U.S. POLICIES AND INITIATIVES FOR THE U.N. CONFERENCE ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

AND THE

SUBCOMMITTEE ON SCIENCE, RESEARCH AND TECHNOLOGY

OF THE

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U.S POLICIES AND INITIATIVES FOR THE U.N. CONFERENCE ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

TUESDAY, JULY 17, 1979

U.S. SENATE, COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION, SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE;
HOUSE OF REPRESENTATIVES, COMMITTEE ON SCIENCE AND TECHNOLOGY, SUBCOMMITTEE ON SCIENCE, RESEARCH, AND TECHNOLOGY;

Washington, D.C.

The subcommittees met jointly at 9:40 a.m., in room 5110, Dirksen Senate Office Building, Hon. Adlai E. Stevenson (chairman of the Subcommittee on Science, Technology, and Space) and Hon. George E. Brown, Jr. (chairman of the Subcommittee on Science, Research, and Technology) presiding.

OPENING STATEMENT BY SENATOR STEVENSON

Senator STEVENSON. The meeting will come to order.

Today, the Senate Subcommittee on Science, Technology and Space and the House Subcommittee on Science, Research and Technology examine U.S. initiatives for the U.N. Conference on Science and Technology for Development to be convened next month in Vienna. Science and technology are assuming ever-greater importance for industrialized and developing countries. The United States is learning the hard lessons of what happens when major industrialized sectors no longer compete effectively with high technology products from other developed nations.

Developing countries recognize that their hopes to escape poverty and achieve an adequate standard of living also depend on the application of technology. All countries share an interest in solving the problems associated with limited food, water, energy, and raw materials and a growing world population. Science and technology must be counted on heavily to provide solutions.

These are among many of the questions which have given rise to the Vienna conference and which will be addressed by it. This morning we plan to explore what the United States expects to accomplish next month in Vienna, given the highly politicized atmoshpere that has prevailed at each of the preparatory meetings, to explore the goals of our delegation and how we intend to achieve those goals, and any specific initiatives which the United States proposes, using science and technology to assist the poorer countries in their development efforts.

We will hear from a panel of administration and State Department witnesses, then from a panel on nongovernmental experts. As I mentioned, this is a joint hearing, and not the first I believe we've had, but I think we ought to do it more often.

I'm very pleased to be joined by my colleagues and counterparts from the House. Congressman Brown, do you have anything to add?

OPENING STATEMENT BY CONGRESSMAN BROWN

Mr. BROWN. Mr. Chairman, I welcome this opportunity also to participate with you and members of the Senate committee in these important hearings. I have a very important significant statement which I would like to make.

Our hearing today takes place in an atmosphere of high uncertainty and strongly opposing influences. There is no need for me to recite a litany of specific problems: The President did that on Sunday night. Let me go directly to several of the opposing influences which might affect the focus of our hearings today: U.S. policies and initiatives for the U.N. Conference on Science and Technology for Development.

POINT 1

On the one hand, the United States has mounted a substantial and sustained effort during the past 2 years in preparing for the Conference. Thousands of pages of analyses, proposals, suggestions and recommendations have been written. Thousands of hours have been devoted by talented, dedicated people, in and out of government. Nearly 300 specific U.S. initiatives have been identified as possible offerings in Vienna.

Yet, on the other hand, the final preparations and the Conference itself are taking place at a time when there is a massive inward turning by large numbers of people in this country. On this very day, a foreign assistance appropriations bill will come before the House with $1 billion cut by the Appropriations Committee from a $3.6 billion request. There will be today in that debate a continuation of an effort to kill the quite modest proposal of an Institute for Scientific and Technological Cooperation.

POINT 2

We are in the midst of a concerted effort by the countries of the developing world—through the Group of 77—to redress imbalances in the world's economic order;

As President Julius K. Nyerere has put it:

> * * * The Third World Nations did not shape the world's institutions of production and exchange and have virtually no say in them. But we are dominated by them. It is this domination by forces over which we have no control that each one of us has rejected.

As specified objectives of the group of 77, 25 percent of the world's productive output, along with 20 percent of R. &. D., have been set as economic targets by the year 2000, up from about 10 and 3 percent respectively. New institutional arrangements within the United Nations, new controls of multinational firms, and new

development funds are being sought within the U.N. Conference forum.

Yet, with few exceptions, we in the industrialized world are responding in ways that range from lukewarm support to open hostility: We tend to think in terms of a number of modest, incremental steps, such as the institute, or some argue for the status quo—and you will hear some of that this afternoon in the House debate: "Trade food for raw materials which we need so dearly." Protectionist sentiments are rising and voices have been raised about giving away our science and technology—as if we really could lock them up or erect impenetrable barriers.

POINT 3

In no way do I underestimate the stifling influence of insularity, protectionism, and the vested interests of the status quo. They are views of powerful forces.

But, it is my contention that in the great debates over what should be done about the world, we must have a coherent, overarching strategy. Such a strategy must draw upon fundamental concepts and deep intellectual roots.

In this sense, the Group of 77 is more advanced than we in the developed world. They have a strategy. But for the most part we have been reacting—mostly negatively—to their strategy as expressed in demands for a New International Economic Order—NIEO.

If we do not believe the NIEO is the way the world should be changed—and changed it will be whether we like it or not—then we should be thinking through and proposing our order. This leads me to my direct concern about the U.S. preparations for the Conference.

I place no blame on those working on the Conference preparations; within your guidelines, you have performed in an admirable way. And these guidelines seem to have led to a low profile, modest, incremental approach to the Conference.

It has been a mistake, I think, for the United States to avoid a major leadership role in the debate over how to make the world a better place for all of us.

We need, I believe, the concepts, the leadership, the commitment comparable to those which led to the Marshall plan.

We must avoid a dogged fixation on assistance and development policies of the past—or a singleminded, superficial devotion to one idea such as basic human needs.

If we can develop the kind of strategy I am alluding to—and I'm not smart enough to define it all by myself—and if we can assume a leadership role in relation to the 77, then it will be more likely that we can avoid sterile, legalistic debates in U.N. forums, and continuing skirmishes and flanking attacks within the Congress on small, individual intitiatives.

Perhaps it is too late for the United States to go to Vienna in a strong leadership role. But surely we should look to the Conference as an important step in developing a more sensible, coherent strategy for working cooperatively in world development. We must break new ground in coming to grips with the realities of a truly interdependent world.

We are at one of those important junctures in history when it is time to reexamine the content and basic purposes of our foreign policy. Science and technology have come of age and we must explore the full range of impact they will have on the human condition.

Senator STEVENSON. Any other comments?

OPENING STATEMENT BY CONGRESSMAN FUQUA

Mr. FUQUA. Well, Senator, on behalf of the full Committee on Science and Technology of the House, we welcome the opportunity to join with you and the Subcommittee on Science, Research, and Technology that George Brown so ably chairs, for these hearings.

We have been participating in varying fashions for some time in preparatory discussions for these meetings in Vienna. Many of us are planning to attend that conference and are very much interested in the work that is done in preparation for that very important meeting in Vienna in August.

I think the United States can contribute greatly, but at the same time, there's a lot of room for participation by other countries in trying to resolve those issues and helping less developed countries, and developing countries, with some of the technology that we have. And we've made some strides in that in some of the recent bills that have passed in both the House and the Senate. So we welcome this oportunity to join with you in hearing from both Government and outside witnesses about some of the preparations that have gone on.

Senator STEVENSON. Thank you, sir. I'm afraid at least one of those recent strides didn't quite make it in the Senate, but we hope to do something about that. As I understand, Congressman Brown and I will divide the honors. I'll chair during the presentation by the administration witnesses, and Congressman Brown will chair later when we hear from the nongovernmental witnesses.

Congressman Winn?

Mr. WINN. Thank you, Mr. Chairman, I have no comments. I do have a double interest, since I serve on both Science and Technology and the Foreign Affairs Committee of the House, so I'm extremely interested in this, and do plan to attend the meetings in Vienna.

Senator STEVENSON. Thank you, sir. Our first witness is Hon. Lucy Wilson Benson, Under Secretary of State for Security Assistance, Science and Technology.

Mrs. Benson?

STATEMENT OF HON. LUCY WILSON BENSON, UNDER SECRETARY FOR SECURITY ASSISTANCE, SCIENCE AND TECHNOLOGY, DEPARTMENT OF STATE; ACCOMPANIED BY THOMAS PICKERING, ASSISTANT SECRETARY OF STATE FOR OCEANS, AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS; BENJAMIN HUBERMAN, ASSOCIATE DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY; JEAN M. WILKOWSKI, U.S. COORDINATOR FOR THE U.N. CONFERENCE ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT, DEPARTMENT OF STATE; AND JAMES P. GRANT, PRESIDENT, OVERSEAS DEVELOPMENT COUNCIL

Mrs. BENSON. Thank you very much, Mr. Chairman. We appreciate very much your continuing interest and that of your colleagues on the two committees in the United States preparations for the U.N. Conference on Science and Technology for Development (UNCSTD). This is the third time administration witnesses have appeared in preparation for this Conference which, as you said, takes place in Vienna August 20–31. I'd like to present our panel first, before I give my statement.

On my far left is Ambassador Jean Wilkowski, who has been coordinator for our preparations for the U.N. Conference for about 2 full years now. Next to her is Benjamin Huberman, who is Associate Director of the Office of Science and Technology Policy. On my far right, James P. Grant, who is President of the Overseas Development Council. To my immediate right is Ambassador Thomas Pickering, who is Assistant Secretary for Oceans, and International Environmental and Scientific Affairs.

We are fortunate indeed this morning, to have as our leadoff witness, Benjamin Huberman. Mr. Chairman, with your permission I would like to call on Mr. Huberman to start off this morning.

Senator STEVENSON. Mr. Huberman.

Mr. HUBERMAN. Members of the subcommittee, I welcome the opportunity to be appearing before the joint session of the two subcommittees.

As you have requested, I will address those U.S. science and technology policies and activities which form the context for our participation in the upcoming U.N. Conference on Science and Technology for Development.

This Conference continues in the tradition of the decades of efforts by a series of U.N. meetings to deal with the problems of development. In particular, the Conference will focus worldwide attention on the challenges and opportunities offered by science and technology in furthering the difficult and complex process of development. In doing so, the Conference will reflect the growing recognition that most of the serious problems facing developing states today—for example, those of health, agriculture, employment, population, energy, industrialization, and education—can be alleviated by the proper application of technology.

For the United States the Conference is timely in that it coincides with a reinvigoration of the role of science and technology in our foreign policy and, in particular, in our relations with the developing world. The administration's approach to international cooperation in science and technology has had four major themes,

each of which has a bearing on our relations with developing countries.

First, we are formulating programs and institutions which help developing countries use science and technology. The United States has long recognized that it has an opportunity and responsibility for sharing scientific knowledge and appropriate technological skills with developings states. Vehicles for the U.S. efforts in this area have included bilateral science and technology agreements as well as the many outstanding programs of training and institution building carried out by the Agency for International Development, AID.

Our goal in these efforts is the further modernization of developing economies while at the same time meeting the basic human needs of the developing world's peoples. This goal is sound not only because of humanitarian reasons but also because alleviating problems such as poverty, high population growth, hunger, and insufficient energy will promote world stability and increase our own security and well-being.

In light of these factors, President Carter has submitted legislation to create an Institute for Scientific and Technological Cooperation, the ISTC. Working within the International Development Cooperation Agency and in parallel with the AID, the ISTC will be a specialized agency for assisting developing countries to improve their scientific and technological capacity. It will do this by drawing on our best talent and by working with developing countries to select and develop technologies which suit their own needs. It will also establish mechanisms for developing countries to select and develop technologies which suit their own needs, as well as mechanisms for developing countries to draw on U.S. Government agencies, universities, and institutes, and on talent in private industry.

Some of the problems to be addressed by the ISTC affect both developing as well as developed countries, for example, those problems related to energy alternatives and better management of natural resources. Through cooperative efforts developing countries can participate in seeking better means of dealing with problems which we all share.

As Ambassador Wilkowski will elaborate shortly, there are three major issues for the U.N. Conference which appear to have a fairly large degree of consensus and which the United States supports. These involve efforts to increase the indigenous S. & T. capability of developing countries; to focus research and development efforts within developed and developing countries on critical problems facing developing countries; and to strengthen science and technology informations systems to improve developing country access to such information. When established, the ISTC will work in each one of these problem areas.

The ISTC also will be charged with working with the more advanced countries of the developing world, such as Mexico. These so-called middle tier countries have the infrastructure and scientific capacity to join us as partners in addressing regional and global problems and the needs of the poor majority.

A number of officials from major developing states, again such as Mexico, have indicated to us the importance they attach to future cooperation with the ISTC. This is reflected, for example, in the

communique issued by Presidents Carter and Lopez Portillo at the conclusion of their recent summit in Mexico City. It would be a sever disappointment to them, and a poor reflection indeed of our commitment to help developing countries use science and technology, if the Congress were not to approve and fund President Carter's proposal for an ISTC.

A second major theme in the administration's approach to international cooperation in science and technology is pursuing new international initiatives which advance our own research and development objectives. We are working with a number of countries on large scale scientific programs, on joint funding of costly research, development, and demonstration projects, and on efforts to alleviate common problems. Excellent examples of efforts to alleviate problems of common concern to us and to developing states are contained in our recently intensified cooperation with Mexico. At the Mexico City summit meeting the two sides agreed to expand cooperation on research for developing the vast arid lands in the border areas. This cooperation will include research and development on new crops, such as guayule and jojoba, and work on effective use of scarce water resources. We also agreed to exchange information and begin joint work on the technical spects of housing and urban planning for cities in the border areas.

As I noted earlier, Mexico, like many middle tier developing countries, now has in place a number of the elements of a viable science and technology infrastructure. These elements enable it to benefit significantly from cooperation with the United States. They also enable Mexican institutions and researchers to contribute in a mutually beneficial collaboration to solve common problems and advance our own research and development objectives.

As a further example, in the coming months we will be exploring ways of strengthening to our mutual benefit our scientific and technological relations with several other developing countries in Latin America. We are convinced that scientific and technological cooperation with states such as these will be a key positive element in our overall bilateral relations.

The United States supports both bilateral and multilateral efforts to deal with problems of developing countries. Existing and prospective bilateral agreements serve as a key means of furthering U.S. objectives. They will also serve to enhance the U.S. position for the upcoming U.N. Conference. Indeed, many of the recommendations which are likely to be agreed upon at the Conference will need to rely on bilateral agreements for their implementation. At the same time, we will seek to strengthen those multilateral efforts which will assist in advancing the recommendations of the Conference.

A third major theme in the administration's approach is developing and strengthening scientific exchanges that bridge political, idelogical, and cultural divisions. A key activity here has been the establishment and growth over the past year of government-to-government cooperation in science and technology between the United States and China, a country which openly declares itself not only a developing country but also one which is backward in science and technology. This activity helped pave the way for, and has benefited from, normalization. Visits by the OSTP Director, Dr.

Frank Press, and by a number of other high level officials led to the United States-China Science and Technology Agreement signed in January by President Carter and Vice Premier Deng. The agreement provides for wide cooperation, including exchanges of students and scholars, cooperation in energy and agriculture and for the development of a satellite communication system which will provide China with the means for a modern nationwide television and telephone system.

The fourth theme in our approach to international cooperation in science and technology has been cooperating with other nations—both developed and developing—to manage technologies with global impact. For example, some 25 developing countries are participating in the international nuclear fuel cycle evaluation, which has been convened at the suggestion of the United States. While recognizing the future world needs for nuclear power, the participants are considering ways to cope with the risk of nuclear proliferation which is inherent in the technologies to produce nuclear power. Cooperation with the developing states will also be a major factor in the success of the 1979 World Administrative Radio Conference, which will provide guidelines for the allocation of radio frequencies for communications and other purposes. All states, large or small, developed or developing, have rights of equitable access to radio frequencies as signatories to the International Telecommunications Convention. As in many other areas requiring global cooperation and management, it is only through international cooperation and management that these rights of access can be guaranteed.

Finally, a significant element of our approach to helping developing countries use science and technology is the U.N. Conference we are discussing today. President Carter has stated that he views this conference as an opportunity for discussing technology related issues of concern to developing countries and for reaching agreement on common objectives. That he has named Father Hesburgh to head a prestigious U.S. delegation speaks loudly of the significance he attaches to the Conference.

The U.S. delegation will take an active role in the Conference. As my colleagues will now discuss, it will work toward a successful Conference, one that has practical and realizable results. The outcome of the Conference will be important in determining how fast and how far the benefits of science and technology will go in solving the problems of the developing world. We pledge to do our share.

Thank you.

Senator STEVENSON. Thank you, sir. My allusion a moment ago to strides made here in the Senate was for the money for the ISTC. I hope that the Senate will approve it, and that it will be established in the Conference. I must say that support for it would be stronger on this side if we were to disassociate it completely with the AID apparatus.

But we still have hopes of passing it in this session of Congress. Now, back to you, Mrs. Benson.

Mrs. BENSON. Thank you very much, Mr. Chairman, and members of the Senate and House subcommittees. It's a pleasure to appear before you as a member of this panel discussing the U.S.

policy and initiatives for the forthcoming U.N. Conference on Science and Technology for Development.

The time is ripe for this interchange. The Conference takes place in about a month. With the final PrepCom—the fifth—now over, the administration's conception of the major issues, problems, and proposals are jelling rapidly. A series of meetings in the executive branch to bring people and agencies up to date and to decide on future courses of action is now taking place. Therefore, we find it particularly helpful to have your input at this time.

The time is also ripe for the less obvious reason that we have come to a transition. We are leaving an era in which science and technology were thought of as independent activities throwing an occasional roman candle—dropping an occasional rocket might be the more appropriate phrase this week—into the foreign policy arena. We have entered an era in which the interactions between science and technology and foreign affairs are recognized increasingly as continuous and central to many of the important foreign policy problems with which we are dealing—among them, energy, food, nuclear nonproliferation, communications, the environment, and so on.

Mr. Huberman just spoke to you of some of the adjustments we are making to this new era. We are pursuing very expensive R. & D. on major common problems on an international joint-effort basis. We are encouraging increased international exchange of scientists and other technical people. We are emphasizing work on technological problems with global impact. And we are organizing for and refining our efforts to assist the developing countries in using science and technology to help themselves.

I would like to discuss briefly with you what our objectives are in the U.N. Conference on Science and Technology for Development, what we foresee as major issues, what is our general approach, and what we see as obstacles to achieving our goals. Ambassador Jean Wilkowski will describe in more detail the outcome of these preparations and the issues we expect will arise at the Conference. And Mr. Grant will speak on behalf of and in place of Father Hesburgh, who is unable to be with us today. Mr. Grant has been a member of the U.S. Steering Committee for UNCSTD from the very beginning.

I would like to discuss briefly with you what our objectives are in the U.N. Conference on Science and Technology for Development, what we foresee as major issues, what is our general approach, and what we see as obstacles to achieving our goals. Ambassador Jean Wilkowski, who is U.S. coordinator for our preparations will describe in more detail the outcome of these preparations and the issues we expect will arise at the Conference.

First, I'd like to say that the United States has a better story to tell than is generally known about what we are already doing in S. & T. for development in developing countries. In the course of preparing for this Conference the Agency for International Development has pulled together in a way they had not done before, information on its S. & T. activities in a variety of areas with strong S. & T. content such as agriculture, nutrition, renewable energy, education, natural resources development and conservation. Their analysis of their current programs in these and related areas shows that the funding comes to about $200 million annually.

Specific examples include work on improved cereal hybrids, advances in fertilizers and nitrogen fixation, water management, pest control, fish cultivation, vaccine against malaria, and many other areas.

There is not time today to give you here a full account of that story, but it is important to emphasize that when it comes to S. & T. development, we've been at it for some time. We have a lot to learn, but we have accomplished some things.

I'd like to depart from my prepared text for just a minute to mention one program having to do with space which I know is of particular interest to Senator Stevenson. We believe remote sensing offers unique opportunities in assisting developing countries to monitor and manage their natural resources, and we plan to emphasize it strongly. We are committed to a civil remote sensing program in which we see two areas in which international cooperation is indicated.

First, we'll explore with other nations planning to operate remote sensing satellites ways to make our respective satellites as compatible and complementary as possible so as to maximize the beneficial data available to users throughout the world.

Second, we'll be discussing with user states and international organizations the various uses that can be made of remote sensing data to monitor and manage the resources of developing countries.

