exchange programmes to strengthen university teaching and research;**
- **support to outstanding individuals to allow them to pursue their teaching and research;**
- **increased provision of training and educational opportunities for young scientists in their own countries and abroad;**
- **expanding existing programmes and strategies to secure academic and professional equiva lence at a regional and international level;**
- **introduction of financial and material incentives to discourage the »brain drain*;**
- **support for increased research on technology transfer between East and West and between basic research and industry;**
- **undertaking independent asessments of science and technology capacity and potential in the countries of Central and Eastern Europe and disseminating the results widely;**
- **development of appropriate legislation in Central and Eastern European countries to meet changing conditions in science and technology, including questions of intellectual property rights, patents, and fiscal matters;**
- **expansion of cooperation through innovative groupings and partnerships of all kinds (e.g., joint ventures, research, networking, etc.) on a regional or multilateral basis, involving appropriate professional bodies and international organizations;**
- **convening periodic meetings of the type held in Leeds Castle to assess the needs for the development of science.**

Finally, participants requested the three organizers of the meeting, ICSU, UNESCO and the Commission of European Communities, to follow up all these recommendations by concrete action wherever possible.