

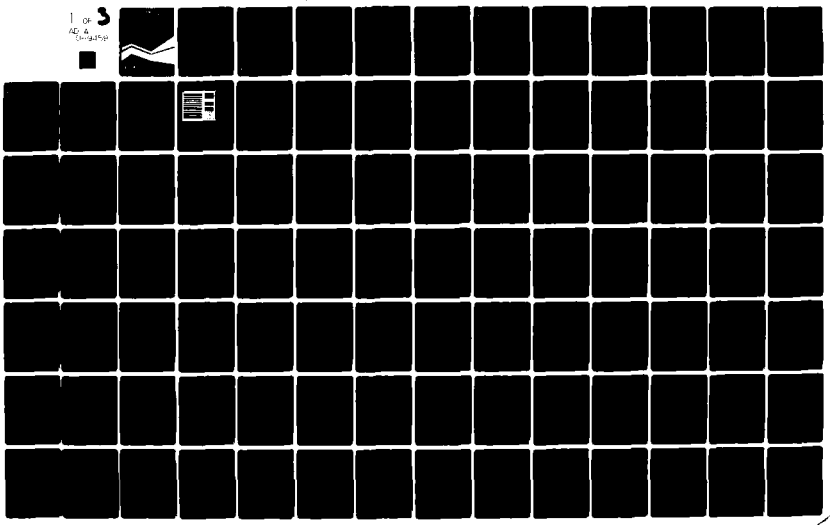
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AN ANALYSIS: U.S. PARTICIPATION IN THE OECD COMMITTEE ON SCIENT--ETC(U)
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LEVEL II
**GRADUATE PROGRAM IN SCIENCE
TECHNOLOGY AND PUBLIC POLICY**

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AN ANALYSIS:
U.S. PARTICIPATION IN THE
OECD COMMITTEE ON
SCIENTIFIC AND TECHNOLOGICAL POLICY (CSTP)

11 November 1979

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Department of State Project No. ST-1751-800356

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EXECUTIVE SUMMARY

The United States should increase its profile in CSTP Theme I and accordingly should refreshen and invigorate its participation in its work...

The current work of OECD's Committee for Scientific and Technolgal Policy (CSTP) is grouped into five broad Themes plus a category of horizontal studies. The central focus of this report is on Theme I, Science, Technology and Economic and Industrial Policy, which encompasses a wide range of technology issues that relate to economic policy and go to the heart of the CSTP raison d'etre. The United States has attached low priority to activities under Theme II, Government Policies and the Strengthening of the Research System. In contrast, there is considerable interest and active participation in projects under Theme III, Informa-tion, Computer and Communications Policy, which deals with subjects high on the U.S. policy agenda. Theme IV, Scientific and Technological Rel-ations with Developing Countries has involved consultation among the OECD members on preparations for the U.N. Conference on Science and Technology for Development held in Vienna in August 1979. U. S. Partici-pation on Theme V, Science and Technology Indicators is provided by the National Science Foundation which is deeply interested in improving these important comparative data. Horizontal activitites relating to OECD-wide questions or those cutting across the individual themes complete the CSTP program. —

The U.S. concern about its participation in the CSTP has been largely concentrated on Theme I. The concern arises from several factors.

Since the early 1970's, U.S. representation to the CSTP has been provided by the Department of State which, with few exceptions, does not have primarily substantive responsibility within the U.S. Government for the subjects under Theme I of the CSTP work program. It has turned to other departments and agencies for support in preparing for and participating in Theme I activities. The response has generally been very flat.

The lack of satisfactory response reflects the fact that the U.S. Government has not addressed itself comprehensively or frontally to the health and vigor of U.S. civilian industrial technologies and has not focused its organizational structure to do so. Although there are some officials who hold views to the contrary, U.S. Government agencies with interests in the Theme I subjects generally have neither a high regard for the Theme I output of the CSTP nor consider that output to be very relevant to their needs and responsibilities. Thus, compounding State's problems is the situation where agencies whose programs and capabilities best match Theme I activities feel under no institutional obligation to participate in the CSTP and are not impelled to participate by any perception of possible substantive gain.

Moreover, Theme I issues are rarely of a character to command attention from the policy leadership of the Department of State. The budget for CSTP backstopping has remained negligible and the level of effort devoted to preparation for Theme I activities has usually been minimal. In the U.S. Mission to the OECD, the Counselor for Scientific and Technological Affairs carries a very heavy work load, encompassing not only the entire CSTP program, but also environmental, road research and technical energy matters.

The procedures and pattern of operation of the CSTP also tend to impact adversely on U.S. participation. Late arrival of documents frequently precludes serious interdepartmental consideration of agenda items, while the extended period ranging from two to four years required for Secretariat completion and member country review of studies is rarely compatible with the tempo of U.S. Government consideration of a policy issue. Further, satisfying the diverse perceptions and sensitivities of the 24-member governments comprising the CSTP, operating under a consensus rule, tends to result in reports that lose some of their sharpness and potential policy relevance to the United States. Also, some U.S. observers feel that many of reports produced under Theme I are initiated with inadequately defined objectives.

Before examining how the United States might deal more effectively with the Theme I problem, it is proper to ask whether any changes should be sought. The basic and underlying determinant in approaching the latter question is the definition of U.S. interests in the CSTP activity, which is to say an assessment of their return or value to the U.S.

Although much of the heart of the Theme I problem lies in the fact that the U.S. Government has not yet taken industrial/technology policy under its wing, individual issues of industrial or technology policy do loom large on the American scene and are growing in importance. Moreover, there are some tangible benefits that the United States can reasonably expect from a more active, continuous role in the CSTP and its sub-groups. They include support to U.S. foreign policy objectives such as technology transfer to the centrally controlled economies and the developing

nations and the definition of new policy options or perspectives potentially pertinent and helpful in understanding the the relationship between science and technology and economic change and government policy in the United States. Political benefits in relations with other OECD countries may also be derived by the United States as a consequence of participating in activities to which other members attach importance but which we might otherwise consider of marginal usefulness. Moreover, U.S. economic interests may be protected or advanced as illustrated by consultations with other OECD members on the "code of conduct" negotiations with the developing nations where the stakes include U.S. foreign direct investments in excess of \$40 billion.

More indirect but, nevertheless, relevant to the U.S. posture towards Theme I activities is their possible collective impact on European governments' inclinations to intercede in the private sector for purposes of supporting national technology development and transactions with the possible consequence of competitive disadvantage to the U.S. business community. Also of importance are the possible contributions to the formulation of U.S. policies and programs resulting from the exposure of U.S. expert and policy officials to the views, perspectives and experience of their opposite numbers from other OECD countries. The United States attaches political importance to the OECD as a whole, and the CSTP must be thought of in that larger context. While greater U.S. activism might improve the value to the United States of Theme I deliberations and reports, this government's ability to influence events is limited by the consensus nature of the organization and by the dominant role of the Secretariat in proposing and conducting the studies.

In sum, however, the authors of this report have concluded that the United States should seek to increase its profile in CSTP Theme I and refreshen and invigorate its participation in its work. For practical reasons and in light of the uncertainty of the return, the effort invested should initially at least be more modest than herculean, but flexibility should be retained to take into account developments in CSTP performance.

The most significant step that might be taken to lay the basis for improved participation would be a statement of guidance to other agencies by the OES Assistant Secretary, preferably supported by the President's Science Advisor, indicating the Department of State's intention to strengthen the U.S. role in the CSTP and specifically on Theme I. It would spell out the objectives and types of actions contemplated. U.S. views and plans along these lines would be communicated to the OECD and other members of the CSTP.

Moreover, there is clearly a need to broaden the base which the Department of State draws upon in preparing the U.S. position on CSTP studies and work program content. To share in the responsibility, which for the most part is now in the hands of the Department of State, an interdepartmental network (committee or task force) should be established to include at least the Departments of Commerce, Labor and Defense, the National Science Foundation, and the Council of Economic Advisors.

Since budgetary constraints may limit any increases of government staff resources available for CSTP, other relatively inexpensive means should be considered of augmenting Department of State and other agency analytic capabilities with respect to the subject matter of Theme I.

Among the options available are the recruitment and use of a small team of carefully selected consultants to provide expertise now lacking. Another mechanism well-suited to the Department's work on CSTP activities and more easily managed than a team of consultants would be a long-term contract with a university or research organization to provide similar expert supporting services.

The very diversity of the five themes of the CSTP and of the activities they encompass, as well as the heavy time demands on U.S. officials serving several times yearly as delegates, create difficulties in establishing a suitable pattern of American representation to the Committee to which there is no outstandingly good answer. Although OSTP would be an attractive source of representation, it is under severe staff limitations and has eschewed taking on tasks that can be handled at Departmental level as is the case with ongoing representation to routine meetings of international organizations.

On balance, it is felt that the Department of State should continue to be responsible for managing and providing representation to the CSTP. A serious effort should be made to bring the Department of Commerce, the NSF or OSTP into the delegations attending one or possibly more CSTP meetings a year. Such an arrangement would be abetted by restructuring CSTP agendas.

The officer who represents the United States as chief delegate should speak with authority and the confidence that he is fully representing the views of the U.S. Government. Maintaining continuity of the relationship is very important.

PREFACE

The Department of State initiated this study because it recognized shortcomings in and wished to strengthen U.S. participation in OECD's Committee for Scientific and Technological Policy (CSTP). It wanted the government to play a role "commensurate with American interests." An essential factor in the achievement of these aims was considered by Department of State officials to be a better integration of the technical and policy implications of prospective U.S. positions or actions to be taken in the CSTP. This would require more effective bridging of the intellectual and organizational gap between the Department of State which "may be skilled in visualizing and formulating international policy but may have insufficient depth and currency in technical matters" and other Departments whose experts "may be highly qualified in technical matters but have little incentive or skill in visualizing or formulating international policy issues."1/

For purposes of conducting this study, a team approach was used by The George Washington University. The team members were the project director, Herman Pollack, Research Professor of International Affairs; Herbert H. Glantz, Research Associate; John M. Logsdon, Professor of Political Affairs and Director of the Graduate Program in Science, Technology and Public Policy; Charles V. Kidd, Research Professor of Public Affairs; Henry R. Nau, Associate Professor of Political Science and International Affairs; and Albert H. Teich, Associate Professor of Public Affairs and Deputy Director of the Graduate Program in Science, Technology and Public Policy. All team members had extensive experience in the U.S. Government or had carried on major studies or published in the field of government science policy.

Members of the team served collectively as a planning body in developing the study design and methodology. Three members prepared monographs 2/ on CSTP activities to demonstrate how technical/policy analysis could best be applied to the work of the CSTP.

Four principal techniques were utilized by the GWU team for obtaining information and insights into the U.S. role in the CSTP. The primary method was an extensive series of interviews with a wide range of individuals from the private and public sector whose position, experience or specialized knowledge suggested their competence to comment or advise on U.S. participation in the CSTP. A complete list of individuals interviewed is contained in Appendix A to this report and in the Appendices of the Part II Monographs.

The second technique was personal observation of the 22nd and 23rd meetings of the CSTP in February and June 1979. In addition, one team

1/ Page 10, Work Statement. Department of State RFP ST 1751-800356-AM

2/ These may be found in Part II of this report.

member visited the Secretariat to obtain first-hand impressions relating to his and the other demonstration projects.

A third technique was a literature search for key reports, articles and books relating to the CSTP and to domestic and international aspects of science and technology. A partial bibliography appears in Appendix C.

Lastly, the University held a day-long seminar on June 18, 1979 on the "U.S. Stake in OECD S&T Activities" in order to bring to bear on the study the views of current and former U.S. officials responsible for the work of the CSTP. The afternoon session was devoted to an examination of the key questions underlying the study, namely, how important is the work of the CSTP to the United States, how important could it become and what changes would be desirable in U.S. arrangements for its participation in the CSTP and in the Committee's program content and organization. This session was attended (See Appendix B) by senior officials in State and other agencies with present or potential policy interest in U.S. participation in CSTP. Also present were the immediate past Deputy Director of the DSTI and a leading member of the industrial research community who is serving as an expert on one of the CSTP's major studies.

This study was the beneficiary of two preceding studies on the CSTP. Professor John M. Logsdon, a member of the team conducting the present study, prepared in 1976 a working paper for the NSF entitled The OECD and Science and Technology: A Time for Transition. In June 1978, Dr. Eugene G. Kovach prepared a study for the NSF entitled U. S. Government Participation in the Science and Technology Programs of Selected Multilateral Organizations. One of the four organizations covered was the OECD. Dr. Logsdon's paper dealt principally with the CSTP performance, while Dr. Kovach's more closely paralleled the terrain of the present study, namely, U.S. participation in the CSTP. Dr. Kovach's findings anticipated many of those in the present study and his conclusions are in no way incompatible.

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vative Capability of Small and Medium Enterprises -
Albert H. Teich

PART I

OVERALL ANALYSIS AND RECOMMENDATIONS

BACKGROUND ON THE
COMMITTEE ON SCIENTIFIC AND TECHNOLOGICAL POLICY (CSTP)

The Organization for Economic Cooperation and Development (OECD)

This section on Background is intended primarily for the reader without prior knowledge of the CSTP. Those already familiar with the CSTP may wish to turn directly to the section on The Present Situation on page 11.

The OECD is regarded by American officials as one of the most important of the international economic organizations to which the United States belongs. Since 1961, the OECD has served its members--the 24 industrially advanced nations of Europe, North America and the Pacific Region plus Yugoslavia as an associate member--as a unique multilateral forum for the exchange of views and coordination of policies on many of the international economic questions that are of special concern to them in their relations with one another or with the developing nations and the non-market economies of Eastern Europe and Asia. The key operational technique used throughout the OECD is the combination of inter-governmental consultation with the support of high quality technical and other expertise from the member governments and non-government sectors.

Until recent years, the OECD has generally found it difficult to articulate its mission in terms of specific goals. The problem was pinpointed by Miriam Camps a few years ago in her perceptive analysis of the OECD when she stated "From its earliest days the OECD has been handicapped because it had no widely agreed raison d'etre, no clear purpose from which its functions could be derived, few precise commitments which governments were pledged to carry out, and no simple goals which command public understanding and support."

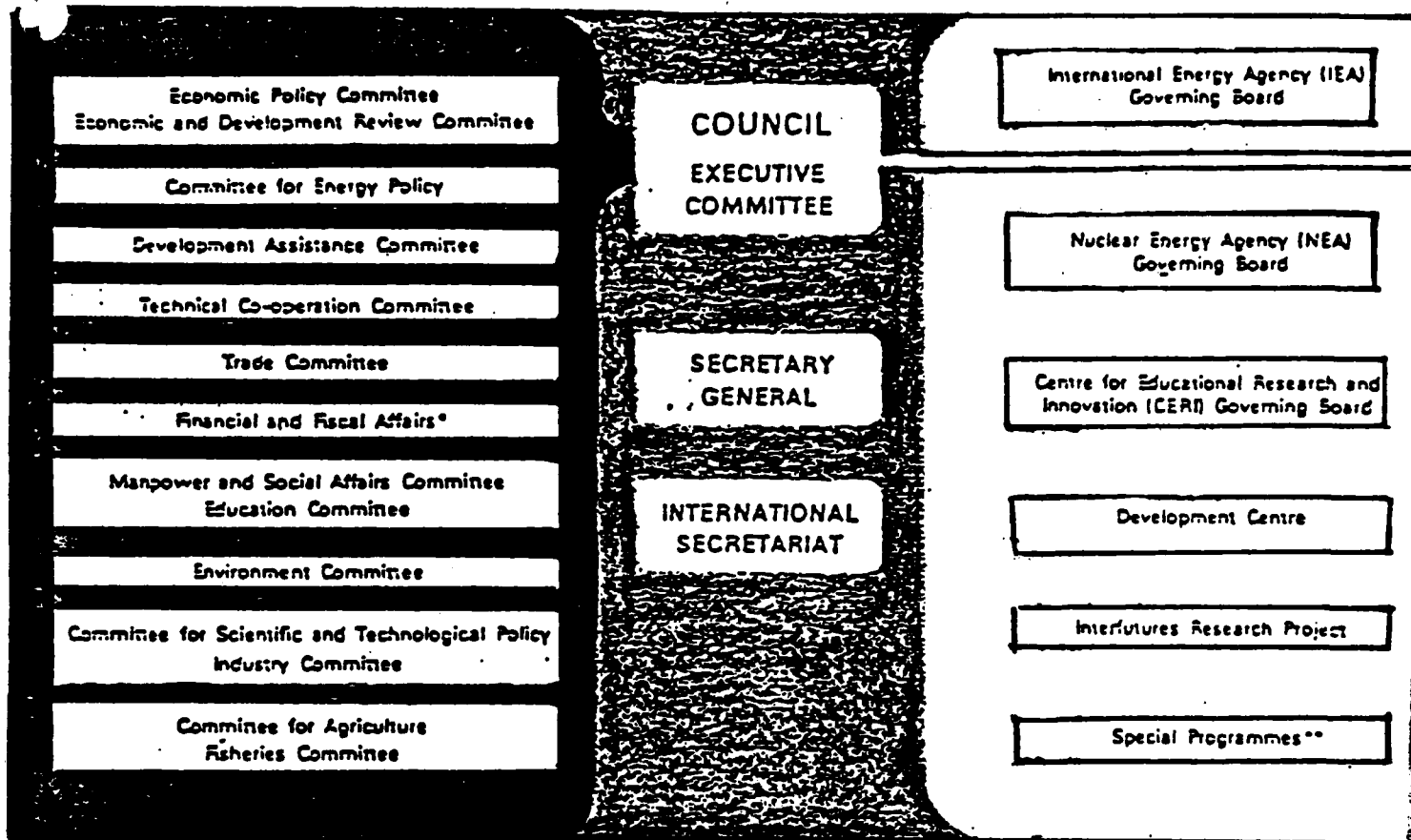
1/ Miriam Camps, "First World" Relationships: the Role of the OECD,
New York: Council on Foreign Relations, Inc., 1975.

Why then the high rating assigned to the OECD by the United States? Because the very lack of well-defined objectives and jurisdictional limits has provided flexibility and capacity for fast response to the organization. Having no precise charter, the OECD has been able to deal with any economic issue that requires or would profit from consideration in an international body with its particular membership composition. Moreover, the OECD has a capable Secretariat and has established an enviable record as a vehicle for the constructive discussions of problems of common concern.

The identity crisis noted by many observers has apparently receded as the OECD has confronted the multitude of interrelated issues stemming from a series of major economic and political developments in recent years. Most notable among these have been the breakdown of the international monetary system, wide fluctuations in business activity, continuing inflation, and unemployment, the oil shortages and price upsurge, and the growing strength, political unity and stridency of the developing nations.

The OECD structure is a complex of specialized committees, expert groups, working parties, and semi-autonomous institutions which have been created to deal with the diverse and changing interests of member countries. The central body is the Council, composed of permanent government representatives at Ambassadorial level which, however, normally meets once a year at Ministerial level. It operates as the governing unit, directing the work of its subsidiary bodies, and approving the program and budget of the organization. The following chart indicates the principal components of the OECD.

STRUCTURE OF OECD



* Committee on International Investment and Multinational Enterprises, Committee for Invisible Transactions, Payments Committee, Insurance Committee, Committee on Financial Markets, Committee on Fiscal Affairs, Committee of Experts on Restrictive Business Practices, Committee on Consumer Policy, Maritime Transport Committee, Tourism Committee, Consortium for Turkey.

** Educational Building, Cooperation in Road Research, Club de Sand.

The Council operates on the principle of consensus. When it wishes to go beyond discussions and exchange of information several courses of action are open. The most formal and potent is a Decision of the Council, which can be legally binding on governments provided that it is consistent with the country's own constitutional procedures. More common, however, is a Recommendation to member countries which carries a strong moral obligation since it has been the subject of consensus action, but is implemented by voluntary action on a member country's part. An action of

lesser status is the Resolution. This is frequently used, for example, to authorize or reject a report for publication or to request information. The Council may also issue a "Declaration by Ministers" which is an expression of political will on the part of governments and hence has considerable weight. These declarations have been used for Trade Pledges and other important matters.

History of Science and Technology in the OECD

Current OECD attention to science and technology issues continues the long history of the interest first manifested in scientific manpower and similar matters in the earliest days of its predecessor, the Organization of European Economic Cooperation. Alexander King, who was Assistant Secretary General of OECD for Scientific Affairs from 1961 to 1974, related scientific activities to the nature and goals of the OECD as follows:

It is characteristic of OECD work on both science and education that it is conceived in terms of policy and of influencing the thinking of the Member countries, rather than as projects which are ends in themselves. Within the economic growth and development objectives of the Organization such work is designed to provide new knowledge, experiment, or demonstration which seek, in a strictly practical sense to provide to the Member countries elements of experience which can be incorporated in the evaluation of their national policies. ^{1/}

King also noted the importance the OECD Ministers of Science ascribed to dealing with science policy in the context of other areas of policy when they met in October 1971 and agreed

...that science could no longer be regarded as an autonomous area of policy; in future it would have to be developed more closely in relation to formulated

^{1/} Alexander King, *Science and Policy: the International Stimulus*, New York: Oxford University Press, 1974. See p. 34.

national objectives and, in particular, intimately coordinated with economic, social, and education policies. Nearly all the problem areas...have economic social and political facets and hence new multidisciplinary attacks would have to be mounted. 1/

The changing needs of member countries and difficulties in clarifying the relationship of the science activity to the economic and, in recent years, social purposes of the OECD led to the creation and restructuring of committees of varying responsibility and longevity during the two-decade history of the OECD. The first was the Committee for Scientific Research (CSR) subsequently renamed the Committee for Research Cooperation (CRC). When the CRC was terminated in 1970, the bulk of its functions was assigned to the Science Policy Committee (SPC) that had been set up in the mid-sixties; those dealing with the environment were assigned to a new committee created for that purpose. The SPC in turn was abolished when the CSTP was created in 1972.

In 1977, when the OECD Council extended CSTP's life for another five years, it approved a mandate which focused on

the growing importance to OECD countries of the effective management of national research and development systems, the role of science and technology in industrial and social change..., and the economic and social consequences of new technological developments. 2/

1/ Op.cit., p. 95

2/ Resolution of the Council C(76)189 (Final).

Organization of CSTP

The structure of the CSTP, which has the same membership as the OECD, provides for a chairman and a number of vice-chairmen who are elected annually. J. Mullin of Canada was chosen for a second term as chairman at the CSTP's first plenary meeting of 1979. Four vice-chairmen, the delegates from Finland, Japan, the Netherlands and Switzerland, were also selected--in 1978 there was a fifth, Oswald H. Ganley then Deputy Assistant Secretary in the Department of State. Together these officers make up the Committee's Bureau, which operates as a steering committee whose main functions are to advise the chairman on issues or problems to be brought to the attention of the Committee, provide the chairman and alternates for the three plenary meetings held each year, and represent member countries in dealings with the Secretariat between meetings on such matters as agenda and work programs.

The CSTP customarily establishes separate committees of government representatives to provide guidance to the Secretariat on design of studies and implementation of each of its activities. A special Working Party was created a few years ago to handle all activities pertaining to information, computer and communications policy (ICCP). This Working Party, while reporting to the CSTP, functions with near total autonomy in developing its own work program for submission to the CSTP; it has its own Bureau and sub-groups of government representatives to deal with specific activities under its jurisdiction.

The Secretariat

Secretariat services for the CSTP (and for the Industry Committee) are provided by the staff of the Directorate for Science, Technology, and Industry (DSTI), which performs or contracts for the actual research and, with the help of consultants, prepares reports for consideration and review by the CSTP.

The DSTI has been headed since 1976 by David Beckler, who for many years had been one of the ranking officials in the Office of Science and Technology in the Executive Office of the President and who had played a prominent role in U.S. relations with CSTP and its predecessors. He directs a staff equivalent to 76 man-years in 1979. The CSTP portion represents 40-man-years, divided into four units: Science Policy Division (14); Science and Technology Division (10); Information, Computer and Communications Policy Unit (8); and Science and Technology Indicators Unit (8). The remainder is in the Industry Division (25), which supports the activities of the Industry Committee, and management and clerical personnel (11). In addition, approximately 8.5 man-years of consultant services are budgeted for DSTI of which 6.5 man-years are available to CSTP.

The CSTP work program emanates largely in the Secretariat. Some activities, however, are proposed specifically by governments, while others are requested by the Council in connection with OECD-wide projects.

Since most activities are multi-year, annual changes in the work program are not usually extensive. At the February meeting of the CSTP, the Director of DSTI, submits a suggested work program for the following

year for preliminary discussion. Delegates comment in varying detail as to content, priorities and suitability. Their views are advisory in nature and are taken into account in the Director's initial submission to the Secretary General some weeks later for incorporation into a proposed OECD work program and budget. A second and final discussion of the work program is made by the CSTP at its second session of the year in May/June. The comments made during this review are also considered by the Director in making his further recommendations to the Secretary General. The latter's programs and plans for the entire OECD are subsequently examined by the Budget Committee, Executive Committee and, finally, the Council, which gives its authorization by the end of the year. This three-tiered review, however, does not usually result in major changes in the specific activities recommended by the Secretary General. The major emphasis of the review of the CSTP program is on administrative, personnel and budget matters rather than program content.

CSTP Program

At its first meeting of 1977 following the Council's renewal of the mandate, the CSTP approved the Secretariat's concept of a flexible 3-5 year planning program for its activities with major emphasis to be placed on issues relating to "science, technology and balanced economic and social development in national and international dimensions."

The newly-appointed Director's paper on Future Direction of the Work Programme (SPT(76)46, 18 January 1977), which had been prepared for that

meeting, set forth the basic considerations that:

The policy framework which shapes the Programme of the CSTP should reflect developments in the macro-economic and political spheres and be responsive to the main concerns of the OECD as an economic policy Organisation.... Foremost attention should be given to the contributions of science and technology to economic growth, reducing inflation rates and increasing employment, taking into consideration the social aspects of technological developments.... An understanding of the factors that influence the generation and beneficial exploitation of technology and its effects on productivity, employment and trade is crucial to the framing of national and international policies that can harness the power of science and technology for worldwide economic progress.

These views continue to shape the program of the CSTP. The output is principally comprehensive reports on a wide range of technology issues which are intended as a contribution to national decision-making. Reports typically require two to three years or more for completion, evaluation by governments of member countries, and consideration at Committee meetings. Frequently, these reports include specific sections on policy aspects, identified as recommendations, conclusions or implications. These are usually general in nature.

Issues raised by CSTP reports are occasionally examined in greater depth in specially planned "forum discussions" held in conjunction with the CSTP sessions, which are extended an additional day for this purpose. The first forum was held in late 1977 at the initiative of the current Director of DSTI who wished to provide an opportunity for informal, extended substantive commentary on important topics by delegates and experts. In all, three such forums have been held, with a fourth scheduled for November 1979.

Members also utilize the CSTP to exchange views and information on policy issues of common concern. A present example is the ongoing dialogue on the "code of conduct" negotiations at UNCTAD.

The current work of the CSTP is grouped into five broad Themes plus a category of horizontal studies. (See Table 1, CSTP Activities in 1979 and 1980). These are discussed in the next section.

TABLE I
CSTP ACTIVITIES IN 1979 AND 1980

<u>ACTIVITY TITLE</u>	<u>DATE APPROVED</u>	<u>CENTRAL FOCUS</u>	<u>STATUS</u>
<u>THEME 1. SCIENCE, TECHNOLOGY & ECONOMIC & INDUSTRIAL POLICY</u>			
International Code of Conduct on Transfer of Technology	June 1975	Consultation and caucus on UNCTAD negotiations on LM code of conduct.	Continuing activity.
Impact of Multinational Enterprises on National Scientific and Technological Capacities	October 1975	1/	Final draft report to be submitted for review by CSTP in November 1979
Science and Technology in the New Socio-Economic Context	February 1976	Assessment of links between S&T and economic performance of member countries in the current unfavorable economic context--inflation, slower growth, etc.	Final draft report to be submitted for review by CSTP in November 1979
Technology & the Structural Adaptation of Industry	June 1976	Analysis of comparative national experience.	Final draft report of Joint CSTP-Industry Committee Working Party approved by CSTP in February 1979.
Prospective Analysis & Strategic Planning	June 1976	Consideration of S&T factors in medium and long-range planning.	Final draft report to be submitted for review by CSTP in November 1979
East-West Transfer of Technology	May 1977		Report approved by CSTP in February 1979.
Technology Transfer to Developing Countries: Implications for Members' Science and Technology Policies	May 1977		Final draft report to be reviewed ad hoc government group in October 1979; completion by mid-1980.
Government Policies and Factors Influencing Innovative Capability of Small & Medium Enterprises	May 1977		Completion expected by end of 1980
Science and Technology and International Competitiveness among OECD Countries.	May 1978		Study plan to be submitted to CSTP in 1980.
Effects of Government Regulations on Technological Innovation	May 1978		Study plan to be submitted to CSTP in 1980.
Technical Change & Employment	May 1978		Exploratory work in 1980.
Development & Use of Technology in Service Sector	February 1979	Government policies to stimulate R&D and innovation.	Feasibility study in 1980.