Senator STEVENSON. Mrs. Benson, could I interrupt? We are interested in this subject, as you well know, and it ties in with many of the other subjects, including energy and food, which we'll be talking about. You just now acknowledged the need to develop compatible systems, compatible remote sensing systems, including ground stations. There's the risk at present of the United States, the Soviet Union, the European Space Agency perhaps developing their separate incompatible systems. And so out of some concern for a neglected potential and the attitudes of this administration, I've been making my own contacts with these other entities and have received nothing but complaints, friendly complaints, about the unwillingness of the United States to engage in discussions which could lead to the development of compatible systems—that is bilateral discussions. There is also a strong recognition elsewhere for the need for multilateral discussions, aiming toward the development of these compatible systems, if not for the short term for the operation of such systems, but the system itself has to be built.

I interrupt on this point because I must leave soon to offer some testimony to another committee. Could you respond to that criticism which we have received from other countries, and if it's true, suggest to us why it isn't possible to go beyond whatever bilateral discussions have taken place and to begin some multilateral discussions, aiming toward the development of these systems that will involve not one or two but many countries, all of which are now moving in separate directions?

Mrs. BENSON. I'd be glad to comment on that, and then I'd like to ask Ambassador Pickering to go into it in more detail.

We have been exploring, and we intend to continue exploring, with other nations how to get together and work together both bilaterally and multilaterally. It is not always easy, as you well

know, to bring this about. It's very easy to talk about what we ought to do.

It's a little harder to get it actually done. We run into a lot of roadblocks along the way, but I'd like Ambassador Pickering to comment on this.

Senator STEVENSON. Ambassador, we're having our own multilateral discussions. If we need any help——

Mr. PICKERING. I've known of your interest in this for some time. We have in the Government pursued an initiative which we hope to be able to move ahead with very shortly which will lead, I think, in the long run to the multilateral discussions which you've just raised. Our principal difficulties have been, in large measure, to get our own house in order in terms of where we were going in the future with remote sensing. That was the major issue.

There are still some questions in terms of our organization for the future, which have to be resolved. And I think shortly we'll be in shape to explore first with the major satellite orbiting countries or those with the potential—those organizations or countries with the potential to orbit satellites—both the issues that you have raised, the complementarity, and the compatibility on that issue, so that we don't end up with situations where we're repeating the same orbits at the same times, or alternatively where six or eight different ground stations have to be produced to receive the data from the system of satellites which ought to be functioning in harness and in harmony.

This is very much something that we had in mind. Internal discussions are going on within the executive branch now to bring this about.

There's a second aspect to this. Mrs. Benson's statement touched briefly on it, but I think it's important to recognize that not only do the flyers of satellites have to get together, but that there are very good reasons why the users of satellites ought to get together in terms of being able to digest the data and being able to convey to the potential flyers whether the data that's going to be offered is, indeed, useful and meets the needs and all the other things that I think we both share in terms of a sense of having a very useful worldwide system of satellites for remote sensing.

So that also forms part of our interest and will form part of one of the things that we will want to discuss at the Conference on Science and Technology for Development in Vienna in order to give other countries a clear idea of where we think we ought to be heading internationally in this area.

Senator STEVENSON. When it's discussed in Vienna, will the Administration have some specific suggestion with respect to remote sensing to discuss?

Mr. PICKERING. I think we'll have a number of specific things to state about what we think ought to be done internationally both from the point of view of operators and users.

Senator STEVENSON. Well, I can't stress enough the urgency, at least as I see it. I think we have been in contact with all of the entities I have mentioned, and some of them in a multilateral context. They are moving rapidly to develop incompatible systems, and they all recognize the desirability of developing compatible systems.

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As far as I can tell, every one of them feels that the United States should take the initiative in bringing about multilaterial consideration of these development questions immediately, not over the long term. We hope to have some very specific proposals on this.

Mr. PICKERING. Could I make one more point on that. We hope very much that in the August meeting we will have specific things to say which can lead to an immediate followup right after the U.N. Conference along the lines that I think you've outlined here in your own statements on the subject.

Senator STEVENSON. Thank you. I apologize for the interruption. In case you didn't hear that, Congressman Fuqua is concurring with my suggestion, not yours.

Mr. FUQUA. If I might make one postscript. I think it's very important that Senator Stevenson mentioned that we try to get a uniform system so that it's interchangeable from country to country and particularly for the ground stations. And it's much better to do it at the beginning rather than to have to make a change after everyone has become used to it. We need 120 volts, or 220, or whatever it is—some uniformity and interchangeability of our ground stations as well as our satellites and the resolution.

Mrs. BENSON. You're absolutely right about that.

Senator STEVENSON. Thank you, Mrs. Benson.

Mrs. BENSON. Thank you, Mr. Chairman.

Now, on the Conference itself. The Conference is not intended to concern itself with science and technology as such, but science and technology as it relates to development. This means it is intended to focus on how programs in S. & T. must be related to the institutional, political, and economic aspects of development. Our objectives and purpose of the Conference, as we see it, are to strengthen the developing world's scientific and technological capacity, to determine ways to accelerate economic and social development through science and technology, and to create and strengthen international cooperation for facilitating the development, dissemination, and utilization of science and technology for development.

These general purposes and related issues were subjected to lengthy negotiation at the prepcoms in New York in which the various representatives searched for areas where both developed and developing countries could agree. This effort did produce elements of consensus, but there remain serious major differences regarding implementation, especially as they relate to new institutions and new financial mechanisms.

Ambassador Wilkowski will elaborate on these problem areas, but briefly, some countries would like a restructuring of the international economic system to implement a program of action on these issues, and they have made demanding proposals to help bring this about. Nevertheless, our progressive experience over these five prepcoms over the last 2 years leads us to have some reason to think that both developing and developed countries are going to Vienna in a spirit of genuine cooperation, ready to work for constructive purposes.

For our part, the United States has a positive role to play in clarifying the issues. We see UNCSTD as an opportunity to give a

new impetus in bringing the skills and resources of science and technology to bear in a major attack on poverty; to advance the economic growth of developing countries with mutual benefit to them, to industrial countries, and to the world economy as a whole; to respond to the less developed countries desire for rapid industrialization—as stressed by middle-income countries—and for better satisfaction of basic human needs by placing major emphasis on building indigenous capacity in science and technology; to mount a cooperative approach to shared global problems, in fields such as food, water, nutrition, health, population, energy, natural resources, education, and environment, where science and technology can be a critical force for constructive change; and to demonstrate our continued support for the United Nations as an appropriate and effective forum for such a dialog.

Our approach will emphasize the need for the developing nations to create or improve their capacity to conduct science and technology activities in their own right and to adapt the achievements of others to their own needs and local conditions.

There is a big job to do. We recognize that the demands on our total resources are heavy—including the serious domestic problems of energy, inflation, and unemployment. But it is in the long-term interest of the United States that the developing countries acquire the capacity to use science and technology for development. We must recognize that our prosperity and our security depend on the prosperity and security of the rest of the world. Our choice really is not to do one or the other. Our challenge is to recognize this interdependence and to do both at the same time.

We will contribute to better management of existing science and technology so that it may have a greater bearing on development. We are examining our present policies and programs in science and technology to see where a change in emphasis can be critical to progress in development.

Frankly, we are counting on the Institute for Scienctific and Technological Cooperation as a major component of our contribution to the Conference. It will fill a void in U.S. development assistance efforts. It will provide a better means to concentrate the planning efforts that we make and others make.

With ISTC the United States should be in a better position to mobilize its scientific and technological resources to help respond to global problems.

Our nation's success in assisting the development of third world countries through ISTC and through existing assistance programs is of great importance to us for a number of reasons. The first and most obvious one is humanitarian.

Equally important, though perhaps not as clearly perceived, is that our future economic security and physical well being will depend on our ability to increase international trade and investment, to employ science and technology more effectively, to avoid problems that grow out of scarcity of food, energy, and other resources and to meet global problems they produce.

The theme of interdependence carries through to science and technnology as well as it does to economies. We cannot put a wall around the United States. The toxic substances whose control we may legislate in our own country can also reach us by the sea and

air we share with others. Desertification is more than a local problem. CO_2 in the atmosphere affects us all.

In raising the level of international activities in S. & T. we acknowledge the fact that nations need each other's help. UNCSTD is an important means by which we can develop our ability to help other nations help each other help themselves.

Senator STEVENSON. Thank you, Mrs. Benson.

Mrs. BENSON. Mr. Grant is next. Ambassador Wilkowski will finish up.

Senator STEVENSON. Mr. Grant?

Mr. GRANT. Mr. Chairman, I welcome this opportunity to appear before this joint hearing. I should emphasize as Undersecretary Lucy Wilson Benson stated in her remarks that I am here really as a proxy for Father Hesburgh, who is leading the U.S. delegation to Vienna. He asked me to read his personal statement to you.

As Undersecretary Benson mentioned, I worked from the outset on the Steering Committee, advising on the preparations for the Conference. I worked very closely with Father Hesburgh in a number of other incarnations including as Chairman of the Board of the Overseas Development Council of which I am President. I served with him on the Rockefeller Foundation Board, and we have just returned from a 3-week trip to China with Ambassador Wilkowski in which our central topic was to study science policy in China.

With your permission, Mr. Chairman, I will read Father Hesburgh's rather brief personal statement about this conference.

[The statement follows:]

STATEMENT OF AMBASSADOR THEODORE M. HESBURGH, CHAIRMAN OF THE U.S. DELEGATION TO THE U.N. CONFERENCE ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (UNCSTD)

A little bit less than one month separates us from the convening of the United Nations Conference on Science and Technology for Development at Vienna. Much that could be said about it in advance has already been said. Most of what could be done in preparing for this conference has already been done, under the diligent and imaginative leadership of Ambassador Jean Wilkowski and her staff with the active cooperation of the American business, labor, scientific, and academic communities. Few contemporary international conferences have captured the imagination of so many from all walks of life, from each and every branch of scientific endeavor. After all, this will be a conference that cuts across disciplines and specializations, and will involve men and women of different interrests and motivations, be theirs a profession of business, a vocation of selfless assistance, or of the pursuit of scientific excellence.

I think you will want to know something about my view on the delegation that we have put together for Vienna. A delegation to a conference such as this, which involves complex issues of foreign policy and the interests of many sectors of the American community, should in my opinion have two things. It should have people with the technical skills and experience to deal with conference issues and questions that may arise, and it should also reflect a balance of the national community in terms of interest. We think our delegation has both.

We have first of all from the government establishment a broad-guage group which has been working on the conference and its substantive questions for the past two years. We feel that the business and industrial community, who deal with the questions of the conference constantly, and have a considerable stake in the outcome of its issues, are well represented. The delegation includes eminent representatives from the scientific and technical community. The foundations are represented, as are representatives of American minorities. We feel we are going to Vienna with a competent and balanced American delegation which will convey the seriousness with which the Administration regards science and technology in U.S. foreign policy.

In preparing the U.S. positions for this conference, in the planning of our proposals, in the interpretation of the demands and needs of other countries, we have benefited from the greatest diversity of views, from the clash of competing ideas and from the creative discord of thinking and caring people. Throughout these two years of preparations, there was, however, one common theme, one common anticipation and one common resolve. It was the theme of modern science and technology in service of man, the anticipation that this can be done and the resolve that it will be done.

So in addition to my colleagues' testimony in briefing you on the state of our preparations for and expectations from the UNCSTD, permit me, Mr. Chairman, to add a few personal observations of my own thinking about this conference.

I have accepted the honor from the President to lead this delegation to Vienna not because I felt that I am uniquely qualified—after all there are many members of our delegation who have greater scientific credentials or more notable diplomatic accomplishments—but because I considered the task of this conference a personal challenge. I view this honor as a synthesis of my many roles: as an educator who invested his hopes in the preparation of the young generation; as a public official who enjoys the trust of the Administration and the public to work for the common good; as Chairman of one of the larget philanthropic organizations spawned by the success of our free enterprise system; and, lastly, as a priest who is dedicated to the welfare of his fellowmen and as a person deeply committed to peace and justice in the world.

We cannot ignore, Mr. Chairman, the Pandora Box qualities of modern science and technology. We must be mindful that they can be abused to kill, maim, and oppress people, ruin our ecosystem, and obliterate life from this earth. And we cannot be so naive to think that they are the panacea for all our ills, man-made or as a consequence of the parsimony of nature—social turmoil, economic stagnation, resource scarcity, and now, a global energy crisis. We must neither bow to the faddish doomsayers who see in every major advance of science and technology new portents of disaster, nor be carried away with unwarranted enthusiasm that the science and technology of the future will inevitably resolve all those problems of the present that we inherited from the past. Both of these schools of thought disregard and dismiss the ingenuity, creativity and goodwill of men everywhere who possess the ability and the desire to forege the tools of a better life with greater determination than with which they prepare the instruments of their own destruction.

Thus, I look forward to this conference—to borrow a phrase from the late President Kennedy—with idealism without illusions. Idealism, because I strongly believe that UNCSTD will be an occasion where East meets West and North is joined by the South in a dialogue, not to win debating points at each others' expense, but to make the point that science and technology are not only our common hereitage but also our common destiny and that the political will can be found to make science and technology work for a better world. And look forward to the conference without illusions because we are not unaware of the prospect that in such a global gathering as this each country has its own cultural, political and philosophical biases that would invariably lead them to propose differing practical solutions.

The five preparatory meetings already held revealed some significant areas of agreements and some sharp differences in approaches. Of these, you will be briefed by the testimony of Ambassador Wilkowski. Let me, Mr. Chairman, highlight some of the major areas of harmony which in my mind far outweigh the potentially disruptive influences of disagreement.

First of all, I am convinced—and I have said so before—that religious and moral values, human compassion, political necessity, economic advantage and pragmatic common sense are all pointing toward a cooperative world effort to get on with the essential task of development, especially in the poorest countries and for the poorest in all countries. Science and technology have already given us the tools with which we can—if we wanted to—eradicate the worst aspects of poverty by the next millenium. Today over one billion people of this earth live in abject poverty, ill fed and in ill health, without shelter and without work. Their basic needs remain unmet because they do not have the basic means to ensure their own survival and livelihood. When we think of science and technology for development we must not think of the poor as incidental beneficiaries of progress. Instead we must be thinking with an of the poor as users of science and technology for the progress of all.

The second point which I believe needs to be made, is that the title of the conference, Science and Technology for Development, should not mislead us into believeing that it will be an assistential endeavor aimed only at helping the developing countries at the expense of the industrialized economies. No, Mr. Chairman, this conference is not a zero-sum game in which the gains of the South would automatically register as a loss for the North. On the contrary, Mr. Chairman, we must look

forward toward this conference as the best chance to prove the mutual benefits thesis—where efforts to advance technology, be they of the simplest type or of the most sophisticated, in any part of the world, is for the benefit of all countries.

Let me be very adamant on this point. Although the UNCSTD program of action has clear objectives to assist in many ways the developing countries, the overarching motive and the inescapable conclusion must be that global cooperation is needed to confront the common problems that plague the developed as well as the developing countries, small ones as much as the powerful nations. The world today is facing critical shortages on many fronts. We live under the constant threat of an energy crisis, the exhaustion of our non-renewable resources, chronic food shortages, overpopulation, and the despoliation of our environment. There is a constant and massive migration of peoples, as refugees in search of freedom and opportunity. There has been an exponential increase in the conventional armament race and the threat of nuclear confrontation remains. We are experiencing a worldwide monetary crisis, and a crisis of confidence in international institutions to confront the mounting and multiplying global problems. The ability of the developed countries to transfer resources to the developing world is being strained to the limit, as most industrialized countries themselves must adjust to stringent budgetary restraints.

This stark panorama of current and foreseeable problems may find their causes in the political or in the economic realm. But underlining all is the growing realization of the limits to the abundance of our natural resources, the realization that we must find new ways to create and exploit resurces that our ignorance leaves hidden or inaccessible.

There is, however, one resource, one common patrimony of mankind that does not diminish, that is inexhaustible. It is our search for knowledge, our technological capacity that bears the stamp of human rationality to manage our fate toward a better life for all.

That is why, Mr. Chairman, in spite of all the current crises we face, we must look optimistically toward this science and technology conference, because in the final analysis this global resource—our capacity to invent new technologies, to create new mechanisms for closer collaboration, and to apply our scientific knowledge in the global interest—is our best chance and at the same time our most exhilarating opportunity.

Thank you, Mr. Chairman.

Mr. BROWN [presiding]. Ambassador Wilkowski?

Mrs. BENSON. We'd be very happy to have Ambassador Wilkowski conclude with the panel's statement this morning on our preparations for the U.N. Conference for Science and Technology for Development. Ambassador Wilkowski?

Ms. WILKOWSKI. Mr. Chairman, as the last administration witness at this hearing, I thought it would be of interest to you and to your colleagues for me to give you an overview of the main issues that have emerged in Conference preparations and to try to answer any questions you have about them.

I should stress, however, that these issues are still under negotiation as part of the Program of Action for the Conference. The positions of individual countries and groups of countries are still in the process of formulation and may well be subject to change between now and the end of the Conference at Vienna, at the end of August.

Therefore, I must be very prudent in characterizing not only U.S. positions but, perhaps more importantly, the positions of other countries. What I shall do is try to indicate the preliminary orientations of participating countries as they emerged during the fifth and final preparatory meeting for UNCSTD held in New York, June 25 through July 7.

At this stage, one can distinguish two sets of issues: First, those on which a consensus seems to be emerging; and second, those on which very serious differences remain to be resolved.

Turning first to the areas of emerging consensus, I would cite three:

First, there is universal acknowledgement in the international community on the need to strengthen the indigenous capabilities of developing countries in science and technology. By capabilities, I mean both institutions and human resources.

This conclusion is based on the premise—again accepted by all countries—that it is both the right and the responsibility of the developing countries themselves to determine the sorts of science and technology they wish to emphasize in their development plans. Moreover, the developing countries recognize and the draft Program of Action affirms that in science and technology, as in other fields, developing countries must shoulder the main burden of helping themselves in achieving greater self-reliance.

The United States and other developed countries recognize and accept supporting responsibility in this field. The most tangible specific evidence of this support, which we hope to be able to explain at Vienna, is the President's proposal to establish the Institute for Scientific and Technological Cooperation, the ISTC.

And I must say, Mr. Chairman, that I'm sure that my other colleagues on this panel and I were very much heartened by your encouraging remarks about the prospects for resolution of this issue.

We are also reviewing our assistance to and cooperative programs with developing countries with a view to giving greater emphasis to capacity building in science and technology. One of the major followup activities after the Vienna Conference will be to determine how capacity can be improved and promoted in cooperative programs at the bilateral and multilateral levels.

Second, there also seems to be an emerging consensus on the need to increase and improve research and development on the critical problems of developing countries. This, too, is one of the key functions envisaged for the ISTC. The modalities for carrying it out will be a subject of major attention after the Vienna Conference in cooperation with developed and developing countries alike.

Third, there is support among most delegations for strengthening science and technology information systems and linkages among these systems. This is a complex subject, Mr. Chairman, on which the true wisdom has yet to be discovered. The differences that remain to be negotiated revolve around those who would proceed cautiously in improving existing systems, and those who advocate a more ambitious approach including new information systems at the regional and world level.

I would like to turn now, Mr. Chairman, to three subject areas in the draft Program of Action on which the lines of a consensus agreement are not yet evident.

First, there is the cluster of questions about the rules, regulations, and conditions related to the transfer of technology. More specifically, the questions include, for example, the responsibilities of governments and private firms in technology transactions, the confidentiality of transactions between suppliers and recipients of technology, the protection of industrial and intellectual property, unpackaging of the components of the technology transactions, and so forth. These issues are currently under consideration in three other fora, each with formal mandates to negotiate them, which the Vienna Conference does not have.

These fora are: First, UNCTAD for the Code of Conduct on the Transfer of Technology, which has a code of conduct on the transfer of technology; second, the U.N. Commission on Transnational Corporations for a Code of Conduct relating to Transnational Corporations; and the World Industrial Property Organization, or WIPO, for the Paris Convention on Industrial Property Rights.

The U.S. position on these issues is that the UNCSTD Program of Action should encourage participants to reach a satisfactory and mutually agreeable conclusion in these negotiations, but for lack of mandate, UNCSTD should not attempt to negotiate the substance, or prejudge the results of the negotiations, which are often highly legal and technical and which are properly under the formal mandate of other fora. The point of view of some other delegations is that UNCSTD should not only give a new impetus to these negotiations but should also provide guidelines for their conclusion.

A second set of questions in search of a consensus relates to the structure and functioning of the U.N. system in science and technology for development. Here the differences relate to those, including the United States, who urge retention and strengthening the existing U.N. structure, modifying it as necessary in light of the UNCSTD Program of Action.

Others urge a completely new institutional structure for science and technology for development including a new Intergovernmental Committee on this subject with substantially strengthened and enlarged secretariat and managerial functions and responsibilities. The elements of a consensus agreement on this issue are not yet evident.

Finally, Mr. Chairman, there is the question of how improved international cooperation in science and technology for development should be financed. As with the institutional issue discussed above, the two central tendencies involve those who advocate a completely new U.N. financing mechanism with substantial new and additional resources assessed on an automatic basis, and those with a preference for using the existing array of U.N. and other financial institutions—for example, United Nations Development Program, the World Bank and regional development banks, including possible consideration of modifying the criteria under which they operate.

These are the major issues before the Conference at Vienna, Mr. Chairman. Some of the differences are serious and will not be easy to resolve. It will be a difficult negotiation as has been true in most north-south encounters.

We approach the Conference in an effort to achieve maximum feasible agreement and to give a new impetus to science and technology cooperation among all countries. Where differences persist, as they will, it is in the interest of all countries to continue the search for better understanding, which is, after all, the first necessary step to eventual agreement.

Thank you.

Senator STEVENSON [presiding]. Thank you, Ambassador Wilkowski. I understand the Swedes have accepted the principle of the financing mechanism along the lines suggested by the Group of 77 at the last preparatory conference, and the $2 billion target figure.

Is that right?

Ms. WILKOWSKI. I do know that the Swedes did make a statement in support of the international financial system which would call for a contribution of approximately $2 billion by the year 1985. I don't believe that this constitutes any formal agreement by any country.

Senator STEVENSON. That was the next question. What is the reaction of the other developed countries, and what will our reaction be, or will we have one, for Vienna? And if our reaction is not positive towards this proposal, what, if any, alternatives does the United States propose?

Ms. WILKOWSKI. Let me tell you a little bit more about this proposal, Mr. Chairman.

The proposal which calls for $2 billion in resources by the year 1985 would be based on a formula related to net balance in trade in industrial products. It would rise eventually to $4 billion by the year 1990. And the United States share on this on an annual basis in the first year would be something like $180 million.

The U.S. delegation made it abundantly clear at the fifth and final Prep Com that a financial scheme of this dimension and this substance and size would be one which could not be supported by the United States.

There were other delegations who joined in this questioning of a fund of this dimension.

Senator STEVENSON. Well, what would we support?

Ms. WILKOWSKI. This, as Undersecretary Benson indicated, is something which we are now studying within the executive branch of the Government, Mr. Chairman. We are trying to see what it is that we can do in the way of responding to this request for any number of programs in research and development and education and training.

We feel that the ISTC will in many ways be responsive, but it is a bilateral institution. It will help certainly, in capacity-building and in problem solving. But we are looking at other options as well. There have been a number of proposals that have been made in the preparatory committee meetings. Several have been made informally. But the only formal one agreed to by the G–77 is this immense fund of $2 billion.

We are trying to see what might more realistically be done within the United Nations system, and the executive branch has not yet reached a decision on that.

As Mrs. Benson indicated, we are bringing ourselves up to date. We are studying various options and we hope to have our position clear so that when we brief those members of the congressional delegation who will be going to Vienna, we will have an indication of what it is the executive branch would like support from the legislative branch as regards this financial issue.

Senator STEVENSON. Is one of the options just taking the ISTC as an alternative to any financing mechanism along these or some other lines?

Ms. WILKOWSKI. Mr. Chairman, the ISTC is central to the package of initiatives which the United States will take and present at Vienna. We would hope also that in addition to the ISTC, we might be able to come forward with a proposal on a mechanism which would link the ISTC with such organizations which the Canadians,

the Swedes, the Germans, and others have which are performing a similar function in research and development, some sort of a mechanism which would unite these institutions so as to enable them to pool resources and talents and to more effectively attack some of the global problems in food and energy. We would like to see a networking scheme which permits collaborative work with developing countries, that is north working with south, which would bring, say Mexico and other developing countries which have comparable institutions to those such as the Canadian IDRC, to work together and which the ISTC could join.

Mrs. BENSON. Mr. Chairman, let me add I think we are not proposing that the ISTC would be a substitute for new funding, large or small. What we are saying, and I think it's recognized by the G–77, is that it's just not going to be possible for us to come up with the kind of massive financing they're talking about.

During the past prepcoms, which have been going on now these 2 years, we have talked a great deal with the various nations at the Prep Coms, including the G–77 representatives, about the need to build capacity internally, for them to build capacity for science and technology use.

They weren't talking very much about this in the beginning but just a week or so ago toward the end of the Prep Com 5, I was in New York talking with several of the delegates and was interested and, in fact, pleased to be lectured about how they had to build an infrastructure and a capacity.

They're talking more now about that sort of thing than they are about financing. I think they realize that we're not going to be able to come up with that kind of financing they were originally talking about, although they will keep on talking about it.

It's also, I think, that they realize that there are things—we are spending roughly $200 million a year on science and technology development now. We hope to be able—and this is what we're thrashing out this week within the administration—we hope to be able to come up with a number of other initiatives, none of which will be as huge as they're talking about, but which we hope will add up to something quite respectable. And even more important, we hope that it will add up to something that will really be helpful.

Senator STEVENSON. Thank you. I hope so, too. The President has spoken recently of malaise. It's not confined to the United States. It's a global malaise, and it requires some positive action.

It seems to me that President Kennedy recognized as much with the Apollo program. We celebrate the results of that initiative this week.

We're acting now. This is why I must leave soon to go to the House-side to testify on several energy initiatives. But I see very little global initiative of any kind, including for energy. Where is it? It was promised.

There is some recognition of need for the United States to lead a global assault on the energy crisis. Where is it? Is ISTC our assault upon the problems that science and technology can solve in the developing countries, a $25 million foundation which was defeated in the Senate?

I hope this recognition of the malaise and of the need for some positive leadership by the United States will be followed by action,

including some proposals for bold cooperative action by the United States in this forum of the world in Vienna.

Most of these energy proposals won't produce anything before 1990. We have to survive until then. I hope my colleagues will forgive me for going over to their body for a few minutes. I hope I will be back before our witnesses leave.

Thank you.

Congressman Brown.

Mr. BROWN [presiding]. Mr. Chairman, may I indicate my own wholehearted concurrence with your emphasis upon the need for bold initiatives in this international forum.

The problems of leadership are pervasive, as you indicated, not only in the United States, but in the world.

What the United States is begging for is strong leadership in the direction—almost any direction that would get us off dead center.

The global situation requires the same sort of approach, and this forum in Vienna provides the opportunity. I'm well aware of the many reasons why we can't do that, the difficulties that we have in formulating bold new initiatives which have the massive support required to propose them in an international conference.

But my personal opinion is that we are continuing here the stance which I've noted in previous international conferences of reacting to initiatives to other places and generally reacting negatively, I might say. And hoping that we can maintain the stability and the status quo and the continuation of the important small things—and I'm not belittling them—the bilateral, and in some cases, multi-lateral agreements in this field are significant and need to be continued. But they are not a substitute for that bold leadership which I think this country ought to give.

Otherwise, we're going to find other countries giving it and our own position in the world which now suffers from our inability to innovate, our inability to increase our productivity, is going to suffer from our inability to do these things at international conferences.

That's my speech. Now Mrs. Benson, you indicated the $200 million S. & T. activities in AID, I wonder if you could provide a listing of those, recognizing that there's many ways we can finance the project.

I think the record ought to reflect what your crosscut of such things is. Would you indicate also which of those might be transferred to ISTC in the event that that is approved by the Congress because I think that that was part of the plan, if I recall, to move at least some of those over to supplement the $25 million in new money coming into ISTC.

Mrs. BENSON. Yes, Mr. Chairman, I would be glad to do that. I will submit it for the record.[1]

But just for the moment there are 10 major categories in which AID is now spending annually on science and technology, their agriculture, nutrition, population, health, renewable energy, education, human resources development, natural resources development and conservation, transfer of capital-saving technologies, and technology transfer to small and medium rural industries. And science and technology information.

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[1] See p. 35.

I'd be glad to submit that in fuller detail for the record.

Mr. BROWN. I would appreciate just a little bit more detail on that because those terms are not too meaningful to me.

Now one of the reasons why—Mrs. Benson, I have before me here a March 15 order, proposals for possible U.S. initiatives to be offered at UNCSTD. I wonder if you could give us the latest or revised ordering of such proposals, if there is such, for the record also.

I'm a little disturbed that we have come no further than distilling out of all these proposals, many of which I know are extremely good ones, some action plan which can be offered as a U.S. initiative. If you could give us the most recent orders of such proposals, to U.S. proposals for the record, I'd like to have that also.[2]

Mr. BROWN. Could you tell me how the current status of deliberations for this conference, the state of agreement on U.S. initiatives compares with other conferences of a similar nature which the United States has participated in.

Are we behind, ahead, about the same? What's your rough evaluation?

Mrs. BENSON. My very rough evaluation of your second question, Mr. Chairman, is that we're somewhat ahead. But it's not an area or a question——

Mr. BROWN. Do you think we're doing better on this conference?

Mrs. BENSON. Yes. It may be hard to believe, but I think we are.

In fact, doing somewhat better than we've done before. There is something peculiar on which a student, a very astute student, may perhaps do a study some day as to why it is we have such a terrible time getting our act together.

Many of us in this administration, both in the executive branch and in the legislative branch right here in your own bailiwick have been deeply frustrated by the length of time it has taken us since the beginning of this conference that we talked about and planned for to pull our act together.

And I would not say that any of us are in the least bit satisfied that we have it together.

I suppose that I am alone in that group of people, crazy people, in this world who have hope that we'll get there before it's too late. So I'm still optimistic.

We are at the present time, this week and next week, with a series of small, very small, conferences. The meetings with those of us who have been working on this, getting ready for a presidential decision, and I really do think that we're going to come up with something, not anything that we are going to be wholly satisfied with from the point of view of what we think we ought to be doing, but we hope it will be a good show. Let me put it that way.

I would gladly give you a paper on the initiatives, those that we finally come up with and those that we are considering now.

Mr. BROWN. Thank you very much. I want to touch briefly on two unconventional approaches to bold new initiatives and ask you to comment. And I'm trying to stretch our framework outside of the normal framework that we think of with regard to funding for science and technology. We are saying, no, we can't go for the proposal made by the Group of 77.

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[1] See p. 35.

But these kinds of suggestions come up over and over again at every conference. And what is to prevent us from offering a tie-in package here which would say, we'll make certain levels of contribution to S. & T. for development or to an organization if we are sure of certain levels of reduction in world armaments from other developed nations.

In other words, tie this together with the oft-expressed desire of the Group of 77 to see a reduction in armaments and a diversion of that money for development purposes.

We could create pressures in two ways that would be beneficial, one, for the reduction of armaments and, two, for the increase in funds available for science and technology for development.

The other unconventional effort that I'd like to ask you to comment on, I understand that Intelsat just last year began to provide technical assistance to underdeveloped countries for the establishment of ground stations and development software and technology necessary to operate them.

Is there any particular reason why we can't include in our considerations ways of using Intelsat even more vigorously than it's currently being used for the development of global communications systems, and in a sense, increasing that indirect subsidy that we're offering now through Intelsat to underdeveloped nations.

We do that both through the provision of technical services and to some degree allowing them to contribute less than the fully developed nations contribute, at least on a temporary basis.

Is there any reason why that which is the epitome of modern science and technology couldn't be considered in our overall deliberations of how we assist the underdeveloped world?

Mrs. BENSON. Mr. Brown, let me take your first question and then I'll ask Ambassador Pickering to respond to the one on Intelsat.

It may surprise you to learn that even if we did tie arms production and our contribution to science and technology, it would be quite small. The amount of money which is spent on arms by the so-called less developed countries is spent mostly by the most wealthy less developed countries. The poorer countries don't spend all that much money on arms.

And I'll be glad to submit to you figures on what the countries are spending on arms, countries, that is, that buy arms from the western world.

We have less on what other countries do, but we know enough of what they do. It simply would not add up to be all that much.

Second, it would be taken, and I think with some certainty, with great remiss if we were to do that by the less developed countries, the leaders of whom have a very acute sense of their own self-perception and their need for arms.

They do not take it kindly when the United States or any other country, for that matter, suggests to them that they don't need arms. And I think that we would end up with another confrontation between north and south or industrialized and nonindustrialized. That would not get us anywhere.

I would like to say that I think that it's a very good idea, but I don't think it will wash, I'm sorry to say.

Mr. Pickering?

Mr. PICKERING. I think on the Intelsat idea we're very keenly aware of the benefits that have already been brought and very interested to see how the totality of the space area, not only in communications but in other areas, can be linked up and brought together.

There is a feeling in some countries that Intelsat is not the final answer because it doesn't provide for the internal communications systems that they would like. And countries like Indonesia and India have already begun putting up their own satellites for internal communications. But that helps by linking, in the long haul, communications systems to Intelsat once again.

There are also other interests in the satellite area that might or might not be linked as Intelsat increases traffic and increases its value to the countries, things such as disaster relief satellites or use of remote sensing in which data is processed centrally, as well as in ground stations in the country concerned.

Mr. BROWN. May I interrupt just a moment, Mr. Pickering? I understand that actually the rate structure of Intelsat provides a modest subsidy to less developed countries because there's a flat rate which is not proportional to use. And the lesser using countries, therefore, get a benefit out of it.

There is also the ability to postpone the paying and the full capital, which is another form of subsidy.

What I'm suggesting is these are very business-like subsidies. They might be called promotional subsidies, if they were being looked at from another viewpoint.

In our great imagination, can't we think of other ways to do these same things and encourage this communication development?

The fact that Indonesia has to develop their own system, I think, is a net plus. It actually goes a long way toward helping Indonesia develop the scientific infrastructure that it has to have as it moves to the developing stages.

Mr. PICKERING. I didn't get your point originally on the generalization of the subsidy. I think it is a good idea. I think in many areas we've even gone beyond that. We're in a situation to provide some basic R. & D. on a grant basis through AID work in remote sensing that can then be generalized both in terms of benefits of the data and also in terms of the user's operation of the system in his own country at a reduced rate or to get some benefit.

I think it goes beyond what Intelsat provides.

Mr. BROWN. Well, I was not trying to bring remote sensing into this. I think remote sensing is the next phase of a global information system as it may some day evolve. But it seems to me if we can't do a simple satellite communications system that encourages widespread utilization in the underdeveloped world as quickly as possible, we have not demonstrated any abilities that would give assurance that a remote sensing operation with all of its political complexities is also going to come through.

Mrs. BENSON. Ambassador Wilkowski would like to add to that.

Ms. WILKOWSKI. Mr. Chairman, I do recall that Intelsat made an offer to AID for 1-year free time on a telesponder and AID did accept this offer of Intelsat and now has an agreement for a 6-year program amounting to $24 million. It will test the effectiveness of

the new satellite communications system in rural areas. And it will be particularly designed for educational work. The initial impact of this $24 million over 6 years will be felt in Peru, the South Pacific, Yemen Arab Republic, Indonesia, the Caribbean, and possibly Kenya.

Mr. BROWN. Thank you. I'm going to defer to my other colleagues. Larry, do you have any questions?

Mr. WINN. Thank you, Mr. Chairman, yes. I have one question which is pretty much a follow up on where we are as far as overall planning is concerned on this conference compared to other conferences. And the reason that I ask that is when Ambassador Pickering talked about some of the things that he referred to very early, he said, we're still working on this. We hope to have this put together in time for the conference.

It's my understanding that you've had several preconferences and that you had five. Is that right? And how many more is it going to take to put these things together? And when are you going to get the time?

Mr. PICKERING. The preconferences relate to negotiation of the international plan of action. In the meantime, we've had U.S. preparations going along in parallel. Our hope is that in the next several days, we'll be able to reach final decisions.

But we've had something like 300 possible initiatives to winnow down to find those few that will survive and be initiatives that you and I could be proud of in a conference and would really carry things a step forward.

It's been a long process. It's been a rather difficult one. But I think it shows signs of careful examination of a wide number of things. All of this has to go on against a backdrop of what you and I both know is rather acute fiscal stringency this year.

That also raises some serious difficulties about the range of particular alternatives we can consider.

All of those, I think, have made the process somewhat slower, somewhat more tedious than we'd like. I still think that we're perhaps in better shape, as Mrs. Benson said, than we have been in terms of comparable conferences.

Mr. WINN. Well, I appreciate that. I'm not sure from the general gist of the conversation that that makes me feel much better. Compared to what, you see?

Mrs. BENSON. Could I ask Ambassador Wilkowski to comment on that?

Ms. WILKOWSKI. Congressman, I'd like to give you an example of how things work in the United Nations. I've been in this foreign policy business for some years, more on the bilateral than on the multilateral front.

But let me give you an example of some of the kinds of things that we are faced with.

We don't control the timing. We knew that there was something that was going to be proposed on financial arrangements. But we have had to wait through four, preparatory committee meetings. And it was not, sir, until the fifth preparatory committee meeting that the developing countries agreed to get their act together on the kind of financial proposal they wanted to table.

They tabled this at the fifth preparatory committee meeting, which took place at the end of June. And so we didn't really see their finished product in final form until that meeting.

So it takes a little while within the bureaucracy to react to this. But initially, our delegate very rightly said that he thought that a $2 billion proposal going up to $4 billion was unrealistic and the developing countries shouldn't end the fifth prepcom thinking that there was a chance that such a plan would gain general acceptance.

Let me give you another example.

The U.N. Development Program has been trying very hard to encourage the successful outcome of this conference. They wrote a remarkably good paper for the conference and in one of the recommendations, they called for a fund which would provide for cofinancing and partial cost recovery.

The UNDP did not table a formal proposal. They don't really have that kind of a role in this conference. They make suggestions. It's up to governments to decide whether they like them or not and went to adopt such ideas and suggestions.

Thus, there has been no formal proposal by UNDP, but we understand that there is some work going on in this proposal so that we are in some way shooting in the dark. And I hope that you can understand that aspect of the preparations. We're waiting to hear more about this United Nations Development Fund idea. But we still have not seen a completed paper on it. The way these conferences work there will probably be a terrible flurry at the last moment, as proposals are sorted out, but I agree with the Undersecretary when she says that we are in pretty good shape although it may not be obvious. This hearing might have been better in some ways had it been timed after we had gotten our decisions on initiatives out of the executive branch.

However, I think your forcefulness and that of the chairman and Congressman Brown in telling us that something dramatic or impressive is needed and expected, helps the case that some of us who have been working on these issues need to strengthen our hand.

Mrs. BENSON. Mr. Winn, can I add to that?

I think what we're struggling with is the example of political reality. The tough decisions always take longer to make than the easier ones. You never really get down to making them until the crunch is practically on top of you. And we've got a month left for the crunch to work.

We're not alone in this. Other countries, the other indstrialized countries are having the same problem. The United Nations system itself is struggling in its own political context, which is none too easy, to pull together a proposal which it can put. But the more difficult it gets, the more politically difficult it gets, and therefore, the more difficult decisionmaking gets.

Most of us who have been working on the conference, especially Ambassador Wilkowski, will say it has taken some patience and I guess we're just going to have to live it out for another month.

We do appreciate, however, the pushing and shoving which you give us because it helps us strengthen our hand.

Mr. WINN. I don't think that members of this committee and the subcommittee intend to be critical. But we don't want you to over-

look the fact that, as Mr. Brown said, it seems to me that we're always waiting for the other countries to come forward with proposals, and that we should come forward with strong initiatives, whether it be, as somebody said, show.

I'm not happy about that description about what we're trying to accomplish in these meetings, although I'm sure in some cases it does turn out to be a show. But I think that Mr. Brown, though I'm not trying to put words in his mouth, wants the United States to take the lead and show strength, both pro and con on some of these proposals that might be developing over this long, slow process.

Mrs. BENSON. We would hope that, indeed, we will do that and as soon as we have our country's position decided on, which should be within 1 week to 10 days, we would be very happy to brief you at another meeting.

Mr. WINN. I have one more subject, Mr. Chairman, that I'd like to touch on. Senator Stevenson touched on it briefly. But I'm interested, and Mr. Huberman might care to respond to this—where do we stand and what initiatives are we putting forth as far as the research on energy alternatives is concerned for developing countries?

Is that going to be a main subject matter? I don't know how much importance the administration puts on that. I think after the last few days it certainly should and would.

Mr. HUBERMAN. Sir, there are many elements to our cooperation with developing countries in the energy area. I'll enumerate some of them.

Early on in the administration, the President decided that it would be important to help developing countries search for alternatives to nuclear power if those were, indeed, available, and launch what is called the International Energy Development Program.

So far Egypt and Peru have cooperated, or I should say vice versa, the United States has cooperated with Egypt and Peru in doing a survey of the energy situations in those two developing countries.

We're now getting underway with similar surveys for Argentina, Portugal, and South Korea. And we hope to have similar surveys done with other countries.

The International Energy Agency also has paid attention to the energy needs of developing countries, as has the economic summit which issued a statement on that subject emphasizing, in particular, the severe economic difficulty that the recent OPEC price increases placed on the developing countries.