1/ When this space is blank, central focus indicated by activity title

CSTP ACTIVITIES IN 1979 AND 1980 (CONTINUED)

<u>ACTIVITY TITLE</u>	<u>DATE APPROVED</u>	<u>CENTRAL FOCUS</u>	<u>STATUS</u>
<u>THEME II. GOVERNMENT POLICIES & STRENGTHENING THE RESEARCH SYSTEM</u>			
Utilization of Social Sciences in Policymaking	Continuing Activity		Work in 1979 on this cluster of activities limited to review of Social Science Policy in Finland to be completed by end of year.
Functions of University Research	May 1978	Problems and prospects of research in higher educational institutions and implications for government research and education policies.	Preliminary conclusions expected in 1980.
Evaluation of Government Programs	May 1978	Government efforts to assess effectiveness of specific programs in relation to objectives.	Interim report to be presented to CSTP early in 1980.
<u>THEME III. INFORMATION, COMPUTER & COMMUNICATIONS POLICY</u>			
Economic Analysis of Information Activities & Role of Electronics, Telecommunications & Related Technologies	February 1977		Final draft report to be submitted for review by CSTP in November 1979 or early 1980.
Implementation of New Business Information Strategies	May 1977	New ways to collect, store & disseminate business information, with particular applicability to medium-sized and small industrial and service sector firms.	Based on a consultant report and a seminar held in 1979, OECD will continue to assist Members to develop policies in this area. Activity to be completed by end of 1981.
Changes in National Government Policy-making Structures in ICCP Field	May 1977	Preparation of handbook on ICCP activities of international organizations; comparison of national structures in ICCP field.	Assessment of national experience will continue in 1980.
Guidelines on Transborder Data Flows & Protection of Privacy	May 1978		Draft by expert group completed in mid-1979; will be reviewed by Working Party on ICCP in October and then by CSTP; implementation of follow-up mechanism in 1980.
Transborder Data Flows of Non-personal Data	May 1978	Assessment of types of data flows and government protective measures.	Completion expected by end of 1980.

CSTP ACTIVITIES IN 1979 AND 1980 (CONTINUED)

<u>ACTIVITY TITLE</u>	<u>DATE APPROVED</u>	<u>CENTRAL FOCUS</u>	<u>STATUS</u>
<u>THEME III (CONTINUED)</u>			
Economic and Legal Aspects of New International Data Bases and Networks	May 1978		Work will start in 1980 on access rules, interconnections of networks and harmonization of tariffs for data networks.
Microelectronics and Structural Change	May 1978	Employment and productivity effects in manufacturing and service sectors.	Completion expected by end of 1980.
High level Conference on ICCP for 1980s	May 1978		Conference to be held March 26-28, 1980.
Guidelines for Computer Vulnerability Policies	May 1978		Guidelines expected to be developed by mid-1981.
Information Transfer to Developing Countries	June 1979		Seminar at end of 1980 will examine Members' policy options to better respond to needs of LDCs for S&T information.
<u>THEME IV. SCIENTIFIC & TECHNOLOGICAL RELATIONS WITH DEVELOPING COUNTRIES</u>			
Consultations among Members on S&T Cooperation with LDCs	Continuing activity		Activities in 1979 limited to consultations on UNCSTD preparations; new programs will be influenced by UNCSTD results.
<u>THEME V. SCIENCE & TECHNOLOGY INDICATORS</u>			
Research & development statistics	Continuing activity		Work being started in 1979 to develop indicators of output of R&D activities; computerized data bank to be set up in 1980.
<u>HORIZONTAL ACTIVITIES</u>			
Positive Adjustment Policies	June 1978 (Council Mandate)	Contribution of S&T policies to adjustment process by facilitating technological change.	Final report submitted to Council in mid-1979.
Science & Technology Outlook and Assessment	Continuing activity	Identification of major issues confronting S&T policy-makers.	Second biennial report in 1980 will emphasize monitoring and assessment of S&T measures implemented or contemplated by Members.

THE PRESENT SITUATION

U.S. Concern is Concentrated on Theme I.

Of the five Themes under which the program of CSTP is organized, the problems which vex the United States in its relationship with the CSTP are essentially limited to Theme I, Science, Technology and Economic and Industrial Policy. This Theme encompasses a wide range of technology issues, all related to economic policy and at the heart of the CSTP mandate. In aggregate these constitute the topics usually associated with national industrial or technological policies. With one exception,^{1/} all of the activities under Theme I are in the form of studies which will produce reports for consideration by the CSTP.

Theme I includes studies on the effect of government regulations on innovation, innovation in small and medium enterprises,^{2/} the relationship of technology to international competitiveness, impact of multinational enterprises on national scientific and technological capacities,^{3/} domestic impacts of technology transfer to developing countries,^{2/ 3/} East-West technology transfer,^{4/} technical change and employment, technology in the service sector and the structural adaptation of industry.^{4/}

^{1/} The activity on the International Code of Conduct on the Transfer of Technology proceeds through consultations.

^{2/} See Part II of this report for monographs on this activity.

^{3/} Completion of report and CSTP consideration expected in late 1979-early 1980.

^{4/} Report completed and approved by CSTP in 1979.

There is also a study under way on science and technology in the new socio-economic context on which a report is expected in the fall of 1979.^{1/} This study, which deals with government policy in science and technology in a period characterized by chronic inflation, high unemployment and declining economic growth, is considered by the CSTP Secretariat to be the most important in the purview of Theme I and perhaps of the CSTP as a whole.

The United States Government has attached low priority to and on the whole kept aloof from the activities under Theme II, Government Policies and the Strengthening of the Research System. Studies are underway on evaluation of government programs and the function of university-based scientific research. The survival of the latter study in the CSTP program is now in doubt. Country reviews of social science policy were until recently an active element of Theme II. In 1978 a report was completed on Public Participation in Decision-making Related to Science and Technology.

In contrast, there is considerable interest and active participation by the United States in the activities under Theme III, Information, Computer and Communications Policy (ICCP). In mid-1979, an important effort to draft

^{1/} The draft of this report was released to governments in mid-September 1979. It is to be considered by CSTP at its meeting in late November 1979.

common OECD-wide guidelines on basic rules governing the transborder flow of personal data and the protection of privacy was completed. A study on the Economic Analysis of Information Activities is nearing completion. All of the other activities under Theme III are in their early stages.

The subjects covered in Theme III are close to or on the front burner of the U.S. policy agenda. They match rather well with the responsibilities of the Assistant Secretary of Commerce for Communications and Information whose office attaches considerable importance to the Theme III cluster of activities. It is his office, together with the Department of State, which provides the substantive participation by the United States in Theme III. Other governments are represented generally by officials from Telephone/Telecommunications Ministries. Largely as a consequence of this specialized governmental representation and the distinctive, coherent nature of the subject matter, the work of Theme III is carried on virtually independently of the CSTP and in a largely self-sufficient manner by the Working Party of the ICCP. Although much of Theme III activity originated in CSTP deliberations, CSTP review of Theme III proposed work programs or results of studies does not ordinarily go beyond the formal procedural necessities.

Theme IV, Scientific and Technological Relations with Developing Countries has involved consultation among the OECD members on preparations for the U.N. Conference on Science and Technology for Development (UNCSTD) which was held in Vienna in August 1979. U.S. representation has been provided by the Department of State's Office of the

Coordinator for that conference. Although views on the value of the consultations vary among the members of that Office, the general attitude is positive and the United States has no institutional or substantive problems in its participation.

U.S. participation on Theme V, Science and Technology Indicators is provided by the Division of Science Resource Studies in the National Science Foundation. This Division is deeply interested in the improvement and expansion of CSTP's comparative international indicators of S&T performance and highly attentive to Theme IV. This activity is a decade and a half old, and is highly regarded.

Lastly, Horizontal Activities which relate to OECD-wide issues or cut across the individual themes complete the CSTP program of work.

(A major paper on S&T aspects of positive adjustment policies was sent to the Council after CSTP review in the spring of 1979. This was in response to an OECD-wide study mandated in mid-1978. In that year, the first report on Science and Technology Policy Outlook was issued. It is a follow-up to the series of science policy studies on individual countries, which had brought considerable acclaim to the OECD.)

The largest single share of the Secretariat's CSTP resources is devoted to Theme I activities. Not too far behind in this respect are Themes III and V.

Although specific problems are encountered in Themes II through V, they usually are of the garden variety and not the object of special concern. Theme I, however, for reasons discussed in the next section, has been the source of chronic and generalized discomfort. Since this is the heart of the problem of participation in the CSTP, the remainder of this report deals with U.S. participation in the activities under Theme I. Henceforth references to CSTP should be understood to be limited to Theme I unless otherwise specified.

The Nature of the Theme I Problem

Since the early 1970's, U.S. representation to the CSTP has been provided by the Department of State's Bureau of Oceans and International Environmental and Scientific Affairs (OES) and its predecessor organization.^{1/} Although officials of foreign offices of other member countries serve with their delegations to CSTP, the United States is currently the only member of the CSTP whose senior representative is provided by its foreign affairs agency. All of the other members send as their senior delegate officials from ministries or other national institutions responsible for policy and programs in technology, industry, or science.

The Department of State is in the position of regularly representing the United States at meetings of the CSTP dealing with subjects for which it does not have primary substantive responsibility within the U.S. Government. This has placed the U.S. delegate under a significant handicap. As one would expect, the Department of State has turned to the other parts of the Government with closer connections to CSTP issues for support in preparing for and participating in meetings of the Committee and its subordinate groups. The response from these agencies has been very flat insofar as Theme I (and to a slightly lesser extent Theme II) is concerned. This has added considerably to the initial handicap. There are several reasons for the flat response on Theme I.

^{1/} Previously it had been provided by the President's Office of Science and Technology (OST), with backstopping services by NSF. During the latter half of the 1960s the senior U.S. delegate had been the Deputy Science Advisor to the President. This was more the consequence of the personal interests of the staff of the Science Advisor than a deliberate decision that the White House should be involved.

--U.S. Agency Disinterest

First of all, much of the heart of the Theme I problem for the United States lies in the fact that as a Government it has not yet come to deal with industrial/technology policy frontally or comprehensively. The U. S. Government in contrast to most of the other highly industrialized members of the OECD, has not focused its organizational structure to deal with civilian industrial technologies. The Office of the Assistant Secretary for Science and Technology in the Department of Commerce which oversees the National Bureau of Standards, the U.S. Patent and Trademark Office, and the National Technical Information Service has, over the years, attempted to identify itself with such a role within the U.S. Government, but with limited success. Although its basic legislation is sufficiently broad to provide covering authority for such a role, the Department of Commerce has neither a legislative nor executive mandate to do so. On the other hand, it should be noted that the Domestic Policy Staff turned to the Secretary of Commerce to organize and carry out studies and develop recommendations for the President on actions that might be taken to promote industrial innovation in the United States. The President's Science Advisor has in the past year or so displayed great interest in the technological position of the United States and particularly in the U.S. rate of innovation. However, neither he nor his office have participated in CSTP Theme I activities and their relationship to CSTP as a whole has been very modest. The National Science Foundation, through its Division of Policy, Research and Analysis, supports research and studies of technology transfer, innovation and other aspects of technology policy. Within the Department of Labor there has been a long-standing

interest in productivity and in employment. But unlike the ministries of industry or technology in Western Europe, or the Science and Technology Agency and the Ministry of Trade and Industry in Japan, no unit in the U.S. Government is identified or charged comprehensively with responsibility for the promotion of civilian technologies or for enhancing the international technological competitiveness of U.S. industry or for studying the developing policy affecting the relationships of the U.S. economy and the technological condition of its industry.

This is not to say that there is no interaction between these agencies and the CSTP on Theme I, for there is some. Thus, a senior member of the Division of Policy, Research and Analysis in the National Science Foundation maintains personal relations with senior members of the CSTP Secretariat, visiting Paris about once a year to keep abreast of developments and consulting particularly on the new socio-economic context project. However, the relationship is more accurately described as personal rather than institutional. There are no institutional relationships between NSF and the Theme I activities of the CSTP. Nor has there been much relationship between the Department of Commerce and the Theme I activities of the CSTP. The Office of the Assistant Secretary for Science and Technology has taken responsibility since mid-1978 for the CSTP activity on positive adjustment measures. Also, an official in that office has had a personal involvement in the activity on innovation in small and medium size enterprises.

Secondly, these agencies generally do not have a high regard for the Theme I output. Nor are the reports prepared under Theme I considered to be very relevant to their needs and responsibilities. Primarily for these reasons, they do not attach great importance to the work performed under Theme I. While

they recognize there may be some political and general benefits to the United States resulting from participation in Theme I, they view that as a concern of the Department of State rather than themselves.

In short, U.S. Government agencies whose activities and capabilities best match Theme I activities feel under no institutional obligation to participate in the CSTP and are not impelled to participate by any perception of possible substantive gain.

--The Problems of the Department of State

Within OES in the Department of State, this lack of interest and responsiveness on the part of the other agencies has caused both distress and frustration. Several additional factors intensify these feelings. Since the Department of State is not responsible for the formulation of domestic technological or industrial policy it has not built staff capability to deal with the issues in Theme I (the East-West Technology Transfer study and Code of Conduct consultations are exceptions). Although the OECD as a whole is considered to be an important international organization, the work of the CSTP with a few notable exceptions has not been considered to be of high priority in the Department of State scheme of things. Moreover, technology issues as developed under Theme I are not of a character to command attention from the policy leadership of the State Department.

This has been offset in part by the positive attitude of several senior members of the OES/SCI staff who felt that issues of technology policy warranted higher priority and who by the force of their position, interest, capabilities and energy sustained between 1972 and 1978 a higher degree and intensity of participation than would have been called for on institutional grounds. This was more tolerated than encouraged

or demanded by the Department of State. The budget for CSTP backstopping remained negligible and the supporting staff effort devoted to preparation for Theme I activities was usually small. It was seldom possible to explore thoroughly the substantive implications of the Theme I subject matter. Therefore, the Department of State officials representing the United States at meetings of the CSTP were not often as well prepared for the CSTP discussions as might be desirable.

With the departure in the summer of 1978 of the second of the senior OES/SCI officers who had taken a deep personal interest in the CSTP, this situation was aggravated. As a consequence primarily of the turnover of personnel and changes in organization within OES, four different individuals have represented the United States at the last four meetings of the CSTP, February 1978 to June 1979. This situation now appears to be stabilized with the assignment earlier this year of overall responsibility for CSTP matters, except Theme III, to an experienced and interested senior professional member of the Office of Advanced Technology in OES. Theme III activities continue to be handled by the officer who had previously been backstopping CSTP affairs in OES.

In the U. S. Mission to the OECD, two officers in the Science Section are now carrying the workload formerly carried out by three officers. The workload itself does not appear to have diminished. The Counselor for Scientific and Technological Affairs is responsible within the Mission not only for the CSTP, but also for the Environment Committee, the Road Research Program and technical energy matters. In the absence of Washington representation, he not infrequently sits in on meetings of CSTP working groups as the U.S. representative. The

pace of his activity is continuously high because of the numerous meetings and visitors that come within his cognizance. As a consequence, like his Washington colleagues, he has no choice but to focus his attention on a limited number of subjects. Others, by pragmatic definition of lesser priority, receive little time or attention. This situation is mitigated to some extent by the fact that the incumbent and previous Counselor had served in OES in Washington, were expert in technological issues and were officers of very high quality.

--CSTP Modus Operandi

Some of the procedures and pattern of operation of the CSTP tend to adversely impact on U.S. participation. For example, the agenda and the supporting documents for CSTP meetings are frequently received by the United States only shortly before the date of the meeting. On occasion, the supporting documents have not been seen by the U.S. representative until he arrived in Paris to attend the meeting. It is difficult enough under ordinary circumstances to obtain action from a reluctant and uninterested bureaucracy. To do so under short deadlines approaches the impossible. Serious interdepartmental consideration is thereby ruled out. One consequence is that the U.S. position on an agenda item frequently is improvised and lacks quality and depth.

The timetable of events is also pertinent. The pace of the CSTP is not rapid. It meets three times a year -- February, June, and October. The CSTP/Theme I product is usually a report, the preparation of which frequently involves questionnaires submitted to governments or studies conducted by the Secretariat or its consultants and multiple meetings of CSTP subcommittees. OECD-wide procedures require documents, including

reports of studies, to be in both English and French. All told, it is therefore not surprising that two to three years are required between the inauguration of a study and the delivery of a report. Perhaps another year or so would be added if conception time were included. This slow pace is generally incompatible with the manner in which the U.S. Government considers policy issues. Witness, for example, the six-month (unmet) deadline imposed by the Domestic Policy Staff in its request for a study and recommendations on innovation.

Furthermore, CSTP reports require consensus among twenty-four member governments whose economic outlooks range from those of Portugal, Greece and Turkey, to those of the United States, Japan and West Germany. Studies designed to satisfy, or at least be acceptable to countries with such diverse perceptions are less likely to be on the mark with respect to any given country than studies prepared with one country in mind.

The study on S&T in the New Socio-Economic Context which was approved by the CSTP in February 1976, has proved to be especially irksome in terms of U.S. participation. It is being conducted by the Secretariat with the support of a distinguished expert group selected from academia and to a lesser extent industry who are acting in their personal and professional capacities. No ad hoc governmental group was formed to provide guidance to this study as is the prevalent practice. Accordingly, governments were dependent on the Secretariat for information on the progress, direction and status of the study. At the meetings of the CSTP in 1978 and 1979, non-revelatory interim reports on this study were presented by members of the expert group and its Chairman. A final report was sent to member governments in mid-September 1979 and the report is on the agenda for the October 1979 meeting, now postponed

until November.

Without reference to their merits, the procedures employed in the development of this report were such that until the report itself was received, the United States had no clear indication of the conclusions and recommendations and only general impressions as to its findings. Even if the United States machinery for dealing with CSTP were firmly established, well-oiled and operating at high gear, it would be difficult in the period of a month or even two for the U.S. Government to study, analyze and develop a position on a report presumably dealing authoritatively with a subject as large and important as this one. Furthermore, it will be difficult to generate a sense of urgency within the U.S. Government about the preparation of reactions to a scholarly report which was in preparation for a substantial period of time and which attempts to suggest directions for long-term future governmental behavior. Again without reference to merits, U.S. representatives to the OSTP were not comfortable with the above process. They had sought closer contact to this activity than they were permitted.

Several U.S. observers of the CSTP scene have felt that the potential value of the studies carried out under Theme I would, from the viewpoint of U.S. Government agencies, be greater were the objectives to be more clearly defined at the initiation of studies and were the questions which the studies seek to answer more sharply articulated.

It is extremely difficult to formulate objectives of policy studies under any circumstances and especially when the varying views of 24 governments must be taken into account. Nevertheless, as matters stand, the objectives of CSTP studies are often weakly focused, especially at their outset, reducing thereby their utility to the governments who are the in-

tended "consumers" of the study results.

In at least these several ways, the procedures and working pattern of the CSTP do affect the nature and quality of U.S. participation in Theme I activities. While not central to the U.S. problem, it seems clear that any plan for strengthening U.S. participation will need to call for appropriate changes within CSTP.

FACTORS AFFECTING U.S. POSTURE^{1/}

This study was prompted in large part by the desire of the Department of State to obtain suggestions on what changes might be made to deal more effectively with the Theme I problem. There is, however, a preliminary question which needs to be addressed: Should the United States seek to make the change?

Defining the U.S. Interest

Many factors impinge on the answer to that question, but the basic and underlying determinant is the definition of U.S. interest, that is, the value or return to the United States. That this is conventional wisdom, neither novel nor earth shaking, does not detract from its soundness or importance. It provides an excellent point of departure in deciding whether and how to strengthen U.S. participation in Theme I.

In the past the United States has often failed to determine its interest in and set its own goals for specific Theme I activities. Lack of time, expertise and interest all contributed. Were all these to be supplied, the task would still not be easy. Establishing the U.S. interest in policy studies, the values of which are often more intangible than otherwise, is not a simple task. It would undoubtedly be useful to have in hand an agreed set of criteria against which to measure proposed CSTP work programs and individual activities. An illustration of what is meant is to be found at Table 2.

^{1/} The monographs in Part II of this report contain additional material bearing on the contents of this section.

TABLE 2

Guidelines for

Determining U.S. Posture Toward CSTP Activities

The value or return of the activity to the United States is the overriding criterion governing the U.S. approach to the activities under the CSTP work program.

1. Is the activity itself or the final product likely to be of importance to the United States in terms such as the following:
 - U.S. foreign policy objectives vis-a-vis the OECD countries
 - U.S. political or economic relations with Eastern Europe, China and the developing nations
 - U.S. trade or economic interests
 - Impact on key U.S. sectors, including industry, labor, academia and R&D community
 - Rights and general welfare of U.S. citizens
2. Is the activity likely to result in a useful analysis of available data and research or in an addition to the state of knowledge on an issue of policy or economic importance to the United States? Would it contribute to improved understanding, policy or decision?
3. Would the CSTP activity supplement or mesh with a similar U.S. national activity?
4. Administratively, is the United States likely to devote sufficient manpower and other resources to participation in the OECD activity and is it likely to put the results to use?
5. Is the CSTP a useful vehicle through which to pursue the activity, e.g.,
 - Does the Secretariat have the necessary capability? Resources? Flexibility to adjust its program and personnel to the new activity?
 - Are other international organizations better suited to carry on the activity?
 - Would U.S. interests be best served by carrying on the activity unilaterally or bilaterally?
 - Would the CSTP activity reinforce U.S. objectives in other international organizations?

Industrial Policy of Growing Importance

Even though the U.S. Government has not yet taken industrial policy fully under its wing individual issues loom large on the U.S. scene and assume more importance today than they did at the beginning of the decade. Unfavorable trade balances, a phenomenon of the 1970's for the United States are frequently attributed in part to a decline in U.S. relative technological prowess. A relative decline in productivity is related in large part by many to a decline in innovative capability. A persistent and rising inflation is similarly tied in part to adverse technological factors. The level of civil R&D expenditures in the U.S. is considered by many to be inadequate and to contribute to a decline in U.S. technological capacity and in the vigor of the U.S. economy.

These concerns are manifested in many ways. Congressional hearings on various facets of the subject are becoming common. The President is even now nearing decision on the proposals of a major Task Force on Industrial Innovation organized by the Department of Commerce at the request of the White House Domestic Policy Staff. The June 4, 1979 cover story in Newsweek was entitled "Innovation: Has America Lost its Edge?" It is but one of many similar newspaper and magazine articles that are appearing with increasing frequency. The technological prowess of Japanese industry and the relationship thereto of the Japanese Government have become a topic of considerable interest--indeed, fascination--in the United States. Articles about Japanese successes now appear frequently and have attentive audiences.

U.S. interest in and desire to examine and understand and deal with the issues and questions encompassed by industrial or technological policy may intensify as the U.S. economy enters a recession and concern about long term decline in growth rates continues to worry our economic leaders. Thus, the subject matter of Theme I is likely to take on increased importance to the United States in the months and years immediately ahead. We may well turn to the OECD as part of the process of its consideration.

Tangible Benefits

The United States can reasonably expect several tangible benefits from a more active, continuous role in the CSTP and its sub-groups.

--Support to U.S. Foreign Policy Objectives

American interests in S&T relations with the centrally controlled economies are a recent case in point. The study completed in early 1979 on Technology Transfer between East and West has been praised by U.S. officials as a highly valuable analysis of information on an issue of economic and political concern to this country. The CSTP project on this sensitive issue could have important impact on long-standing U.S. policies favoring selective controls over economic transactions with Eastern Europe. The positive outcome in terms of U.S. interests is due in part to the active participation of the Department of State and the Department of Commerce in the work and meetings of the ad hoc group of government representatives that monitored the Secretariat's efforts on the study.

A Theme I activity that can well affect U.S. economic relations abroad is one relating to technology transfer to the developing nations. The intense dissatisfaction with multinational firm practice on technology transfer has led to efforts by developing countries to negotiate an International Code of Conduct in UNCTAD. An ad hoc group set up by the CSTP has been consulting and caucusing on the UNCTAD Code of Conduct negotiations. The U.S. Government has thus had available a forum of like-minded industrial nations in which to air its concerns in an effort to assure recognition and consideration of this country's approach to technology transfer.

--New Policy Options or Perspectives Potentially Helpful on U.S. Domestic Problems

The long-awaited report on Science and Technology in the New Socio-Economic Context has had from its inception more than three years ago the potential for contributing significantly to U.S. understanding of the relationships between science and technology and economic change and government policy. The uncertainty that exists as to whether there will be any dividends from the report is related in part to the procedures followed in its preparation, which isolated the member governments from the analytic process. On the other hand, the United States and other members of the CSTP accepted the passive role assigned to them. Dr. John M. Logsdon's case study in Part II of this report on this activity concluded that the likely outcome is that the report will serve as a "reference work" rather than as a direct contribution to policy formulation. It is possible that the usefulness of the report to the United States would have been greater had a procedure been followed which

gave a larger role to governments in the definition of the study, the analyses that were part of it and the development of recommendations. Had the United States taken advantage of such an opportunity, U.S. participation in the study might have helped focus attention within this country on industrial/technology policy issues. One must, however, respect the counter argument that governmental participation would have greatly circumscribed the independence of the intellectual effort and the sharpness of the recommendations.

Dr. Charles V. Kidd's case study in Part II of this report indicates that for still another set of reasons it is not clear as yet whether there will be any policy value to the United States from the study on "Technology Transfer to Developing Countries: Implications for Member Countries' Science and Technology Policies". The report resulting from this activity is scheduled to be reviewed by its ad hoc group of government representatives in the fall of 1979. The drafts seen by that group have reached delegates only slightly ahead of the meetings themselves. This has greatly limited consultation within the U.S. Government prior to discussions in Paris. Moreover, treatment of the policy implications of the problem has been deferred to the later phases of report writing, a procedure decided on by the Secretariat and accepted by governments apparently without opposition. Within the United States, there was evidently no explicit consideration of the implications of such a delay to the usefulness of the activity. Nor was there any determination by executive agencies early in the study as to the desirability of shaping its content, which has tended to become diffuse. Moreover, no apparent effort was made by CSTP members to influence the timing of the study

so that it could be of maximum value in the North-South dialogue at the UNCSTD. Had early consideration been given to this possibility, the activity might well have made a valuable contribution.

--Political Benefits to Relations with Other OECD Countries

U.S. policy goals include the promotion of unity and harmony among the advanced industrial members of the OECD as well as between them and the other members of lesser economic and industrial status. Moreover, the United States attaches importance to the OECD as a mechanism for the conduct of economic relations with other industrialized countries. The U.S. relationship to the CSTP cannot be thought of separately from these considerations. Much the same point can be made of Theme I as a unit of the program of CSTP. The United States does attach importance and therefore is attentive to Themes III, IV and V and even to several activities within Theme I. It is in the nature of the political process, including participation in international organizations that "take" must be accompanied by "give." In order to maintain its stake in Themes of established interest to it, the United States may need to be more attentive to Theme I activities as a whole.