The ISTC will have as a major problem area helping developing countries develop new energy sources, conventional and unconventional. And AID will continue to work with individual countries on energy projects.

Furthermore, in many of our bilateral science and technology agreements with developing countries, a key element is cooperation in energy.

Mr. WINN. I'm not talking necessarily—I'm sure you'll talk about cooperation in energy, but I'm more interested at this stage of the game on the research end of it.

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How do we turn on some of those other countries other than just showing them how to do it or try to tell them how to do it, or swap ideas with everybody at a conference?

How do we get them charged and turned on to research for their own natural resources?

Mr. HUBERMAN. Yes, Congressman Winn. The ISTC will work directly with other countries. Seventy-five percent of its funding will be overseas. In accomplishing work, for example, in doing research on energy in bilateral science cooperation that we undertake with other countries, the work is done by both countries and work is research and development of new energy sources in the area that you're concerned with.

It's not just, as you say, giving them finished technology and saying to them, go ahead and use it. It is developing—starting from research in some cases to determine what their needs and possibilities are and going through to energy sources, new energy sources.

Mrs. BENSON. Can I ask Ambassador Wilkowski to comment?

Ms. WILKOWSKI. Mr. Congressman, I would like to call your attention to the work that's being done at the East-West Center in Hawaii, which was established with the help of the Congress of the United States and which the Congress is supporting annually at about $14 million.

I was just speaking to Dr. Harrison Brown yesterday from the center. He was telling me about the work that they're doing on energy research and development in the Pacific basin with developing countries there. It's very impressive what they are doing in attempting to develop the consciousness and awareness among these countries about their needs and in planning programs for joint collaborative research for the future.

In addition, they also have 300 Ph. D. candidates out at the center working in science and technology.

A second point, Mr. Congressman, is that AID does intend to increase its renewable energy assistance to developing countries by more than $45 million next year, which will be one of the points we intend to make at the conference. And I'm sure as our own domestic work progresses on a national energy program, out of this will also come additional ideas for collaboration with developing countries.

I must say when we were in China, we had it impressed upon us very forcefully by the foreign minister there that the United States start on a program of conservation because what we do affects all of the developing countries immeasurably.

Thank you.

Mr. WINN. I think that we get that lecture from all over the world, wherever we go—the European community on conservation. I'm well aware of the work done at the East-West Center this last year. I think it is impressive.

When are you going to announce the members of the U.S. delegation if we're working so hard and we've gone to all this input and we're only a month away from the Conference?

Ms. WILKOWSKI. I would have liked to have done that today but I can say that seated in front of me are several members of the U.S. delegation. We'll have 20 members from the House of Representa-

tives. And seated before you on this side are several members of the U.S. delegation.

We hope to have a delegation of about 40, Mr. Congressman. We have sent out invitations to these 40. Some people have not yet accepted, and we feel that it would be wrong to announce a delegation when we don't have full acceptances yet. We're waiting for that. And we hope to have it within the next few days. And I will call you immediately when I have it. I was in a phone conversation on the very urgency of this subject just before coming over here. I hope to be able to inform the members of both committees within a week, sir.

Mr. WINN. I think that it's important because these people are going to go and participate. Time is running out. And they should be participating in some of the things at this stage of the game.

Ms. WILKOWSKI. They have been. We have had one delegation meeting with people who were invited. We have scheduled another delegation meeting on the 30th of this month and we have been in touch with the staff of the Congress regarding briefings for congressional members of the delegation.

Mr. WINN. I understand that because I was asking when we were going to be briefed on this. Thank you very much. Thank you, Mr. Chairman.

Mr. BROWN. Mr. McCormack?

Mr. MCCORMACK. Thank you, Mr. Chairman.

I'd like to shift, if I may, the context of the discussion just a bit and see if we can get a little bit at the big picture as it relates to the Vienna conference.

I think I share a bit of the frustration that has been expressed by my colleagues. I think I felt something of what Larry Winn has been feeling trying to get a handle on what we're going to be doing when we get there and how we can make a contribution.

I would like to ask, if I may, if you would discuss with me a little bit about how you see the conference shaping up. I would like to ask you, for instance, are we on the same plane at all with the less developed countries and the underdeveloped countries as far as approaching any meaningful accomplishments in this conference?

It's been my impression that the past history has been somewhat frustrating in these relationships because it seems to me that the Western industrialized nations have been saying essentially anybody must walk before they can run. And at least some of the spokesmen for the LDC's have been saying, give us your most advanced technology now at your expense. Come and make it go in our country at your responsibility.

I am somewhat concerned because, whereas I want to see as much progress as can be made, I have a feeling that we're not really talking to each other very much, that we're in danger of having another confrontation without any productive program emerging from it.

And I'm curious to know if we have been doing any studies on what is required to handle technologies that can be transferred.

I am continually struck as I travel around the world by the lack of competence in depth in society to handle even intermediate technology. Driving along the roads of certain Caribbean countries and Central American countries one sees one automobile after

another that has simply been driven until it has stopped and then stripped because nobody could repair it.

You see refrigerators and water stills and air conditioners just simply thrown outside and they don't work.

Entire weapons systems in the Middle East that can't be maintained by the countries that presumably own them because they don't have the technological depth.

Now somewhere between those extremes and the existing world today there has to be some sort of an agreement, some sort of an understanding.

I don't know for certain where it is, but I am curious to know what your perspective is of this problem and what your perspective is as to how this problem will impact the actual conduct of the Vienna conference.

Are we going to get any place. And if so, what initiatives do we anticipate.

And peripheral to that, I'd like to ask a couple of other questions which may filter into the conversation. And that is, do we have any studies on information exchange with less developed countries that have a thin technological competence in education for technology and basic research and teacher training?

I go to international meetings on advanced technology with Western industrialized nations, and not exclusively in Western industrialized nations. I recently attended the American Nuclear Society and European Nuclear Society meeting in Europe with about 60 or so nations represented from around the world. They come voluntarily to exchange information and to move forward together.

Is there any sort of a mirror image of this sort of activity being stimulated to bring people from where they are to a level where they can handle the technology levels above those that they now have?

Finally, there's another question that comes into this thing, and that's the degree of American support for the programs, for the funding.

Is our attitude toward funding one based on total dollars or is it based on ratios?

In other words, are we concerned with what percentage we're contributing as compared to the gross national product or something of the sort, or is it the total amount of dollars, or is it both?

That's a group of questions which may or may not interrelate, but which I'd like to throw on the table and ask for conversation on.

Mrs. BENSON. Thank you, Mr. McCormack. Let me start out, and then I will call on other members of the panel to pick up from where I leave off. I think we are to take some of your more general questions first. I think we are going to have a productive conference. I say that because the experience of the five prepcoms has been progressively more productive as we have gone along. That isn't to say that we aren't going to have confrontations and severe disagreements over certain issues such as transfer of technology or total financing and that sort of thing. But there has been a shift in understanding, I think on both sides or among all parties.

The LDC's are far more aware now, I think, than they were 2 years ago, of the fact that the transfer of technology or the use of science and technology for development is infinitely more complicated than just picking proprietary technology and plopping it in the middle of a country. They are talking much more now about building infrastructures, about building capacity.

One of the representatives I was talking to last week from a South American country, who is one of the leading exponents of new financing, talked at much greater length to me about the need for capacity building than he did about the need for money, and with considerably more passion as well.

I think there is a realization of the worldwide problem of money right now, and also a realization that money is just not going to solve all their problems. I still think we're going to have trouble coming forth with what any of us who have been involved—either in this effort or previous efforts having to do with development aid—we all feel that we are not going to be able to come up with what we would consider to be an adequate, let alone really good sum of money.

I think this is a political reality we apparently have to face, and therefore that places a greater premium on our ability to do other things. Now, the other questions that you raised are more specific, and so I'll ask Ambassador Pickering to pick up where I left off and go on with them.

Mr. PICKERING. I think you've raised a striking number of very important and useful questions. I can answer more than a few, and others will have more to add.

I think capacity building, as Mrs. Benson mentioned, is a central feature of an area of agreement among the parties or potential area of agreement among the parties, certainly an area where we intend to do a great deal of focusing ourselves.

One of the missions of the ISTC is capacity building, and it's an area where aid has also worked and we hope will continue to work—with special reference to the sort of projects it's undertaken. I share with you the concern that one sees when he sees the remnants of technology transfer littering the roadsides of the world. And there are two sets of problems. Obviously, the set that most strikingly comes to mind, can people maintain these, and this is the training and educational area. It's one that I think is important. I think it's one that we all share a feeling here, this side of the table, on the need to improve our capacity to help developing countries.

There's also the other important aspect of capacity building, of being able to take the technology often developed for a highly advanced society in the West and to apply that and use that in a different society and culture at a different stage of development. This stage of technology is also extremely important. I think it's something we should try to cultivate as well in the capacity building area.

I would just add just another word on information exchange. Ambassador Wilkowski I think touched on this in her opening statement. She may have more to raise, but I see numerous efforts now being made to try to bring into effect more rational, more complete systems of international information exchange in the

area of technology so that people have access to what is available, either on an open basis or if it's available on a willing-buyer/willing-seller basis, that also will be broadcast and made available to the developing world, and the people assist in this process. I think there's a great deal more that can be done, that needs to be done in that area.

On the money side I think that both percentages and actual funds in terms are interrelated. They obviously have a close interrelation. There are traditional percentage contributions in the U.N. system that people have become attached to, they have meaning, they develop precedent and they're important.

There are new formulae that are now proposed for contributions that have great implications internationally, which others are much more competent than I am to discuss, but in terms of trade relationships, formulas for calculating funds for contribution do raise some problems. A lot of developed nations have great reservations about those, as has already been mentioned.

Mr. McCormack. Go ahead, Jean.

Ms. Wilkowski. I may take too long, please.

Mr. McCormack. Let me ask one question. Do you think it makes any sense to relate funding levels, U.S. funding levels to certain specific activities rather than just science and technology for development in general?

Mr. Pickering. My own judgment if the question is directed at me, is that it makes a great deal of sense to relate funding levels to specific kinds of activities in which we would participate or in which the international system would participate, and that broad goals of funds which is one of the things which has disturbed me personally about selecting a figure—whether it's $2 billion or $4 billion—seems to me to be not closely enough yet related to the kinds of work that are expected to be accomplished.

As someone whose background is oriented more to programs, I think we must really also begin to talk programs than to be talking about large amounts of funds. Otherwise, the disconnect is great, and it's not possible to come before discerning committees of Congress, for example, and justify a U.S. contribution with anything other than the fact that this is what the international community thought it needed.

Clearly we won't get very far if that's the approach that has to be taken.

Mr. McCormack. Jean, may I ask a couple questions directly at you? Would you wish to respond to my previous comment?

Ms. Wilkowski. I wanted to try and grapple with some of your philosophical concerns, Congressman McCormack, because we have the same concerns. We've had the same questions as we prepared for this conference. We've asked ourselves, you know, where is this conference going, what track is it really on—I think that it came as something of a shock to our good friends over at the National Academy of Science earlier in the game when they realized that this conference is really not about science and technology. It's about politics.

It's a political conference, that is what it is. It's political, why? It's political because it deals with the concern of the developing countries about two very key issues that are overarching issues.

We talked about the issues of capacity and about institutions and financing, but the overarching issue of this conference is developing country concern, a great and deep concern, about inequality and dependence.

Those are really the catalytic forces that gave cause to this conference. It's the desire of the developing countries to overcome this technological dependence and to overcome this inequality. Why do they say there's such inequality? Well, one example is that about 95 percent of the research and development in the world today is carried out by the industrialized countries; only about 5 percent by developing countries.

I think a second overriding concern is that developing countries want to redress this inequitable situation by action, and the chosen action is a complete restructuring of international patterns of science and technology, and of the United Nations system as well.

So you're dealing with pretty massive propositions when you look at it that way. To handle your question of tracks, are we on the same wavelength, yes. I think thanks to skillful diplomacy of the U.S. delegation at the fifth prepcom—and I say that without any pride, because I was not there, my deputy was, and he takes credit for it—but I think through skillful diplomacy the impression has been engendered within the developing countries that, yes, the United States is on the same wavelength. We hear them and we are talking about the same things with them.

In fact, I think if anything, we were singled out privately for having finally gotten down to the same common denominator in understanding their concern. Now, the big question is, what can we do about it? And that takes us to the question of financing on initiatives, and it's a real and a serious problem that we're hoping to approach and reach some solutions on during our current Executive Board review.

But, I think that this conference has to be looked at in its totality, the preparations and the Vienna meeting. And together this has been an enormous educational process between developed and developing countries leading to better understanding of their concerns and what we are trying to achieve. And it's been an educational process here in the United States as well, not only within the Government but in the private sector. It's the first time we've dealt with this complex issue of science and technology and development. Sort of a three-headed monster, and I think within the Government there has been a much greater awareness of the developing country grievances on inequities and dependence.

Within the private sector, great deal of work has been done and you will be hearing directly from them. Today, they can well speak for themselves, but I honestly think that what we've done is tried to encourage both sides, the developing countries and our own private sector, to look at this thorny question of technology transfer in an unbiased nonemotional way, and to try and find new opportunities for a better dialog on the subject.

I think the educational achievements of the preparatory process shouldn't be underrated. I don't think we should concentrate just exclusively on what it is we have in our portfolio or our bankbook for this conference at Vienna. I think it goes beyond that.

Mr. McCormack. Thank you. You've answered several questions I was going to ask. I had them written down and you've already answered them, and I appreciate it. Mr. Chairman, I yield back the balance of my time.

Mr. Brown. Let me just ask one question, if I may.

All of the administration witnesses have stressed a posture of not wanting to move dramatically into new institutions, new mechanisms, and I'm going to suggest one possibility of expanding present mechanisms and see how that grabs you.

We're suffering a considerable slump at the present time in the utilization of the United States' very great and very capable system of higher education. It's a demographic phenomenon. It threatens in the normal course of our own system. The abandonment of many very valuable institutions of higher education and when private business is faced with this kind of a situation they offer a half price sale. You get to ride anywhere in the United States on these half filled aircraft, half fare and so forth.

Why can't we offer at Vienna an opportunity for any country in the world that wants to develop a bilateral agreement the opportunity to use this underutilized higher education capability, particularly in smaller college that we have here, and use that to help build this infrastructure, not only of world class businesses, but of electronic technicians, and the other kinds of mundane things that are needed so badly around the world, and serve both of our purposes by utilizing that capacity, strengthening our own schools, and strengthening the infrastructure of the underdeveloped world.

Mrs. Benson. Mr. Chairman, on the assumption that we could work out the logistics—and I'm sure we could—I think it's a fine idea. A very good idea.

Mr. Brown. Thank you. All right, I want to thank all of you. Oh, Larry?

Mr. Winn. Mr. Chairman, thank you. This shouldn't take long, but it's been called to my attention that the wealthier Arab countries have not participated in the prepcoms. How do we explain this? What's the reason?

Mrs. Benson. They've been for a variety of reasons very reluctant to. I think Ambassador Wilkowski has had more experience with this.

Ms. Wilkowski. They have participated, Congressman Winn. But they have not played a very active role. I'm waiting to hear more about this United Nations development program fund proposal that I've heard rumors about because I understand that there is a suggestion within the United Nations that this could involve the Arab countries—but this is only a rumor and I'm waiting to hear more about it.

Mr. Winn. Do you think they're on the verge of taking a strong initiative on their own, that you were referring to earlier?

Ms. Wilkowski. I couldn't say. There has been, sir, an exchange of correspondence between Ambassador Hesburgh and some of the leaders of these countries, whom he hopes to consult with very closely in Vienna. He has sought some early opportunities for exchanges of views with them. But unfortunately, we have not had the policy makers at the preparatory committee meetings, and so it's very hard to say what their position is going to be.

They've been represented, for the most part, by middle grade diplomatic officers from their United Nations missions, and have not played an active role.

Mr. WINN. Thank you very much.

Thank you, Mr. Chairman.

Mr. BROWN. Thank you very much for your excellent testimony this morning. I think it's given us an excellent perception of what we're all getting into and we appreciate it very much.

Mrs. BENSON. Thank you, Mr. Chairman.

[The following information was subsequently received for the record:]

DEPARTMENT OF STATE,
Washington, D.C., August 17, 1979.

Hon. ADLAI E. STEVENSON,
Chairman, Subcommittee on Science, Technology, and Space, Committee on Commerce, Science & Transportation, U.S. Senate.

DEAR MR. CHAIRMAN: Thank you for your letter of July 25 to Under Secretary Benson regarding the joint hearing on the UN Conference on Science and Technology for Development. We are grateful for the opportunity provided by the hearing to discuss with you and your colleagues the issues to be addressed and proposals to be considered at UNCSTD. We are looking forward to your participation as a member of the US delegation to the Conference.

In addition, we are glad to provide informantion for the record in response to the two questions contained in your letter.

Question 1. (a) Provided a listing of the $200 million Science and Technology activities in AID.

(b) Which of these activities might be beneficial to ISTC?

Answer. The average of A.I.D. expenditures for science and technology taken over the three-year period, FY 1976–79–80, amounts to approximately $219 million. The total of $219 million represents roughly 15 percent of projected A.I.D. expenditures for Official Development Assistance.

Appended are: 1) a summary of average estimated yearly expenditures for major subject area categories; 2) a detailed list of ongoing and proposed projects for each category; and 3) a list of projects scheduled for transfer to ISTC. The 41 projects listed all appear on these lists which comprise the total of $219 million.

Question 2. What is the latest on revised ordering of US proposals for possible initiatives to be offered at UNCSTD?

Answer. US initiatives (or our support for similar initiatives proposed by others) include:

Authorization by the U.S. Congress of the Institute for Scientific and Technological Cooperation, which will expand U.S. capability to work collaboratively with developing countries in R & D and problem solving and related capacity building.

Authority to engage in discussions and planning for arrangements which would link the ISTC with other institutions of similar purpose in developed and developing countries.

U.S. endorsement of a special $250 million fund or special account over a two-year period for S & T capacity building, to which the U.S. would contribute its fair share and which could be administered by UNDP. It would be subject to a number of conditions such as consultations with other countries, particularly potential donors including OPEC, clarification of the purposes of the fund especially in relation to ISTC and Congressional support and approval.

A U.S. endorsement of an increase in bilateral and multilateral S & T aid to help developing countries expand their energy production with coordination by the World Bank.

A U.S. endorsement of greater national and multinational aid for agricultural research in developing countries through the Consultative Group on International Agricultural Research.

A U.S. offer to hold discussions following the Conference on the future of remote sensing techniques in the 1980's with satellite operator and data user states; together with an expanded U.S. remote sensing program to assist developing countries in such key areas as environmental management, rural communications and worldwide crop production estimates.

You will note that the UNDP fund idea is subject to negotiation in Vienna. We would be grateful if you would not discuss this time outside the US delegation until

you can be briefed on its status at Vienna. A similar reply is being sent to Representative George E. Brown.

Sincerely,

J. BRIAN ATWOOD,
Assistant Secretary for Congressional Relations.

Enclosure.

Summary of AID S. & T. activities

[Estimated average annual expenditures]

Category:	*Millions*
Agriculture	$50
Nutrition	8
Population	5
Health	6
Renewable energy	15
Education and human resources	50
Natural resources development and conservation	25
Transfer of capital savings technology Technology transfer in small and medium industries	20
Scientific and technological information	15
S. & T. capacity building	25
	219

AID PROJECTS IN AGRICULTURE

Project #	Country	Title	FY 78	FY 79	FY 80
C.G.I.A.R.				80	85
021 A003		International Agricultural Research	1 800	2 800	3 775
021 0069		International Center for Agricultural Research			825
631 0013		National Cereals research and extension	35 000	3 600	3 675
021 0309		International Institute of Tropical research	1 970	2 150	2 200
021 0310		Int'l Lab for Research on Animal Diseases	1 600	2 200	2 425
021 0311		Int'l Livestock Center for Africa	3 380	3 340	3 850
021 0826		International Rice Research Institute		433	425
498 0265		Small Scale Agricl Equipment (Asia Regional)	2 800	3 500	4 025
021 0840		Int'l Maize & Wheat improvement center	2 600	3 200	3 300
021 0865		Int'l Center for Tropical Agriculture			245
598 0595		Latin American Regional Seed Unit	1 200	2 250	2 500
021 0972		Int'l crops research Institute for Semi-Arid Tr.	1 600	1 800	1 950
021 0973		International Potato Center			
021 4020	Interregional	Soils	250	250	2 000
021 1254	Interregional	Sorghum/Millet	---	5 000	2 500
021 1328	Interregional	Small Ruminants	4 186	3 200	3 200
021 0660	Interregional	Grazing Ruminants	150	---	---
021 4009	Interregional	Animal Health	---	250	---
021 1259	Interregional	Beans	250	---	3 000
021 4013	Interregional	Peanuts	---	250	---
021 1309	Interregional	Functional Implications of Malnutrition	---	---	1 750
021 0127	INTERREGIONAL	BNF-Tropical Soils (Cornell)	---	250	---
021 0128	INTERREGIONAL	BNF-Tropical Soils (Puerto Rico)	---	240	---
021 0129	INTERREGIONAL	BNF-Tropical Soils (Hawaii)	---	250	---
021 0130	INTERREGIONAL	BNF-Tropical Soils (North Carolina U.)	---	240	---

021 0095	INTERREGIONAL	World Rhizobium Collection Center	109	150	150
021 0247	INTERREGIONAL	Nitrogen Fixation Research and Training	---	120	---
021 0610	INTERREGIONAL	Nitrogen Fixation Limiting Factors	174	500	---
021 0613	INTERREGIONAL	Nitrogen Fixation Symbiosis	1 256	---	800
695 0102	BURUNDI	Highland fisheries	500	550	255
696 0112	RWANDA	Fish Culture	---	---	600
683 0205	AFR REGIONAL	Niamey Department Development	1 675	---	---
492 0322	PHILIPPINES	Freshwater Fisheries Development	---	400	1 000
492 0266	PHILIPPINES	Agriculture Development	221	---	---
263 0064	EGYPT	Aquaculture Development	900	2 500	8 000
532 0059	JAMAICA	Fish Protection System	---	3 380	---
021 0075		Asian Vegetable Research and Dev. Center	600	600	600
021 0054		International Fertilizer Development Center	4 000	4 000	4 000
021 0095		World Rhizobium Collection Center (USDA)	109	150	150
		TOTAL	73 430	47 633	57 285

AID PROJECTS IN NUTRITION

Project No.	Country	Title	FY 78	FY 79	FY 80
6600055	Zaire	Nutrition Planning		823	
6600079	Zaire	Area Nutrition Improvement			800
6800207	Benin	Soya Production/Nutrition		300	300
4920320	Philippines	National Nutrition Outreach	--	530	1,000
2980036	Near East Regional	PVOs	--	250	700
5210075	Haiti	Nutrition Improvement	290	299	
5240128	Nicaragua	Nutrition Development Program	3276	180	44
5380022	LA Regional	Caribbean Regional Nutrition	350	480	272
5380P01	LA Regional	Caribbeana Council	278		
0230625	Interregional	Protein/Calorie Interventions	2714		540
0230799	Interregional	Nutrition Science & Technology Support		275	300
0231064	Interregional	Nutrition Surveys/Surveillance	772	300	300
0231274	Interregional	Consumption Effects of Agricultural Policies		500	513
0231315	Interregional	Consumption Effects of Economic Policies	320		180
9040002	Interregional	Maternal Child Health Assessment	220	220	
0231065	Interregional	Technical Assistance in Nutrition Education		300	500
0231124	Interregional	Nutrition Agriculture Centers		600	
0210786	Interregional	Grain Marketing and Storage	978		400
0230077	Interregional	Clinical Assay of High Protein Food Sources	151	300	200
0231010	Interregional	Changing Maternal and Weaning Dietary		500	1000
0230225	Interregional	Soybean Utilization	346	375	
0230045	Interregional	Vitamin A Delivery Systems	674	300	400
0231309	Interregional	Functional Implications of Malnutrition			1750
		TOTAL	10 369	6 532	9 199

AID PROJECTS IN HEALTH

Project #	Country	Title	Funding FY 78	FY 79	FY 80
498 0020	ASIA REGIONAL	Cholera Research	1 900	---	---
042 0453	INTERREGIONAL	Malaria Immunity & Vaccination	1 352	1 566	2 276
042 1126	INTERREGIONAL	Tropical Disease Research	800	1 000	4 000
042 1058	INTERREGIONAL	Alternative Malaria Approaches	235	---	---
042 0642	INTERREGIONAL	Anti-Shistosomiasis drug test	644	---	---
042 1012	INTERREGIONAL	International Center for Diaherrial Diseases	---	1,400	1,900
042 0068	INTERREGIONAL	Replacement for DDT	179	197	200
		TOTAL	5 110	4 163	8 376

AID PROJECTS IN POPULATION

Project #	Country	Title	Funding FY 78	FY 79	FY 80
043 0618	INTERREGIONAL	Development of New IUD	79	---	---
043 0537	INTERREGIONAL	International Fertility Research Program	4 800	4 500	4 800
043 0548	INTERREGIONAL	Simplification of Technical Fertility Control	350	400	510
043 0629	INTERREGIONAL	Prolongation of lactational infertility	---	225	---
		TOTAL	5 229	5 125	5 310

A.I.D. RENEWABLE ENERGY PROJECTS

Project #	Country	Title	Funding FY 78	FY 79	FY 80
698-0410	BURUNDI	Alternative Energy-Peat	490	-----	-----
695-0103	BURUNDI	Alternative Energy Peat II	-----	-----	2 500
633-0209	BOTSWANA	Alternative Energy (Inst'l Dev)	-----	580	500
631-0012	CAMEROON	Mandara Mountains Water Resources	-----	1 000	1 000
698-0135	GHANA	S&T Development (Pyrolytic Converter)	83	-----	-----
632-0206	LESOTHO	Alternative Energy (Inst'l Dev)	-----	574	-----
688-0217	MALI	Renewable Energy (Inst'l Dev)	2 174	-----	500
688-0213	MALI	Action Ble	30	-----	-----
683-0039	NIGER	Solar Energy	500	-----	-----
685-0238	SENEGAL	Renewable Energy - Demonstration	-----	500	-----
645-0207	SWAZILAND	Alternative Energy (Inst'l Dev)	-----	446	-----
698-0410	UPPER VOLTA	Photovoltric Pump - Demonstration	80	-----	-----
698-0424	INTERREGIONAL	Regional Energy Initiatives	-----	-----	1 065
515-0149	COSTA RICA	Energy Dev. & Conservation	-----	-----	3 000
517-0129	DOMINICAN REPUBLIC	Energy Assessment	-----	-----	250
521-0096	HAITI	Integrated Resources Mgt.	-----	-----	138

Project #	Country	Title	Funding FY 78	FY 79	FY 80
532-0065	JAMAICA	Science & Technology	-----	-----	100
525-0207	PANAMA	Renewable Energy Sources	-----	400	-----
525-0215	PANAMA	Alternative Energy Sources (Shelf)	-----	-----	3 000
538-0032	CARIBBEAN REGIONAL	Alternative Energy System	-----	400	1 000
596-0086	ROCAP	Non-Conventional Energy Studies Grant	-----	-----	500
598-0601	LAC REGION-WIDE	Energy Resources Development	-----	300	625
388-0018	BANGLADESH	Karnaphuli Third Unit/Hydro	2 500	7 000	-----
386-0465	INDIA	Tech. for Rural Dev.[1/]	1 300	-----	2 000
386-0472	INDIA	Rural Energy/"Plug"	-----	5 000	-----
497-0266	INDONESIA	Science & Technology (Non-Conventional)[1/]	150	60	60
367-0132	NEPAL	Resource Consy & Util (Non-Conventional)[1/]	-----	-----	1 500
367-0129	NEPAL	Rural Area Dev. (Biomass)[1/]	-----	-----	700
492-0294	PHILIPPINES	Non-Conventional Energy[1/]	8 650	-----	-----
493-0304	THAILAND	Renewable/Non-Conventional Energy	-----	-----	5 000
498-0262	REGION-WIDE	Energy Dev. & Support Centers	-----	600	1 545

[1/] Energy component of larger project

Project #	Country	Title	Funding FY 78	FY 79	FY 80
664-0315	TUNISIA	Science and Technology Development Phase II	-----	275	200
298-0005	REGION-WIDE	Energy	-----	863	1 300
298-0237	JORDAN	Solar Energy (Desalination of Brackish Water)	-----	-----	500
New	SYRIA	Solar Energy Center	-----	-----	500
936-5709	INTERREGIONAL	Bioresource - Energy Production (U.S. Forestry Service)	-----	1 500	2 500
936-5715	INTERREGIONAL	Small Decentralized Hydropower (NRECA)	-----	500	1 000
936-5710	INTERREGIONAL	Energy Production Through Photovoltaic Technology (NASA-Lewis)	-----	2 000	500
936-5717	INTERREGIONAL	Energy Production Through Solar Thermal (undetermined)	-----	-----	1 000
931-1080	INTERREGIONAL	Wood as Fuel Resource	250	-----	-----
936-2514	INTERREGIONAL	Energy Development & Support Groups	-----	1 000	1 500
936-5701	INTERREGIONAL	Low Cost Technology for Rural Poor (VITA)	-----	914	2 000
936-5711	INTERREGIONAL	Renewable Energy Survey and Demonstration (Peace Corps PASA)	-----	250	600
		TOTAL	16 207	24 162	36 583

AID PROJECTS IN EDUCATION

Project No.	Country	Title	Funding (in thousands) FY 78	FY 79	FY 80
6120201	Malawi	Malawi Polytechnic		1524	
6120054	Malawi	Bunda Agricultural College		805	
6310008	Cameroon	Agriculture Management and Planning		700	500
6310009	Cameroon	Practical Training in Health Education	500	800	140
6310007	Cameroon	Social Science Research and Training	290	380	260
6410088	Ghana	Manpower Development in Community Medicine		250	480
6570003	Guinea	Primary Teacher Training	610	850	410
6630189	Ethiopia	Non-formal Education		300	350
6630213	Ethiopia	Integrated Family Life Education II	275.	213	238
6690130	Liberia	Improved Efficiency of Learning	825	1411	948
6690131	Liberia	Vocational Training	800	1900	1500
6690134	Liberia	Rural Learning Delivery System		210	400
6960103	Rwanda	Farm Hand Tools	240		
6960109	Rwanda	Agricultural Education		3286	602
6980062	Africa Regional	African Graduate Fellowship Program	2250	565	
6980210	Africa Regional	African Higher Education Inter-Africa Scholarship Program	750	550	
6980390	Africa Regional	Africa Science Education	144		
3670124	Nepal	Education Skills Training	557	69	
3670131	Nepal	Development Services and Training			600
3830049	Sri Lanka	Agricultural Education Development	3000	3000	
4920293	Philippines	Bayanihan Barangay Schools		600	
4930295	Thailand	Non-Formal Vocational Education		500	
4970290	Indonesia	Graduate Agricultural School Title XII		6000	
4970293	Indonesia	Eastern Islands Title XII Agriultural Ed.		6000	
4970297	Indonesia	Title XII - Sumatran Agriculture Program			5000
4970289	Indonesia	Primary Health Nurse Training			9000
4980257	Asia Regional	Agricultural Development Council	150	300	500
4980253	Asia Regional	Regional Remote Sensing		3500	
4980260	Asia Regional	Rural Electric Training Center	250		

				2865	1685
2790053	Yemen	Basic Educational Development			475
2790058	Yemen	Education Outreach			
2980015	Near East Regional	American University of Beirut	2925	2300	3500
3060150	Afghanistan	Rural Primary Schools II	46	1278	1316
3060157	Afghanistan	Development Support Training	300	500	1193
3060161	Afghanistan	Technical Manpower Development		1776	1776
6080134	Morocco	Higher Agriculture Education	500	775	800
6080139	Morocco	Non-formal Education for Women	2291		1020
6080146	Morocco	Vocational Technical Skills		500	900
6080147	Morocco	Industrial & Commercial Job Training for Women	2400		426
6080149	Morocco	Dev. Training & Mgmt. Improvement	2175		549
2760003	Syria	Agricultural Education and Research		3000	1900
2780208	Jordan	Health Planning and Services Development	500	125	
5110485	Bolivia	Farm Policy Study	272	500	343
5110471	Bolivia	Rural Development Planning	975	265	510
5110477	Bolivia	Rural Education I		680	455
5110482	Bolivia	Rural Education II	200	575	
5110520	Bolivia	Bilingual Education			600
5150140	Costa Rica	Participation of Poor Women (OEF/FOV)	133	128	
5150150	Costa Rica	Women in Development Increased Employment			100
5150151	Costa Rica	Urban Poor Job Training			140
5150138	Costa Rica	Science & Technology		3000	
5150142	Costa Rica	SCONA Environmental Education	240		
5170119	Dominican Rep.	Education Sector Loan		7500	
5180001	Ecuador	Working Boys Center	186		
5180017	Ecuador	Training for Development			400
5210104	Haiti	Para-profess. Engineering Education		990	750
5250164	Panama	Training for Development	293	300	
5250198	Panama	Training of Rural Youth	50	100	75
5250217	Panama	Environmental Management			200
5260503	Paraguay	Bilingual Education	171	307	313
5270148	Peru	Education Service Centers	400	790	
5270165	Peru	Rural Job Skills Training		285	200
5270173	Peru	Selected Development Training		162	
5270199	Peru	Bilingual Education			400
5270200	Peru	Teacher Training Rural			500
5270201	Peru	Pre-school Education			250

5380016	LA Regional	Caribbean Institutional Development	300	500	500
5381100	LA Regional	Improved Learning Environment		1000	1000
5380100	LA Regional	Quality of Instruction		1000	1000
5980588	LA Regional	Training for Development		1015	1145
5980556	LA Regional	Experimental Radio Education	200		250
5980558	LA Regional	Radio Schools of Latin America	200		
5980574	LA Regional	Education Media for the Integ. of Women	200	250	210
1411054	Interregional	Structuring Non-Formal Education Resources			
0321330	Interregional	Environmental Grant		1080	450
0420239	Interregional	Teaching Community Medicine	100		
1411233	Interregional	In-Service Teacher Training	221		
0421174	Interregional	Health Manpower Training Capacity		500	
0411031	Interregional	LDC Institutional Involvement		1117	
0411017	Interregional	Extension of Rural Primary School		200	150
1415804	Interregional	Non-Formal Education - Assessment & Analysis	700		250
0411233	Interregional	Educational Technology			240
0411237	Interregional	Role of the Family (in Developmental Education)		500	
0411241	Interregional	Non-Formal Education - Out of School Youth		200	
0411242	Interregional	Literary Oriented Functional Education			500
0411250	Interregional	Non-formal Education Networks		200	
			30	240	

Project No.			FY 78	FY 79	FY 80
6030002	Djibouti	Skills Training			400
6210149	Tanzania	Training for Rural Development		750	2985
6410089	Ghana	Transportation Maintenance Training Center		500	365
6410070	Ghana	Agricultural Management Development	410	340	100
6500012	Sudan	Rural Planning		750	500
6500021	Sudan	Southern Manpower Development	2000		1000
6600068	Zaire	Development Manpower Training		500	
6600073	Zaire	Nonformal Education Staff Development-(CIDEP)		741	400
6600052	Zaire	Agriculture Economic Development Planning		764	800
6630208	Ethiopia	Agricultural Planning, Analysis and Evaluation		600	500
6770021	Chad	Rural School Construction-(CARF)	315		
6770005	Chad	Comprehensive Human Resources Development	1000		
6900083	Africa Regional	Southern Africa Academic & Skills Training	1647		
3880027	Bangladesh	Technical Resources Development		650	
4981140	Asia Regional	Communications Technology Applications	400		
3060167	Afghanistan	Primary School Teacher Training		2022	1676
2760019	Syria	Technical Health Institute	4050	750	350
2760004	Syria	General Participant Training	850	850	1100
2780238	Jordan	Vocational Training		225	600
2780192	Jordan	Water Management Technology	300	500	
2780232	Jordan	School Construction II			7000
5110508	Bolivia	Fe y Alegria-Forestal Agriculture School	100		
5190172	El Salvador	Basic Competitive Skills Training	3450	180	125
5200229	Guatemala	Rural Primary Education	6000		
5200258	Guatemala	Bilingual Education	200	280	280
5200259	Guatemala	Education Administration		100	200
5200264	Guatemala	Non-formal Education			250
5040077	Guyana	Agriculture Resource Planning		233	228
5240115	Nicaragua	Rural Education Development	7780	270	340
5250214	Panama	Workforce Development			3500

Project No.			FY 78	FY 79	FY 80
5260502	Paraguay	Rural Radio Education	187		
5270182	Peru	Education for Responsible Parenthood	5	213	198
5270158	Peru	Decentralizing Education Planning	237		
5270161	Peru	Pre-school Education for Disadvantaged		199	151
5270179	Peru	Campesino Training (IPFE)	100	110	
5320061	Jamaica	Agricultural Planning		500	250
5320068	Jamaica	Training for Development			300
5380019	LA Regional	Basic Health Management Training	1000		400
5980453	LA Regional	Scholarship Program of American Universities	242		
9030022	Interregional	Inst'l. Dev. (World Education, Inc.)	302	350	270
0410569	Interregional	Radio for Elementary Match Teaching	429	200	
0352507	Interregional	Training in Energy Management		400	400
		TOTAL	57 653	83 843	72 067

AID PROJECTS IN NATURAL RESOURCES DEVELOPMENT AND CONSERVATION

Project No.	Country	Title	FY 78	FY 79	FY 80
6950104	Burundi	Land Use Survey			757
6310020	Cameroon	Satellite Application and Training			95
6310025	Cameroon	Mandara Area Wells			450
6250913	Africa Regional	Regional Remote Sensing	770		
6980414	Africa Regional	Regional Remote Sensing, Nairobi		750	540
6980XXX	Africa Regional	Regional Water Resources			265
6550003	Africa Regional	Tarrafal Water Resources	900		
3880040	Bangladesh	Integrated Land and Water Use			5000
4970311	Indonesia	Soil Conservation Program			9000
3670132	Nepal	Resource Conservation and Utilization			3300
3670134	Nepal	Agriculture Resource Inventory - Nepal		1000	1000
3910447	Pakistan	Water Management Research		1000	1000
3830055	Sri Lanka	Reforestation & Watershed Management			2000
3830057	Sri Lanka	Water Management		4200	
2630017	Egypt	Water Use Management	1500	1500	1700
2790043	Yemen	Water Resources Planning and Management		1060	630
2790025	Yemen	Water Survey of North Yemen	500		
5110509	Bolivia	Conservation and Environmental Protection I		500	500
5170126	Dominican Rep.	Natural Resources Management			3000
5190214	El Salvador	Environmental Improvement		100	285
5210101	Haiti	Water Resource Development	100	200	190
5210096	Haiti	Integrated Resources Management		1266	549
5220134	Haiti	Water Resources Management	300	2000	
5220136	Honduras	Water Resources Management			
5980580	LA Regional	Remote Sensing		270	100
0211007	Interregional	Water Management Synthesis	1000		710
909PE00	Interregional	Pol,Ec,Soc Dimensions of/Nat Resource Degradation			200
0321166	Interregional	Remote Sensing Resource Assessment	1740	500	
0325500	Interregional	Man and Biosphere II			1350
0325502	Interregional	LDC Forest Resources			750
		TOTAL	6 810	14 346	33 371

AID PROJECTS IN TECHNOLOGY TRANSFER

Project No.	Country	Title	(in thousands) FY 78	FY 79	FY 80
686 0219	UPPER VOLTA	Rural Enterprises Development	353	---	---
696 0103	RWANDA	Farm Hand Tools	240	---	---
698 0407	AFRICA REGIONAL	Improved Rural Technology	400	1 000	1 205
698 0424	AFRICA REGIONAL	Energy Initiatives	---	---	1 065
497 0268	INDONESIA	Appropriate & Low-cost Technology	500	---	---
498 0265	ASIA REGIONAL	Small-scale Agricultural Equipment (IRRI)	---	433	725
279 0046	YEMEN	Appropriate Village Technology	---	1 070	575
664 0304	TUNISIA	Agricultural Technology Transfer	1 480	---	---
263 0096	EGYPT	Small-scale Agricultural Activities	---	500	1 000
519 0197	EL SALVADOR	Small Enterprise Development	120	180	180
520 0245	GUATEMALA	Small Enterprise Development	623	241	468
521 0095	HAITI	Appropriate Technology	623	241	468
522 0123	HONDURAS	Small Farmer Technology	350	697	1 000
522 0157	HONDURAS	Rural Technologies	---	850	1 900

538 0013	CARIBB. REGIONAL	Employment Investment Promotion	320	7 050	987
527 0162	PERU	Appropriate Rural Technologies	300	445	300
527 0176	PERU	Rural Enterprises II	---	5 000	---
511 0517	BOLIVIA	Appropriate Technology Research Applications	---	675	700
511 0472	BOLIVIA	Agribusiness & Artisanry	185	215	---
596 0066	LA REGIONAL	Technology Transfer (ICAITI)	183	250	---
598 0600	LA REGIONAL	Appropriate Technology for Rural Women (OAS/ IACW)	---	182	112
032 1071	INTERREGIONAL	Appropriate Technology International (ATI Grant)	5 000	2 200	5 000
032 AT00	INTERREGIONAL	Appropriate Technology Support	---	---	500
032 5511	INTERREGIONAL	Scientific Institutions for Development	---	---	500
024 1191	INTERREGIONAL	Off-farm Employment	644	---	145
013 2250	INTERREGIONAL	Appropriate Technology Network	---	225	---
034 0221	INTERREGIONAL	Ultra Low-Cost Shelter	95	75	---
		TOTAL	11 416	21 529	16 830