The study on "Government Policies and Factors Influencing the Innovative Capability of Small and Medium Enterprises" is of interest to most European members of the OECD, and particularly the smaller countries. The United States initially opposed this activity primarily because of concern that it might be directed against the American multinational firms. Its participation in the ad hoc group of government representatives overseeing the work was spotty or non-existent, although prospects for

greater involvement have improved with the development in recent months of a more positive view within the Departments of Commerce and State on the activity. This activity is the subject of Dr. Albert H. Teich's case study in Part II of this report.

--Protection or Advancement of U.S. Economic Interests

The economic stakes in some of the Theme I activities can be important. This is evident, for example, in the activity involving consultations on the UNCTAD negotiations with the developing countries on the "code of conduct." It is important to the economic interests of the United States that the OECD countries pursue comparable approaches to patent rights, terms of investment and similar matters vis-a-vis developing countries. At stake are the future welfare of U.S. foreign direct investments in excess of \$40 billion and the value of intellectual property among other things.

Other activities under Theme I have a more indirect, although important, potential impact on U.S. economic interests than those discussed above. Collectively, for example, they tend to support the existing inclinations of many European governments to intervene increasingly in the private sector in order to support national technology development and transactions. In the first place, this would probably place the U.S. business community at competitive disadvantage. Secondly, it might lead to responsive actions by the U.S. Government, including following the European pattern. The danger, of course, is beggaring one's neighbor, which is the antithesis of the mission of the OECD.

Other Considerations

Several other considerations are relevant to the U.S. posture towards CSTP/Theme I activities. There are benefits to the formulation of U.S. policies and programs that result when the perspective and understanding of the U.S. experts and policy officials are broadened and deepened by exposure to the views and experiences of the national experts and policy officials of other OECD members. Not only is U.S. expertise enlarged but U.S. policies and programs in technological areas are more effective when sensitive to those of our trading partners and political allies. These are important advantages that can be best acquired if Theme I meetings are attended by responsible U.S. Government experts. This returns us to the Department of State's original question of how can the active participation of the technical competent agencies of the U.S. Government in Theme I activities be obtained.

Also, the mere process of collecting information and preparing for a meeting of the CSTP or a sub-group can serve to bring attention to bear on a subject that might otherwise go unattended. This is an important consideration in an area such as technology policy which in the United States has not received the consistent attention of the Government.

Perceptions of the past will also influence the U.S. posture. As mentioned earlier, U.S. agencies do not attach much importance to most Theme I reports in terms of their utility and relevance to U.S. needs. As is made clear in the monographs in Part II of this report, the United States is not without blame in this matter. CSTP products might be of more relevance and utility were the United States to play a more constructive role in helping them to be so.

On the other hand one should keep in mind that although the United States wields a large relative influence, the ability of the United States to influence events in the CSTP is limited by the fact that it is but one of twenty-four members and, as in most international organizations, the Secretariat by its longevity, continuity and ability constitutes a powerful force of its own and is clearly dominant in the CSTP. The vested interest in the status quo is substantial. Any change in the balance of power, the practices of the CSTP or the direction of its activities would be difficult to achieve and the consequences would not be entirely predictable.

Consideration must also be given to the fact that the time required to attend three meetings a year in Paris is substantial. It will be difficult to get a policy level officer of senior rank to devote that time unless the results are recognizably of sufficient value to warrant it.

The U.S. Posture

What light is cast by the foregoing considerations upon the question of whether the United States should seek to make a change in its participation in the CSTP?

Summing up is a matter of judgment and it would be remarkable were there not to be considerable variation in the conclusions arrived at. No overwhelmingly best answer emerges. Using the criteria of U.S. national interest in Table 2, the authors of this report do believe that there is greater benefit to the United States to be found in many of the activities in Theme I than can be obtained through the present manner or level of U.S. participation. Moreover, the United States is not making effective use of the opportunities afforded by the Theme I activities to advance its ideas and objectives.

Underlying the point of view of the preceding paragraph is the belief that technology policy questions are looming larger in the American political and economic scene and that the understanding of the need for a comprehensive approach to technology policy as well as to various aspects of such policy is outpacing the institutional capacity to develop or manage such policy. As the American economy is subjected to greater stress, the relationship of technology policy to the health of the U.S. economy will be given greater credence and attention. Furthermore the Theme I activities of the CSTP provide an excellent means of keeping close to European and Japanese experience in technology policy.

All things considered, the authors of this study conclude that the United States should increase its profile in CSTP Theme I and accordingly should refreshen and invigorate its participation in its work.

How large should the effort to strengthen U.S. participation be? If a scale is pictured ranging from modest to herculean, the effect envisaged would be closer to the former than the latter, but it would be large enough to be discernible. In our view, dramatic changes are not presently called for. It is to some extent a chicken and egg question. Without additional input, continuation of a poor return is practically guaranteed. To justify the status quo by the presently poor return is to argue in circles. However, to provide additional input will not of itself guarantee a better return. The degree to which the work of the CSTP Theme I can be more beneficial to the United States cannot be determined until a sustained effort is made to make them so through strengthened U.S. participation.

RECOMMENDATIONS

General Approach toward CSTP

Although circumstances do not call for drastic actions such as large new investments in manpower, the intention to make changes in the U.S. approach to Theme I to bring about an increase of U.S. profile should be discernable not only within the U.S. Government, but also to the membership and Secretariat of the CSTP. Furthermore, the Department of State has historical responsibilities for providing guidance to other parts of the Government on foreign policy and relations. This responsibility was underlined with respect to science and technology in Title V of the Foreign Relations Authorization Act, Fiscal Year 1979 (P.L.95-426, October 7, 1978). This setting suggests that tone and attitude will have to make important contributions to bringing about desired changes. It is believed that they can do so.

The recommendations which follow are intended to be more stimulative than prescriptive. They may, however, suggest level of effort contemplated.

An early step might be a statement by the OES Assistant Secretary indicating the Department of State's intention to raise the U.S. profile at the CSTP and specifically on Theme I. The statement might indicate that the objectives are to exert greater influence on the shape of the CSTP program and to conduct U.S. participation therein so as to increase its value to the United States, keep abreast of relevant action by other OECD members in the area of technology policy so as to benefit from their experience and anticipate impacts

on the United States and have more complete access to the intellectual analyses of technology issues performed by the CSTP Secretariat and its consultants and expert advisors. This statement might also specify the types of actions that are contemplated in moving toward more active U.S. participation in the CSTP. The statement could be oral or written, preferably the latter.

The impact of such a statement, whether written or oral, would be greater if accompanied by endorsement from the President's Science Advisor. Prior discussions with the Department of Commerce, the Department of Labor, the National Science Foundation, the Council of Economic Advisors and perhaps others would help ensure an understanding and supportive welcome to the Department of State initiative.

It is suggested that the Department of State also notify the Secretariat and Bureau of the CSTP of its intentions and solicit cooperation. At the same time, the Department of State should indicate the desirability of certain CSTP procedural and operational changes, the need for which is discussed elsewhere in this report. Expanded use of the forum concept should be encouraged.

While an open declaration of intentions, both domestically and abroad will give rise to expectations, those same expectations will place pressures to perform both on the Department of State and on other agencies. In any case, the intentions are reasonably modest and attainable. Moreover, the Department of State's function of providing guidance will have been fulfilled.

Preparation of Positions

There is clearly a need to broaden the base upon which the Department of State presently draws in preparing positions to be taken on CSTP Theme I studies and on the contents of the CSTP work program. Presently, this is done largely within the Department of State. The Departments of Commerce, Labor and Defense, the National Science Foundation and the Council of Economic Advisors and perhaps others should be formed into a network to share in the responsibility for U.S. participation in the CSTP and especially Theme I. One objective would be an arrangement under which individual Theme I activities would be assigned to the agency with the greatest capability and interest in the subject matter. The network might be manifested through an interdepartmental committee established either on an ad hoc basis or as part of the more formal interdepartmental machinery which has been set up under the aegis of the OSTP. In effect the membership of this committee would approximate the collective interest and capability of the U.S. Government in science and technology policy. It is not likely that the Committee would need to meet as such very often, although its members might be in frequent contact on specific matters.

Two functions should receive prominence in the delineation of the Committee's responsibilities. One is the identification of activities which the United States would like to see incorporated not only in Theme I but in other Themes as well. The second is the placement of U.S. priorities on the various activities in Themes I and II.

Since Theme III activities are now satisfactorily handled by an existing interdepartmental mechanism, they should be excluded from the cognizance of the new committee.

Although greater interest may be generated without too much difficulty, budgetary constraints may pose obstacles to providing additional staff for essential analytical work both within the Department of State and for the use of the interdepartmental mechanism. Therefore, consideration ought to be given to alternative relatively inexpensive means of providing such services particularly with respect to the subject matter of Theme I.

One way of providing such analytic support would be through the recruitment and use of a small team of carefully selected consultants. One approach might be to match a consultant to one or two of the specific CSTP activities such as the one on the Innovative Capability of Small and Medium Enterprises or that dealing with Technology Transfer to Developing Countries. The consultant would be a well informed expert already working in the general field of the Theme I activity. He would be expected to have a continuing association with OES, would be kept abreast of OECD documents and developments by OES, and in general would bring to bear on behalf of the OES function the knowledge and insights of the knowledgeable non-Government sector. He would be placed by OES in direct contact with counterpart OECD Secretariat personnel and on occasion, he might attend working group meetings at OECD headquarters. He would assist in providing to OES a sound factual and analytic basis for the development of U.S. positions on the CSTP activity. The consultant should be expected to provide an informed critique of CSTP Secretariat designs for studies and to originate suggestions which might be incorporated in new U.S. proposals to the CSTP.

Depending on the subject and other circumstances, the consultant might come from either academia, business, or labor. The prospects are

are excellent that he would provide perspective and insights new to OES. Although the initial establishment of the relationship would require an investment of OES time, the ongoing relationship should not be very time demanding. Since issues taken up in the CSTP arise in other national and international forums as well, it is likely that OES would make broader use of the expertise of the small consultant corps than just on the OECD work itself.

Another mechanism well-suited to the nature of the work that OES must do with respect to the CSTP and more easily managed than the concept of a team of consultants, would be a long-term contract with a university or research organization to provide in general the same kind of supporting services just described. In this mechanism, the OES contact would center around a single project director who would assemble the expertise required from the resources of his organization or from other sources. Over a period of a year or so, an institutional competence or memory would be created that would increasingly enrich the value of the support provided to the OES. To the extent that high turnover in personnel would continue to characterize the OES relationship to CSTP, the development of this external institutional capacity would become a very attractive asset.

Representation at the CSTP

The very diversity of the five themes of the CSTP and of the activities under the major themes and the heavy time demands mentioned earlier create difficulties in establishing a suitable pattern of representation to the CSTP by the United States. There is no agency or department of the U.S. Government whose responsibilities or jurisdiction

match the entire scope of CSTP activities, or are encompassed by Theme I alone. On a pragmatic basis, this problem is relieved by the fact that, with respect to Themes III and V, such substantive issues as arise tend to be resolved in theme level committees or working parties. Theme IV which in effect uses the mechanism of the committee as a whole and whose process is consultative has thus far been served by U.S. representation appropriate to the subject matter. When matters arising under any of these themes appear on the agenda of the CSTP, it is usually for a "laying on of hands" or other ministerial purpose. The activities in Theme II have been of low priority to the United States and in any case do not now play a large role in CSTP deliberations. Although most of the matters dealt with substantively by the CSTP relate to the activities under Theme I rather than the other themes, the CSTP is nevertheless the responsible OECD committee for activities under all five themes.

No candidate emerges among the Government agencies with outstanding assets or qualifications to provide representation to the CSTP. OSTP however, at the White House level would be an eminently suitable source for U.S. representation to the CSTP as was its predecessor during the 1960's. Its interests and activities not only match well with Theme I, but with the CSTP as a whole and it speaks with authority from the vantage point of its Presidential relationship. However, its staff is stringently limited and its philosophy of operations call for heavy reliance on the Departments and agencies for tasks which can be handled at that level. This includes routine participation in organizations like the CSTP.

Given these considerations, and in light of its responsibilities

for OECD as a whole, it would appear that the Department of State should continue to be responsible for managing and providing representation to the CSTP. A serious effort should be made however to bring the Department of Commerce, NSF or OSTP into the delegations at one or, possibly, more CSTP meetings a year. This would be particularly desirable if invigorated U.S. participation resulted in the agenda assuming more importance to the United States than has been the case in the past and if the CSTP could be brought to attempt greater cohesion of subject matter in individual agendas. Alternatively, the United States might seek to have the agendas for the year so planned as to concentrate a group of important items in one of the three annual CSTP meetings. If an important set of issues were ready for serious discussion at a meeting or at a forum, OSTP and/or senior department officials might join the delegation and other governments might respond by also raising the level of their representation. Senior OSTP staff are receptive to this concept of their participation.

It is important that the officer who heads the U.S. delegation to the CSTP be enabled to speak with authority and with the assurance that he is fully representing the views of the U.S. Government. Continuity of the relationship to CSTP is also very important, both from the viewpoint of maintaining the coherence of the U.S. approach and in terms of relations with the CSTP permanent staff.

Additional Remarks

The preceding recommendations do not call for dramatic or far-reaching changes. The present state of consciousness and concern in the United States

about technological policy, although rising, does not justify nor would it sustain such changes. They do, however, call for more than the current level of attention given to CSTP Theme I activities and to the study and understanding of the technological policies of other advanced countries. Implementation of the recommendations will meet those requirements. Moreover, it will better position the Department of State and other agencies to respond and deal with the rapid intensification of concern about U.S. technology policy which is likely to be a derivative in the next few years of growing economic difficulties.

LIST OF INTERVIEWEES

AUBERT, Jean-Eric, Science and Technology Division, DSTI

AVERCH, Harvey, Assistant Director, Scientific, Technological and International Affairs, National Science Foundation

BARUCH, Jordan, Assistant Secretary for Science and Technology, Department of Commerce

BEAN, Alden, Director, Division of Policy Research and Analysis, National Science Foundation

BEAUDRY, Robert, Director, EUR/RPE, Department of State

BECKLER, David, Director, DSTI

CLAPP, Allan, International Economist, Department of the Treasury

CRAWFORD, Morris, Deputy Director, Office of Cooperative Science and Technology Programs, OES, Department of State

CZIESLA, Manfred, Head, Operational Studies and Analysis Section, Division of International Programs, National Science Foundation

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GRANGER, John, Counselor for Science and Technology, American Embassy, London; formerly, U. S. Representative to CSTP

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KATZ, Abraham, Deputy Assistant Secretary for International Economic Policy and Research, Department of Commerce; formerly, U. S. Deputy Representative to the OECD

KAY, Colonel Wayne, OSTP

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KOVACH, Eugene G., Deputy Director, Office of Advanced Technology, OES, Department of State

LAASE, Paul P., Deputy Director, EUR/RPE, Department of State

LEANDER, Bo, Science Counselor, Swedish Mission to the OECD

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June 18, 1979

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ACRONYMS USED IN REPORT

CRC	Committee for Research Cooperation
CSR	Committee for Scientific Research
CSTP	Committee for Scientific and Technological Policy
DSTI	Directorate for Science, Technology, and Industry
EUR/RPE	Office of OECD, European Community and Atlantic Political-Economic Affairs, Department of State
OECD	Organization for Economic Cooperation and Development
OEEC	Organization for European Economic Cooperation
OES	Bureau of Oceans and International Environmental and Scientific Affairs, Department of State
OST	Office of Science and Technology, Executive Office of the President
OSTP	Office of Science and Technology Policy, Executive Office of the President
S&T	Science and Technology
SCI	Bureau of International Scientific and Technological Affairs, Department of State
SPC	Science Policy Committee
UNCTAD	United Nations Conference on Trade and Development
UNCSTD	United Nations Conference on Science and Technology for Development

PART II
MONOGRAPHS ON INDIVIDUAL CSTP PROJECTS

A REVIEW OF THE OECD STUDY:
SCIENCE AND TECHNOLOGY IN THE NEW SOCIO-ECONOMIC CONTEXT

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November 1979

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I. Introduction

The goals of the economic policy of the United States government, and indeed of most other governments of the world, include sustained economic growth achieved in the context of stable prices, new employment opportunities, adjustment to structural changes in the economic system, and relative equilibrium in the flow of payments among countries. In the past decade, achieving all of these goals simultaneously has proven extremely difficult; the success of economic policy has been the source of deep concern among policy-makers and analysts alike in most countries of the world. This concern has been manifested in many contexts, most recently being the June 1979 Tokyo summit of the leaders of seven highly-industrialized countries.

One setting in which issues such as these are discussed on a multi-lateral basis is the Organization for Economic Cooperation and Development, the 24-member intergovernmental organization which has as its members most of the developed countries of the world with open-market-oriented economic systems. The primary focus of OECD activities is economic policy and its relationships to sectors such as education, environment, energy, and science and technology. Within some elements of OECD, the complexity of the current economic situation has been capsulized by the phrase "new economic context," defined as

the problems resulting from oil price increases, the slowing down of global demand, persistently high levels of unemployment, inflationary pressures in many countries, the disturbances of the international monetary systems, the new trends in international economic competition and the numerous government regulations brought about by environment and safety concerns. *

In addition to sharing the general concerns regarding the economic situation held by its major trading and financial partners which are

* SPT (78)2, January 20, 1978, paragraph 8.

members of the OECD, the United States government in the past several years has paid particular attention to problems of inflation, unemployment, sluggish economic growth, and declining international economic competitiveness. While the reasons for these unfavorable economic trends are many and varied, one line of thinking has focused on the performance of the U.S. R&D system and on the incorporation of its outputs into the process of industrial innovation as important influences on economic performance. These factors are thought to exert influence as:

- 1) contributors to current economic problems, in that past declines in levels of R&D investments and imperfections and sluggishness in the processes of industrial innovation have led to declines in the growth rate of productivity, lessened ability to compete with other technologically-advanced economies in world markets, and similar aspects of economic malaise; and/or
- 2) sources of future remedies to the current malaise and to emerging economic problems, in that industrial innovation and the R&D system which contributes to it are among the few means of assuring future economic growth which is non-inflationary.

In the past year or so there has been increased attention paid to the links between U.S. technological vitality and economic performance by both the Executive Branch and the Congress.

It is in this very broad context that the OECD study which is the topic of this report--"Science and Technology in the New Socio-Economic Context"--needs to be evaluated. This case study of the process through which the "new economic context" study was prepared was being completed just as the study itself was made available for government review. There is no attempt in this report to evaluate the substance of the study, which is, after all, the ultimate measure of the success or failure of the process

of bringing it into being. This limitation on the analysis which follows needs to be kept in mind. This study is a comprehensive examination, by a group of fifteen highly-qualified scholars and practitioners, of fundamental questions related to past, and particularly future, trends with respect to the interrelationships among scientific inquiry, technological applications, industrial innovation, and shifts in productivity growth, price trends, and employment patterns. Given this broad canvas of concern, and given the quality of the individuals involved, this study could be a significant influence in shaping the thinking of policy-makers interested in the technology-economic nexus for the next decade. It is far from clear, however, whether the "new economic context" study will achieve such a substantial and central impact; it is also possible that the study may make few new contributions to the discussions within OECD countries on the topics it covers, either because of substantive limitations or because potential users have not yet shown, and may not show, any intense interest in the study's findings or intent to use the study as a major focus of discussions in this area.

Over three years will have elapsed between the time the study was first approved and the initial review of the completed study by governments. During that period, there was limited information available about the study's substance and potential conclusions and recommendations. No parts of the text of the study were made available to governments until 1-2 months (the English-language version was issued a month before the French version) before this initial government review; at that time governments saw the completed expert group study for the first time. In the interim, no

discussion papers or preliminary drafts of portions of the report had been circulated outside OECD. This report reviews the background of the study and its implications with respect to U.S. policy concerns. As a potentially significant international statement on issues of growing concern to U.S. policy-makers, the "new economic context" report is deserving of close attention. In addition, the study was at its initiation seen as an excellent example of the kind of relevant, policy-oriented undertaking which would be characteristic of future OECD work in the science and technology area. For reasons detailed below, it is not clear whether the study will meet this expectation. Whatever the specific value of this particular study, it seems useful to examine the experience of the study process from the perspective of U.S. involvement in future OECD activities, to see whether that experience can provide any insights on how to shape U.S. involvement in a fashion which increases the chances of the American government deriving meaningful benefits from its participation in OECD's science and technology policy activities.

II. Background of Issues Discussed in "New Economic Context" Study

When the front covers of national magazines headline stories on "Vanishing Innovation,"^{*} and when the President, on the basis of a major multi-agency review of industrial innovation, proposes a number of policy initiatives in this area, it is a fair assumption that the problems in the issue-area of innovation and its sources are perceived within the United States as rather serious. Over the past several years, this perception has grown in intensity and spread among those within the

* Business Week, July 3, 1978.

Executive, Congress, industry, and universities concerned with the integration of technology policy and economic policy. Given this expressed concern within the United States, a major study of similar issues on a comparative basis among the major industrial partners of the United States could have been very useful to U.S. policy-makers; for reasons detailed later in this report, although the "new economic context" study has dealt with almost precisely the same set of issues of current concern to U.S. policy analysts and decision-makers, it has made essentially no contribution to U.S. thinking to date, and it is not clear whether it will have such an impact in the future.

The sense that there are many problems related to the condition, operation, and results of the research and innovation enterprise in the United States has become pervasive in the past few years. Science Indicators 1976 sketched a picture of declining innovative capability in the United States.

...Since 1963 the United States has spent a steadily declining percentage of its GNP on research and development, down from nearly 3 percent to 2.2 percent. Japan, West Germany, and the Soviet Union recorded significant growth in the proportion of their GNP devoted to R&D.

Foreign patents in the United States increased 91 percent between 1966 and 1976 to the point where patents of foreign origin represent 35 percent of all U.S. patents and are distributed across a wide range of subjects. United States now has a negative patent balance with both Germany and Japan.

The United States' share of major technological innovations fell from 80 percent in the mid 1950s to 60 percent in the mid 1970s. In output per man hour, the U.S. productivity gain between 1960 and 1976 was smaller than that of Japan, Germany, Canada, France and Britain. *

* cited in Mary Ellen Mogee, "Industrial Innovation and Its Relation to the U.S. Domestic Economy and International Trade Competitiveness," Congressional Research Service, Library of Congress, Report No. 78-204SPR (mineo), October 1978, p. CRS-2

A Library of Congress report summarizing 1978 hearings on industrial innovation and its relation to the U.S. domestic economy and international trade competitiveness identifies the components of the current problem: **

a. funding for U.S. industrial R&D has for the past decade barely kept up with inflation; in particular, federal funding for industrial R&D has decreased over this period.

b. R&D funding levels are, in the judgment of most experts, related to the pace of industrial innovation, which, in turn, is thought to be a key component of economic growth and international competitiveness; thus a slowdown in R&D spending is thought to be one source of poor economic performance;

c. although precise measures are not available, most observers detect the decline in the U.S. capacity for industrial innovation which is predicted to follow a decline in R&D funding;

d. not only the pace, but the nature, of industrial innovation is problematic; innovation appears increasingly oriented towards short-term, incremental, defensive changes and away from long-term, growth-creating developments;

e. the competitiveness of the United States industry in the international economy is declining; one possible cause of this decline is the loss of the comparative technological advantage vis-a-vis our economic competitors;

f. a number of government policies in addition to direct funding of R&D can effect industrial innovation; the cumulative effect of current policies--which include tax policy, regulatory policy, import policies, price controls, antitrust policy, and patent policy--has been negative with respect to the potential rate and direction of industrial innovation.

** Moguee, op.cit.

A diagnosis much like that sketched above was accepted by the White House as a basis for approving a Domestic Policy Review of Industrial Innovation. In the memorandum authorizing the review, Presidential advisor Stuart Eizenstat noted that

Industrial innovation is central to the economic well-being of the United States. Innovation provides a basis for economic growth and is thus intimately related to productivity, to inflation, to unemployment, and to the competitiveness of U.S. products both in domestic and world markets. Efforts to enhance or improve innovation activity therefore may lead to an improved economic posture in the United States.

Several observations underscore the need for increased federal concern for the industrial innovation process:

- Indications that industry underinvests in innovation in terms of the ultimate benefits to the firm and society.
- Increased private-sector R&D emphasis in recent years on low-risk, short-term projects directed at incremental product changes, and decreased emphasis on the longer-term research that could lead to new products and processes.
- Declining international competitiveness of some segments of U.S. industry as reflected in: a growth rate for productivity in manufacturing industries that is lagging behind that of some nations; the increasing penetration of domestic markets by producers of intermediate technology and basic industrial goods; and a level of production technology in certain important industries (for example, coal mining and steel production) that lags behind that in other countries.
- Difficulties that small, high-technology firms encounter in obtaining venture capital.
- The changed direction of industrial innovation in recent time resulting from the diversion of corporate efforts from developing new products to meeting other social goals.

Although in the United States the development of new products or processes is left largely to the private sector, federal economic, tax, regulatory, procurement, and foreign policy--as well as direct federal support programs--have a profound impact upon the innovation process. Given the central role of innovation in economic development and the expressed concerns for the innovative process, federal policy affecting industrial R&D and innovation must be carefully reconsidered.*

* Stuart Eizenstat, "Issue Definition Memorandum: Federal Policy on Industrial Innovation," White House, May 9, 1978.

This Domestic Policy Review was carried out under the day-by-day leadership of the Assistant Secretary of Commerce for Science and Technology, and has involved extensive inputs from many federal agencies, the industrial sector, financial institutions, and the analytic community. The President's proposals which were derived from the review were announced on October 31, 1979; they will be debated in Congress and elsewhere in coming months. Thus, there are, in principle, close links in both timing and substance between a major policy concern of the U.S. Government and the "new economic context" study, and it may still make sense to try to make those linkages real.

III. Overview of "New Economic Context" Study Process

The "new economic context" study deals with issues of continuing central importance to at least the science and technology policy interests in member governments, if not the economic policy interests, but governments have not felt well-informed about the substantive progress, issues at controversy, and probable conclusions and recommendations of the effort. The study has been large in comparison to other science and technology policy studies carried out by OECD, and has taken 6 - 12 months longer to complete than originally estimated. Some participants believe that the expert group assembled for the study is the best group of its kind ever assembled for a major study of the links between science and technology and the economy, and there have been suggestions that a similar

* The Washington Post, November 1, 1979, p. B1

group might be constituted as a standing advisory committee to the OECD Secretariat. At least at one stage in its development, the Secretariat suggested to CSTP that "this activity should be considered as laying the ground-work for a continuing programme of policy analysis for the CSTP-- and indeed for the DSTI--rather than a discrete project with a terminal date for providing definitive answers and policy recommendations."

Some projects which are said to be follow-ons to the "new economic context" study have already been approved by CSTP, and others are likely to be proposed for inclusion in the CSTP work program. For all of these reasons, a clear understanding of the origins and life-history of the "new economic context" study is a useful element of any general review of U.S. participation in OECD science and technology activities.

A. Project History

Like most CSTP studies in the past decade, the origins of the "Science and Technology in the New Socio-Economic Context" effort were in a Secretariat proposal; that proposal was included in the CSTP work plan for 1977. The head of the DSTI Science Policy Division, Jean Jacques Salomon, proposed the study early in 1976. Salomon was interested in getting his division more involved in what he perceived as being the central issues of science and technology policy for the 1980's; in the seventies, his group had received some criticism for focusing on topics of marginal

* SPT(76)39, January 6, 1977, paragraph 11.

The Committee for Science and Technology Policy (abbreviated CSTP in English and CPST in French) is the government committee responsible for overseeing OECD's work in the science and technology policy area; the Directorate for Science, Technology, and Industry (DSTI) is the staff element which provides support for CSTP and the Industry Committee.

interest to government policy. The proposal came at a time of transition for the science and technology policy activities of OECD, with the arrival later in 1976 of David Z. Beckler as the new head of the Science, Technology, and Industry Directorate. Beckler viewed the proposed study as the kind of policy-relevant activity he wanted to undertake in DSTI, and he gave strong support to the effort.

The original conception was that the study would be a "review" of "our knowledge and our assumptions regarding the role of technological progress as related to growth and inflation."^{*} The study was to begin with a "comprehensive and critical review of past OECD work" related to technology and innovation; the Secretariat was to "appoint an expert group which will help it to understand and to summarize the relevant issues and to draft the final report." Also contemplated were "discussions of the latest issues involved with Member governments and additional contributions by Member governments could be necessary, especially statistical data and information on policy measures."^{**} The study was to be completed by 1978.