		AID PROJECTS IN SCIENCE AND TECHNOLOGY INFORMATION	FY 78	FY 79	FY 80
598 0572	LA REGIONAL	Science and Technology Information Transfer	250	250	350
013 0064	DS/DIU	Agricultural Information and Related Services	---	245	245
043 0659	DS/POP	Population Information Program (Johns Hopkins)	1 141	1 300	1 730
931 1027	DS/ST	Arid Lands Information System (U. Arizona)	120	60	---
013 A232	DS/DIU	Information as a tool in Development	795	1 275	1 200
041 1231	DS/ED	Educational Technology Information System	---	590	---
625 0929	SAHEL	S & T Documentation		200	200
013 2250	DS/DIU	Appropriate Technology Network	---	225	---
596 0066	LA REGIONAL	Technology Transfer	183	250	---
903 0026	PDC/PVO	International Executive Service Corps (IESC)	4 100	4 000	5 000
903 0023	PDC/PVO	Volunteers in Technical Assistance (VITA)	280	280	280
936 5701	DS/E	Energy Network		914	2 000
660 0048	ZAIRE	Agricultural Economic Development Planning	---	764	800
596 0048	LA REGIONAL	Agricultural Research and Information System	226	500	758
625 0620	SAHEL	Data and Institutional Development		4 700	1 500
625 0917	SAHEL	Sahel Water Data Network		954	1 313
625 0927	SAHEL	Demographic Data Collection		400	500
043 0648	DS/POP	Demographic Data Collection--Asia	750	900	700
515 0139	COSTA RICA	Development Information	---	2 250	---
032 0097	DS/ST	Denver Research Institute--Know-How Center	63	---	---
		TOTAL	7 908	20 057	16 576

AID PROJECTS SUPPORTING S&T CAPACITY-BUILDING

PROJECT NO.	COUNTRY	TITLE	(IN THOUSANDS $) FY 78	FY 79	FY 80
615 0162	Kenya	Rural Planning	700	742	388
621 0099	Tanzania	Agricultural Marketing and Development	130	---	---
631 0008	Cameroon	Agriculture Management and Planning	400	300	141
631 0007	Cameroon	Social Science Research and Training	290	380	260
660 0055	Zaire	Nutrition Planning	---	823	---
677 0004	Chad	Health Planning and Management	411	---	---
677 0201	Chad	Range and Livestock Development	500	---	---
367 0130	Nepal	Population Policy	---	1,911	---
367 0126	Nepal	Integrated Health Services	685	2,125	---
367 0124	Nepal	Education Skills Training	557	69	---
367 0131	Nepal	Development Services and Training	---	---	600
383 0044	Sri Lanka	Development Services and Training	1,000	1,600	---
388 0021	Bangladesh	Rural Electrification	3,000	3,000	---
492 0266	Philippines	Aquaculture Production	221	---	---
492 0320	Philippines	National Nutrition Outreach	---	530	1,000

PROJECT NO.	COUNTRY	TITLE	FY 78	FY 79	FY 80
492 0291	Philippines	Barangay Water I	184	---	---
497 0311	Indonesia	Soil Conservation Program	---	---	9,000
497 0296	Indonesia	Educational Communications Development	---	1,000	1,300
515 0138	Costa Rica	Science & Technology	---	3,000	---
515 0145	Costa Rica	Natural Resources	---	5,460	---
517 0126	Dominican Republic	Natural Resources Management Loan	---	---	3,000
517 0119	Dominican Republic	Educational Sector Loan	---	6,500	---
518 0017	Ecuador	Training for Development	---	---	400
504 0067	Guyana	Leprosy Control Program	126	68	56
504 0076	Guyana	Data Management Development	---	---	245
511 0458	Bolivia	Rural Sanitation	100	45	100
511 0483	Bolivia	Rural Health Delivery Systems	---	5,900	900
511 0471	Bolivia	Rural Development Planning	975	265	510
519 0182	El Salvador	Nutrition Improvement	114	200	161
519 0184	El Salvador	Small Farm Irrigation Systems	380	---	---
519 0176	El Salvador	Multi-Purpose Household Survey	167	127	---
521 0091	Haiti	Rural Health Delivery		4,152	2,373
521 0082	Haiti	Disaster Preparedness		150	165
525 0217	Panama	Environmental Management	---	---	200
527 0183	Peru	Health Sector Planning, Management, and Information Development	---	465	---
527 0173	Peru	Selection Development Training	---	162	---

PROJECT NO.	COUNTRY	TITLE	FY 78	FY 79	FY 80
279 0045	Yemen	Local Resources for Development	---	1,710	2,260
279 0043	Yemen	Water Resources Planning and Management	---	1,060	630
306 0157	Afghanistan	Development Support Training	300	500	1,139
608 0149	Morocco	Development Training and Management Improvement	2,175	---	---
664 0237	Tunisia	Agriculture Economic Research and Planning	145	---	---
263 0063	Egypt	Development Information Support	1,000	500	300
276 0030	Syria	Agricultural Planning	---	---	1,200
278 0208	Jordan	Health Planning and Services Development	500	125	---
278 0226	Jordan	Health Information Systems	---	---	500
		TOTAL	14 060	42 869	26 828

Projects to be Transferred to ISTC
$(000)

Office	FY 79	FY 80	FY 81		
			Min.	Cur.	Proj.
Health					
Malaria	1,730	2,476	2,350	2,350	3,200
TDR	1,000	4,000	4,000	4,000	4,000
	2,730	6,476	6,350	6,350	7,200
POP					
Prostaglandins	360	260	150	150	150
Biomedical Res.	50	240	200	200	350
WHO	-	2,000	-	-	2,000
	410	2,500	350	350	2,500
N					
Nutrition Ag. Center	683	-	-	400	400
CRSP	-	1,750	600	900	900
	683	1,750	600	1,300	1,300
EY					
Unspecified		2,000			
ST					
Man & Biosphere	-	1,350	100	400	700
Forest Resources	-	750	100	350	550
Sci. Institution for Dev.	-	500	250	500	750
Sci. Policy	-	1,000	--	-	-
Desertification	-	1,000	100	400	700
Industrial Tech.	-	500	250	500	750
	-	5,100	800	2,150	3,450

Office	79	80	81		
			Min.	Cur.	Prop.
AGR					
CGIAR	26,600	29,600	26,150	26,150	32,280
CRSP Small Rumin.	4,000	1,500	2,700	2,700	2,900
IFDC	4,000	4,000	3,500	3,500	4,000
CRSP - Fish	-	1,750	600	600	600
CRSP - Sorghum/Millet	5,000	2,500	2,000	2,000	2,200
Spring & Winter Wheat	166	400	270	270	270
CRSP - Beans & Cowspeas	-	3,000	1,500	1,500	1,700
CRSP - Peanuts	-	250	-	-	1,900
Soybeans	520	700	-	-	-
Nitrogen Fixation Sym.	-	800	500	500	500
World Rhizobium	-	150	150	150	150
Root Knot Nematode	-	130	-	-	200
Ticks	-	300	-	300	300
ICLARM	300	200	300	300	300
Barley	-	270	-	-	100
CRSP Animal Health	-	250	-	-	-
Tissue Culture	-	600	-	-	300
BNF-Econ. Analysis	-	200	-	-	-
Grazing Ruminants	-	100	-	-	-
Tropical Soils	980	-	490	490	490
Trop. Legume Innoc.	-	-	-	-	300
Striga Control	-	-	-	-	140
Tsetse Fly Control	-	-	-	600	600
Mycorrhiza on Trop. Grains	-	-	-	-	200
CRSP - Roots & Tubers	-	-	-	-	250
Aflotoxin Reduction in Maize	-	-	-	-	300
N-Fixation Associative	345	-	-	-	355
N-Fixation Limiting Factors	500	-	-	-	400
	42,411	46,700	38,160	39,060	51,275
Total*	46,234	64,526	46,200	49,210	65,725

*In addition to the above list, the International Center for Diarrheal Disease Research with an annual funding level of $1.9M will be transferred to ISTC at a later date.

Mr. BROWN. I would like to next call a panel of witnesses representing the private sector—industry, labor and nongovernmental organizations.

Again may I welcome this distinguished panel of witnesses, which includes: William D. Carey, executive director of the American Association for the Advancement of Science; Mr. Harvey Wallender, managing director, Council of the Americas, James D. Grant, vice president of CPC International; Don Furlong, vice president and manager of corporate marketing for Bechtel Industries; Nat Robertson, scientific adviser to Marion Laboratories; and Michael D. Boggs, assistant director, Department of International Affairs, AFL-CIO.

We know that all of you have a very important contribution to make to this hearing, which has focused on involving to the fullest extent possible representatives of nongovernmental and private organizations. We're very pleased that you could all be here.

I'm sure that all of you also recognize that the committee has consumed more time than it should, and in the interest of not going too far past the lunch hour, I would like to suggest that, to the degree that you feel that you can, you summarize your statements, that way the full text of all of your statements will be included in the record.

So we start with Mr. Carey.

STATEMENTS OF WILLIAM D. CAREY, EXECUTIVE DIRECTOR, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE; HARVEY W. WALLENDER, MANAGING DIRECTOR, COUNCIL OF THE AMERICAS; JAMES D. GRANT, VICE PRESIDENT, CPC INTERNATIONAL, INC., AND CHAIRMAN, INDUSTRIAL SECTOR ADVISORY GROUP TO SECRETARY GENERAL OF UNCSTD; DON FURLONG, VICE PRESIDENT AND MANAGER OF CORPORATE MARKETING, BECHTEL INDUSTRIES; NAT C. ROBERTSON, SCIENTIFIC ADVISER TO MARION LABORATORIES, CHAIRMAN, INTERNATIONAL SUBCOMMITTEE OF THE FEDERAL SCIENCE AND TECHNOLOGY COMMITTEE, INDUSTRIAL RESEARCH INSTITUTE; AND MICHAEL D. BOGGS, ASSISTANT DIRECTOR, DEPARTMENT OF INTERNATIONAL AFFAIRS, AFL-CIO

Mr. CAREY. Thank you, Mr. Chairman. Good morning, gentlemen.

I will try to abbreviate my statement, which is a little long because the invitation carried about 15 questions which I tried to deal with in my responses. But I will deal very generally with it.

This is a conference which is only 30 days away. It's going to be a significant event, in restructuring geopolitical relationships. And I think we have to understand the conference in that general context and not simply as a passing event, in the usual U.N. pattern.

I believe the problem is partly that the United States has done its bit to raise expectations for the last three decades in the Third World, and rightly, and now those expectations call on us to define some terms on which to negotiate a peaceful process of change. That's partly what Vienna is all about, and we can't go there in a stonewalling state of mind.

Now, I think that I will be one of the delegates to Vienna. The list has not yet been posted. And I have to say that, in my own opinion, we're going to be traveling very light as a delegation as far as U.S. initiatives are concerned. The posture that our delegation will have to carry with it is shaped by the current mindset in the administration and in Congress towards new directions in domestic and international matters, with a strong preference for restraint and retrenchment and national self-interest.

This is grounded quite solidly, I think, in public opinion. And so, faced with these problems of inflation and possible recession and energy constraints and rising uncertainty as to whether we can sustain a growth economy, I think it's natural that these problems arise.

But as a result, the approach we take to Vienna as of today is built very close to the ground, and unless Congress somehow can see fit to rescue the ISTC, the single most visible element in our portfolio going to Vienna as a delegation will be undercut.

I'm not sure what tomorrow will bring in terms of executive branch decisions. But as of today, we have no brief to say we are ready in this country to scale up research and development on problems of developing countries over the next decade. We have no brief to participate in a new common front for R. & D. in order to facilitate new terms for the transfer of proprietary technology, nor to expand the availability of public technology like the Earth resources satellite, nor to create a workable science information system oriented toward development.

These are a lot of gaps, and yet the U.S. national paper says that this conference is to provide a vision as to how far we can go, so that the world's knowledge can become the world's own.

Now, the U.S. positions, as we heard this morning, may indeed not yet be locked up. But we're getting awfully close to departing for Vienna.

Before our delegation goes to a conference of this kind, unless they're just going to be tourists, they should do their homework, they should know the U.S. positions, they should know the problems that those positions will create in terms of debate, controversy, and how to field them.

So I hope that we don't get our last instructions at the airport.

The goals of the United States for Vienna are quite substantial. One of them is to overcome the worst aspects of poverty by the year 2000—formidable. Another is to advance economic growth in the developing countries, the essential and foundation for overcoming poverty; and a third is to deal with some of the global problems of food, water, energy, population, and so forth.

Now, these are very ambitious goals. I think they do reflect the right U.S. sense of priorities, and I think they show realism that peaceful change is very illusory as long as incendiary dissatisfactions in the majority of the world's population are present. And I wish we'd give this threat to our future some of the attention that we give to the new emerging missile gap.

My problem is that while our objectives for Vienna are great, the effort we're proposing is not commensurate, unless this gap is repaired in the next couple of weeks, which is asking a lot. I don't think any of us could claim that maintaining our present commit-

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ment level to development and research and development can have a chance of overcoming the worst aspects of poverty in 20 years, nor solve the global problems that we mentioned in our national paper. It seems to me that what we're going to do in this country in the next few years and the next couple of decades, to strengthen our national defense on the one hand, and to break our dependence on OPEC on the other hand, will to make it very hard for development assistance and science and technology for development to compete for the marginal Government budget dollar, unless there's a change of opinion as to the priority that we assign to science and technology for development.

Now, there is this mismatch, in my opinion, and I have to be candid about it. But the developing countries are not all alike. They fall into different tiers, different stages of development, different needs. And there is a cluster of Asian countries which met recently in Malaysia and came up with six basic principles to improve science and technology in their country. These are cited in my testimony and I shall not recite them again, except to say that they are reasonable, they are doable, they're affordable, they are sensible, and they are targets that are well within the capacities, even the marginal capacities of affordability of the United States and other developed countries, and they don't overstrain funding capacity.

I think we should pay attention to the statements of these Asian countries, because I think they're important and I think they're consistent with the findings of the Asian regional seminar which AAAS cosponsored last year in New Delhi. They don't call upon us to throw science and technology promiscuously at the developing countries. They recognize that modernization has to build on a strong base of education, health, literacy, and productive employment, instead of instant industrialization and culture shock.

And I hope that out of our Vienna meeting we can deal with these proposals and these principles, and bring something away that counts. This may not be enough for those middle-income developing countries, whose desire for rapid industrialization compels them to demand more.

You raised a number of questions in your letter of invitation. Again, my testimony covers my responses—I don't know if you've had a chance to look at my testimony, but very very briefly, I will touch on it.

One of the questions is whether the concerns of nongovernmental organizations have been adequately picked up in the preparatory work. I'm not going to try to speak for the large community of nongovernmental organizations whose views of the preparations for UNCSTD are mixed. I'll just say that as far as AAAS is concerned, our inputs to the State Department began in 1976 with the famous letter from five presidents to the incoming Secretary of State, and the Department's door has never been closed to us. Ambassador Wilkowski has sought our views consistently.

Two past presidents of AAAS have, as well as myself, participated in Father Hesburgh's steering committee, and Revelle and I will be on the delegation. We've done a number of other things for the Department, including workshops. So AAAS is satisfied that at least we have had our innings.

Another question, technology transfer issues in UNCTAD and UNCSTD—excuse the acronyms. It seems to me, very briefly, that while UNCSTD is a one-time meeting, the trade and development process of negotiation is an ongoing and continuing one, and I think that, even though a lot of the questions that concern the Conference on Trade and Development will creep into UNCSTD, the place to settle them is in the other fora that the U.N. provides for.

As to what AAAS hopes to do to follow up with UNCSTD, we will have a symposium on the UNCSTD world plan of action at our annual meeting next January in San Francisco. We hope the symposium will have participants from developing countries as well as the UNCSTD Secretariat.

We're going to be working with the U.S. scientific and professional societies to try to link them in to counterpart organizations or public organizations within the developing countries. And if funds can be found, we are perfectly willing to go back into Asia and Africa and Latin America and deal on an eyeball-to-eyeball basis with our affiliated societies in promoting science or development.

We ran several workshops, which you've asked about. I think I will let the testimony speak for itself, except to say that I feel that they were lively and useful and did provide thoughtful output which can be provided to the delegates as we depart for Vienna. They were good sessions: Women and development—there was a strong sense that there was a need for training for poor and illiterate women in the developing countries to improve their development potentials.

In the seminar on building institutions in developing countries, there was a strong sense that ISTC was a critical new factor in getting that act together.

The workshop on organized labor's concerns, as you might suppose, brought out a great deal of concern and worry from the labor organizations about the job losses in the United States due to increased imports from less developed countries and the problems of multinational corporations. There were many suggestions which grew out of that workshop, including better trade adjustment allowances and internationally pooled trade adjustment assistance.

The fourth workshop, on the roles of scientific and engineering societies in development, largely saw opportunities to work with developing countries through exchange visits, publications and reports, conferences, workshops and other things, along with the development or stimulation of development of indigenous societies.

You asked about research problems amenable to international collaboration. My testimony, will spell that out. It emphasizes basic human needs.

You asked about new institutions and funding mechanisms, and I do not believe that a strong case yet has been made for creation of new institutions per se for financing. We have a multitude of multilateral and bilateral assistance agencies, and while some may be slow and very bureaucratic, they do have deep resources. Even more important, they have experiences with success and failure, which you don't brush away.

For the most part, they've approached development assistance only in terms of economic and economic infrastructures, with too

little focus on scientific and technological capabilities. So the science deficit in developing countries is huge, after all these years of U.S. multilateral and bilateral assistance, and cutting back that deficit will take several more decades and a redirection of the systems of priorities.

Here again is where I feel that ISTC is a very important new catalyst. For the longer run, it's my view that if we're serious about assisting modernization in developing countries with science and technology, and we've caused those countries to believe that we're serious, we 're going to have to pace the overall real growth of research and development in the U.S. federal budget with proportionate increases in the share of research and development to be applied to the problems of developing countries. And that's one of the messages that I hope very much our delegation can take to Vienna.

Mr. Chairman, I don't want to prolong this. Your question to me about international regional centers for remote sensing data is an important one and I am very much in favor of this concept in principle, but we have a long way to go as to who is to pay for those regional centers, whether the LDC's will be able to finance their operating costs, who is responsible for training people in data analysis, and even whether political agreements can be reached to bring in the countries that would make up those regions.

So there's a long way to go. It's a great idea. Precisely the way we ought to be moving—if some of the missing answers can be filled in, this one could be a winner and I hope that Congress will continue to push our agencies to get on with it.

The idea of a global information network, on the other hand, is one that I think less of. Here in the United States we've got an infinite number of separate and very costly science and information systems, no consensus as to the standards of definitions or languages, and no national guidelines to rationalize what goes on here. And if we scale that up to consider a global information network, it boggles the imagination. It's the sort of proposal that I think brings very little to the UNCSTD meetings and to the agenda.

So the prospects for Vienna remain rather uncertain. And as one member of the delegation, my hope is that from both the north and south, the conferees will keep cool heads and try not to lose sight of the time constants that confront all of us, rich and poor alike.

Thank you, Mr. Chairman.

[The statement follows:]

STATEMENT OF WILLIAM D. CAREY, EXECUTIVE OFFICER, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Members of the Subcommittee, the UN Conference which begins thirty days hence in Vienna will be one event in an extended restructuring of geopolitical relationships. To see it as anything less is to mistake the whole trend towards breaking the dependency relationship of developing countries upon the developed nations. The problem for us, and for others like us, is to accept that for three decades we have been raising the expectations of the third world, and now those expectations require that we find terms through which the process of change can be managed peacefully and cooperatively. If we can make some progress at Vienna in devising such terms, and not go there in a stonewalling state of mind, some benefits can be rescued from a somewhat unpromising scene.

Putting on my second hat as a U.S. delegate to the Vienna Conference, I must say that we will be traveling light so far as U.S. initiatives go. The posture of our

delegation is unavoidably shaped by the current mind set of the Administration and the Congress towards new directions in either domestic or international policies. The strong preference for restraint, retrenchment, and national self-interest is unmistakable and grounded solidly in public opinion. Faced with inflation, recession, energy shortages, and rising uncertainty as to the sustainability of the U.S. growth economy, public policy tilts decisively towards a defensive orientation. As a result, the approach we bring to Vienna and to the promotion of development through sharing U.S. science and technology is built very close to the ground. Unless the Congress sees fit to rescue the Institute for Scientific and Technological Cooperation from the fate to which the Senate recently consigned it, the single most visible gesture offered by the United States to the Vienna agenda will disappear and the credibility of our intentions will be seriously undercut. As of now, the delegation has no brief to report U.S. readiness to scale up research and development on problems of developing countries over the next decade, nor to participate in a new common fund for research and development, nor to facilitate negotiation of new terms for the transfer of proprietary technology, nor to expand the availability and services of public technology such as the earth resources satellite, nor to help create and support a workable science information system to guide development. Yet, the U.S. national paper says that the Vienna Conference "must provide a vision of how far we must go so that the world's scientific and technological knowledge can truly become the world's own." True, the final U.S. position fix for Vienna hasn't yet been locked up, so it may pick up more substance in the next couple of weeks. I for one hope it does.

The goals of the U.S. for the Vienna Conference are spelled out in the U.S. national paper, and I support them. They are, first, to overcome the worst aspects of poverty by the year 2000; second, to advance in developing countries the economic growth that is essential to overcoming poverty; and third, to create the scientific and technological relationships needed to deal with global pressures on food, water, energy, raw materials, population, and the environment.

These are ambitious goals for a ten-day conference, but they indicate the right long-term priorities. They show realism on our side that peaceful change is an illusion as long as incendiary dissatisfactions fester. One wishes that this threat to our future could receive a fraction of the attention that we give to the new missile gap. Our objectives for Vienna are fine, but the effort we propose is scarcely commensurate. I do not think that any of us would claim that maintaining our present commitment level to development can overcome the worst aspects of poverty in 20 years, nor create the economic growth needed to achieve that end, nor solve the global problems that are cited in our national paper. My own opinion is that the steps we seem about to take in the United States in the coming years to strengthen our national defense and break our dependence on OPEC will make it very difficult for development assistance to compete for the marginal government dollar absent the political vision to upgrade the priority that we assign to it.

While I see a mismatch between our objectives for Vienna and our willingness and ability to support them with effort, not all is lost. The developing countries are not all coming to Vienna with the same demands upon the developed nations for large new investments and transfers of advanced science and technology. Some take a more balanced view of science and technology in development than others. To the extent that this is the case, the U.S. response will be more acceptable.

Let me spell this out briefly. According to a report in Nature (June 28, 1979), scientists from 21 South and Southeast Asian countries agreed at a conference last month in Malaysia on six basic principles to improve science and technology in their countries. Bear in mind that these were Asian scientists and not politicians, and there's a difference. However, these were the six principles:

(1) Scientists and technologists from developing countries should have greater representation in internatioal bodies dealing with science, technology, and development, perhaps through traveling fellowships and new institutions in the developing world;

(2) Because scientific and technical capabilities are low in LDC's, there should be more emphasis on required sharing of competence;

(3) More international help is needed for effective and relevant science and technical education, including educational materials and training of the kind that promotes self-reliance;

(4) There should be a mechanism to follow up and implement the decisions resulting from the Vienna Conference;

(5) Scientific and technical information systems should be set up and aimed at key issues in development; and

(6) It is especially important to define the goals of development clearly, with emphasis on basic human needs of people rather than high per capita GNP. The

accent would be on lifting the parameters of health, literacy, and employment to a level by the year 2001 that would bring the developing countries up to one-fifth of the equivalent standards of the rich countries.

Now, these six points strike me as focused targets that are well within the capacities and affordability of the U.S. and other developed nations, and they would not put much strain on funding mechanisms. They are consistent with the findings of the Asian Regional Seminar that AAAS cosponsored last October in New Delhi. They do not call on us to throw science and technology blindly at the developing countries. On the contrary, these principles recognize that modernization must build a strong base on education, health, literacy, and productive employment instead of instant industrialization with cultural shock. I believe that existing U.S. government agencies, industries, universities, and nonprofit institutions, hopefully orchestrated by the ISTC, can rally to an agenda like that in Vienna and come away with acceptable terms for the management of peaceful change. I hope this is how it turns out, though I recognize that this may not be enough for those middle-income LDC's whose desires for rapid industrialization impel them to demand more.

In your invitation to testify this morning you asked a number of specific questions to which I will respond briefly.

CONCERNS OF NONGOVERNMENTAL ORGANIZATIONS

I would not wish to speak for the large community of non-governmental organizations whose views of U.S. preparations for UNCSTD are quite mixed. But as far as AAAS is concerned, our inputs to the State Department began in 1976 and have continued. The Department's door has never been closed to us; quite to the contrary, Ambassador Wilkowski has sought our views and assistance from the very start. Two past presidents of AAAS (Margaret Mead and Roger Revelle) and I have participated in Father Hesburgh's Steering Committee, and Revelle and I are nominees to the U.S. Delegation. The State Department also came to AAAS with the request to hold regional conferences and workshops as part of the preparations for UNCSTD, and we obliged as much as we could, and we have brought a considerable number of NGO's into these workshops and conferences. AAAS is satisfied that we have had our fair innings.

TECHNOLOGY TRANSFER ISSUES IN UNCTAD AND UNCSTD

Here we have to remember that while UNCSTD is a one-time Conference, the UNCSTD process is a continuing one with formal meetings at four-year intervals. The issues of aid and trade and terms of technology transfer run deep and are troublesome. They go to questions of proprietary rights, patents, copyright, and the role of multinational enterprises. While nobody can keep these issues from creeping into UNCSTD, since they are all linked to the premises of the New International Economic Order, it is not the business of UNCSTD to short citcuit the settled UN machinery which is concerned expressly with trade and aid, whereas the focus of UNCSTD is—or should be—on identifying how science and technology can be threaded strategically into social and economic goal-setting. Life is confused as it is, without having one UN enterprise take in another's washing.

AAAS AND THE FOLLOWUP TO UNCSTD

AAAS expects to hold a symposium on the UNCSTD World Plan of Action at our Annual Meeting in San Francisco next January, when the dust settles on events in Vienna. We hope that the symposium will have participants from developing countries as well as from the UNCSTD secretariat. In addition, AAAS sees a need to identify those U.S. professional societies with interests and programs relating to development assistance and to match them with counterpart public and private sector organizations in the developing countries, including but not limited to scientific and engineering societies. If we can find the funds, we would also want to hold focused meetings and workshops in developing regions on approaches to strengthening education and research for purposes of promoting self-reliance, concentrating on the unique contributions scientific and engineering societies can make. Finally, if the ISTC is approved by Congress we will be fully prepared to work with it.

RESULTS OF AAAS WORKSHOPS

We ran four workshops for the State Department. On "Women and Development" the emphasis was placed on scientific and technical education for women professionals, and on training for poor and illiterate women to improve their income-producing skills both for small-scale local industry and the modern industrial sector. The workshop on "Building Institutions in Developing Countries" concluded that devel-

oped countries should leave it to the LDC's to set their own priorities for science and technology and then work with them. This workshop also came out strongly for creation of the ISTC with substantial autonomy and with emphasis on capacity-building in developing countries, preferably of the non-governmental kind. The participants keyed on information flow as a crucial tool for advancing science, but favored exchanges of experts and journals over the creation of fancy automated storage and retrieval systems. The workshop called for U.S. leadership in establishing a new journal of science and technology tailored for developing countries, and the placing of regional science attachés in Southeast Asia and West Africa.

The third workshop, on "Organized Labor's Concerns," expressed strong concern over job losses resulting from increasing U.S. imports from LDC's, especially where such imports are traceable to technology transfers by U.S.-based multinational corporations. Even though statistical evidence showed that imports from LDC's were of minor proportions when compared with other factors affecting jobs, and that job-creating effects of our exports to LDC's often offset the adverse effects of imports, trade unionists made the point that many of the displaced U.S. workers can't shift over to fill job openings created in the exporting industries. Trade adjustment allowances were criticized for providing inadequate unemployment compensation, and preference was expressed for trade measures such as orderly marketing agreements. Some other proposals were for internationally pooled trade adjustment assistance financed by export levies, special assistance for workers displaced by actions of MNC's, and a comprehensive U.S. manpower policy to help all structurally unemployed in place of special adjustment assistance.

The fourth workshop, on "Roles of Scientific and Engineering Societies in Development," emphasized the high potential of these professional organizations with their expert resources. They have the advantage of nongovernmental status, which enables them to respond readily and flexibly, and for development purposes they have a valuable educational function through journals, reviews, and books. The workshop saw opportunities for these societies to encourage development through exchange visits, publications and reports, conferences, workshops, and special courses. They can also stimulate the creation of couterpart scientific and technical societies in the LDC's, work with universities to strengthen the disciplines, and give more recognition to U.S. scientists and engineers who today get no professional rewards for participating in development.

That sums up the highlights of the four AAAS workshops. Reports are now being printed for distribution and use by the delegates to Vienna.

RESEARCH PROBLEMS AMENABLE TO INTERNATIONAL COLLABORATION

If one starts with basic human needs, accepting the priorities suggested at the meeting of the Asian scientists, the menu for cooperative research is a large and pressing one. Health stands out in terms of priorities, and the areas of nutrition and health care—including prevention—are fundamental targets for research. Population follows closely, and here the research has to emphasize social sciences, educational methods, and delivery systems. Given the seriousness of the food problem, joint research and demonstration in agricultural technology ranks high as to priority, and I include fisheries management and food storage and processing. Both as to agriculture and natural resources and energy, there are substantial payoffs to be gained from increased U.S. cooperation via remote sensing of the quality and distribution of soil, water, minerals, and vegetation—basic resource and environmental information on which development goals and plans need to rest. This is a partial list of opportunities for collaborative research, and the National Academy of Sciences has gone into far more extensive detail than I can. What is important is to look to the LDC's themselves to identify research problems and priorities and not try to outthink them from here.

NEW INSTITUTIONS OR FINANCING MECHANISMS

I do not believe that a strong case has been made for the creation of new institutions per se. We have a multitude of multilateral financial and investment institutions in operation, as well as national development assistance agencies providing bilateral support, and while some of them may be excessively slow and bureaucratic, they possess deep resources and experience with successes and failures. But for the most part they have approached development as a problem of economics and economic infrastructures, with relatively slight focus on building scientific and technological capacity. The result is that after three decades of development assistance, the "science deficit" in most developing countries is huge. Reducing this deficit will take several more decades and redirection of financial and technical assistance priorities. In our own country, we need an organizational focus

for rationalizing and targeting our scientific and technological resources upon development needs—an institution with flexibility to cut through bureaucratic barriers and reach out to universities, industry, and professional societies as well as the mission-oriented government agencies, and to be the responsible U.S. organization to follow through on the outcomes of the Vienna Conference. It does not have to be financed heavily in the beginning with new money, but it should have enough to seed new starts and to leverage funds that are available for development elsewhere. I am very much afraid that without the ISTC the Vienna Conference will be a fading memory. As for the longer run, I will be frank to say that if we are serious about assisting the modernization of LDC's in science and technology, and if we hope to convince the developing countries that we are serious, we will have to pace the overall real growth of R&D in the federal budget with the proportionate increases in the share of R&D to be applied to the problems of development.

INTERNATIONAL CENTERS FOR REMOTE SENSING DATA

It is my understanding that this idea came from NASA rather than from the European Space Agency. As I understand it, the concept calls for taking better advantage of existing data from satellites of the Landset variety by establishing regional processing centers in the developing world. In principle, the idea is a good one. Some 130 countries now purchase information from our distribution center in South Dakota. I understand that the U.S. has arranged with several governments to set up such centers in several African countries, and that others are planned for Asia and Latin America.

But the advantages of a regional center are numerous, including economies of scale and the ability to pool skills among the poor LDC's. Besides, the significance of natural resources and environmental data is necessarily regional, not national. Having said all this, we are still not out of the woods. It isn't clear who is to pay for the regional centers, whether the participating LDC's will be able to finance their continuing operating costs, where the responsibility lies for training local personnel in data analysis, or even whether political agreements can be reached to bring in the countries that make up a region. In short, this idea is an attractive one and a specific example of how advanced technology can, in fact, contribute cost effectively to development. If some of the missing policy answers can be filled in, and some of the arguments settled, this proposal could be a winner.

A GLOBAL INFORMATION NETWORK

The idea, from the Group of 77, is an extreme, unworkable, and idealized proposal for a global information bank within the UN, connected with centralized national depositories of scientific and technological information and data. When one considers that here in the U.S. alone we have a variety of separate and very costly science information systems which are designed for particular uses, and with no consensus on standards or definitions or languages—and no national policy guidelines to rationalize what is going on—the problems and costs associated with a global network boggle the imagination. All that apart, it is hard to believe that either market-type or socialized national economies would disclose everything they know about science and technology to such an open information system. This is the sort of proposal that brings nothing useful to the UNCSTD meetings nor to the agenda for applying science and technology to development.

This concludes my prepared statement. The prospects for the Vienna Conference remain uncertain. As one U.S. delegate, my hope is that the conferees, from both the North and the South, will keep cool heads and resolve not to lose sight of the time constants that confront us all, poor and rich alike.

Mr. BROWN. Thank you very much, Mr. Carey.

Mr. Wallender?

Mr. WALLENDER. Mr. Chairman, members of the committee.

Again not going through the complete testimony, but recalling again the fact that in the last 2 years U.N. Ambassador Wilkowski's office, other executives of the administration and our organization, in cooperation with the Council of Americas, the Fund for Multinational Management Education and a number of other business associations, have delivered 70 working programs involving nearly 500 U.S. corportations. So certainly we've been involved.

I think what's most important about this process is that when we arrive in Vienna, we establish a platform for continuing a dialog. Relationships have changed. Unfortunately, the public dialog at the Vienna conference will not accurately reflect the present

changes in attitudes which characterize the improving relations between users and buyers of technology.

Much of the reason for our being in Vienna and for being involved in other multilateral negotiations, stems from an initial concern about uses, about inappropriate costs of transfer of technology, and about problems of dependency. It's our belief—and in the testimony there is evidence provided—that the atmosphere has moved from the original issues of coercion, to trying to gain greater control of the supply of the technology to the access issue.

We see more and more emphasis on questions of capacity building, issues where interests converge.

Again, I think as long as we are prepared to deal frankly and openly in Vienna, we have a chance to maintain that, and it must be maintained. This dual level of exchange at Vienna, I think, is where the payoff will take place. As long as we're able to talk as a delegation about the actual obstacles that inhibit science and technology, as long as we're prepared to talk in principles, then I don't think we should be that concerned with the package we offer. We have presented an extremely valuable package in the past and will continue to present that package.

First of all, the foremost obstacle we must deal with is building manpower. The question raised earlier by Mr. McCormack is absolutely critical: There is virtually no user community for advanced research and development facilities. Certainly there is no user community to analyze and actualize the kind of information systems put forward by the UN and other multilateral agencies.

Another major problem which we must stress is the problem of linkages. The linkages between local enterprises in developing countries, their governments, their academic institutions, are extremely weak. We have to look forward to building institutions that forge new linkages before we will have any type of ability to exploit the kind of initiatives we've been discussing.

Finally, a major obstacle that's associated is disincentives. The political instability, the confusion surrounding the technology issue, has already caused a decline in technology absorption in a number of developing countries. Somehow we have to pass that message, again, without trying to stimulate conflict.

I think as long as we're talking in Vienna about issues like building smaller and medium-sized enterprises to use technology, about practical linkages among governments, the technological infrastructure, productive enterprise, we will be talking issues that will be picked up after the conference. They may not lead to consensus in the conference, but I think that represents issues of leadership.

I also think we have to be concerned with modifying and improving the existing educational systems here and abroad. It's clear that a great number of our university programs are not adequate for developing country needs. I note that almost 50 percent of the Ph. D.'s in engineering in the United States today are from LDC's, yet virtually none of our programs deal with appropriate technology or local technology requirements for developing countries.

Finally, we do have to support the development of national policy centers to help plan and establish clearcut goals. Unfortunately, as I said, I think the prevailing environment in Vienna will

not reflect these realities. At one level, governments and regional groups will continue to stress the need for improved access to foreign technologies. There are many reasons for this. Many of the multilateral agencies already have a strong interest in continuing assistance programs they've already begun in this area. We can expect them to be concerned with centralized global information systems, centralized regional research and development centers.

Unfortunately, I think the experience we've had with these experiments suggests that we have to take a frank and honest approach toward any new institutions and look toward using what we have more effectively in terms of the working programs we've had, at least in some of the private sector. I think some specific recommendations that have been utilized so far focus on the problem of building capacity.

More specifically, Mr. Chairman, we think that some principles need to be constantly reinforced in Congress. The importance of private property and individual incentives is critical if technology is to be used and exploited. The problem of balancing agricultural development with industrial strategies. Again, the importance of linkages. Finally, our concern over highly centralized institutions, which actually inhibit and discourage innovation and productivity at the developing country level.

The United States should encourage at Vienna a focus on programs that build enterprises and individuals, not intergovernmental institutions. The U.S. Government should reinforce and acknowledge that the existing science and technology system has in fact supported development in the third world. I think government should be encouraged to regulate technology in a reasonable fashion. At the same time, they have to strive to encourage and facilitate.

We need an environment of trust and confidence for science and technology exchange. I think actions by developing countries to secure greater access to information on technology transactions will mean little to science and technology development unless we're able to build the user community I spoke of earlier.

Many of our working groups have studied the problems of ISTC and its opportunities. We all think that positive actions should be taken on ISTC, but that emphasis should be given to the initiatives in the program that provide a new relationship for middle income countries and allow vigorous participation of the U.S. private sector.

Conversely, we feel that we should avoid building new academic institutions which are overly theoretical and do not relate to the practical problems of manpower development and maintenance of systems and the development of capacity. We feel that much has been done, but much more could be done in terms of engaging and activating U.S. industry in the developing country problem, looking for strategies that do not require massive new funding.

We have suggested areas like a cooperative industries program through which we can try to organize and provide access to over 3½ million U.S. personnel working abroad, who are capable of training and assisting manpower development.

We're concerned with various information systems designed for global integration. On the other hand, we agree that information is

critical to effective decisionmaking. And again, Mr. Chairman, I think that some of the initiatives developed under the work programs in preparation for Vienna have called for good bilateral and national programs.

In summary, then, I think that in many ways U.S. business will become much less cynical about the question of science and technology through the preparations for Vienna. We've seen that in fact forums in the past have led to a number of changes. We can point to a wide variety of governments in Latin America that have already begun, on a national basis, to reorient some of their strategies and regulations regarding science and technology.

If we arrive in Vienna well prepared and we engage these issues frankly, I think that dialog will continue. Hopefully, U.S. business is prepared and committed to continue that dialog.

Again, without a practical outcome in Vienna, I think we face a more confused and restricted world, and this ultimately translates into lost markets, lost jobs and diminished U.S. influence.

Thank you.

[The statement follows:]

STATEMENT OF HARVEY W. WALLENDER III

During the U.N. Conference on Science and Technology for Development, the U.S. Govenment should be prepared to engage frankly and constructively with developing and developed countries. Given the historical development of this conference, the United States should not take on a leading position but rather should assume a posture of well prepared responsiveness. The Vienna Conference represents a significant opportunity for the U.S. private and public sectors to demonstrate their willingness to cooperate in the development of science and technology activities in developing countries. However, it should also be a forum in which the United States speaks clearly and frankly about its concerns regarding programs that will be mutually beneficial to both the developed and developing countries. What is most important is that the United States and other developed nations establish a platform in Vienna that will serve as a basis for ongoing dialogue and a joint search for mutually beneficial, practical initiatives for the next decade. If a frank and constructive platform does not emerge from Vienna, the United States and especially its international business and labor interests will be faced with increasing conflict and serious disruptions.

The public dialogue of the Vienna conference will not accurately reflect present changes or attitudes that characterize the improving relations between suppliers and user of technology. In fact, much of the debate (especially the political rhetoric) will reflect ideas and issues that are somewhat out of date. The concern of the developing countries to maintain solidarity and to push toward a new view of economic and political relationships between developed and developing nations will be a discouraging factor affecting the final resolutions and resulting programming. In actuality, the most constructive and meaningful results of the conference will be the ultimate development of bilateral relationships. These programs will emerge from the conference only if we can address both the issues deriving from the older conflict and coercion issues and the more recent issues of convergence:

Original Issues of Coercion—Control of Supplier and Access to Science and Technology;

Emerging Issues of Convergence—Science and Technology Capacity and Developing Country Self-reliance; and

Major Obstacles—Manpower, Enterprises, and Linkages.

Understanding the relation of the topics of coercion and convergence, along with the underlying obstacles, will clarify the importance of this program to the United States and why we should adopt certain policies and positions at the conference. This clarification could be the basis for a more vigorous and sustained dialogue after the conference.