The CSTP approved the study in principle at its June 1976 meeting, but asked for more specifics for consideration at its October 1976 meeting. However, it was not until January 1977 that a detailed research plan was presented to CSTP, and by that time the concept of the study had evolved into an examination of fundamental issues in the relationship between science and technology and their socio-economic context.

* SPT(76)14, May 25, 1976, paragraph 25.

** SPT(76)14, May 25, 1976, paragraph 75.

This evolution was most likely the result of several factors. No one within the staff of the Science Policy Division had been working on innovation-related issues in recent years; that work had been centered in the Science and Technology Division of DSTI. Yet the proposal for the "new economic context" study, and indeed the definition of the "problématique" which occasioned the study, originated with Salomon, and it was his Division alone which assumed the responsibility of staffing the study. Because of constraints on staff size, Salomon was not able to add anyone to his division with existing expertise in the area of the economics of R&D, nor was anyone from the other Division within DSTI involved in the effort. Also, OECD's Economic Directorate was not interested in participating in the study; in fact, the study from the start adopted a "structural" approach which challenged the "conjunctural" approach strongly held within that Directorate. ^{*} This meant that the design of a detailed research plan for the study was left largely to the expert group, which met for the first time in October 1976. The expert group included several prominent economists actively working on issues of science, technology, and innovation, and several leaders in industrial research planning and management. The result of this meeting and of the Secretariat's consultations between June and December 1976 was that CSTP

* In understanding the history of this study, it may be useful to realize that it was viewed by some, particularly within OECD, as a necessary corrective to the approach taken by the "McCracken Report" prepared through the work of the Economics Directorate, which explained current economic problems largely in terms of needed shifts in demand management policies.

was presented in January 1977 with a quite ambitious, and rather open-ended, research plan, one that in retrospect would have required more resources than were available for its successful execution.

The proposed effort was to concentrate on five themes, each requiring "investigation by experts, data collection and case studies."

These themes were:

- the rate of technical advance
- the direction of technical change
- technical change, price trends and market structures
- fundamental research and technological advance
- technological advance and the international environment.

The proposal included analyses of issues on both a theme-by-theme basis and on a sectoral basis. The "sector studies" were to provide "facts and figures" in support of thematic analyses. The design of the sector studies would be left to the expert group, which would prepare a "checklist of questions" for data gathering so that the results of the sector studies could be used "to test the key working hypotheses of the overall study, and to provide new and specific evidence as a concrete basis for conclusions and recommendations." At this point, "approximately six" sector studies were contemplated.

The research plan included provisions for an "initial phase," with a progress report to CSTP at its Autumn 1977 meeting; only if CSTP approved of this progress and of future work plans was the implementation phase of the study to be undertaken. The plan called for a final report on the study to be submitted to CSTP at its first meeting in 1979.*

* These details on the project are taken from SPT(76)39. It should be noted that, because of the time required to organize the expert group, retrain staff, and identify external consultants, substantive work on the study did not really begin until mid-1977.

At its February 1977 meeting, the CSTP, reflecting some apprehension over the broad nature of the proposed research plan, noted "the need to give careful attention to the design of the study so as to concentrate on a limited number of important questions which would be susceptible of analysis within the terms of reference of this study." The Committee also requested that at its October meeting, "detailed proposals should be submitted on how to concentrate and organize work to be undertaken in 1978." The CSTP, recognizing the need to exert more effective control over the conduct of the study, noted the "need for participation of government experts" in this October review. In order to symbolize its continuing interest in the study and concern that it be relevant to policy issues, the CSTP designated one of its members, the delegate of Italy, "to follow more closely the work of the experts." *

The expert group appointed for the "new economic context" study was selected by Jean Jacques Salomon; there was in this case, as in many similar situations in the past, essentially no consultation with governments. The chairman of the group also had no say in who the other group members were. Members of the expert group were:

Dr. B. Delapalme, ELF-ERAP, Paris (Chairman)
 Professor A. Caracciolo di Forino, Rome (CSTP Member)
 Professor U. Colombo, Montedison, Milan
 Professor C. Freeman, Science Policy Research Unit, Sussex
 Dr. H. Fusfeld, Kennecott Copper, New York
 Professor R. Gilpin, Woodrow Wilson School, Princeton
 Mr. C. Gruson, Compagnie Bancaire, Paris
 Professor A.O. Hirschman, Institute for Advanced Study, Princeton
 Professor H. Krupp, Institute for Systems Technology and Innovation
 Research, Harlsruhe
 Dr. Gosta Lagermalm, Board for Technical Development, Stockholm
 Professor R. Nelson, Yale University, New Haven
 Professor K. Pavitt, Science Policy Research Unit, Sussex
 Professor G. Rathenau, Scientific Council for Government Policy,
 The Hague
 Professor N. Rosenberg, Stanford University
 Miss E. Rothschild, Yale University, New Haven

* SPT/M(77)1, paragraphs 19, 22, 23.

This was indeed an eminent group. It included:

a) several economists and policy analysts with distinguished reputations derived from their research in areas relevant to the study (Freeman, Hirschman, Krupp, Nelson, Pavitt, and Rosenberg);

b) two industrial research managers who had headed the American and European associations of research heads of major corporations (Fusfeld [IRI] and Delapalme [ERIMA] respectively);

c) a former chairman of CSTP - Colombo.

d) individuals who were eminent industrial scientists and who also had held distinguished academic and government positions (Colombo, Rathenau, Delepalme). The range of experience, prestige, and contacts brought to the study by the expert group ensured that the effort would be carried out in full knowledge of government concerns, relevant issues, and related research throughout the major OECD countries.

The expert group met as a whole twice in 1977; in addition, sub-groups on four of the five themes of the study held separate informal meetings. The Secretariat staff--led by Jean-Jacques Salomon and Salomon Wald of the Science Policy Division, although several other staff members of the division and outside consultants were involved in various parts of the study--was involved in data-gathering and analysis in support of the expert group activities.

Only two sector studies were given much effort in 1977. One was on the electronics industry, and was carried out by a consultant to OECD; the other was on the pharmaceutical industry, and was carried out by a DSTI staff member. A planned study of the plastics industry was dropped because of budget constraints, and a study of the agrochemical sector was initiated toward the end of 1977.

Most of this activity was carried out without involving government representatives. At least one request by a government representative to attend a meeting of the expert group was denied, and no interim products of the study were made available to governments for review.

Among the primary reasons for this pattern were the nature of the study itself, which dealt with complex and controversial issues, and the conduct of the study by an expert group which did not agree within itself about those issues. Among members of the expert group, however, there were no purposeful attempts to exclude others from being aware of the areas of disagreement. The Secretariat believed that it would be counterproductive to involve governments in the intellectual debates and analytic controversies accompanying the study, desiring to report on the study only when agreed-upon findings were available. There has been a tradition within DSTI of not encouraging interim reviews of reports in progress.

The progress review involving government experts which CSTP had requested for its October 1977 meeting never took place, then or at a later CSTP meeting.

* In some other major OECD studies an ad hoc committee of government experts had been appointed to act as a link between CSTP and the staff carrying out the study. No such group was formed for the "new economic context" study, and there was no tradition of other forms of government involvement in study definition or conduct. The arguments for and against government involvement during the course of a study are reviewed later in this report.

** However, the Secretariat did allow a staff member of the U.S. National Science Foundation to attend an expert group meeting; this individual was an economist responsible for NSF support of much of the related research within the United States, and he was apparently invited to attend more as a professional colleague than as a government representative. In addition, other OECD Directorates were invited to send representatives to expert group meetings, though practically none attended.

*** Again, the pros and cons of this tradition will be discussed later in this report.

In October, the chairman of the Expert Group made only a brief oral progress report. The Committee "expressed the wish that the first results of this activity, even if partial and subject to modifications, could be submitted to the Committee as soon as possible." ^{*} In response to this pressure, the Secretariat prepared a written progress report for circulation prior to the February 1978 CSTP meeting, and arranged to have Bernard Delapalme, the chairman of the Expert Group, and Christopher Freeman give oral briefings on the study to that meeting.

The progress report was rather general in nature; it noted that "at the present time, the Expert Group is not in a position to give definite conclusions on complex and controversial issues." ^{**} Freeman's presentation, however, did arouse more than usual interest among the government delegates to the CSTP meeting, particularly his suggestion that one of the study's findings was likely to be that "a plausible possibility for the 1980's, to put it no higher, is that there will be a period of jobless growth in the entire manufacturing sector in the industrialized world." ^{***}

As an expression of its strong interest in the "new economic context" study and of its sense that it had not been kept adequately informed of the study's progress, the CSTP at its February meeting: "expressed the wish that working documents be, if and when appropriate, circulated to the Committee" and "invited the Secretariat to take all necessary measures to

* SPT/M(77)3, paragraph 17.

** SPT(78)2, paragraph 5.

*** SOT/M(78)1, Annex II.

ensure close liaison between the Expert Group and Member governments."*

Even with these admonitions, the study continued to be carried out in a manner which made it difficult for governments to anticipate its findings and to understand the arguments leading to them. There were two more meetings of the expert group, one in June 1978 and one in March 1979. Four sector studies were completed; the sectors finally examined were electronics, machine-tools, pharmaceuticals, and fertilizers and pesticides.

In preparation for the March 1979 expert group meeting, the Secretariat drafted a final report for review by the group; the hope was that the expert group could use the Secretariat's draft to complete their report in time for CSTP review at its June 1979 meeting. However, the expert group concluded that the Secretariat's draft did not form the basis for moving quickly to a final draft, particularly since it represented only a first attempt at stating the study's conclusions and recommendations. It was therefore decided once again to slip the schedule for the report, with initial discussion by governments scheduled for the November 1979 CSTP meeting.

The interim Secretariat draft which was the basis for the March expert group meeting was not made available to governments; there were no "working papers" issued by the group, either. The expert group in March did agree upon a four-part final report, and assigned the drafting of those parts to a few individuals. The four parts of the report are:

- I. The New Economic and Social Context (drafted by Hirschman, Robert Gilpin, Rothschild)
- II. Trends in R&D and Innovation (drafted by Pavitt and Krupp)
- III. Technical Change and the Economy (drafted by Freeman and Nelson)
- IV. Conclusions and Recommendations (drafted by Delapalme)

* SPT/M(78)1, paragraph 9.

These draft sections were circulated to all members of the expert group for comment; at the end of June, a few expert group members and Secretariat staff met to draft a final report, taking these comments into account. This draft final report was circulated again to all expert group members, their comments incorporated, and a revised final report draft then made available to CSTP Member governments "sufficiently in advance" ^{*} of the November CSTP meeting to permit internal national reviews. A day of that meeting has been set aside for discussion of the report.

After its discussion of the report, the CSTP will "examine whether and how it should develop ... its own [emphasis added] policy conclusions to be submitted to the Council and member governments as well as its views on the implications of this study on the future work of the Committee." ^{**} It is not yet clear on what form, if at all, the study will be made available to others than OECD Member governments. Whether the report and supporting sector studies will be published as an OECD document and whether the expert group will be the "authors of record" of any published report which appears, has not been determined. The chairman of the expert group has also prepared a summary of the report which contains his own analysis of the study's findings and of the implications for government and industrial policy which follow from those findings.

By the time it is completed and discussed by CSTP, the study of "Science and Technology in the New Socio-Economic Context" will have taken

* The English-language version of the report was issued on September 11; the French-language version in mid-October.

** SPT/M(79)2, paragraph 8.

more than three years to complete (although most of the work was concentrated in the last two years) and will have required over 135 person-months of Secretariat effort, the work of a number of consultants, and significant contributions of time and effort on the part of the expert group.^{*} Even though this report does not evaluate the substance of the report, some comments on what the United States might do in order to give the study, and indeed similar major analyses produced by OECD, an adequate evaluation can be made. These comments must be set in the context of U. S. Government involvement in the study to date which has been minimal.

B. U.S. Government Involvement in the "New Economic Context" Study

At the time the "new economic context" study was approved by CSTP, those within the U.S. Government involved with OECD science and technology activities recognized the potential importance of the study, as a leading example of the kind of policy-relevant activity which they had been urging DSTI to pursue. They attempted to ensure that the relevant agencies of the U.S. government, particularly the Office of Science and Technology Policy, the National Science Foundation, and the Department of Commerce, were aware of the proposed study, and tried to enlist the support of these agencies in the Department of State's effort to influence the design and conduct of the study. This attempt was unsuccessful; the other agencies did not allocate any significant staff resources to support State's efforts in this direction.

Since that time, there has been little official U.S. Government involvement with the study; like at least some other CSTP members, the United States

* At the time of writing.

has felt adequately informed on the study's progress.* A request by the U.S. Science Counsellor at our Mission at the OECD to attend an expert group meeting was denied.

The OECD staff involved in the study asked the U.S. Government for assistance in scheduling specific appointments and making travel reservations in the United States; the State Department was, in the words of one official, "unwilling to act as OECD's travel agent," and did not provide the assistance requested. However, State did contact a number of industries to alert them to OECD's interest in arranging a visit and to urge them to meet with OECD staff. In the eyes of OECD staff, State could have gone beyond these efforts in providing assistance in carrying out research on various aspects of the study within the United States; such lack of support from some member governments is one reason, in this view, that the study took longer to complete than was originally planned.

One of the members of the expert group who was from the United States, Herbert Fusfeld, did arrange a one-day meeting between the chairman of the expert group, OECD staff, and U.S. policy makers so that the concerns within the United States with respect to industrial innovation and the ongoing efforts to develop U.S. policy in this area were known to the OECD group. However, this meeting was organized at Fusfeld's initiative, not the government's, and it was made clear that it was a private meeting, even though it was held in a government building.

The NSF staff member most directly involved in parallel analyses within the United States of the socio-economic effects of science and technology, Rolf Piekartz, has had continuing involvement with the "new

* By contrast, Salomon traveled to Sweden, at the request of the Swedish Government, to brief Swedish officials on the study.

economic context" study, has established direct links with the DSTI staff, and even has attended an expert group meeting, but as a professional economist rather than as a representative of the U.S. government. Through his contacts with the study, Piekarz has developed a fair degree of skepticism about the way the study has been carried out and about the value and validity of its results. Although NSF has agreed in principle to receive and review all CSTP project proposals and reports, this link has to date not been very effective, and NSF has provided only occasional support to the State Department staff backstopping U.S. involvement in CSTP activities.

As this account suggests, the U.S. government has given little concerted attention to the "new economic context" study. One reason for this posture is the general lack of government information about the substantive progress of the study; another is a lack of interest and/or doubt that an OECD study on these issues can be valuable on the part of those within the government who are the most obvious "users" of the study's findings. A third may have been an unwillingness on the part of the United States to become involved in an international policy debate on issues important to this country until our own internal policy debates on those issues had been settled. Certainly there has been no pressure on the State Department from other government agencies to gain access to the study, and State has had little reason to make the United States more insistent on meaningful CSTP oversight of the study than other governments.

C. Evaluating the Benefits to the United States of the "New Economic Context" Study

Because it has the responsibility for representing the United States on the CSTP and for the presentation of the U.S. position on CSTP issues, the Bureau of Oceans and International Environmental and Scientific Affairs (OES)

of the Department of State has had the task of organizing and coordinating the evaluation of the "new economic context" study and of the preparation of the U.S. position on it for the November CSTP discussion of the study's report. This is a difficult assignment, if the intent is to be prepared for an extensive and substantive discussion of the report's analyses, conclusions, and recommendations. This is so because of:

1. the limited exposure of governments to the study's interim conclusions and the data supporting them during the conduct of the study; there is no one within OES or the U.S. mission at OECD who was familiar with the study's substance prior to seeing the final expert group report in September 1979;

2. the lack, in other government agencies, of individuals or organizations who view the study as a major contribution to issues with which they are concerned;

3. the lack of existing links between OES and a community of U.S. experts outside the government who are knowledgeable on the topics covered in the report and who might be mobilized to aid in a review prior to preparing the U.S. position for CSTP discussion;

4. the relatively limited time available between the time the draft report is scheduled to be available for review (mid-September) and the CSTP meeting at which it is to be discussed (November).

In his analysis of U.S. participation in the science and technology programs of various multilateral organizations, E.G. Kovach notes with respect to the "new economic context" study that

it seems clear that if this project were to be of greatest benefit to the U.S., we would already have initiated a continuing dialogue among senior personnel from a wide variety of agencies to contribute fully to the formulation and design of the study, to identify the kinds of national support (data, analyses, case studies,

personnel, etc.) we should plan to provide, and to insure that the work proceeds in a form permitting facile adoption of the findings to our national needs.*

None of these requirements has been met, and thus the U.S. government is approaching the necessity of preparing a position on the "new economic context" report with the likelihood that the study will result in measurable and meaningful direct benefits to the United States already significantly diminished. The preparation of U.S. comments on the report must proceed with this reality as background; if one adopts the perspective that early and continuous involvement in study design and conduct is the best way of ensuring both transfer of ideas and perspective during the study process and useful and relevant study results**, then most of the opportunities to make the "new economic context" study a valuable contribution to U.S. thinking on the links between technology policy and economic policy have already been missed.

In terms of the criteria established in the body of this report*** for evaluating the value of OECD science and technology activity to the U.S. government, the major contribution of the "new economic context" study is as "an addition to the state of knowledge on an issue of policy or economic importance to the United States." The study could still "contribute to improved understanding, policy, or decision," and it could "supplement or mesh with similar U.S. national activity." Because it deals with topics which are of very current interest in terms of Executive and Congressional review of the policy recommendations emerging from the Domestic Policy Review of Federal Policy on Industrial Innovation and the Congressional Special Study on Economic

* E.G. Kovach, "U.S. Government Participation in the Science and Technology Programs of Selected Multilateral Organizations," Division of Policy Research and Analysis, NSF, May 1978, p. 29.

** One should note that another view is possible; this other perspective argues that analysts require the "space" free from outside involvement within which to complete their work, and that the value to users derives from the final product, not involvement in developing it.

*** See pages 24-25 of the main report for a discussion of these criteria.

Change, the findings of the OECD study ought properly to be assessed in the context of areas of agreement and disagreement with those recommendations, and the consistency of the recommendations from the strictly U.S. review and the comparative OECD analysis checked.*

This line of argument suggests that the "new economic context" study could still make a useful contribution to U.S. policymaking, if it is evaluated by a qualified group in the context of current policy issues and if the results of that evaluation are used in the policy formulation process; it also suggests that such a review may be one effective way of preparing the U.S. position for CSTP discussion of the study. However, there might not be time to perform simultaneously both functions--the somewhat political task of preparing a U.S. position for CSTP and the more substantive job of making a comparative analysis of current U.S. policies and policy proposals and the findings and recommendations of the "new economic context" study.

To do this latter job fully, at least those members of the expert group who are familiar with U.S. economic and technology policy ought to be involved, as well as other experts and key government officials. It may not be possible to carry out this review prior to the November CSTP meeting, but because there is such a close congruence between the issues discussed in the OECD study and current U.S. policy concerns, any short-term benefit to the United States from the "new economic context will come from such a review.**

* It appears, for example, that the OECD study will give substantially more emphasis to the employment impact of future technological developments, and a number of non-economic effects, than have the current reviews of technology policy within the United States.

** One implication of the above argument is that copies of the study should be widely available to the relevant government and non-government individuals; even more, longer term benefits of the study such as those discussed in IV.4 below are likely to be lost if OECD does not publish the study in some generally available form after CSTP review.

IV. Lessons from the "New Economic Context" Study

Because it appears to have been such a substantial study on issues of major policy significance, the "new economic context" study deserves attention from the perspective of whether its organization and conduct offer useful insights for the United States as it reviews its approach to participation in CSTP activities. Such an analysis is carried out below.

1. Design of studies - one aspect of the "new economic context" study which has broader significance is the way in which the study plan was developed. The study was approved by CSTP on the basis of the Secretariat argument of its relevance and timeliness, but the Secretariat did not present at the time, or develop later, a detailed research plan. Rather, the expert group developed the research design, although it had no involvement in securing the staff resources needed to carry it out. As might be expected in this situation, the research design as presented to CSTP in January 1977 was ambitious, rather general, diffuse, and open-ended, and weak on research approach and methods. Governments were given no opportunity to participate in designing the research plan, and little time to review it and make meaningful substantive comments. The experts reserved to themselves the right to change the plan as the study progressed; they noted that, although they had "sought to define the content and modalities of required work, they recognized that, as the inquiry proceeds and the results of empirical investigation are reviewed, it will be possible to more precisely define and delimit the issues requiring in-depth study."*

* SPT(76)39, paragraph 15.

If the United States wants to ensure that OECD studies are germane in concrete ways to its policy concerns, some meaningful participation in study design and allocation of resources to studies appears essential. Allowing this crucial step to be carried out by a group of prestigious experts in conjunction with a strong Secretariat, with little opportunity for government involvement, does not seem an effective way of accomplishing this objective.

If the United States decides to adopt an "activist" perspective with respect to the design of OECD studies, two elements will be required:

a. effective links among the U.S. mission at OECD, those in the United States government involved in U.S. representation at CSTP, and the agency (and potentially the non-governmental) expertise required to develop substantive comments on projects proposed for inclusion in the CSTP program. If the primary product of CSTP activities is viewed as useful policy analysis (see 4, below), then early involvement in study design and in planning for carrying out the study becomes a critical element in increasing the relevance and potential utility of studies. Review of project plans on a case-by-case basis is possible, if enough time is available prior to CSTP discussion of proposed studies to organize such reviews and if a general pattern of interagency cooperation and/or government-private sector relationships related to OECD science and technology affairs is established; however, it is unlikely that effective reviews of proposed OECD studies can be carried out on an ad hoc basis without such a pre-existing pattern.

* Such participation in study design does not, it should be made clear, necessarily imply major government involvement in implementing that design.

b. Even if the U.S. Government is able to exert influence during the study design phase, there needs to be some means of monitoring shifts during the life of the study. Because OECD studies often deal with complex and controversial (both analytically and politically) issues, the focus and emphasis of the effort often shifts during the course of the study. Such certainly was the case with respect to the "new economic context" study as sector studies were dropped, added, and modified and as study themes received differential emphasis. Those involved in the original internal U.S. review of the study proposal ought to have some form of continuing involvement in advising the government during the course of the study. In order to make this mechanism effective, of course, there must be a means for governments to exert influence on at least the general direction of OECD studies while they are in progress.

2. Use of expert groups in OECD studies - the ability of governments to exercise influence over the conduct of a CSTP study is almost certainly diminished when a group of independent and prestigious experts, rather than OECD staff, have primary responsibility for the study. The "new economic context" study was one of the few instances of the use of such an expert group for a CSTP study. In the past, studies had most often been carried out by the Secretariat staff or specially-hired consultants, sometimes under the guidance of an ad hoc group of governmental representatives. The United States should evaluate the pros and cons of the use of such expert groups in terms of the results it seeks from participation in OECD.

One reason for using an expert group is to compensate for the substantive limitations of the DSTI Secretariat with respect to a particular study area. Because the staff is tenured and has had very little turnover, it is not surprising that there may not be preexisting staff

expertise available for each new study topic. One option in dealing with a varied work program is to retrain staff for each new area of inquiry; another is to go outside the OECD for expertise; a third is to remove the institution of staff tenure. Given the current limits on consultant support, the (substantially less expensive) use of a high level, but part-time, group of outside experts makes some sense.*

The division of labor within OECD in this situation can be problematic. In the "new economic context" study, it was some time before it became clear to at least some members of the expert group that they were not just advising the Secretariat, but rather were directly responsible for the study. When the Secretariat produced a draft report, the expert group found that it was closer to a Secretariat view on the issues than it was a synthesis of the expert group discussions which could easily be used as a basis for a final report. Thus the expert group took on the task of drafting parts of the report itself, in order to ensure that it accurately reflects the views of those responsible for the study. Some of the delays in completing the study can also be attributed to this working out of expert group-staff relationship. If expert groups are to be used in this way in the future, either extra time should be allowed for busy part-time people to actually draft substantial portions of their report, or better ways of ensuring staff responsiveness to expert group guidance should be developed.

The use of an expert group as the authors of an OECD study also presents problems with respect to relations between governments and the organization. If a study is carried out, and presented, as the product of highly-qualified and eminent experts, will the U.S. government (particularly as it now prepares for CSTP discussions) and other governments

* Another option is for the U.S. and other governments to detail qualified individuals to the DSTI staff for the course of a study or some other substantial period of time.

be credible if they disagree with the findings of the study? Will governments want to be in the position of disagreeing, in the relatively public context of a CSTP meeting, with the experts' policy recommendations which are derived from their findings? Indeed is it appropriate for specific policy recommendations to be included in a study for CSTP, or is the drawing of policy conclusions properly a government responsibility? For that matter, does the fact that a study is being carried out by experts effectively remove the study from constructive criticism by governments while it is in progress? It seems unlikely that an "our experts disagree with your experts" situation would result in useful products emerging from CSTP studies carried out under the control of a Secretariat-selected expert group.

On the other hand, getting the U.S. and other governments involved in nominating and/or approving the members of an expert group can result in delay and dilution of the study effort. In the "new economic context" study, the experts were selected by the Secretariat without formal consultation. Some interviewed felt that the two members of the expert group from the Science Policy Research Unit of Sussex University were able to exert a major influence on the emphases and analytic perspectives of the study, not only because of the persuasiveness of their positions in the judgment of the other members of the expert group, but also because of their long and intimate relationship with the DSTI Secretariat. This "special relationship" may have made them more able to present analyses in a manner congenial to the OECD style of work.

Whether government review of the members of an expert group, or of their research approach, data, findings, or recommendations can be productive is a question that the U.S. government should answer before it supports further CSTP studies under an expert group aegis.

It was mentioned earlier that other OECD studies have been carried out under the guidance of an ad hoc group of government experts. A full evaluation of the use of expert groups should compare the impacts on U.S. interests of using such ad hoc government groups with the implications of using non-governmental experts to oversee a study. Often, ad hoc government groups are neither the leading experts in the topic under investigation nor composed of influential individuals; in this situation, it is possible that the primary reason for using an ad hoc group is to ensure that studies do not adversely affect national interests, rather than a hope that the members of the group can have a positive substantive effect on the study. Or perhaps, given the relatively low priority within the U.S. and other governments given to CSTP studies, no more powerful and expert group of government officials willing to devote time to overseeing OECD activities can be assembled.

3. Oversight of studies and staff. The combination of limited government involvement in the design of the "new economic context" study and the insulating effect of the use of an expert group to carry out the study has made it particularly difficult for governments to exercise effective oversight over the effort. There have been continued complaints from some government representatives to CSTP about the lack of access to the study's substance as it progressed. Even though CSTP has gone on record several times as wanting to see the study's working papers and as desiring better communications between the expert group, Secretariat, and governments, none of these requests has been fulfilled.

There was no provision in the research plan for interim study products, and no meaningful documents have been available for review. There have been several oral progress reports, and one very general and heavily qualified written report, but government representatives (at least those from the United States) feel that they have had no opportunity to exert influence over or indeed to be aware of the progress in the implementation of the study.

A strong argument can be made that this is an appropriate situation, if OECD is to be used by governments as an institution to carry out major policy analysis. Those issues analysed in the "new economic context" study are complex and controversial, and at no point in the progress of the study has there been enough agreement on major issues among the members of the expert group to permit a consensus on findings to be provided to any external group. There were no procedures established to permit government representatives to monitor the intellectual and policy discussions and debates which have been characteristic of the study. Even as they approached the task of drafting the final report, members of the expert group were uncertain as to the way in which many of these disputes would be resolved.

This process of intellectual ferment is the natural course of affairs in challenging studies, and it can be argued that attempts by governments to intervene in and exercise control over the study would have disturbed the evolution of thinking which is the predecessor of major analytic findings.* However valid this perspective, it begs the point of whether the OECD is the proper context for this sort of path-breaking analytic effort.

The relationship between the permanent staff of an international

* One reviewer of an early draft of this report commented: "if you want an expert group to work effectively, it is necessary to choose a good one and let it get on with the work in its own way." It does seem possible, however, for governments to have some oversight relationships to an evolving study without getting involved deeply in its substantive discussions.

organization and member governments and their representatives is almost always a source of tension; OECD is no exception. The difficulties which CSTP has had in getting access to the interim results of the "new economic context" study is symptomatic of a persistent conflict between the desire of governments to ensure that the work of an organization is responsive to their "real" concerns and needs, and the attempts of secretariats to maintain the autonomy required to carry out their duties in a professional manner. In the case of OECD, this tension has been exacerbated by a tradition that the organization, even though it is intergovernmental in character, provides a congenial environment for professionally, perhaps even academically, legitimate analytic work. It is not surprising that long-time OECD staff regard themselves as having independent standing in their fields of expertise; little has happened in the history of the organization to counter this perspective, and indeed it may have some strongly positive results with respect to the quality of OECD's work.

However, the combined results of this perception of professional reputation and the fact that most OECD staff are tenured makes it rather difficult for a committee like CSTP, which meets only three times a year, to exert enough continuing influence over the direction of OECD analytic work in order to make it generally responsive to government interests. The individuals within the permanent delegations of Member countries to OECD responsible for maintaining cognizance of CSTP and DSTI activities also have historically had difficulty in exerting much influence over the permanent OECD staff. The role of OECD staff directors is particularly difficult. On one hand, the staff director must try to manage the activities of staff who are not totally dependent on him for their position; on the other

the director must gain and keep the support of Member governments for the work program of his unit.

The conduct of the "new economic context" activity provides a good case study of the situation just described. Within the OECD staff, there are strongly held intellectual positions with respect to fundamental issues of economic policy. The Economics Directorate has traditionally been a stronghold of individuals who take what can loosely be described as a "Kenyesian" position on macro-economic policy, believing that economic phenomena are cyclical and that the intelligent management of the level of demand can ensure stable economic growth. Others within the staff, including the DSTI staff who proposed the "new economic context" study and selected the the experts to oversee it, take what is called a "structural" position, believing that basic and permanent changes in the structure of the economic systems of OECD Member countries are occurring, and that policies designed to respond to these long-term changes must be adopted.

Given this situation, there was little that CSTP could do either to make sure that the cooperation of the Economics Directorate was enlisted on the study or to have the study take any but a structural approach to the issues it examined. Neither was it possible for governments to make sure that the total range of relevant DSTI staff capabilities was available for use in the study.

If this cannot be accomplished at the level of CSTP and DSTI, and if the U.S. government decides that CSTP activities can indeed produce significant benefits for this country, then efforts at higher levels within the U.S. government to increase the responsiveness of OECD to U.S. concerns seem justified. However, it should be remembered that the other twenty-three

member governments might also reach similar conclusions. The results of such government pressures could well be destructive of any effective performance by OECD as an analytic organization.

4. Policy Analysis in the OECD Context

The "new economic context" study, as it has evolved, is likely to be an example of a phenomenon noted by Kovach: "While the CSTP Secretariat has produced a number of reports...which have received critical acclaim and are now considered standard reference works, no strong rationale has been advanced for such activity on behalf of an intergovernmental body."* No other outcome than to serve as a "reference work" appears likely for a study extending over three years, designed and carried out by a group of specialists and supporting staff without government involvement, and dealing with very broad, quite complex, and still emerging issues about which there is neither analytic nor political consensus.

There is a chance that the report could still be used as the basis for a productive dialogue on common policy concerns within the OECD context but this outcome is possible only if the United States and other leading OECD countries decide, when they review the report, that the substance and recommendations of the effort justify the concerted actions required to organize such a dialogue within the next 4-6 months. Of course, the report can also be the focal point for discussions among specialists in science policy and economic policy throughout the world without such concerted government action; at a minimum, the report would have to be published quickly and widely circulated for this to happen. If this were to be the

* Kovach, p. 25

case, then the report's contribution to policy would be much more indirect (though none the less real); as its analysis becomes part of the broadly-based discussion on the issues of science, technology, and the economy throughout the industrialized world.

In this way, the "new economic context" study might eventually take its place as one of the major intellectual contributions to thinking on issues of relationships among science, technology, economic change, and government policy. An argument can be made that OECD is an appropriate, and perhaps the only feasible, context within which such a study could be carried out, that such studies have, over the medium to long term, at least as much policy relevance as more focused and action-oriented analyses, and that the United States and other governments should therefore work to increase OECD's capabilities to carry out such studies. The elements of this argument are:

a. a unique attribute of OECD, among intergovernmental organizations, is precisely its tradition of being a congenial setting for bringing together high-quality, policy-oriented but professionally well-qualified analysts and the government officials who "ought" to be aware of the conclusions emerging from the work of such analysts; other institutional settings for the convergence of government policy concern and top-quality, objective, policy analysis on issues of common concern to OECD countries all have significant disadvantages compared to the best of OECD performance. The role of OECD reports and Secretariat staff, in this view, is to facilitate international discussions on issues of common concerns, not to make direct and specific contributions to national policy debates.

* The "new economic context" study went beyond most DSTI policy analyses by including, not only analysis based on existing knowledge, but the commissioning of original research, i.e., the sector studies. The issue of whether OECD ought to be a research performing organization, as well as an analytic organization, deserves further attention.

b. analysis can contribute to government policy-making in several ways. One is by being directly and immediately relevant to specific policy concerns. Another, however, is by performing what a leading observer of the analysis-action nexus has called the "enlightenment" function:

The major use of social research in public policymaking may not be in problem solving, however. Research use appears to be a much more diffuse and circuitous process. Evidence suggests that government officials use research less to arrive at solutions than to orient themselves to problems. They use research to help them think about issues and define the problematics of the solution, to gain new ideas and new perspectives. They use research to help formulate problems and to set the agenda for future policy actions. And much of this use is not deliberate, directed, and targeted, but a result of long-term percolation of social science concepts, theories, and findings into the climate of informed opinion.**

Examples of situations in which specific public policy choices have been influenced in a significant manner by the findings of analysis undertaken for the purpose of clarifying that choice are relatively rare, but most policymakers would agree that the general contributions of informed analyses are important conditioning factors as they weigh policy alternatives;

c. if the style of OECD operation were changed to place overriding priority on specific policy-oriented analysis of direct relevance to short-term government action, there would be no other institutional setting in which these broader contextual studies could be performed with respect to issues facing the industrial free-market countries; yet increasingly the issues facing those countries are similar, and ought to be addressed on a basis broader than the experience of one or a few countries. While the results of a particular study might not be of value to each OECD Member, including the United States, the sum total of analytic work would be an important asset to all Member countries, both in terms of specific national

* * Carol H. Weiss, "Research for Policy's Sake: The Enlightenment Function of Social Science Research," Policy Analysis, Vol. 3, No.4 (Fall 1977) p. 534

interests and in terms of the common economic and social interests of the OECD group.

Certainly this line of reasoning can be questioned; however, if it has any validity, then there seem to be some consequences for the ways in which major OECD countries such as the United States participate in the organization. Many of the ideas put forth by Kovach, e.g. sending U.S. personnel to the OECD Secretariat for specific project tasks, inviting OECD staff to contribute to ongoing U.S. studies and giving them an opportunity to become deeply familiar with U.S. research and analysis in their areas of expertise, frequent consultation between those involved in OECD studies and complementary U.S. efforts, make sense.*

The United States might attempt to determine what areas within the proposed CSTP work program are particularly germane to likely areas of future policy concern, and ensure that the DSTI develops "clusters of competency" in those areas, rather than provide general encouragement to OECD to increase the flexibility and professional qualifications of the DSTI staff. For example, if the United States should conclude that it is interested in having available comparative and objective analyses of the impacts on employment patterns of emerging technologies and shifts in "technological comparative advantages" among industrialized countries, then it might want to use OECD as a major element in stimulating attention to this area, making sure that it, and other member states, see the value of an OECD staff which is working on the "real" issues, is professionally in touch with the most advanced thinking among other analysts and researchers, has access to the advice and involvement of individuals

* Kovach, p. 45

outside OECD who can contribute to ongoing analyses, and in other ways is able to provide the intellectual foundation for informed opinion and decision among policymakers in OECD countries, which Weiss suggests is the major contribution to government policy of research and analysis.

It is not feasible to use OECD in this way on a large number of issues, but if the United States, by taking some of the steps suggested above, were to take the lead among Member countries in making the CSTP and DSTI places where exciting, challenging, and fundamental issues in the areas of science and technology policy are addressed, then the benefits to policymaking, in this country as elsewhere among our closest allies, could be substantial, especially compared to the cost involved. Whether or not such a posture toward future CSTP activities is realistic is beyond the scope of this paper. However, a close examination of the "new economic context" study in terms of the preceding analysis suggests that the United States, if it had followed a course of action similar to that suggested above, might well now be in a position to get more substantial and lasting benefits from this particular undertaking than are likely to be derived from the enterprise as it has evolved.

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In addition, the following offered comments on an earlier draft of the report:

Morris Crawford, OES, Department of State
Oswald Ganley, formerly Deputy Assistant Secretary of State for Science and
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A REVIEW OF THE OECD STUDY

**TECHNOLOGY TRANSFER TO DEVELOPING COUNTRIES:
IMPLICATIONS FOR MEMBER COUNTRIES' SCIENCE AND TECHNOLOGY POLICIES**

Prepared by

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November 1979

Preface

This report is one case study undertaken as part of a larger project on how the U. S. Government organizes itself to deal with the work of the Committee for Scientific and Technological Policy (CSTP) of OECD.

The detailed exposition of how the CSTP project on transfer of technology evolved, the role played by the United States, and an examination of alternative roles that the U.S. might have played is intended to raise for discussion means of enhancing the capacity of OES, given its limited resources and its broad charter and the performance of the U.S. Government as a whole. Examination of other projects and consideration of the totality of U.S. interest in the CSTP may produce other perspectives and prescriptions.

This report is not a critique of OECD as an organization or of the OECD secretariat. The focus is on U.S. participation in the project, and on what leads this experience might provide for upgrading the effectiveness of U.S. participation in OECD affairs.

I have been aware of the limitations faced by one who has not been a participant in the affair under examination. The counter consideration is that the absence of bias may compensate for the presence of ignorance.

Any suggestions that positions or actions other than those actually taken might have been preferable should be taken not as criticisms but as an agenda for discussion and consideration.

Many people^{1/} have helped me to avoid errors of fact, judgment, and composition by reading and commenting on successive drafts. Virtually all of their suggestions were gratefully accepted. Of course I and not they am responsible for the final draft.

Charles V. Kidd

^{1/} Oswald Ganley, Wreatham Gathwright, Herbert Glantz, Frank Kinnelly, George Kovach, Herman Pollack, William Trainor and Morris Crawford

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I. Origins and Evolution of the OECD Study

A. Origins of the Study

Over the period 1965 to 1976 OECD had sought a way to become involved with the questions surrounding the transfer of technology to developing countries. However, efforts in this direction were killed off year after year for one reason or another. The situation changed in 1976. By then it was evident that transfer of technology to developing countries had taken place on a scale that enabled developing countries to report technologically based goods to developed countries. Increasing recognition of the actual and potential consequences of this movement generated for the first time among the member states of OECD widespread sentiment that the organization should launch an inquiry dealing with transfer of technology. Initiative in making a specific proposal was taken by the United States. John Granger, who was then the alternate U.S. delegate to CSTP, had the idea of proposing a study which would focus sharply on the effects of transfer of technology from developed to developing countries on the economies of the developed countries. He discussed the idea with Oswald Ganley who was then the U.S. delegate to CSTP. It was

1/ This section is written chronologically to show how questions of potential or actual interest to the United States emerged. The reader who is interested primarily in questions which the Department of State - and specifically OES - might pose in searching for more productive use of OECD can proceed directly to Part II.

agreed that the focus suggested by Granger would be proposed and that the study should not be just another inquiry into the history, mechanisms, obstacles and extent of technology transfer from developed to developing countries. It was also agreed that Granger would make the formal presentation. This was done, and CSTP accepted the proposal.^{1/} However, the Nordic and Benelux countries had second thoughts. They felt that the study as proposed by the United States could develop into a protectionist tract harmful to the developing countries. These differences in views, plus the fact that Granger and Ganley later lost contact with the study, account for some of the changes, noted in the following pages, in the goals of the study.

Those who represented the United States on the CSTP understood the general position of the United States with respect to international scientific and technological cooperation (see Appendix A, IV, D).

The more complex considerations involved in transfer of technology, listed below, were also understood.

First, the effects of transfer of technology to developing countries on the economy of the United States generate heated differences among interest groups. Industries that are threatened by foreign competition and workers in those industries who are threatened with unemployment press for such measures as higher tariffs on imports, import quotas, subsidies for threatened firms, and protection for displaced workers in such forms as retraining and relocation allowances. Labor takes the position that transfer of technology is often equivalent to export of jobs. Consumer groups and politicians concerned with citizens as consumers press for liberalized trade on the ground that this enhances productivity and tends to keep prices down.

^{1/} This account of the origins of the study is from the viewpoint of the United States. A full account of the origins would reveal the participation and initiatives of others and a complex interplay between country representatives and OECD staff

Second, transfer of technology is an element of a long list of interrelated factors influencing international trade. As a consequence it is in practice difficult if not impossible to isolate transfer of technology from international economic relations, and in particular from related factors such as tariffs, quotas, and patent and license policy. One consequence of this is that transfer of technology can be dealt with only to a minor degree as a technical matter.

Third, there is continuing tension between the desire of this country to help developing countries by taking steps to make technology more readily available to them, and the desire to promote trade on terms more favorable to U.S. firms and to the general interests of the U.S.

Fourth, our economic and political system leaves most important decisions related to transfer of technology to the private sector. As a consequence, one of the most important policies of the United States has been to subject multinational firms to relatively light Federal influence or control over international aspects of their operations.

For all of these reasons, there was a high premium on grasping not "the policy of the United States" but on understanding specifically what questions the participants in the domestic debate would like the proposed OECD study to address. An adequate understanding of the priority questions could be acquired only if the common perceived needs of business and labor were determined by face to face discussions. Determination of the position of executive agencies on the issues is necessary but not sufficient.

The evolution of the study is recounted below to indicate such things as: (1) the role of the United States in influencing the study; (2) the reasons for the U.S. attitude and actions relating to the study; and (3) the substance of the study.

B. Study Plan Sketched - 1976

The story in terms of the formal record begins in June 1976:

"At its 14th session, the Committee for Scientific and Technological Policy (CSTP) requested the Secretariat to submit proposals for studies of the implications, for OECD Member countries' scientific and technological policies, arising from an accelerated transfer of technology towards developing countries. In response, the Secretariat suggested the 1977 Programme of Work of the Committee be developed to include an investigation of the "feedback effects" or impacts of technology transfer towards, and industrialization of, developing countries." 1/

The statement that the study would focus on the implications of technology transfer on the scientific and technological policies of member countries was apparently designed to legitimize the study as an undertaking of CSTP. This introduced a fuzzy complication in planning and executing the study because the effects of technology transfer from developed to developing countries have much more relevance to the industrial policies of the developed countries than to their scientific and technological policies. If CSTP had in fact intended that the study would concentrate on effects on scientific and technological policies of developed countries, there would not have been much to study. The record does not indicate that this question was raised by the CSTP.

In any event, two lines of investigation were proposed:

- "1) construct a picture of major flows of technology towards LDC's in order to identify quantitative trends (e.g. volume of flows) and qualitative changes in the ways technology is marketed;
- 2) try to identify industrial sectors in which the competitiveness of OECD Member countries may be diminished as a result of international technology transfer to the LDC's." 2/

1/ Technology Transfer to Developing Countries, Impacts on OECD Member Countries and Implications for Science and Technology Policies. (SPT [76]45) (Paris, December 22, 1976) (Underlining added). Later in this report, shifts in the objectives of the study are noted. Some of these appear to be the normal consequence of evolving thought as a complicated project evolved. However, there also appeared to be some wavering and digressions which weakened the study.

The outcome of the exploratory work by the Secretariat was approval of the staff proposal by the CSTP in February 1977, and a directive to prepare a detailed work plan for consideration later in 1977. The U.S. representative concurred. No record exists to show that further work was done in Washington to define the interest of the U.S. in the study.

C. Developed Plans and Drafting - 1977 ^{1/}

1. The April Work Plan

The Secretariat produced a detailed work plan in April, 1977, for the meeting of CSTP early in May.

After a discussion of the purpose of the study, the report said: ^{2/}

"The project proposed here is a 'first-cut' attempt to assess the magnitude of the problem: a fact-finding exercise of an exploratory nature. The emphasis of the project, at least in the first stages, will be on diagnosis, leaving the extremely difficult area of prescription for later efforts. It is proposed in particular to: (emphasis added)

1. construct a picture of major flows of technology as noted above.
2. try to identify implications for science and technology policies resulting from the problems and opportunities which increasing North-South technology transfer may bring to the OECD countries."

The scope of the proposed study was indicated by these major headings:

- I. Technology and International Trade: A Framework
- II. Flows of Technology Towards Developing Countries
- III. The Evolution of Technology Transfer Conditions
- IV. Changing Patterns of International Industrial Location: An Overview
- V. Conditions for Industrial/Technological Competitiveness
- VI. Conclusions"

The summary points raised by the staff and the draft table of contents raise three interesting points. First, an examination of the actual experience, policies and actions of developed countries generated by the consequences of transfer of technology to developing countries was not proposed.

^{1/} This history is written from documents and without the benefit of discussions with the OECD secretariat. Accordingly, there may be some misinterpretations or omissions. However, the purpose of the background is to provide a framework for U.S. participation in the project, and for the purpose the background is adequate.

^{2/} Technology Transfer to Developing Countries: Implications for Member Countries' Science and Technology Policies. (Paris, April 29, 1977) (SPT/76/45, First Revision)

Second, it began to appear as if the study would encompass a number of aspects of technology transfer not linked closely to the sharply focused original proposal. Third, consideration of "the extremely difficult area of prescription" was postponed.

2. The May Informal Meeting of Experts

The Secretariat did convene an informal meeting late in May with a small group of experts. They were Mr. Jacques Delorme of the European Patent Office in the Hague, Professor John H. Dunning of the University of Reading, Mr. C.D. Alejandro and Professor Edward Graham of MIT. Each of these advisors was commissioned to prepare a paper intended to be a part of the final report. Rosenberg wrote a paper on North-South Technology Transfer in Historical Perspective and a paper on The Changing Economic Environment and Technology Transfer. Graham wrote on The Functioning of the Technology Transfer System and the Interpretation of Its Implications on Developing Countries. Dunning wrote a chapter on The Taxonomy of Technology Transfer. Delorme wrote a chapter on Changes in International Rules Governing the Technology Transfer System - Analyses and Reactions. These reports were incorporated in the rough draft presented to the CSTP in October.

The content, approach and tone of these background papers are interesting. They are competent descriptions, histories and analyses of various aspects of transfer of technology. However, they do not have as a central focus the major objective of the study. They do not complement each other to provide a strong background for the intended central theme of the study. The central reason for this is that the members of the Ad Hoc Group came on the scene after the Secretariat had decided on the themes and the authors. There was not strong and continuing pressure on the staff to center its efforts

on the major focus of the study. So far as the identity of consultants, as contrasted with areas selected for study, is concerned it seems that the existing procedure of leaving the selection of experts to the Secretariat is a sound procedure, on the ground that selection of experts would be impossibly complicated and long drawn out if each member had to approve the selection of experts.

3. The October CSTP Meeting

By September, 1977, the Secretariat had prepared a 16 page single spaced prospectus^{1/} for the October CSTP meeting. This prospectus modified the outline that had been presented to the Committee in April.

As in the December, 1976 document two basic purposes were stated. The first - "construct a picture of major flows of technology towards LDC's" - was reiterated, with the added provision that the report would concentrate on a limited number of sectors and on a limited group of more advanced developing countries. However, the objective of finding "implications for science and technology policies arising from North-South transfer of technology, and its related effects," was substituted for an effort "to identify industrial sectors in which the competitiveness of OECD member countries may be diminished as a result of international technology transfer to the LDC's."

These two objectives are quite different and inability to stick consistently to a central theme contributed to a tendency towards diffuseness as the study proceeded.

The written record and interviewing do not reveal any dissatisfaction with the development of the purposes of the study on the part of the United States.

^{1/} Committee for Scientific and Technological Policy. Technology Transfer to Developing Countries: Implications for Member Countries' Science and Technology Policies. (Note by the Secretariat) (SPT[77]17) (Paris, Sept. 21

The outline of the staff proposal presented at this meeting was as follows:

- CHAPTER I : The Study: Background and Objectives
- CHAPTER II : North-South Technology Transfer in Historical Perspective
- CHAPTER III : A Framework for the Study: Identification of Key Characteristics
- CHAPTER IV : Flows of Technology Towards Developing Countries
- CHAPTER V : Sectoral Analysis: Flows of Technology and Trends within Selected Sectors
- CHAPTER VI : The Evolution of Technology Transfer Condition
- CHAPTER VII : The Effects of North-South Technology Transfer on Member Countries: Implications for Science and Technology Policy

Consultants and staff drafted large sections of the proposed outline before the October meeting.

The study appeared to be evolving in a way reasonably consistent with the original purposes of the study. The flow of technology would be the topic for chapters IV and V, and policy implications (again limited to science and technology policy), the subject of chapter VII. The study was developing with a heavy descriptive and historical element, and not much attention was given to the policy questions. Of ten double spaced pages describing the various chapters, chapter VII was described in these terms:

"CHAPTER VII - The Effects of North-South Technology Transfer on Member Countries: Implications for Science and Technology Policy"

The details of this chapter will be delineated at a later stage. However, it could consist of a preliminary exploration of the impacts of technology transfer particularly related to LDC industrialization, and analysis of the nature and extent of adjustments to be considered by OECD countries and an indication of the possible role of science and technology policy in this context. Salient income and substitution effects, complementarities, competition and indirect effects drawn from previous chapters could be presented as a series of "if-then" possibilities." ^{1/}

^{1/} Ibid, p. 14

The Secretariat report also noted that the final report "will focus attention on the relations between:

- medium term adjustment problems in Member country industries and exploration of relevant sectors;
- scope and costs/benefits expected from transfer of technology to developing countries;
- scope and kind of science and technology policy action." 1/

However the attention of the Secretariat continued to be centered on descriptive and analytical material and work on policy alternatives continued to be postponed.

A case can be made for this procedure. That is, first examine the nature and volume of transfer of technology transfer to developing countries, then the effects on developed countries, then policy implications. On the other hand, this sequence seems more suited to the format of a report than to actual study procedures. From the record there is no evidence that the advantages and disadvantages of a concurrent rather than a sequential approach were considered.

This question of strategy for the study had in retrospect important implications for the attitude of the United States. The further the study moved into the historical and descriptive mode, the less significant it was for the United States government. Neither the Department of State nor other executive agencies felt a sense of significance and urgency over a study that appeared to touch no policy issues of substantial concern to this country. Since the details of the critical policy chapter would be delineated at a later stage, the position of the United States could also be delineated at a later stage.

1/ Ibid, p. 3

Turning from issues of substance at the October meeting to administrative matters, the specific action requested of CSTP by the Secretariat was to agree to the setting up of an ad hoc working group of government experts to be appointed by the member countries. The group would be asked to comment on the study outline; assist the Secretariat in the choice of sectors, development of study methods and providing supplemental information; and review the draft report before submission of the final report to CSTP. The CSTP agreed to the setting up of the Ad Hoc Group.

D. Drafts Reviewed - 1978

The Ad Hoc Group on Transfer of Technology to Developing Countries had its first meeting in Paris on February 6 and 7, 1978. Representatives of eighteen countries participated, and the most active were the United Kingdom, Germany, France, Canada, Sweden, Italy, Austria, Norway, Denmark, and the United States.^{1/} The principal agenda item was a critique of a 118 page draft report of January 19, 1978.

The 118 page report dated January 19 was not available to Jacob F. Blackburn, the U.S. delegate, until immediately before the meeting in Paris on February 6-7.^{2/} Obviously he had little or no opportunity to study the document carefully or to consult with other U.S. officials.

This was the first time that delegates from governments met specifically to consider the study. The three earlier meetings of CSTP simply ratified Secretariat proposals and authorized the general lines of activity required if the study were to go forward.

The Ad Hoc Group was presented with a document that had been in preparation for about a year. Consultants had been retained and they had produced seven draft papers. Many chapters were also drafted, and a plan for completion of the study had been worked out.

^{1/} Information on the February 6-7, 1978 meeting is drawn from an unclassified cable report on the meeting, and from interviews.

^{2/} The fact that U.S. participants have said that they have not had adequate time to review documents before OECD meetings is mentioned at several points in this document. On some occasions, documents have indeed been available only at the last minute. On others, the documents were prepared in a timely fashion, but for one reason or another U.S. representatives who attended OECD meetings did not receive the documents on time. **The matter is worth careful attention.**

A rather complete study plan was projected in the Secretariat document:

"First Stage: Factual and Methodological

"In member countries there is currently a great deal of concern because of the sectoral difficulties facing some industries - difficulties partly blamed on technology transfer. It is feared that the comparative advantage enjoyed by the OECD countries might gradually disappear and that their profits (or at least the overall social benefits) from that transfer might sooner or later prove to be temporary." 1/

This statement of purpose led to a proposal to study technology transfer in the 19th century, to prepare a taxonomy of technology transfer and to ascertain facts.

"The overall aim of the factual survey is to try to ascertain at global level what are typical failures of the current technology market, including its growth rate and structure geographical, sectoral, etc.), and how it differs from the market in industrialized countries, etc." 2/

"Second Stage: Outline of Some Scenarios"

"No automatic effects can be expected from a technology transfer. Consequences will depend on a whole series of conditions connected with the importing countries' arrangements for absorbing technology, with the type of technology transferred, with the scale of the transfer, its speed, etc., and with the attitudes and policies of the exporting countries." 3/

Note that this proposes extensive research on some peripheral matters that could have been reduced or eliminated if, in the interest of sharpening and expediting the report, the representatives of governments had so desired.

The report then proceeded to state:

"A necessary stage in the research would be to work out a set of 'scenarios' outlining possible or reasonably probable situations in which Member countries might find themselves and from which typical policies might be worked out." 4/

1/ Technology Transfer to Developing Countries (Note by the Secretariat) (DSTI/SPR/78.3)(Paris, January 19, 1978) p. 2

2/ Ibid, p. 5

3/ Ibid, p. 6

4/ Ibid, p. 9

"Third Stage"

As suggested in earlier versions of the study plan the third stage, to be undertaken after completion of two earlier stages, was consideration of policy issues.

The reaction of the Ad Hoc Group to the draft of the Secretariat document was mixed. On the one hand, the group thought that a lot of helpful material had been drawn together and competently analyzed. On the other hand, there was some fairly sharp criticism. The primary perceived deficiency of the document was that a number of chapters, most notably the one on the taxonomy of transfer of technology, were abstract and not grounded in experience. Some delegates urged that the abstract material be deleted, but the decision was to keep those parts of the material that could be related to actual experience. The group also urged that a series of case studies be undertaken, and specific suggestions were made. Finally, the Ad Hoc Group pointed out that the chapter on The Flows of Technology to Developing Countries did not actually present the nature and quantities of the flow of technology. This was true, but comprehensive quantitative measures of technology transfer have thus far been impossible.

The Ad Hoc Group not only reviewed draft material, but restated the objective of the study with some new wrinkles added:

"it should be the aim of the project to supply specialists in the transfer of technology with a synthesis of existing information concerning the feed-back effects on industries in Member countries of transfers of technology to the developing countries. The project should be developed from a constructive standpoint, in order to help Member countries to frame policies enabling them both to carry out the necessary transfers of technology to the LDCs and to make the structural changes that would be necessary in their own industries." ^{1/}

^{1/} Ad Hoc Group on Transfer of Technology to Developing Countries, Summary Record of First Meeting, February 6-7, 1978. (DSTI/SPR/78) (Paris, March 10, 1968)

The selection of specialists in the transfer of technology as the audience was a new idea. However, as far as the content of the report is concerned, this did not seem to have much effect.

The advice to concentrate on the "feed-back effects on industries in Member countries of transfers of technology to the developing countries" picked up the theme that was stated from the beginning as the central purpose of the study.

The idea that the study should help member countries to frame policies enabling them to carry out the necessary transfers of technology to the developing countries was new and was not the initial intent of the study. There was no comment on this suggestion.

However, the comments and criticisms of the Ad Hoc Group did not modify the basic policy orientation and study plan developed by the Secretariat and approved by CSTP.

This rather detailed account of the meeting is presented to make the point that the Secretariat received CSTP guidance on the project only after work had been proceeding for a year. This suggests that substantive discussions with representatives of government earlier in the game could have made secretariat and consultant work more effective. In addition, earlier consultation would have tended to make a tighter, more logically constructed, more pointed and more effective document. This is the case because once secretariat and consultants have drafted material for any report, it tends to stay in the report, in one form or another, even though it is of vague relevance to the central purposes of the study.

After the February, 1978 meeting of the Ad Hoc Group, the staff and consultants redrafted material in accordance with the advice of the Ad Hoc

Group, wrote new material and made plans for industrial sectoral studies.

The industries and consultants were as follows:

<u>Industry</u>	<u>Consultant</u>
Petrochemicals	Prof. J.M. Chevalier Centre de Recherche en Economie Industrielle, Universite Paris Nord, France
Consumer Electronics/Television	Dr. E. Sciberras Science Policy Research Unit University of Sussex Sussex, England
Rubber Tires	Mr. I. Senior Economists Advisory Group, Ltd. London, England

The Secretariat selected the consultants. Neither the United States nor other members wished to play a role in this selection.

E. CSTP Discussion, a Recapitulation

As noted above, CSTP authorized the study in June, 1976. Thereafter, the study was discussed in CSTP in almost every session through 1979. The written record of OECD meetings is meager and generally uninformative (see Appendix B), but there are some noteworthy aspects of the chronology:

1. The guidance provided by CSTP was quite general.
2. Such guidance as was provided by CSTP surfaced during 1977 - after the initial plans were spelled out by the Secretariat but before extensive drafts were prepared.
3. The CSTP left more detailed oversight of the study to the Ad Hoc Group.
4. A reading of the CSTP Summary Record shows that the transfer of technology project was of less concern to CSTP than a number of other projects. Among the projects considered more significant - at least as judged by the detail of the reported discussion and by the evident concerns of country

representatives - were in order of importance: a) information, computer and communication policy; b) positive adjustment measures to meet changed competitive conditions; and c) East-West technology transfer. These subjects do indeed appear to be of more vital interest to the OECD.

5. There was a high degree of continuity in U.S. representation on CSTP in 1976, 1977 and 1978: O.H. Ganley, Deputy Assistant Secretary for Science and Technology, Department of State; L.S. Packer, Counsellor for Science and Technology, Permanent Delegation; and C.A. Wait, Science Advisor, Permanent Delegation, attended every meeting from June 1976 through March 1978. From June 1978 through June 1979, the persons representing the United States changed at each meeting.

F. Work Proceeds - 1979

The work of the Secretariat progressed in 1978 to a point warranting a review by the Ad Hoc Group early in 1979. The second meeting of the group was held for this purpose on February 6, 1979, at OECD headquarters in Paris. ^{1/}

The representative of the United States at this meeting was Frank Kinnelly of OES. As was the case at the February, 1978, meeting of the Ad Hoc Group, the documents to be discussed at the meeting were available only after the U.S. representative arrived in Paris.

Plans for the three sectoral studies were ratified - a formality since the group had been advised in 1978 of the sectors to be studied and of the consultants chosen to do the studies.

The Ad Hoc Group also agreed to meet in October 1979, to review final drafts after commenting by mail between February and October 1979.

^{1/} Ad Hoc Group on Transfer of Technology to Developing Countries. Summary Record of the Second Meeting, Feb. 6, 1979. DST 1/SPR 79.9. Paris, March 2, 1979.

The Status of the analytical studies was announced:

No. 1. The International Transfer of Technology: Past and Present (drafted by Nathan Rosenberg, Stanford University).

No. 2. Summary of Composition and Importance of Flows of Technology to Developing Countries (being drafted).

No. 3. Main Characteristics of Industrialization in the Developing Countries (drafted by the Secretariat).

No. 4. Developing Countries and the International Division of Industrial Labor (drafted by the Secretariat).

No. 5. The Terms of Transfer of Technology to the Developing Nations: A Survey of the Major Issues (drafted by E.A. Graham of the MIT Sloan School).

No. 6. Transformation of the Legal Framework for Technology Transfer (final drafting deferred).

The final study will present a synthesis of the impacts on member countries of technology transfer to developing countries. This is the part of the enterprise corresponding with the central point of the original proposal.

Delegates who had been participating in the North/South debates on issues involving technology transfer saw much in the studies that would be useful in defending the position of OECD members in the debates. This was the view of the U.S. delegate, and the delegates of France and Norway agreed. Among useful points that were well documented were shortages of skilled

manpower in developing countries as a barrier to use of technology, the volume of transfer that has taken place, and the experience of the developing countries in regulating the inflow of technology.

While the draft OECD studies are available to the member countries as background for UNCSTD, their utility is substantially diminished by the fact they they will not be printed until after the Conference.

On March 8, the U.S. delegate to the Ad Hoc Group distributed for information and comment the draft studies to appropriate offices in the Department of State, the Department of Labor, the Department of Commerce and the Office of Science and Technology Policy.

As of early June, 1979, the three sectoral studies were on schedule, and it appeared that a detailed final outline of the report would be ready for discussion with the expert advisory group by July, with a first draft ready by September and a final report drafted by the end of October. ^{1/}

G. Summary

Several significant points can be made in recapitulating this section:

1. The U.S. did not establish, state explicitly and consistently advocate goals which it wished CSTP to adopt for the study.
2. With the concurrence of CSTP and the Ad Hoc Group, and in the absence of firm guidance on many important points, the Secretariat had to determine the content, authorship, priority and timing of the study.
3. With the concurrence of CSTP and the Ad Hoc Group, identification and consideration of policy issues was postponed until the final months of preparation of the report.
4. Draft material was presented to the CSTP and the Ad Hoc Group only a few days before the meetings.

^{1/} Letter of May 16 from G. Belof OECD to Charles Kidd

5. In the United States, there was little consultation among Federal agencies as the study developed, and no consultation with Congress, business or labor.

So far as implications for the United States are concerned, the project is entering a critical phase. By the middle of the summer 1979, the Secretariat is expected to prepare a brief paper on policy issues faced by the developed countries as a consequence of the transfer of technology to developing countries. This will be circulated to experts and then to the Ad Hoc Group. It is at this stage that consultation will be particularly important. The Department of State is prepared to call for a delay in the planned discussion at the November meeting of CSTE if the policy paper is not distributed well enough in advance to permit adequate consultation.

The next steps will be receipt of agency comments on the existing draft studies and a decision as to the kind of review process that will be established for the forthcoming paper dealing with policy issues.

II. U.S. Goals and OECD Performance 1/

A. Reactive U.S. Goals

While Granger and Ganley had a clear idea of what the study should produce, this understanding was not reviewed and reinforced later in Washington as preparations were made for later meetings. As a consequence, the U.S. representatives had to react on the basis of their best judgment, on the basis of a feel for what U.S. interests were and on the basis of hasty readings of drafts which were never available more than a day or so before they were discussed. Based on positions taken by the U.S. representatives, four implicit policy objectives in relation to the OECD study

1/ None of the problems encountered in performing the study of transfer of technology is new. Most of them are described in the study by Eugene G. Kovach, U.S. Government Participation in the Science and Technology Programs of Selected Multinational Organizations. (NSF, Division of Policy Research and Analysis, May 1978)

of technology transfer can be inferred. The first goal, which was later virtually abandoned, was to secure an assessment of the effects of transfer of technology to developing countries on the economy of the United States and potentially upon the scientific and technological policies of the United States. The second was to ensure, insofar as possible, that the report would support - or at least not undercut - the policy position of the United States on technology transfer and related issues. The third was to make the study accurate and technically sound. The fourth, which developed rather late in the life of the project, was to develop data useful in defending positions in the North-South dialogue on transfer of technology.

As can be seen from the preceding review of the development of the study, the U.S. positions on the study have been primarily reactive because the initial goal was not aggressively pursued. There has not been a consistent U.S. line on such matters as what the study should emphasize, on the timing and sequence of reports and on the relative weight to be given to background facts and analyses and to policy analysis and recommendations. It may be that this modest approach has been the optimum position, and that the best interests of the United States have been served thereby. If so, the outcome is fortuitous, since the position was arrived at without serious examination of alternatives.

B. Reasons for the Absence of Positive Goals

At any stage in the two-year process of planning and preparing the report on transfer of technology, the Department of State could have articulated a conscious, consistent position on the OECD study and could have urged OECD to adopt this position. Why was this not done?

1. Agreement on Fundamentals

As the earlier analysis of U.S. policy towards transfer of technology has indicated, there are wide areas of disagreement on specifics. Nevertheless, the U.S. has in general a liberal, anti-monopolistic, free market approach to transfer of technology.

As the first drafts of plans for the proposed study were prepared in 1977, it was evident that the approach of the OECD Secretariat would be basically consistent with U.S. policy, as these excerpts indicate:

"There are considerable problems of internal and inter-country adjustments to the realities of new economic forces. Specifically, there have been suggestions that the export of technology (either to affiliates or, of increasing importance, to independent purchasers) to produce goods and services that could be produced within the technology-exporting country has adversely affected jobs, exports and trade balances of the technology-exporting country. Such suggestions must be weighed against the positive effects on income, jobs, exports and trade balances of sales and supply of technology, and the costs and benefits of industrial protection, for example, must be balanced against income loss and increases in prices of traded goods relative to non-traded goods." 1/

Because the essential policy position taken by the OECD Secretariat (and ratified by the Ad Hoc Advisory Group) and the policy position of the United States were congruent, there was no sense of urgency to spend time fashioning and defending U.S. goals for the study.

2. Low Relevance of OECD Reports to Current Operating Decisions

This feeling was accentuated by the fact that most OECD reports in the field of science and technology in recent years have been perceived in U.S. governmental circles as competent and useful collections of background data and competent descriptive analyses. The excellent reviews of national science policies are cases in point. However, the reports have

1/ OECD Committee for Scientific and Technology Policy. Technology Transfer to Developing Countries: Implications for Member Countries' Science and Technology Policies (Note by the Secretariat). (SPT[77]17) August 21, 1977, p. 6-7

not been perceived as having a high degree of relevance to current policy decisions. This perception made the establishment of U.S. policy positions with respect to the OECD study a matter of low priority.

3. Central Attention on U.S. and Not the OECD Studies

Substantially more attention has been devoted by the Department of State, the Department of Commerce and the Department of Labor and the Congressional Reference Service to theoretical and practical studies carried out in the United States than to the OECD study. These and the extensive studies and conferences in preparation for UNCSTD in the United States and elsewhere tended to reduce the perceived significance of the U.S. of the OECD study, and the need to establish U.S. goals for the study.

4. Gradual Development of the Study and Late Production of Drafts

The study was presented to CSTP in the early stage in such a low-key, prosaic, gradual manner that a prudent person would have had to be particularly alert to foresee at that time the advisability of establishing explicit, consistent U.S. goals for the study. By the time of the CSTP meeting in October 1977, the Secretariat had preempted the question of goals by commissioning studies, preparing a full outline of the study and producing voluminous drafts. It was at this point that the full dimensions and substance of the study became clear.

It would have been possible for the U.S. delegate to CSTP to flag the study for attention and to arrange for consultation after the October, 1977, meeting. However, the postponement of consideration of policy questions by the Secretariat again played down the policy significance of the report, and hence the urgency of setting U.S. goals for the study. The possibility that the study might be redirected, or augmented to provide facts and analyses of special relevance to the United States was not explored.

5. General State Department Attitude Towards CSTP

The absence of a positive goal for the U.S. in connection with the study of transfer of technology no doubt reflects the relatively low level of U.S. involvement with all CSTP affairs. "Our commitment to the CSTP is significantly less than to many other parts of the OECD. We rarely cause difficulties in budget discussions, and usually make appropriately positive formal statements. This U.S. reserve is probably shared by most of the large countries." ^{1/}

The appropriate level and nature of U.S. involvement with CSTP is a central question for the future. For the purpose of this review, the existence of a tacit if not explicit policy of low involvement significantly influenced the attitude of the U.S. representatives on CSTP and the Ad Hoc Group.

6. Work Load and Turnover

While the OECD study of transfer of technology was being planned and carried out, the OES staff had to participate in a number of CSTP endeavors, many of which were of greater perceived importance than the transfer of technology project. Moreover, other aspects of the work of OECD had to be dealt with. At the same time, preparations for UNCSTD were consuming progressively more staff time.

Use of talent elsewhere in the Department of State was minimal. INR and IO would not ordinarily see such documents and did not in this case. EB saw some of the OECD material in response to a request. In view of the long involvement of parts of the Department of State other than OES with transfer of technology, it is reasonable to ask whether the existing procedures and customs relating to clearance of CSTP studies are adequate.

^{1/} Kovach, E.G., Op. cit., p. 23.

Recall that the U.S. representative on CSTP and the U.S. member of the Ad Hoc Group changed during the course of the study. This contributed to the difficulty of framing and presenting a consistent U.S. position, and of building the optimum rapport with executive agencies and interest groups concerned with transfer of technology. Greater continuity in staff assignments would have no doubt increased the effectiveness of staff work, and the possibility of setting goals that the U.S. sought for the study. However, the price that the State Department would have been required to pay to sustain staff continuity might have been greater than the gains that would have resulted from continuity.

7. Absence of Consultation with Management and Labor

Consultation by the Department of State on the transfer of technology study was with executive agencies. Short discussions with management and labor, which did not take place, would have uncovered topics of inquiry of great and shared concern to these key interest groups. (see Appendix A, p.) Attention to these specific shared concerns could have helped to establish U.S. goals for the study.

C. Consequences of Limited Goals

The consequences of setting limited goals were not particularly serious. More direct and sustained attention to the study might have resulted in an orientation more useful to the United States, but this is not certain. For example, the study might have produced an analysis of mechanisms used by other OECD governments to promote, monitor or limit transfer of technology to developing countries.

Consideration early in the study of the interrelationships among technology transfer and science and technology policy and other policies in developed

countries was explicitly postponed. Since it appeared that the study would not be particularly useful or harmful to U.S. interests, there was a low level of concern with the study in OES, elsewhere in the Department of State and in other executive agencies.

The Department of State did not feel impelled to use staff time for extensive discussions with other interested agencies, nor did the agencies feel that consultation with the Department of State on the study was urgent.

Inability to use the OECD study most effectively in connection with UNCSTD was one consequence of the absence of firm U.S. goals for the study. The potential utility of the OECD report in connection with UNCSTD evolved gradually as the U.S. and other countries saw developing an array of facts on such matters as the extent and nature of technology transfer and the attitudes towards transfer of technology of those in charge of the development and trade policies of developing countries. However, there was not an early considered review of the potential of the report, nor a deliberate effort to ensure that the relevant facets of the report would be given a priority ensuring their completion in time for UNCSTD. While the report will be useful in North/South dialogue, its full potential in connection with UNCSTD will not be developed.

The role played by the United States left undisturbed the custom by which the member states give very wide discretion to the Secretariat to design and carry out studies and has had significant consequences for the study of transfer of technology. The level and intensity of consultation and participation by Executive agencies, Congress, business and labor in the OECD study has been low or non-existent, in substantial part because the low policy content of the reports does not require high level attention.

This raises the point that securing greater agency participation in OECD affairs is not an end in itself, but a function of the goals sought by State and other departments in their dealings with OECD.

Finally, the U.S. defensive goals have had some positive consequences. State Department investment in the study in terms of staff time has been low. The study has not developed positions that threaten the United States, and it will produce some useful by-products. The burden on executive agencies of commenting on the study will be minimal and technical. Little time of senior staff has been absorbed because the study has thus far raised few if any matters which deserve their attention.

D. Positive Goals - Benefits and Costs

The United States could have established more deliberately considered positive goals for the CSTP study of transfer of technology. Four goals that might have been set can be recapitulated from the preceding sections:

- (1) Orientation of the analyses towards questions of current urgency in the United States, such as those noted above.
- (2) Early consideration of the policy issues raised for OECD countries by transfer of technology to developing countries. Recall that, with the concurrence of member countries, consideration of policy issues was deferred until the study was in the final stages.
- (3) Preparation of a report that would produce facts and analyses of maximum utility to the U.S. in connection with UNCSTD.
- (4) Adjustments in the developed countries to dislocation resulting from foreign competition.

The sectoral studies now in progress may well provide information on this point, and this will be useful to the United States. However, the United States did not undertake to shape the sectoral studies so that they would

answer questions of importance to the United States. The adjustment problem will be covered in the OECD report, Positive Adjustment Policies.^{1/} It will therefore deal with the subject originally considered as one of the core topics of the study of transfer of technology. How the Secretariat and U.S. representatives linked the two studies was not explored for this report.

More extensive consultation would no doubt have uncovered additional matters of current significance to business, labor, Congress and experts in the field. Discussions held in the course of writing this report made it clear that such consultation could have been easily arranged. Richard Seisman, Executive Director of the USA United Nations Association's Economic Policy Council (mentioned earlier) confirmed that he would be glad to have leaders in business and industry come to Washington to discuss the OECD study, and Frank Pollara, Deputy to the Vice President of the AFL-CIO, confirmed that representatives of labor would be glad to discuss the OECD study.

The point of this discussion is not to state what the U.S. objectives should have been, but simply to point out that rather precise and productive objectives could have been set without absorption of an inordinate share of staff time.

^{1/} Committee for Scientific and Technology Policy. Positive Adjustment Policies: Revised Draft Report to the Council. (Note by the Secretariat) Incidentally, the differences in style and approach between the report on Positive Adjustment Policies and the report on transfer of technology are striking. The Positive Adjustment Policy report is succinct, forceful, logical and pointed. The transfer of technology report has diametrically opposed characteristics. Among other things, this difference demonstrates that the OECD Secretariat has the talents required to produce reports of high quality. The problems with the transfer of technology report lie elsewhere.

Assuming for the moment that it would have been wise to set goals and to undertake to persuade OECD to act accordingly, what would then have been required of the State Department?

First, OES would have to determine the questions of high priority for the United States. This would have necessitated wider consultation inside and outside government early in the life of the project.

Second, the U.S. would have had to take a more positive stand at meetings of the Ad Hoc Group on the content of the study and on priorities, and to persuade other members of the Ad Hoc Group to agree that the topics proposed by the U.S. were also of high priority to them.

Third, the United States would have had to persuade other CSTP members to insist that draft reports be available to governments sufficiently in advance of the meeting at which they would be considered to allow for adequate review and consultation. One of the most significant problems created by late receipt of manuscripts for review is that reactions tend to be within the framework of the manuscript. Suggestions for improvement are often made and accepted. Experienced reviewers can spot weaknesses in drafts even if they must read manuscripts hastily and even though they cannot secure other opinions. For example, the Ad Hoc Group noted on the basis of a quick review of draft chapters the overly abstract character of the draft presented to them, and they advised that case studies based on actual experience be undertaken. However, some fundamental assumptions that should be analyzed often go unchallenged - for example, the decision to postpone study of policy alternatives.

Fourth, the United States would have had to persuade other Member countries and the Secretariat that attention should be concentrated upon

effects on member countries (not sectoral studies but effects on the entire economy) early in the study. The probability of producing a policy paper of the quality of Positive Adjustment Policies is markedly decreased by postponing drafting to the final stages of report writing. Such reports have to be carefully written by good people, carefully reviewed and rewritten. There is no assurance that early consideration of policy issues would have resulted in a high quality report, but the probability would be increased.

Policy recommendations in a study of this kind rest not only on the inquiries made for the study but on the sum total of knowledge, to which the study would add a small increment. They also rest upon realistic political considerations within and among countries, and upon interrelationships with other national policies. For these reasons, work on policy recommendations (including careful consideration of making any recommendations) need not wait upon completion of other segments of the study.

In addition, sound policy recommendations are difficult to prepare and require extensive discussions. Postponement of work on policy recommendations generates the possibility that time will be insufficient to permit the necessary maturing of the proposals with the result that recommendations can be reduced to a platitudinous least common denominator.

To do all of these things would have required the assignment of substantially more staff time to the transfer of technology project.

In total, it is reasonable to estimate that the equivalent of one third of the time of a senior staff member would have been required to carry out the tasks of analysis, consultation, explanation, and persuasion. It is easy to underestimate the time absorbed by activities of this sort. Given the staff situation of OES, it is by no means clear that the proper course would have been to assign the required staff resources to this project.

However, it does not appear that the question of whether more attention should be paid to the technology transfer project was considered in a deliberate way. Whether this would have been wise could have been determined early in the life of the project by more extensive consultation and by more thorough assessment of the U.S. position vis-a-vis OECD. With respect to OECD, such matters as the reaction of other Member nations to a stronger degree of direction to the Secretariat would have to be explored.

More extensive consultation would not have been inordinately time-consuming, and the skimpiness of consultation seems to be a deficiency in the handling of the project by OES.

If these steps led to the conclusion that a passive role was indicated for the U.S., then this course would have been selected deliberately rather than by drifting.

If careful review had led to the conclusion that a more active role was appropriate, an outcome which is possible in the light of the potential gains to the U.S. outlined above, means of enhancing U.S. participation in the project would have been required. It seems clear that some means of augmenting the capacity of OES staff would have been necessary. These options would have existed:

- 1) Shift OES staff time from other OECD projects to the transfer of technology project;
- 2) Increase OES staff available to work on OECD matters;
- 3) Use various devices, such as contracting for provision of background information, to economize on staff time and expand the capacity of the staff;
- 4) Draw more extensively upon the staff capabilities of State Department bureaus or other agencies;
- 5) Call upon management and labor to provide background to indicate questions of interest to them;
- 6) Shift responsibility for the study to another executive agency with continuing concern for and expertise in technology transfer.

Deciding which of these devices to use for which purposes, and dealing with those requested to help, would have required a modest investment of OES staff time, but more time than was actually allotted.

Whether any or all of these actions would have been taken involves management decision on which outsiders cannot pass competent judgment. But even with this disclaimer, it seems that each of the options would have been worthy of serious consideration if the general decision had been to establish more explicit U.S. goals and to follow through.

Finally, the question of the position of the U.S. with respect to the OECD study of transfer of technology tracks back to the general attitude of the Department of State towards technology in relation to foreign policy. On this point, an experienced observer has noted that:

"Considering the limitations on its staff resources (only a handful have advanced training and experience in technology) and the general lack of interest in technology matters that has been characteristic of State's leadership in the past, it is unlikely that OES - or any other organizational element of the State Department - can ever play a true leadership role in international technology-related policy making." 1/

While the judgment on the capacity of the State Department to exercise leadership in matters involving technology on the international scene may be pessimistic, the judgment on staff resources is certainly correct. One aspect of the work of OES on the OECD study of technology transfer that stands out starkly is the thinness of staff back up. The primary conclusion of this review is the need to concentrate on means of amplifying the capacity

1/ Granger, John V., Technology and International Relations (W.H. Freeman and Company, San Francisco, 1978), p. 181.

The limitations are actually on total staff resources and not on staff with advanced training and experience in technology. In the transfer of technology project, as with most OECD studies, what is needed is experienced staff with talent and experience in general administration and international affairs.

of existing staff by calling upon outside resources, and by shifting to others to the greatest practical degree all OECD chores which do not require continuing surveillance and direction by the staff of the Department of State. If this is not done, whatever potential there may be in CSTP activities - and indeed in all OECD activities - for the benefit of the United States will not be fully realized.

VII. Epilogue

While many parts of the study have been drafted, much remains to be done and the possibility of a more active and productive role for the United States remains. For example, in February 1979, the Secretariat asked for the first time that member countries submit information regarding legislation designed to regulate transfers of technology. This, as well as the sectoral studies, could provide information useful to the United States. It is possible, as often happens, that work in the final months of the study will produce a report of higher quality and relevance than seemed probable on the basis of early drafts. A first draft of a synthesis of the impacts on Member countries of technology transfer to developing countries will be submitted to the Ad Hoc Group for discussion in October. This is the report which should be seen well in advance, studied carefully, reviewed with consultants and commented upon deliberately.

Definitions, Background and Interest Groups

I. Background^{1/}

A grasp of the central concepts, quantities and issues involved in transfer of technology to developing countries is useful as background for examination of U.S. participation in the OECD study.

A. What is Technology?

The following description is a good one for the purpose of this report:

"No definition satisfactorily describes the combination of skills and rights embraced within the concept of technology. Technology involves patents, designs, and technical data; it also includes the ability to put things together, to make things work to develop and satisfy customers, and to maintain efficient operations and uniform quality. Technology is also the desire--institutional and personal--that does not rest at any given level of achievement, but continually searches for improvement. It is for this reason that attempts to misappropriate technology, or attempts to reproduce a product from a prototype, rarely work: at best they yield results that are obsolescent by the time they are operational.

Technology is property, in that it costs money to create, produces revenue for its owners, and in some forms

^{1/} This background provides information designed to give an interested person enough background to assess the potential nature and extent of the U.S. interest in the OECD study of transfer of technology, and to find experts in the field. The background is not intended to substitute for the excellent brief articles on the subject, and it is not intended to provide instant expertise on the subject. The staff of the Department of State cannot be expected to be professionally competent in the range of studies sponsored by the CSTP. It is more important that the staff be informed enough and adept enough to seek out advisors on specialized topics, and to use them effectively and economically.

can be bought and sold. Technology is also process, however, and attitude, and in the long run neither the creation nor the transfer of technology can be compelled. Whatever form it takes in particular instances, technology transfer is learning; it requires voluntary participation by both transferor and transferee, it requires time, and it requires a receptive environment. ^{1/}

Technology is often thought of as being embodied in machinery, and this is often the case. However, technology is also embodied in patents, and access to patented products and processes is often governed by licenses. Trademarks also embody technology. In practice, firsthand knowledge of the unwritten details required for successful exploitation of an industrial or agricultural process--know-how--is an element of technology. Finally, research and development are integral elements of the process of generating technology.

B. What Is Transfer Of Technology and How Is It Transferred?

Transfer of technology is for the purpose of this report the process of shifting technology from one nation to another. This comes about through a large number of processes:

- Exports generally embody technology, and for the United States a comparative advantage in high technology export goods makes international trade an important means of transferring technology if, as some maintain, exports do constitute a form of technology transfer.
- Direct investment in developing countries by foreign concerns is accompanied by transfer of technology to produce goods or services.
- Another device is production by firms in developing based on processes created elsewhere and made available under licenses.

^{1/} Technology Transfer and the Developing Countries, Chamber of Commerce of the United States, 1977, p. 3

- Consultants and management firms ordinarily from developed countries shift know-how to plants or farms in developing countries.

A large array of training efforts (licenses with intensive training features, training programs of multinational firms, engineering and management education in developing and developed countries) is involved because technology is ultimately transferred by trained people.

Many consider transfer of technology to be the generation of indigenous capacity to understand, critically assess, design and diffuse technology. Those who hold this view consider installation of complete plants (turnkey facilities) not as transfer of technology but simply creation of a producing unit.

C. How Much Technology is Transferred?

"Given the varying definitions of technology and technology transfer and the broad array of mechanisms through which technology can be transferred with varying degrees of effectiveness, there is no single set of records or statistics which mirrors the complete flow of technology to or from the United States." ^{1/} Nevertheless, data are adequate to establish the validity of three propositions. First, the volume of technology transferred is high. The Department of Commerce estimated book value of U.S. foreign

^{1/} Report of the President to the Congress Pursuant to Section 24 of the International Security Assistance Act of 1977. Printed for the use of the Subcommittee on International Security and Scientific Affairs of the House Committee on International Relations, 1979. P. 19.

direct investment stood at \$137 billion in 1976. U. S. receipts from licensing fees and royalties were \$2.1 billion in 1976. Second, the volume of technology transferred to developing countries is relatively small. Only \$29 billion in direct investment, or 20 percent of the total, was in developing countries. Only \$182 million, or 9 percent of the total, was paid in licensing fees and royalties by developing countries. Third, the relatively small volume of technology transferred to developing countries is nevertheless significant to them and to the developed countries, a matter to which the discussion now turns.

II. Transfer of Technology on the International Scene

Over the past several years, access of developing countries to technology on more favorable terms has grown to be a dominant theme in the continuing economic and political discussions between developed and developing countries.

Issues related to transfer to technology rank with such issues as oil and other commodity prices, tariffs and quotas and access to capital as subjects of intense polemics and negotiation in the fora where developing and developed countries hammer out their differences.

The developing countries at meetings of the U.N. and U.N. organizations (The Group of 77) state their conviction that the developed countries, primarily through the unfettered activities of multinational firms, are securing monopoly profits through exploitation while denying the developing countries access to advanced technology. They make the following specific allegations:

1. The developed countries withhold advanced technology to keep the developing countries in a dependent state.

2. Appropriate technology is an idea advanced by the developed countries to confine access by developing countries to second class or outmoded technology.

3. Most technology required by developing countries is proprietary or patented knowledge held by multinational private firms controlled from developed countries. The patent and licensing system, as well as internal accounting procedures, force developing countries to pay what they consider to be unfair prices for access to the technology and for products and services.

4. Multinational firms restrict access to know-how, design and maintenance by "bundling" technology and conducting R&D primarily in developed countries.

5. Knowledge is a commodity that should be fully available to all countries.

6. A compulsory code of conduct should be binding on all nations to do away with abuses such as those listed above.

The aspirations of the developing countries are embedded in the answers to questions such as these:

- How can they improve the terms on which they secure technology?
- How can they develop the expertise required to select, acquire, modify, use, and diffuse technology?
- How can they acquire or develop technology that will promote most effectively their national development goals?
- How can they use imported technology without becoming dependent on the suppliers of technology?

The developed countries tend to take a different position and face different questions. They stress these points:

1. The ability of developed countries to develop technology derives from their economic and political systems and their cultures.
2. Private enterprise, the profit motive, and proprietary rights are among the characteristics responsible for the capacity to develop and diffuse technology.
3. Multinational firms are the most important single mechanism for diffusion and adaptation of technology.
4. A central need of developing countries is development of the capacity to absorb technology. If this capacity exists, technology will be available. The developed countries are willing to help the developing countries increase their absorptive capacity.

Some of the goals sought by the developed countries are reflected in an effort to answer questions such as these:

How can the desire to help developing countries secure access to useful technology on better terms for them be reconciled with reluctance to interfere with multinational firms which typically wish to retain terms and conditions favorable to them?

How should developed countries react to the enhanced competitive capacity of developing countries--in substantial part as a consequence of transfer of technology to them?

How can developed countries secure the advantages of free movement of goods, services, and technology while avoiding the disruption that often accompanies this movement?

What is the proper balance between free flow of goods, with disruptive effects on some industries and their employees, and measures designed to cushion the social and economic impacts?

As developed countries transferred technology to developing countries they became increasingly concerned about the effects on their own economies. A number of circumstances elevated concern over this issue. These included

such factors as declines in productivity in some developed countries; startling and rapid expansions of the competitive position of some developing countries in areas of high technology as well as in "standard" or "mature" areas such as textiles and steel; inflation; the strong push on the part of the developing countries to secure technology on more favorable terms; balance of payments problems; and added costs of production to protect workers and the environment.

To make concrete the concerns of both labor and management over increased imports, these figures on domestic job losses because of imports are presented:

Estimated Declines in Job Opportunities in Selected
U.S. Import-Competing Industries Due to Increased Imports from LDCs
1964-1971

<u>Industry</u>	<u>Number</u>
Apparel	54,426
Rubber and Plastic Products	12,383
Leather Products	9,650
Primary Metals	25,479
Machinery (except electrical)	12,821
Electrical Equipment and supplies	78,490
Transportation Equipment	33,881
Other Industries	<u>78,007</u>
TOTAL	295,487

Source: "Foreign Trade and Domestic Aid", Charles R. Frank, Brookings Institution, 1977. p. 37. These figures are actually much less precise than they appear. An error of at least plus/minus 10 percent exists.

Given the perceived importance of technology by developed and developing countries alike, and given the sharp differences of judgment on the factors that limit the capacity of developing countries to acquire and use technology, the stage is set for a continuing intense debate. This issue is one of the focal points of discussion as the U.N. Conference on Science and Technology for Development approaches.

It was in this context of ferment in development doctrine and practice that OECD decided to undertake a study of the effects of transfer of technology to developing countries on the economies of the developed countries.

III. Knowledge and Opinion on Technology Transfer Issues in the United States

Both knowledge and opinion on matters related to transfer of technology are in a mixed state in the United States. Some facts are known, but there are wide areas of ignorance. There are even problems of definition. So far as attitudes are concerned, there are general areas of philosophical agreement but also sharp controversies on specifics. To put the discussion of United States activities relating to the OECD study of transfer of technology in the context of concerns in the United States, the current state of facts, analyses, and judgment is outlined below.^{1/}

1/ This recapitulation is drawn largely from these documents:

- (1) U.S. International Trade Commission, U.S. Department of Labor and U.S. Department of Commerce, Technology Transfer, A Review of the Economic Issues. 1978, (A study pursuant to Sec. 119 of P.L. 95-52).
- (2) Mintzes, J., Domestic Employment Implications of U.S. Technology Transfers to Developing Countries. Department of State, Washington, D.C., February 1979. (Prepared under contract number 1722-820150: N.S.F.);
- (3) The Effects of International Technology Transfers on U.S. Economy. Papers and Proceedings of a Colloquium Held in Washington, D.C., November 17, 1973; . . .
- (4) Science and Technology for Development. The U.S. National Paper for the United Nations Conference on Science and Technology Development, January 1979.
- (5) Technology Transfer and Developing Countries. Task Force on Technology Transfer, Chamber of Commerce of the United States. April, 1977. Contains an excellent bibliography.
- (6) Public Policy and Technology Transfer: Viewpoints of U.S. Business. Fund for Multinational Management Education, Council of the Americas. United States Council of the International Chamber of Commerce. 1978, Vol I.
- (7) A Program to Build America's Jobs and Trade in the Seventies. AFL-CIO, 1973. (The AFL-CIO is preparing a more recent comprehensive report on international trade and the domestic economy.)

1. There is no doubt that the transfer of technology to developing nations provides important opportunities and benefits to private business and industry in the United States. It enables them to expand their markets and to enhance their skills and experience through opportunities to address new problems and challenges in their respective fields, as well as to help developing nations meet serious needs for technological progress.

2. At the same time, concern has been raised within the United States that technology transfer can have adverse effects on domestic employment, as indicated in the job loss figures cited above. The concern is elevated by the fact that industries in which unemployment is generated tend to be those less able to compete internationally, and hence those that find it difficult to recoup their market positions. The specific plants that are affected often have work forces that are not well suited to retraining and relocation because of the relatively high age of the work force.

3. As contrasted with the specific losses of sales and jobs attributable to imports, the gains to consumers and to the entire economy resulting from relatively cheap imports are difficult to measure, and the gains therefore tend to be undervalued. On this point, a substantial portion of the OECD study is an investigation of technology transfer in three industries - the petrochemical industry, consumer electronics (T.V.) and rubber tires. A Secretariat note on the sectoral studies had this to say: "It must be remembered at the outset that the conclusions coming from sectoral studies cannot be extrapolated to industry or the economy as a whole."^{1/} The purpose

^{1/} Technology Transfer to Developing Countries, Note by the Secretariat. Sectoral Paper: Introduction and Sectoral Proposals. DSTI/Working Paper, Paris, November 24, 1978, p. 1.

of the sectoral studies was not to provide a basis for evaluating the total input of transfer of technology from developed to developing countries on the economies of the developed countries, but "to enlighten some of the changes taking place in the world economy."

4. Even if the general benefits from imports are accepted, there is also widespread acceptance of the idea that more effective adjustment mechanisms should be developed to avoid undue hardships for employees, owners and communities adversely affected by foreign competition. The 1962 Trade Adjustment Assistance Act is designed to serve this purpose, but it is widely regarded as ineffective because it tends to be reactive rather than anticipatory, because it does not provide effective incentives and aids for workers to secure new employment and because the program reacts slowly.

5. It is important to distinguish between the effects of imports on the domestic economy and the effects of transfer of technology to less developed countries on the domestic economy. Sometimes the two are confused. The impact of imports can be measured in a number of ways. However, it has thus far been impossible to measure the extent to which transfer of technology in itself contributes to the capacity of other countries--including less developed countries--to compete. So many other factors are simultaneously at work--exchange rates, tariffs and quotas, productivity of labor, relative factor prices, management and sales capacity and efficacy of quality control--that the effect of transfer of technology cannot be disentangled. Indeed, the problem may be unsolvable in quantitative terms, and reliance upon qualitative judgment may be the best that can be expected. This fundamental question was not addressed directly when the OECD study was being planned.

IV. Interest Groups and Policy in the United States

A: Interests of Business and Labor

Business and labor are the two institutional groups with the largest stakes in the domestic and foreign consequences of transfer of technology. It is not a newly discovered fact that business and labor are intensely interested in such matters as imports from foreign countries, export of high technology products, licensing of processes for offshore production, foreign direct investment, and protection of domestic industries and jobs. What is new is that attention to the effects of technology and innovation on all of these matters in an international context is at new levels of intensity.

Business and labor agree on some long-range generalities, such as the beneficial long-run effects of open markets on productivity, output, and jobs. However, they take sharply different positions on a number of issues such as the scope and kind of measures that should be adopted to ease the social consequences of newly competitive imports, and the relative economic and social desirability of domestic production for export as contrasted with offshore production under license.

The position of business is epitomized in this statement:

"The protection of technology by patents and by contractual agreements pertaining to its transfer from the private supplier to the user under mutually acceptable conditions has proven to be beneficial both to the creation of new technology and to its transfer to users in developed and developing nations. The existing system of commerce in technology is working and has led to cost-effective technology transfers to the developing countries. The case studies prepared for this project indicate the flexibility of the existing market-coordinated system and the many adaptations and adjustments that already have been made in response to the special needs of nations in various stages of development. Such continuing refinements in the existing free enterprise system are preferable to the creation of a regimented system of technology protection and transfer. No centralized system can cope equally well with the infinite diversity of the users and suppliers of technology.

"The development, adaptation, and transfer of technology are costly activities. Their cost cannot be eluded, and must be offset by incentives. These incentives are provided through the availability or the prospect of a profitable market in those cases where technology is transferred along with investment or by compensation which encourages the owner of technology to make it available to others under license or by sale.

"The effectiveness of technology transfer is greatly dependent on the capability of the user to absorb it. The availability of skilled personnel and physical facilities is second only to the market in attracting foreign technologies and encouraging local research and development activities.

"The legal, political, and economic environments of both supplier and receiver countries are critical variables that inhibit or promote technology transfer and development.

"Finally, it is obvious that there is little precise information available to determine the consequence of international transfer of technology process. It is thus hard to evaluate whether certain kinds of transfer are detrimental or beneficial to developing and developed countries." ^{1/}

Labor, on the other hand, places primary emphasis on protecting domestic production and jobs. "Organized labor as represented by the dominant AFL-CIO has switched its allegiance from liberal trade to virulent restriction, concretely in support of the Burke-Hartke bill calling inter alia for import quotas on virtually all industrial goods, designed to reduce imports substantially (by about one-third) from existing levels and to assure that imports grow no more rapidly than domestic demand, product by product, exporter by exporter."^{2/} (The Burke-Hartke bill would have established specific

^{1/} Fund for Multinational Management Education, Council of the Americas, United States Council of the International Chamber of Commerce. Public Policy and Technology Transfer, Viewpoints of U.S. Business. Vol. 1, Overview and Policy Considerations. (Washington, D.C., 1978) pp. 5,6,26.

^{2/} Cooper, Richard N., "Trade Policy to Foreign Policy." Foreign Policy. No. 9, Winter 1972-73, p. 29.

controls over the outflow of technology in order to prevent the "export of jobs".)

Moreover, labor complains that the export of capital and technology rather than products results in the loss of jobs and hence the loss of national income from domestic production. Labor holds that sale of technology may eventually reduce the income and incentive for funding technological innovation in the U.S. and contribute to an erosion of U.S. technological leadership. It may also contribute to the creation of foreign rivals which subsequently compete with U.S. products in both export and home markets.^{1/}

In spite of the differences between business and labor on many issues relating to transfer of technology, both parties recognize the importance of continuing discussion of issues in the international trade area--including transfer of technology. Moreover, they agree that more information on the extent, nature and mechanisms for transfer of technology, and on the effects of transfer is needed.

There are organized fora for these discussions which have provided one of the few fora for face to face high level discussions. One is the Economic Policy Council of the United Nations Association of the United States. The chairman of the Council is Robert O. Anderson, President of the Atlantic Richfield Company. The Vice Chairman is Douglas A. Fraser, President of the United Auto Workers.

^{1/} AFL-CIO, A Program to Build America's Jobs and Trade in the Seventies. (Washington, D.C., 1973), p. 11. It is interesting that no comparable current statement of the position of labor exists. Such a statement would not be markedly different from the 1973 version.

B. Executive Agency Interests

A number of executive agencies must, by reason of their missions, be concerned with international trade and, within the broad field, with issues raised by transfer of technology.

The pervasive significance of technology in international affairs has forced the Department of State to become involved with this area for years. In the first half of the 1970s, concerns and opportunities generated by technology became more pronounced elements of foreign policy. In 1974 and 1975, Secretary of State Henry Kissinger made these statements: "Science and technology are becoming our most precious resources... . Technology is a valuable and saleable national asset... . America's ability to contribute money and run the world in the old-fashioned way of the 1950s and 1960s is now over. What we can contribute--and what the world wants--is our technological capability."^{1/}

Technology transfer poses a subset of issues within the broader set of technological issues. On a relatively small scale the technology transfer issues encompass most if not all of the problems faced by the Department of State in securing informed judgments for the formulation of positions on the many areas where science and technology intersect foreign affairs. The three executive agencies in addition to the Department of State that have the most direct interest in technology transfer issues are the Department of Commerce, the Treasury Department and the Department of Labor.

In addition to State, the executive agency principally concerned with the transfer of technology to developing areas is the Department of Commerce. There the Assistant Secretary for Science and Technology is

^{1/} Quotations from Nau, Henry H., Technology Transfer and U.S. Foreign Policy. Praeger Publishers, Washington, 1976, p. 1.

concerned with the various policy aspects of the issue, the Assistant Secretary for Industry and Trade Administration with the terms of transfer of such technology and the impact on U.S. industry, and the Bureau of Economic Analysis with data questions.

The Treasury Department has interests in OECD activities because they deal, among other things, with international trade policies, international flows of goods, services and information, barriers to trade and national adjustments to international competition. However, the Treasury Department has little interest in the work of CSTP.

While only slightly involved with CSTP, the Department of Labor is concerned with numerous other OECD activities that have implications for employment, income, and welfare.

The National Science Foundation conducts research and analyses that parallel many of the fields of inquiry pursued by CSTP such as the effect of the transfer of technology to LDCs on the U.S. economy. However, State Department consultation with NSF on technology transfer has been noticeably skimpy.

This web of departmental interests in OECD affairs is well known to the Department of State, and an extended description of it is not called for here.^{1/}

^{1/} The nature and degree of involvement of the Office of Science and Technology Policy in OECD and CSTP matters raises questions that cannot be answered in the context of the study of transfer of technology. They are discussed in the overall report of this project. Kovach (op cit. p. 44) believes that a supra-agency leadership role, perhaps exercised by OSTP, is necessary if the government of the United States is to organize itself to take full advantage of the potential benefits of CSTP membership. The author of this report believes that such an OSTP role is not desirable because OECD S&T affairs are peripheral to the central OSTP tasks.

C. Congressional Interests

Since business and labor are both politically powerful, their interests in transfer of technology have been reflected in rising Congressional interest. Representatives of both business and labor have testified before numerous committees over the past few years. The most recent expression of Congressional concern resulted in a comprehensive Presidential study of government policies and practices with respect to the national security and military implications of international transfer of technology.^{1/} This study was mandated by Sec. 24 of the International Security Assistance Act of 1977. The Chairman of the House Subcommittee on International Security and Scientific Affairs, Clement Zablocki, requested the Congressional Research Service of the Library of Congress to prepare a study which would identify further the range of issues and problems relating to international technology transfer as background for the mandated Presidential study.^{2/}

Sec. 119 of the International Security Assistance Act of 1977 (P.L. 95-52) also mandated a study of the economic issues generated by transfer of technology. This report, Technology Transfer: A Review of the Economic Issues, was prepared jointly by the International Trade Commission, the

1/ Subcommittee on International Security and Scientific Affairs. House Committee on International Relations. International Transfer of Technology. Report of the President to Congress Together with an Assessment by the Congressional Research Service (Committee Print), 1979.

2/ Subcommittee on International Security and Scientific Affairs. House Committee on International Relations. International Transfer of Technology: An Agenda of National Security Issues. Congressional Research Service, 1978.

Department of Commerce, and the Department of Labor, and issued in June 1978.

D. United States Policy

The Carter Administration is amply on record as favoring scientific and technological cooperation with developing countries. The President has made these statements, among others:

"The United States has an opportunity and responsibility to share scientific knowledge and appropriate technological skills with the developing world. Our purpose is to assist other countries in developing technology for their own needs. We must accomplish this purpose both for humanitarian reasons and because overcoming the problems of poverty, overpopulation and scarcity of food and natural resources, will promote a stable world, enhancing our own security and well being."

Message to Congress, March 28, 1979.

"One of the most important purposes of international cooperation in technology and science is to meet the developing needs of the poorer countries of the world. The future of the advanced countries is increasingly tied up with that of the developing world. Yet, only about one percent of the world's civilian research and development is devoted directly to the problems of the poorer half of humanity - problems such as poverty, disease, hunger, education and resource development."

Message to the National Academy of Sciences
April 23, 1979.

The Secretary of State, Cyrus Vance, has made this statement:

"Despite severe economic pressures, the United States remains committed to making international trade fairer for developing countries and to encouraging the transfer of resources and technology to these countries. The United States intends to concentrate on...increasing the capacity of the developing countries to obtain and apply the knowledge and technology they need."

New York Times, March 30, 1979.

The President's Science Advisor, Frank Press, has made this statement:

"International technology transfer already has its impact on every major issue today - world peace, global resources and the global environment, hunger, health and economic development"

International Symposium on Science, Inventions and Social Change. Report of Panel Discussion. General Electric Com-

Finally, the U.S. position paper, Science and Technology for Development, United Nations Conference, 1979, took a clear position on the desirability of U.S. action to strengthen the capability of developing countries in science and technology, on the desirability of enhancing the flow of technology to them, on criteria for effective transfer of technology and on principles that the U.S. believes must underlie transfer of technology.

These statements combined provide general guidance for any action that the United States may take as the OECD study of transfer of technology enters its final phase although many important specifics are missing - such as conditions of transfer and U.S. action when foreign competition hurts specific industries. However, not even this general guidance existed in 1976 and 1977 when the OECD study plan was being evolved, and this may have contributed to the absence of a carefully thought out U. S. position on the proposed study.

CSTP Discussion - A RecapitulationJune 1976 (14th Session)

The Committee agreed that one major direction of analysis should be to study the implications of accelerated transfer of technology towards developing countries for member countries R&D organization, financing and technology strategies, and requested the Secretariat to present at the next meeting detailed proposals on how to study this issue.

(CSTP Summary Record [STP/M(76)27], 14th Session, June 1976)

October 1976 (15th Session)

No mention

February 1977 (16th Session)Technology Transfer to Developing Countries, Impacts on OECD Member Countries and Implications for Science and Technology Policies

The Committee agreed that the first phase of the study proposed in document SPT(76)45 should be undertaken, but considered that presentation of this document should be revised to take into account the various views expressed during the discussion, and in particular the need to consider technology transfer in the more specific and yet broader and more balanced context of the mutual interests of developing and industrialised countries and its implications for science and technology policies of Member countries.

(CSTP Summary Record [STP/M(77)17])

June 1977 (17th Session)Technology Transfer to Developing Countries: Impacts on OECD Member Countries and Implications for Science and Technology Policies

The Committee approved document SPT(76)45 (1st Revision) with the understanding that the Secretariat would take into account the views expressed during the discussion, and in particular:

- (i) the remark by the Delegate of the United Kingdom concerning the importance to be given to in-depth studies of selected sectors where successful industrialisation has affected the international competitiveness of OECD countries;
- (ii) the suggestions by the Delegate of Denmark that due account be taken of the mutual benefits of technology transfer for both developed and developing countries, and that the implications for science and technology policies be mentioned more explicitly in the outline of the Study.

(CSTP Summary Record [STP/M(77)27])

October 1977 (18th Session)

Technology Transfer to Developing Countries -
Implications for Science and Technology
Policies

The Committee noted the report on the progress of this activity contained in document SPT(77)17 and agreed to set up as quickly as possible an Ad hoc Group on Technology Transfer to Developing Countries, under the Chairmanship of Mr. Turpin (France), whose tasks would be to:

- (i) comment on the general outline and timetable for the study;
- (ii) assist and advise the Secretariat with regard to sectoral studies; and
- (iii) comment on a draft report for final revision prior to its submission to the Committee.

(CSTP Summary Record [STP/M(77)37])

March 1978 (19th Session)

The Committee noted an oral report by Mr. Turpin on the progress of the work of the Ad Hoc Group on Technology Transfer to Developing Countries. (p. 51)

(CSTP Summary Record [STP/M(78)17])

June 1978 (20th Session)

The project was not discussed, but was in the work plan presented to CSTP.

October 1978 (21st Session)

The Committee took note of the Secretariat report which recorded progress on items not discussed at the meeting.

February 1979 (22nd Session)

The Committee took note of activities, including the technology transfer project, which were not discussed but which were in the progress report of the Secretariat.

Interviews

These interviews were conducted for two purposes. The first was to secure information on the substance of issues in transfer of technology. They did uncover a spectrum of views, analyses of facets of the problem and leads to data and studies. The second purpose of the interviews was to determine how difficult it would be to (1) gain access to informed people in various key spots and to available data and studies, and (2) to secure the participation of appropriate people in consultation on the OECD study of transfer of technology. It is clear from this sampling that there is a loosely linked group of people in the government (executive and legislative), in universities, in private research firms, in business and in the labor movement, who constitute the nation's store of expertise on this issue. It is also clear that a modest investment of time - a week or so - would be adequate to gain access to people and data in enough depth to provide background for the development of alternative policy positions for the Department of State on the OECD study of transfer of technology. Digesting the meaning of interviews and studies might require an additional two or three weeks.

Finally, it is clear that most members of this group of informed people know about the OECD study in only the vaguest terms, or not at all, and that they are, upon learning of the study, keenly interested in it.

A. Government - Congress

1. Congressional Research Service

Franklin P. Huddle, Senior Specialist, Science and Technology
Walter Hahn, Senior Economist, Science Policy Research Division
Warren Donnelly, Senior Specialist, Senior Specialist Division
Genevieve Knezo, Senior Analyst

2. Office of Technology Assessment

Henry Kelly, Director, International Technology Studies
Ronnie Goldberg, Chief, Technology Transfer Branch

3. Congressional Staff

Dr. John Holmfeld, Science Consultant, Subcommittee on Science,
Research and Technology, House Committee on Science and
Technology

Ivo J. Spalatin, Staff Director, Subcommittee on International
Security and Scientific Affairs, House Committee on Inter-
national Relations

B. Government - Executive Agencies

1. National Science Foundation

Rolf R. Piekarz, Division of Policy Research and Analysis

2. Department of Statea. O.E.S.

George Kovach
 Frank Kinnelly
 Jacob Blackburn

b. Office of the Coordinator for the U.N. Conference on
 Science and Technology for Development

James Stromayer
 Simon Bourgin

3. Department of Commerce

Frank Weil, Assistant Secretary for Industry and Trade
 Albert Small, Office of the Assistant Secretary for Science and
 Technology.

4. Department of Labor

Donald Avery, Special Assistant to the Deputy Undersecretary;
 Departmental Coordinator for OECD Matters

C. Labor - AFL-CIO

Frank Pollara, Deputy to the Vice President

D. Business

Dr. Stuart Flaschen, Vice President, ITT
 Dr. Jacob E. Goldman, Sr., Vice President, Xerox Corporation
 Harvey W. Wallender, Managing Director, Council of the Americas
 Donald Guertin, Senior Planning Advisor, Public Affairs Dept.,
 Exxon Corporation

E. Independent Research Organizations

Arnold Kramish, Research and Development Associates
 Jack Baranson, President, Developing World Industry and Tech-
 nology, Inc., 919 18th Street, Washington, D. C.

F. United Nations Association of the U.S.

Roger J. Cochetti, Washington Representative, United Nations Assoc.
 Richard Seisman, Executive Director, USA-UNA Economic Policy Council

G. Universities

Oswald Ganley, Harvard University

A REVIEW OF THE OECD STUDY

**GOVERNMENT POLICIES AND FACTORS
INFLUENCING THE INNOVATIVE CAPABILITY OF
SMALL AND MEDIUM ENTERPRISES**

Prepared by

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Graduate Program in Science, Technology, and Public Policy
The George Washington University**

November 1979

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I. Introduction

It is widely believed in the OECD member countries, including the United States, that small firms have played a key role in industrial innovation-- a much greater role than their relative share of the overall economy would imply. It is further believed by many observers of science and technology policy that the innovative capacity of such firms is diminishing as a result of factors in the current economic context, and that this is a problem that requires special attention from governments. The OECD project on "Innovation in Small and Medium Firms" is intended to provide information that will help member governments in dealing with this problem. Although the project has been under discussion at OECD for more than two years, the work plan was only approved in late January 1979 and the final report is not expected to be ready until late 1980. This paper examines the nature and purpose of the project, its history and development, and the U.S. role in it. It is preceded by an examination of the nature of the small firm/innovation issues in the U.S. context, and it concludes with some preliminary observations on the potential utility of the project to U.S. interests. Because this is a relatively new project on which work has not yet progressed very far, attention here is focused on U.S. involvement in the shaping of the study design and on the development of U.S. attitudes toward the study.

result, and the overall health of the economy worsens. Government policies, which force more and more industrial R&D into a defensive mode to meet the requirements of new regulations (in, for example, environmental protection), and which fail to provide proper incentives for investing in R&D and exploiting the results, exacerbate the situation. Meanwhile, in the realm of international trade, U.S. technological superiority regarded through the 1950's and 60's as the key source of U.S. economic strength, is being challenged on many sides, particularly by Japan and West Germany. Future American dominance in such fields as computers, other areas of microelectronics, aviation, telecommunications and pharmaceuticals is no longer a foregone conclusion.

This economic situation has been developing for at least a decade, but the emergence of industrial innovation as a subject of national policy attention--highlighted by the government-wide Domestic Policy Review (DPR) ordered last year by President Carter--has only come about in the last couple of years. The increasing severity of the economic problems described above and the desire of federal policymakers to get a politically viable handle on them are primary factors behind the growing interest in industrial innovation. There are other threads to the policy as well, however. Some are drawn from the changing framework of the R&D policy.

R&D and innovation are far from synonymous. In fact, R&D is regarded as one of many diverse inputs into a process of which innovation is the output. But, particularly in the realm of government policy, it is often easier to see and measure inputs than outputs, and so attention tends to focus on them. As national expenditures for R&D, both by government and the private sector,

grew rapidly through the 1950's and 60's, their public and political visibility grew in proportion, and pressures on the institutions involved to show tangible results increased. Growing public skepticism about the presumed beneficence of science and technology and a shift in national priorities from space and national security to domestic, social goals also helped foster this utilitarian perspective for R&D. In what has been called the "moon-ghetto" syndrome, the dramatic accomplishments of high technology programs, particularly in space, became yardsticks with which to measure the failures of earth-bound efforts: "If we can put a man on the moon, why can't we solve the problems of the cities", etc. The early 1970's saw growing federal interest in an enlarged role in civilian technology, marked by such efforts as the State Technical Services Program in the Commerce Department, the Nixon administration's abortive New Technology Opportunities Program, the NSF Experimental R&D Incentives Program, and the Commerce Department's Experimental Technology Incentives Program.

Other threads of policy development come from indicators of industrial R&D and innovation. Apart from the general economic ills already noted, there have been a variety of other signals. Industrial R&D expenditures, regarded as the basis for much (but not all) of the innovation that takes place in industry have declined somewhat (in constant 1972 dollars) during the 1970's, reflecting declines in federally-funded industrial research combined with relatively small increase in expenditures by industry itself. Total expenditures for industrial R&D in 1969 (in constant 1972 dollars) were \$21.1 billion, including \$11.4 billion in industry funds and \$9.7 in federal funds. In 1976, the total was \$19.8 billion with \$12.2 billion coming from

industry itself and \$7.6 billion from the federal government. Basic research in industry, with both federal and industry funds, has declined considerably since peaking in the mid-1960's, from \$813 million in 1966 to \$579 million in 1976 (constant 1972 dollars)². In the meantime, as reported in Science Indicators 1976, the number of U.S. patents granted per year to U.S. inventors has declined steadily since peaking in 1971, while the number granted to foreign inventors has increased almost every year since 1963³. There are problems with such measures--for example, the fact that many significant inventions are not patented at all but protected through industrial secrecy--and the Science Indicators analysis of innovation rates is subject to some question. Nevertheless, quantitative data, such as that in Science Indicators, have been repeatedly cited and reinforced by spokesmen for the industrial R&D community in statements decrying the worsening climate for industrial R&D⁴.

Government policies affect the climate for industrial innovation in various ways. Direct government expenditures for R&D and demonstration programs in areas relevant to the civilian market are one obvious influence. Government expenditures for basic research and purchases of new technologies for government use can have less direct, but still important effects. As noted above, a key current complaint of industrial spokesmen relates to the negative

² See National Science Board, Science Indicators 1976 (Washington, USGPO, 1977), Tables 3-16, 4-1.

³ Ibid., p. 109-113.

⁴ See, for example, National Science Board, Science at the Bicentennial (Washington, USGPO, 1976); U.S. House of Representatives, Committee on Science and Technology, Selected Readings on Research and Development Expenditures and the National Economy (Washington, USGPO, 1976); and "Vanishing Innovation", op cit.

impact of government regulation--environmental, industrial health and safety, anti-trust--on innovation. Government fiscal and monetary policies, through their influence on the investment climate, also influence innovation. Similarly, provisions of tax laws, for example as they relate to the treatment of industrial R&D expenditures, are also believed to affect innovation rates.

All of these are examples of government actions which may be undertaken for reasons not directly related to an interest in the rate of industrial innovation, but which may have profound effects on that rate. Viewed from the perspective of government concern with industrial innovation, changes in such policies (and others) can become tools with which government can consciously intervene to promote innovation. Recent U.S. interest, inside and outside of the federal government, has focused on developing an awareness of the effects of existing policies and looking for additional forms of intervention which might be employed by government. A study conducted last year for the Office of Technology Assessment by the MIT Center for Policy Alternatives attempted to analyze the impacts of government actions on the innovation process in several U.S. industries and also made some comparisons with the experiences of other industrial nations.⁵ The report groups U.S. programs relating to technological innovation into thirteen broad program areas, shown below in Table 1. Each of these areas may be dissected into numerous specific potential interventions, ranging from exemption of joint R&D programs from anti-trust regulation, to diffusion programs for R&D from government laboratories, to investment tax credits.

Despite publication of the MIT report, despite other studies of a similar

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A summary of the study report may be found in J. Herbert Hollomon and Members of the Center for Policy Alternatives, M.I.T., "Government and the Innovation Process," Technology Review, Vol. 81, No. 6 (May 1979), pp. 30-41.

Table 1

Types of U.S. Programs Relating
to Technological Innovation

Technology Assessment	1	The assessment of new and existing specific technologies
Direct Regulation	2	Direct regulation of the research or development of new products and processes
	3	Direct regulation of the production, marketing and use of new or existing products
Enhancement of Technology	4	Programs to encourage the development and utilization of technology in and for the private goods and services sector
	5	Government support of technology for public services where consumers are the primary users
	6	Support for the development of technology where the federal government is the primary user
Support of Infrastructure	7	Support for the science base necessary for the new technology
Industry and Labor Market	8	Policies to affect industry structure which may affect the development of technology
	9	Policies affecting supply and demand of manpower resources having an impact on technological change
Domestic Economic and Foreign Trade Policy	10	Economic policies with unintended or indirect effect on technological innovation
	11	Policies affecting international trade and investment
Consumer and Worker Demand	12	Policies intended to create shifts in consumer demand
	13	Government policies responding to worker demand having impact on technological change

Source: J. Herbert Hollomon and Members of the Center for Policy Alternatives, M.I.T., "Government and the Innovation Process," Technology Review, Vol. 81, No. 6 (May 1979), p. 33.

nature, and despite completion of the Domestic Policy Review of innovation (which, as of this writing, has not yet been released by the White House), there is little evidence of a consensus in the national political arena as to what, if anything, the federal government ought to do with respect to industrial innovation. An authoritative study (including one by OECD), were it either to contradict or to reinforce the conclusions of the DPR and other U.S.-based studies, has the potential for making an important contribution to U.S. policy-making.

III. Small Firms and Innovation

On the surface, there is reason to believe that larger firms possess special advantages in respect to the industrial innovation process.⁶ To the extent that innovation is based on R&D, large firms, by virtue of economies of scale, are generally capable of mounting much more substantial R&D programs than smaller firms. Large firms, in addition, have easier access to the capital needed to exploit a new product or process and most have in place marketing structures that facilitate product dissemination. Nonetheless, those who have looked closely at the industrial innovation process have uncovered a considerable body of evidence that suggests that small firms are responsible for a disproportionately large share of industrial innovations. The reasons for this phenomenon seem to derive from the entrepreneurial behavior of small firms, their greater willingness to take risks, and their lack of ties to and vested interests in existing products and markets.

Much of the evidence supporting these beliefs is drawn from studies conducted

⁶
For a classic statement of this view see Joseph A. Schumpeter, Capitalism, Socialism and Democracy, 3rd ed. (New York, 1950).

in the United States and the United Kingdom. Probably the best known and most influential work is John Jewkes' The Sources of Invention.⁷ Jewkes examined case histories of 61 important 20th century inventions and concluded that about two-thirds originated outside of large firms. The difference between invention and innovation (as discussed above) is often overlooked by those who cite Jewkes, however. Jewkes examined inventions, as his title implies, not innovations. Beyond Jewkes, a variety of other studies have indicated that small firms contribute disproportionately to industrial innovations, particularly more radical ones.⁸ In Britain an official "Committee of Inquiry into the Small Firm", known as the Bolton Committee has lent support to the notion. Further weight was lent to the idea by a U.S. government study conducted in the mid-1960's. The report of this study, known as the "Charpie Report" is widely cited on the subject of small firms and innovation.⁹

None of these studies, of course, suggest that small firms are more prolific sources of innovations under all circumstances and in all industries. Freeman points out, for example, that there is a very strong correlation between capital intensity in an industry and the small firm share of innovations in that industry. In the most capital intensive industries, few important innovations seem to arise from small firms, while in industries of low capital intensity, small firms account

⁷ John Jewkes, David Sawers, and Richard Stillerman, The Sources of Invention (New York: W.W. Norton and Co., Inc., second edition 1969).

⁸ See, for example, Daniel Hamburg, R&D: Essays on the Economics of Research and Development (New York: Random House, 1966); Edwin Mansfield et al, Research and Innovation in the Modern Corporation (New York: W.W. Norton and Co., Inc., 1971); Science Indicators 1976, Ch. 4.

⁹ U.S. Department of Commerce, Panel on Invention and Innovation, Technological Innovation: Its Environment and Management (Washington, USGPO, 1967); see esp. pp. 16-18.

for a large share of innovative output.¹⁰ Studies of Abernathy and Utterback and others, suggest that industry structure and the role of small firms both change substantially with the stage of development of a particular product technology.¹¹

Much of the American literature on the subject of small firms and innovation focuses on the small technology-oriented company; the electronics and scientific instrument firms that line Route 128 outside of Boston are prototypes.¹² Government concerns and policies relating to innovation in small firms seem to be particularly responsive to the needs and conditions of this type of firm.¹³ In many European nations, the flavor of concerns with small firms is somewhat different; it is based in part on an appreciation of the social and political roles of small firms and on a resistance to the kind of cultural homogeneity associated with "big business"--including of course American-based multinational corporations.

In view of the key role of small business in the innovation process suggested by the literature, it is perhaps a bit surprising that there has not been more emphasis placed on small business in the current U.S. policy discussions of innovation. Small business was not singled out for special concern in the presidentially-mandated Domestic Policy Review. Each of the seven subcommittees of the 150-member Industry

¹⁰ Christopher Freeman, Innovation and Size of Firm, Science Policy Research Centre, Occasional Paper No. 1 (Brisbane, Australia: Griffith University, 1978).

¹¹ W.J. Abernathy and J.M. Utterback, Innovation and the Evolution of Technology in the Firm, (Cambridge, Mass: Harvard Business School, 1976) and Dennis C. Mueller and John E. Tilton, "Research and Development Costs as a Barrier to Entry", Canadian Journal of Economics, Vol. 2 (Nov. 1969), p. 570.

¹² E.B. Roberts and H.A. Wainer, "New Enterprises on Route 128", Science Journal (December 1968).

¹³ See the "Charpie Report" cited above.

Advisory Committee, however, included at least one executive from small business. These individuals got together on their own and prepared a 27-page supplementary report (not a dissent) concerning the specific impact of federal policies on innovation in small business and how such policies might be revised to stimulate innovation in this sector.

Small business concerns have also been traditionally important in Congress and discussions of innovation have also taken place in that body. The House and Senate Small Business Committees held two days of joint hearings on "Under-utilization of Small Business in the Nation's Efforts to Encourage Industrial Innovation", in August of last year. The hearings, which featured testimony from a wide range of Federal science and technology officials, as well as small business advocates, resulted in identical House and Senate reports. The reports did not make legislative recommendations, but instead focused on encouraging the Administration to give proper weight to small business in the course of its Domestic Policy Review.

There is a tendency in all this to see the small business perspective on innovation as an interest group matter--a form of special pleading by the members of this sector. The interest group, formally represented in Washington by the National Small Business Association, has in fact recently asserted its position on innovation in a published report calling for the Federal government to take greater account of its special contributions and special needs.¹⁴ The interest group character of the policy process is probably reinforced by the role of the Small Business Administration, which maintains an Office of Advocacy, headed by a chief counsel for advocacy. That office issued a report on Small Business and Innovation in July 1979,

¹⁴
Eric P. Schellin, Esq., Small Business Views with Regard to Invention and Innovation (Washington, D.C.: National Small Business Association, n.d.)

containing an analysis and a series recommendations for enhancing the role of small business in innovation.

IV. The OECD Project

A. Origins

The project on Innovation in Small and Medium Firms derives from OECD's general concern with trade and industrial policy, and within that, from the interest of the OECD Committee for Scientific and Technological Policy (CSTP) in the role of science and technology in policymaking. Concerns with industrial R&D and its relation to economic growth are prominent throughout the organization's science policy documents dating back to the mid-1960's. Consideration of the special problems of small and medium-sized enterprises can be traced back at least to 1969, when the Industry Committee conducted "a short written inquiry to governments" on their assessment of these problems and the efforts undertaken to deal with them.¹⁵

At its 17th session (24-25 May 1977), in response to an initiative from the Dutch delegate, supported by delegates from several other smaller European nations, the CSTP agreed to initiate a study of "Government Policies and Factors Influencing the Innovative Capability of Small and Medium Enterprises" as part of its 1978 work program. Seventeen man-months were allotted to the effort during 1978. The object of the study was defined as follows:

The purpose of this study is to present an updated assessment of the place of small and medium enterprises as purveyors and/or

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Problems and Policies Relating to Small and Medium-Sized Business, analytical report drawn up by the Industry Committee, OECD, 1971. Cited in OECD document SPT (78)11, p. 1

utilisers of new technologies and of the degree of effectiveness of government policies aimed at assisting this category of companies. Special care would be given to evaluating the impact of such government policies and measures aimed at strengthening the innovative capacity of firms in situations marked by adverse economic conditions and by restrictive macro-economic, demand management policies.¹⁶

In response to this CSTP action, the OECD Secretariat, with the help of the Staff Group for Strategic Surveys of TNO (Netherlands) prepared a proposal for implementation of the study (not a work plan) which was presented to the CSTP and approved at its 20th Session, 31 May - 1 June 1978.¹⁷

B. Conceptual Basis of the Study

The Secretariat's proposal was mainly devoted to surveying what it believed to be the key issues in the field and suggesting the outlines of a study that would address these issues.¹⁸ Since it represents the major conceptual basis for the study, the proposal merits careful attention here. The discussion incorporated literature and policy initiatives which deal both with the population of small firms in general and with the group of small, new technology-based firms. It noted the difficulties in defining precisely what is meant by the term "small industrial firm", and some of the conceptual issues raised in this connection.

The paper then reviewed two types of policy arguments for government support of small industrial firms. The first type, general policy arguments, are those which consider small and medium firms as worthy of special government concern because of their unique social and political contributions as well as their value to the economy. The second type, scientific and technological policy arguments,

¹⁶ SPT(77)11, para. 33, cited in SPT(78)11, para. 1

¹⁷ SPT/M (78)2

¹⁸ SPT(78)11

are those which focus on the role of such firms in the innovation process.

Included among the general policy arguments were:

(1) that the distribution of economic power through small firms has positive effects on political and social stability;

(2) that the presence of small firms spurs competition and guarantees a more dynamic market;

(3) that small firms complement and help support large firms in a kind of economic "hinterland";

(4) that small firms are better able to cater to individual tastes and help maintain cultural richness in the marketplace;

(5) that small firms provide a buffer to sharp fluctuations in employment; and

(6) that the environment of small firms provides a higher quality of working life.

Among the scientific and technological arguments were:

(1) that small firms complement large ones through their special ability to produce radical innovations;

(2) that small firms form "a genetic pool from which the successful techno-economic combinations of the future will be selected" [emphasis in original];

(3) that "an industrial structure marked by the presence of small high technology firms may...be considered to be simultaneously the cause and the consequence of product lines in the fluid stage of development";

(4) that small firms have a higher innovation rate per dollar of R&D expenditure than large firms.

The proposal reviewed the findings of studies which suggest that the contribution of small firms to innovation is quite different in different branches

of industry and is related to the share of small firms in the overall net output of the industry. It also noted the possible difference in the role of small firms depending on whether a country is first in the market in a new area of technology, or whether it follows later. After a brief examination of the process of innovation and the three inputs required (information about demand, information about technical feasibility, and investment funds) and an examination of the handicaps suffered by small firms in this process, the paper looked at the major government programs relevant to innovation and assessed them in terms of the three inputs. These government programs include: technical information (e.g. technology transfer, university-industry liaison offices); demand information (e.g. market research, procurement); and investment funds (e.g. development credit, tax breaks).

All of this led up to an implementation proposal comprising two major elements. The first, an updated assessment of the place of small firms in relation to innovation and related questions, was to be a cross-national comparison, based partly on secondary analysis of existing statistical data and partly on the collection of new data. It included:

- (1) a review and extension of studies concerning the share of small firms in the production of innovations;
- (2) an examination of industrial and technological relations between large and small firms;
- (3) an examination of the special quality of products of small firms (taking a Japanese data base as a point of departure); and
- (4) a study of the impact of new technology (e.g. microprocessors) on the viability of small firms.

The second part of the proposed study was to be an assessment of the special problems of the small firm in relation to technological innovation and an appraisal of government measures (including the conflicts with other areas of government policy). This would involve refining the model of innovation presented in the proposal, making an inventory of existing government policies, conducting a survey of perceptions of stimulants and obstacles to innovation from the viewpoints of small firms, and drawing conclusions with respect to the effectiveness of existing policies and possible alternatives.

C. The Ad Hoc Group

The summary record of the 20th (May 1978) Session of the CSTP indicates that the Committee: (1) expressed strong interest in the subject as presented in the proposal; (2) agreed that the study would be based primarily on studies undertaken by member countries, and should be begun by making full use of available data; and (3) agreed to set up an Ad Hoc Group, chaired by Mr. A.A. Th. M. Van Trier of the Netherlands to oversee the study. The group's first task was to agree on the definitions of small and medium sized firms, and on the approach to be used, as well as to define the scope and time schedule for the project.

By stressing the use of existing data and studies of member countries, the Committee was clearly signalling to the Secretariat its intention to restrict the magnitude of the effort. The decision to set up the study under an ad hoc group of governmental representatives rather than a group of experts appears to have been motivated by the Committee's desire to maintain a greater degree of control over the effort than it would otherwise have. One would expect a group of experts, chosen for their substantive knowledge of the subject, to operate with more autonomy from the Committee than an ad hoc group of government representatives who lack such substantive expertise.

The Ad Hoc Group held its first meeting on 18-19 September 1978 with 37 representatives in attendance. The U.S. was not represented at this meeting. On the whole, this meeting produced only relatively minor shifts in emphasis in the study.

D. Draft Program of Work

Following the first meeting of the Ad Hoc Group, the Secretariat drew up a program of work consisting of four lines of approach. These are: (1) an analysis of the place and role of small firms in the economies of member countries; (2) an assessment of the contribution of innovations by small firms and their own need for innovations; (3) an analysis of the conditions governing innovation in small firms; and (4) a review of government policies designed to promote innovation in small firms. The plan calls for separate reports to be prepared in each of these four areas. Work is to be carried out simultaneously in all of the areas, with an integrative final report to be ready by late 1980.

The report on the role of small firms (part 1) is to be prepared on the basis of materials already available to OECD and submitted in response to a request made at the first meeting of the Ad Hoc Group. The report on the contribution of innovation by small firms (part 2) is apparently intended to be an exploratory effort rather than an exhaustive study. The method proposed is to conduct on-the-spot surveys of secondary information from institutions well-informed on the technological situation of small firms in several selected countries, rather than to collect original data.

To study the issues subsumed under the third aspect of the project, conditions governing innovation in small firms, the Secretariat proposed to conduct a number of seminars for experts, each devoted to a different topic. The fourth aspect of the study involves preparing an inventory and assessment of government policies

designed to promote innovation in small firms. This the Secretariat proposed to do on the basis of materials submitted by member governments. The draft work program was approved by the Ad Hoc Group at its second meeting, in January 1979, with relatively minor modifications. In general, the modifications related to the interest of the delegates in stressing international comparisons and assessments of government policies rather than simply lists of various mechanisms.

E. Status of the Project

According to the progress report prepared for presentation to the third meeting of the Ad Hoc Group, 14-15 May 1979, work is underway on all four parts of the project. On the first study element, concerning the role of small firms in the economy, the Secretariat prepared a "note on draft report" suggesting the shape of the final product and indicating a number of difficulties and gaps in the data. The note suggests that the final report on this portion of the project will be essentially a convenient, up-to-date summary of data available from diverse sources, rather than an original piece of analysis.

A draft of the questionnaire to be used in the survey of experts concerning the contributions of small firms' innovations was also presented. Plans call for the questionnaire to be submitted to experts in five different industrial sectors in each of ten countries. Several of the surveys will apparently be conducted by cooperating governments, while the others will be handled by the Secretariat. The remaining two study elements were covered by oral reports. It appears that plans are being developed for several expert seminars on conditions governing innovation in small firms, and that the inventory of government policies toward innovation is well along.

V. The U.S. Role

Although the U.S. has been neither a very active nor an enthusiastic participant in the small and medium firm study, it has apparently influenced its direction through informal channels. According to Jean-Eric Aubert, the Secretariat staff member responsible for this study, the U.S. played no role in the discussion of the project at the May 1978 CSTP meeting at which it was approved and at which time the Ad Hoc Group was set up. The American delegate commented at the time that the U.S. had not received the necessary documentation in time to formulate and state a position.

The U.S. did not send a representative to the first meeting of the Ad Hoc Group in September 1978. Robert Morris, scientific counselor to the U.S. Mission to the OECD, did attend the second meeting, in January 1979. He had an instruction cable and made a number of points, including an expression of the hope that the project would not be directed against larger firms. Apparently, the concerns expressed by Morris reflected rather substantial misgivings about the project on the part of OES. These misgivings were based on the perception of OES officials that the study--which was introduced into the CSTP by the Netherlands, with the support of several small European nations--was aimed at promoting the capacity of small European companies in competition with American-based multinationals in several fields, particularly electronics.

According to Morris Crawford, OES official responsible for OECD affairs at the time, it turned out that, despite informally-voiced U.S. concerns, the governments that were proposing the study were quite intent on pursuing it. In order to accommodate them, the U.S. agreed to accept the project, but with the understanding that this country would not take an active part in it.

At the same time, through several conversations with the Secretariat and with members of CSTP, the U.S. sought to modify the terms of reference of the study to assure that it would not take an inwardly-oriented perspective, and to limit the extent to which it would develop new initiatives.

Apparently, the changes desired by the U.S. were incorporated into the structure of the project, for U.S. perceptions of the project and attitudes towards it changed considerably in subsequent months. State and Commerce officials working on the project indicate that as the study now stands it has potential for yielding results of interest to the U.S. Rather than maintaining its posture of indifference, the U.S. has sought to play a role in the field work for the project in order to see that relevant U.S. data is included and to assure that the project continues in the new direction it has taken.

Despite this evolution in the U.S. relationship with the project, U.S. participation has still been limited. Cuts in travel funding prevented OES from sending a representative to the third meeting of the Ad Hoc Group, in May 1979, during which time Morris was in Washington for consultations. Instead, OES sent a cable, conveying regrets and assuring the Secretariat that the absence of a representative "does not indicate any lessened interest in or support for [the] project." The cable indicated U.S. receptivity to collaborating in some of the seminars planned for the project, and offered some critical comments about the draft questionnaire that was to be considered at the meeting.

The cable was reviewed both by Al Small at Commerce and Rolf Piekarz at NSF. These individuals represent the foci of interagency collaboration on

the project within the Federal government. They have been kept up to date on the project by OES and have provided both substantive criticisms of the OECD documents and indications of its potential utility to their own agency's interests. It does not appear that the project is very widely known among other science and technology policymakers either within or outside the Federal government, but given the early stage it is in, this may not be surprising.

VI. Assessment

In view of the fact that substantive work on the study has only recently gotten underway and the fact that even draft reports are still several months away, it is clearly too early to draw conclusions about the U.S. relationship to the study with any real confidence or to suggest what lessons may have been learned. Nonetheless, it has been hard to review the case history without developing at least some preliminary impressions.

One way to look at the study and the U.S. relationship to it is to ask what kind of information concerning small business and innovation would be of most direct value to the U.S. government. The question does not have a unique answer, of course. It depends on the political context of the information, on the timing, on the particular agency or agencies of the government which would receive the information, and on the relation between the organization providing the information and the relevant government agency. In general, though, it would appear that a timely and scientifically authoritative assessment of the impacts of various forms of government intervention on the innovation process (including those policy instruments previously employed in the U.S. and those in use in other countries) would find a large and attentive audience and would be widely regarded as an important contribution

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to U.S. policymaking in this area. The small business aspect could be important, but, except in certain circles, interest in it would probably be subordinate to concern about the overall innovation process.

This is, of course, a rather tall order, and not really a fair standard by which to judge the relevance and potential impact of the OECD study. On the other hand, it does not appear that the possibility that the OECD study might yield information useful to the U.S. government in these terms was ever given serious thought in decisions surrounding U.S. participation in the study. Nor does there appear to have been much consideration given to the question of what actions might the U.S. have taken to help shape the study so as to make its outputs more directly relevant to U.S. interests.

The U.S. relation to the study seems to have been much more narrowly conceived. It appears to have been based on a perspective that emphasised the potential damage the study might do to U.S. interests and asked how such damage might be limited. In that narrow sense the U.S. experience with the project to date may be viewed as more or less successful. The government, through OES, looked at the study proposal, made some judgments on its relationships to U.S. interests and acted upon those judgments. It initially opposed the study. When it saw that direct opposition was untenable, it acquiesced to the study and sought successfully to change the basis of the study in order to make it more acceptable to the U.S. Whether the OES perception of the original basis of the study--that it might be directed against U.S.-based multinationals--was accurate or not is not at issue here. Nor is the question at issue of whether it is appropriate (or useful in the long term) for the U.S. to identify its national interests with the interests of U.S.-based multinationals. (Although both of these are certainly legitimate questions.) The point is that a judgment was made and acted upon, and at least at this

level, U.S. participation can be viewed as productive. Regardless of whether the study has any impact on policy development in the U.S., it may affect U.S. interests indirectly by influencing policy development in other OECD member countries. In this sense, the U.S. actions may shift the influence in a direction more favorable to this country. Whether it will actually do so or not remains to be seen.

Several factors may have colored the U.S. relationship to the study. One is somewhat idiosyncratic and concerns the way in which small business issues are framed in the U.S. national political arena. As noted in Section III, above, there is a tendency for small business issues to be treated on an interest group basis at the Federal level. While the roles of the individual entrepreneur and small businessman have broadly-based ideological support in American politics, the policymaking apparatus seems more responsive in many cases to the better articulated and represented interests of larger enterprises. To the extent that the interests of large and small scale enterprises diverge, an effort such as the OECD study might well be perceived by policymakers as more relevant to the small business constituency than to those actors primarily concerned with the innovation process itself. This perception might have diminished the interest of OES and other agencies with which it dealt in this OECD study. On the other hand, it might have suggested the utility of forging some links between the study and the community of small business advocacy within the government. This kind of linkage does not appear to have developed, since awareness of the existence of the OECD study or, in fact, of OECD itself, is apparently not widespread in the relevant community. In fact, neither the key staff members in the House and Senate Committees, nor the Deputy Director for Policy in the Small Business Administration's Office of Advocacy had heard anything about the study when queried

in June 1979. This network, plus the private sector individuals and organizations (as represented, for example, by those who testified or submitted statements in last year's joint hearings) would probably become an important part of the user community for products of the OECD study.

Aside from the interest group aspect of the issue, the potential utility of the OECD study to the U.S. policy process is also likely to be limited by several other factors. One is timing. The DPR has already been completed and, in the wake of last year's hearings, neither the House nor the Senate is planning additional activity on small business and innovation in the near future. The climate for action on the OECD report will depend in part on what actions have been taken in the period just prior to its release. The problem is that the study was framed in 1977, is being based largely on data that are already several years old, and the final report will not be available--according to current estimates--until late in 1980. Pressures for action in the U.S. policy system are strong, and events will not wait for the completion of the study. However valuable the study's findings may be, they may well be old news by the time the report is published. It may simply come too late in the game to have much impact.

Another problem is the perceived relevance of this kind of OECD study to American needs. There is some feeling among U.S. policymakers that we already know a good deal about small firms and innovation--particularly in technology oriented companies--and that a study with a basically European orientation will benefit the European nations more than ourselves. The U.S. experience with small technical enterprises is, after all, regarded as a model by many other nations and is a source of pride to this country. While there are many other reasons to be less sanguine about the current U.S. situation, and there is, in fact, growing interest in the experience of other

governments (especially Japan) with various policy instruments for enhancing innovation, a European-based study such as this will still undoubtedly encounter considerable skepticism on the part of U.S. policymakers and policy researchers. Skepticism about the value of the study will not be allayed, furthermore, by the general reputation of the OECD or by the design of this study in particular. Past OECD studies in science and technology policy have not gained for it a strong reputation as an authoritative policy research organization. This is, after all, quite a bit to ask of a body that must be responsive to the diverse political interests of 24 member states. Further, the design of this study and its limitation to secondary analysis of existing information (a result in part of U.S. pressure) do not give indication that it will contain many important new insights or conclusions.

The U.S. might have attempted to influence the course of the study so as to make its results more directly useful to its own interests. It is not clear whether the decision not to attempt this was a conscious one or whether it simply happened that way, based on perceptions at OES of the nature of the study, the intent of its promoters in OECD, and the general utility of OECD work in this realm. Certainly the mechanisms for making a careful prior assessment of the potential utility of the OECD study and its relation to the national interest--incorporating the perspectives of the full range of potential users in the U.S. government--do not exist.