THE INITIAL ISSUES OF CONFLICT

No matter what the title of the conference is, the actual agenda and underlying concern of the developing countries relates to technological dependency. Beginning ten years ago, the developing countries, out of frustration about their overall devel-

opment process, became concerned with increasing technological dependency. It was felt that they were not capable of effectively controlling the development of their own science and technological activities and were especially vulnerable to developed countries and multinational corporations. Concern over possible abuses in the transfer of technology led to a rash of international initiatives and specific national legislation designed to control the supplier of technology. The UNCSTD preparatory documents still reflect this initial concern for control of the supplier and the importation of foreign technology into developing countries.

The cost of technology was an immediate issue of concern. More specifically, the developing countries were convinced that they did not have the capability to bargain effectively for technology and in many cases were paying too much to import foreign technology. In addition, it was felt that certain social costs were being incurred because of the inability to find more appropriate technologies or develop the capability to adapt foreign technologies to their specific local needs.

Control over how technology is used was a second issue of major concern. It was argued that the traditional patterns of multinational firms and certain types of technology agreements limited the ability of the developing country to control the actual use of the technology. Countries, therefore, implemented laws and established initiatives for international codes of conduct to assure that the host country and its particular enterprises would have the maximum control over how the technology was to be used, diffused, and otherwise applied to national interests. Developing countries were also anxious that no other restrictions be placed on whether or not the technology could be used to develop exportable goods and whether or not it could be mixed with other foreign technologies as deemed appropriate by the developing countries.

In order to gain greater control over foreign technologies and reduce costs, governments developed centralized government agencies which would register, review, and control all technology transfers. Additionally, developing countries, especially in Latin America, began to establish national centers for policy development to help guide the nation in terms of building up its scientific and technological capability. This included the creation of research and development centers, standards bureaus, and other institutions designed to facilitate the control and guidance of foreign technologies into the countries.

The focus of national concerns was rapidly picked up by intergovernmental organizations and made manifest in a wide variety of activities. The U.N. Conference on Trade and Development (UNCTAD) began a program designed to create an international code of conduct for technology transfer which would primarily embody the developing countries concern with regulating the supply of technology. Other U.N. organizations established technical assistance programs that would help train negotiators and help develop policy programs at national levels. The U.N. Transnational Center was created and provided an activity through which information and programs could be developed that would aid developing countries to further control and direct the multinational corporation. Other intergovernmental organizations, including the Organization of American States, began specific assistance programs dealing primarily with institution building aimed at improving the bargaining and control capability of the developing country governments vis-a-vis the international supplier of technology.

The focus on the supplier created an immediate zone of conflict between the developing and developed countries. While developing nations and intergovernmental institutions were accelerating activities to control and limit the multinational corporations, developed countries and their international firms were developing very different views regarding the international transfer of technology issue.

Many industrialized nations and their enterprises are concerned that technology has been transferred too cheaply. Additionally, we have been anxious to protect the legitimate property rights and were greatly concerned about the initiatives of the Third World to increase the diffusion and open the access to private technology. Finally, many experts are greatly concerned that the decentralization of research and development would inhibit competitive capabilities by making overall research and development less efficient and more costly. Finally, a major concern has been associated with the possible export of jobs and loss of competitive capability through the increased flow of technologies to developing and developed countries. These obvious areas of conflict between the developing and developed countries have dominated the last five years of the international technology dialogue.

While the intergovernmental forums, especially in the United Nations, continue to focus primarily on control of and reshaping the behavior of the supplier, individual developing nations and subregional groups have begun shifting their orientation toward improvement of their capacity to receive and utilize technology. Argentina and Chile have already taken dramatic steps to reverse their previous policies

toward technology importation and utilization. Mexico, Korea, and the Philippines are placing increased efforts on building local industrial capacity and technology infrastructure while redirecting their national control registries away from rigid limitation and constraints on foreign suppliers. Within the Andean Group, major revisions have been initiated and are now being developed which will create more positive incentives and facilitating structures to reverse the disincentives and barriers erected in the past decade. These and many other countries have already identified the counterproductive conflict associated with their previous one-sided policies. Unfortunately, these new attitudes and changes will not be prevalent in Vienna.

At the international level, the leading developing nations still adhere to the old adages. They are concerned with maintaining developing country solidarity and continuing to move the developed nations toward a new international economic order. Traditionally, they see Vienna and other similar conferences as primarily political forums in which long-term norms and general goals should be established. Practical and specific programs are left to the individual nations. We can expect much of the old rhetoric from many nations that have already begun modifying their own international policies. Additionally, many of the secretariats of different U.N. bodies have already established a considerable stake in continuing the development of international information, regulation, and assistance programs linked to controlling foreign technology suppliers.

This forecast of the Vienna program may appear negative and it is if we focus only on the most visible or rhetorical exchanges. In contrast, the forum also presents an essential vehicle through which other practical and concerned initiatives can be aired and debated. They will not influence the plenary conclusions but they will establish a basis for a multitude of follow up programs, exchanges, and policy modifications. For this reason, the United States, its enterprises, and other interested parties have much to gain especially if we can move collectively toward identification of the major obstacles affecting the developing countries.

UNDERLYING OBSTACLES OF S. & T. DEVELOPMENT

Unfortunately the environment leading to the Vienna Conference has focused primarily on trying to restrict and control the supplier of technology. In contrast to the assumption that the major problem for development is associated with guiding and directing the international transfer, the real problem is to develop the ability to use and exploit existing technology. Professor Jack Behrman of the University of North Carolina has recently reported in a study that of foreign technologies available, 40 percent can be obtained from publicly available sources at little or no cost to the recipient, 30 percent is in private hands but not owned and can be obtained at virtually the cost of transmittal, and only 20 percent is proprietary information that must be paid for in amounts which reimburse not only the transmission cost but also some of the cost of generation. About 10 percent is available from governmental institutions. Obviously this vast amount of technology is not being exploited and utilized in the developing countries for several reasons. Therefore, access is much less an issue than is the capacity to utilize technology.

The primary obstacle is associated with the lack of enterprises and skilled manpower. In very few of the developing countries does there exist an adequate productive sector with firms that are capable of diagnosing technology needs and beginning the search for appropriate technologies. One of the major reasons for this lack of firm and enterprise capability is the scarcity of trained and experienced managers and engineers. In many countries there is available a wide variety of scientific resources, but these resources cannot be put to work through an enterprise or particular user firm that is effective.

Another problem in developing countries is related to the linkages between the enterprise and the technological infrastructure. Unfortunately many universities in these countries are characterized by highly theoretical and impractical educational systems. In addition, there is a scarcity of practical programs to train technicians and other kinds of mechanically skilled individuals who can support the enterprise. In short, the lack of managerial, technical, and skilled labor resources presents a major obstacle that inhibits the development of sound enterprises and user firms that can exploit technology.

Finally, a major obstacle is associated with disincentives. The political instability and rigorous control by governments over certain sectors of the economy discourages the development of a balanced productive sector. In a variety of countries the recent and numerous technology dialogues and the resultant legislation of governments has tended to exacerbate the problem of developing effective users of international technology transfer.

It is perfectly reasonable that the developing countries would want to stimulate a more active and independent local technology capability, but in order to do this, they must attempt to overcome major constraints by focusing on several specific strategies, such as:

1. Building small, medium, and large size enterprise capability;
2. Developing practical linkages among governments, technological infrastructure, and productive enterprises;
3. Modifying and improving existing educational systems to fit LDC needs (within host countries and developed nations);
4. Developing stable and predictable economic policies that encourage risk taking and technological change by enterprises;
5. Developing effective national policies that channel the technology resources into practical and productive efforts.

Assistance programs that help build enterprises, improve linkages, and reinforce infrastructure, benefit not only the developing countries but the overall global science and technology community. Unfortunately, it should be noted again that the present trend of the multilateral forums is still focused on trying to control and shape the behavior of the supplier. Fortunately, there are a number of countries who have realized that the key to technology development lies in their own self-reliance which is really more associated with building manpower and effective and appropriate systems within the country. The United States has a great deal of experience and resources which it can share with the developing countries in these areas. For example, in most of the areas of training and firm support we do not encounter inherent conflict between the developed and developing nations. It is in these areas that the developed governments and especially the United States should urge further efforts and activities.

THE PREVAILING ENVIRONMENT FOR VIENNA

The U.S. Delegation will be faced with a dual exchange atmosphere in Vienna. At one level, governments and regional group spokesmen will continue to stress the need for improved access to foreign technologies. Programs will be advocated that will help develop bargaining and information centers, local national policy planning programs and other activities which would allow developing countries to gain greater access to foreign technologies at lesser cost.

At a second level, many of the individual delegates will be attuned to discussions of building local science and technological infrastructure. In fact, at the national level a number of important developing countries have already begun to refocus their efforts toward building an ability to attract and exploit existing technologies. The changes that we have already discussed that have taken place in Latin America are beginning to affect other nations. Unfortunately, these kind of ideas dealing with infrastructure development and manpower training will not dominate the public forums nor will they be the key issues of interest for multilateral action. Rather we can expect that the multilateral initiatives will deal with the following:

1. Developing centralized-multilateral information systems;
2. Developing national policy centers;
3. Developing cooperative research and development;
4. Developing means by which developing countries can collaborate with each other regarding science and technology policy and programming;
5. Developing financing mechanisms to fund new S&T programs.

Many of these activities are reasonable as long as they are complemented with practical infrastructure programs and activities. It is in the area of manpower development, enterprise improvement, and infrastructure creation that the developed nations can support a cooperative and mutually productive effort.

RECOMMENDATIONS FOR U.S. STRATEGY AT UNCSTD

The U.N. Conference for Science and Technology for Development is primarily concerned with science and technology within the developing countries. It is appropriate that the United States take a reactive stance in the sense that we are prepared to be practically responsive and willing to cooperate in dealing with opportunities where there is mutual benefit for both developed and developing countries. The United States must present itself in a frank and direct manner in terms of its own belief regarding what the obstacles and problems are that inhibit science and technology. In addition, we must be prepared to clearly communicate the principles and factors we believe should guide effective development procedures though we acknowledge that the ultimate policies and programs are the responsibility of individual nations. Because of the complexity and uniqueness of these differ-

ent situations, the U.S. should approach specific programs on a contingent basis and more specifically a bilateral basis.

A contingent approach suggests that science and technology programs be developed on a nation-by-nation basis. There are no general rules that are comprehensive enough to deal with all situations. Additionally, we should evidence our concern about the fact that many multilateral programs deal with issues that are not at the heart of the science and technology dilemma. Specifically we should avoid programs that deal with expanded global information systems and other efforts to coordinate and regulate technology trade on an international basis. Unfortunately, these are several of the issues dominating the recent preparatory documents of UNCSTD.

The U.S. position should also state its belief that a constuctive science and technology policy process should involve a wide variety of groups within individual countries. In our experience it has been the cooperation and linkage among government, labor, academia, private business, and volunteer activities that have led to successful development. We should evidence our belief that these capabilities within the United States, when properly coordinated, can make a major contribution to the development of science and technology infrastructure in the developing countries.

Education for many of the underdeveloped countries is a critical obstacle. The more practical and less esoteric capabilities of our smaller and lesser known universities represent a significant resource for the developing countries. In addition, our ability to organize and launch technical training for various needs represents a major resource that can be called upon by the developing countries.

Considering the problem of creating effective enterprises and managers, the multinational corporation as well as small U.S. firms can play a greater role. At the moment, there are a number of initiatives, such as a Cooperative Industries Program in ISTC, being considered which will engage these communities more effectively in the developing countries. However, it must be brought to light that these private initiatives will only transpire when the appropriate incentives and cooperative environments are established. Effective incentives and facilitating organizations must be established through which the most appropriate resources can be brought to bear in the developing countries.

The United States is also rich with a wide variety of specialized consulting and engineering firms. Organizations such as the Institute of Management Resources have recently proven how certain kinds of programs can be used in improving day-to-day productivity of various sized enterprises. Arthur D. Little, Inc. and the Stanford Research Institute have also demonstrated a capacity to help build and design science and technology institutions. These organizations can make major contributions in the developing world if governments can find an appropriate way to introduce and utilize such resources.

The U.S. should make clear that our governmental, industrial, and private volunteer organizations have made major contributions in the past and will continue to support the development of science and technology infrastructure in the future. Programs such as the International Executive Service Corps and Volunteers in International Technical Assistance are but examples of the success we have had in building enterprises and infrastructures in developing countries. Our focus should be to learn from the best of these programs and apply this understanding to the various environments in the developing countries.

The United States must engage in the dialogue in Vienna with a frank but flexible attitude. In many cases in the past, we have promised much and delivered little. There are many reasons why we are unable to expand our assistance programs, and these should be communicated openly with other nations. We must also indicate clearly our national concern with our own industrial and labor capabilities. Finally, it must be made clear that there are certain political and economic principles that the United States intends to adhere to and that these must be taken into consideration in terms of finding constructive programs for international cooperation. More specifically, we must reassert our confidence in certain principles such as the following:

1. The role of private property and individual incentives;
2. The required balance between appropriate agricultural and industrial strategies for effective development;
3. The importance of proper linkages between public and private institutions;
4. Our concern over highly centralized institutions which inhibit and discourage innovation and productivity of individual enterprises or persons.

The above analysis suggests that we should develop initiatives that encourage bilateral and contingent programming rather than highly centralized global activities. Following are some recommendations that should be considered:

Mechanisms should be encouraged to develop unique ways to finance and support science and technology infrastructures on a country-by-country or regional basis.

The U.S. should not support centralized, multilateral financing systems which will lack the flexibility to deal with the unique variations and needs of developing and underdeveloped countries.

The U.S. should encourage a focus on specific programs that build national enterprises and institutions that can use existing technology and assistance programs more effectively. We should avoid the tendency to create new institutions especially at the multilateral level.

The U.S. Government should reinforce an acknowledgement that the existing science and technology system has in fact supported development in the Third World. Efforts should be made to clarify which activities should be improved and facilitated as well as which should be corrected or eliminated.

Governments should be encouraged to regulate technology in a reasonable fashion, but they should also strive to encourage, facilitate, and protect the positive aspects of the technology transfer system.

Nations and institution should be reminded that technology transfer cannot be mandated but rather has to be encouraged and facilitated. The adoption of compulsory licensing and generalized codes of conduct will not encourage technology transfer unless they are complemented with other types of incentives and facilitating devices. The most important factor that will attract technology will be the stimulation of active and stable markets.

Actions by developing countries to secure greater access to information on technology transactions will mean little to science and technology development unless they are complemented with vigorous and broad scale programs that build up the different enterprises or individuals capable of using the information.

Positive action should be taken to launch the Institute for Scientific and Technological Cooperation (ISTC). Emphasis should be given in this initiative to programs which provide for a new relationship with middle income countries and allows a vigorous participation of the U.S. private sector. Conversely, we should avoid directions the Institute may take in terms of overly academic research and traditional assistance programs.

Engaging and activating U.S. industry in the developing countries can be facilitated with projects like the Cooperative Industries Program stimulated by work groups for the Coordinator's Office and the Planning Staff of ISTC. Industry needs leadership and modest assistance from government in stimulating such activities and Congressional efforts supported by U.S. AID can help launch such activities.

Various national information initiatives have emerged from the work programs preceeding UNCSTD. Efforts should be made to support new U.S. programs that create mechanisms for access, especially to private information networks, associations, and other sources not now related to programs like the National Technical Information Service.

These kinds of recommendations will enable the United States to draw on its experience to try to respond to the legitimate concerns and aspirations of the developing countries. Specifically, this means trying to direct practical programs towards building enterprises, training manpower, and establishing infrastructure in the developing world. This is consistent with the present evolution of thinking of a number of important developing countries. Unfortunately, it is not consistent with much of the multilateral forums which are still more concerned with controlling international firms, regulating abuses, and trying to increase the bargaining power of developing country users.

ROLE OF THE PRIVATE SECTOR AT UNCSTD

The Vienna Conference has a unique and significant importance to the private industrial community in the United States. Though the debate about technology ranges from issues of general education to sophisticated research and scientific infrastructure, the central focus is associated with basic industrialization. In short, we are concerned about the technologies and skills, the machines and systems necessary to establish basic manufacturing industries. These are the technology issues of greatest concern to the developing countries. Because such technologies represent a private firm's capability to manufacture and distribute useful products, we are dealing with a key factor of success for our firms and our economy.

International corporations and most industrialized nations generally accept the idea that it is in their interest to encourage technology development in the Third World. Hopefully this creates new markets and opportunities for increased activity of our firms, better export of products and services, and better cooperative relationships between ourselves and other nations. Unfortunately, existing theories and activities of many multilateral forums emphasize the need to reshape the activities of technology suppliers as opposed to focusing their attention on improving the ability to utilize technology in the developing countries. There is also in many

industrialized nations a growing concern in both labor and management circles that technology is being transferred too cheaply to the detriment of the society which created the technology.

As a result, the international firms are caught squarely on the horns of a serious dilemma. The developing nations are seeking greater access to industrial know-how at lower cost while the developed nations and other interest groups are increasingly reluctant to surrender technology. The activities that take place in Vienna to a great degree will ultimately result in specific legislation which will influence how our companies operate abroad. They will also in turn affect how we are able to acquire and utilize technology in this country. It is therefore a very serious question for U.S. business as to how this conference will proceed and what will come out of it.

On one hand, we have the opportunity to establish a constructive dialogue and specific programs that will help build the capacity and infrastructure in developing countries. This means greater opportunity to participate and cooperate in the industrialization of these countries. On the other hand, a prevailing trend is to find ways to greater restrict, inhibit and control the international firm. This ultimately will mean less opportunity for U.S. business to participate effectively abroad. It also may in turn trigger greater regulation on the U.S. side which would further inhibit international business' ability to compete and survive effectively.

The preparations for UNCSTD have provided an important opportunity for U.S. firms to understand more clearly the environment in which science and technology must be transferred. In many cases, our companies participating with the coordinators' office have discovered new thinking and approaches toward our international operations. More importantly, it has given confidence to U.S. business that there is a sincere interest within government to have business participate in the development of policy activities. Finally, it has given us an opportunity to have greater contact with foreign government officials and technicians. This collective learning process has very special and direct payoff to U.S. business:

1. U.S. business is learning more about the directions which foreign markets are taking and can, therefore, adapt itself to fit these activities;
2. U.S. businesses are finding an increasingly open channel to participate with U.S. government in establishing long-term effective policies;
3. U.S. business is learning to cooperate with developing country governments more effectively, thus helping to close the threatening gap that divides private and public interests;
4. U.S. businesses are identifying and understanding opportunities through which it can collaborate with governments in the process of building science and technology infrastructure.

UNCSTD represents an important new kind of activity for U.S. business mainly because of the way the U.S. government has involved it in its early preparations. Ambassador Wilkowski's office has supported and directed over 80 meetings throughout the United States involving both small and large business. The activities and guidance of her office have generated over 3,000 pages of analysis, suggestions, and comments from both business, labor, and academic communities. To our knowledge, this is the first such program that has allowed business the opportunity to participate in such a large scale and thorough process. It is hoped that this kind of program is an indication of a new openness by government towards effective cooperation in the policy process.

Unlike the cynical approaches held by many governments, U.S. business feels that a constructive environment can be created in Vienna which will provide the opportunity for long-term dialogue and cooperation between the private and public sector throughout the world. Though business expects the tone and public exchange of the meeting to be somewhat counter-productive, it hopes that the underlying exchange of ideas will establish a basis for more effective bilateral and private and public exchanges in the future. Recent meetings in Brazil, Columbia, Mexico, India, and Venezula, sponsored by the U.S. Department of State, are considered to be very successful examples of a possible cooperation. Specifically, this program, supported by the Department of State and managed by the Fund for Multinational Management Education, has brought together government, private and public participants from both the U.S. and developing countries. Unlike the exchanges we have seen in the U.N. and other multilateral forums, these programs have been constructive, practical and cooperative. It is also acknowledged by business that these kinds of interactions would probably not have taken place had we not had the stimulus of the Vienna Conference. It is hoped that these kinds of practical, bilateral, and more specific exchanges will be the ultimate outcome of the Vienna Conference. Without a practical outcome from Vienna, we will face a more confused and restricted world economy, and this translates into lost markets, jobs and U.S. influence.

Mr. BROWN. Thank you very much, Mr. Wallender, for an excellent statement.

Mr. Grant?

Mr. GRANT. Thank you, Mr. Chairman.

As you indicated, I'm James D. Grant, vice president of CPC International. However, for the purposes of this testimony, I am representing my views as Chairman of the Industrial Sector Advisory Group to the Secretary General of the U.N. Conference.

Today I would like to talk specifically about our report, which has been submitted to the staff and which I would like to have included in the record.

Mr. BROWN. Without objection, it will be made a part of the record.[1]

Mr. GRANT. Thank you, sir. I will abbreviate my testimony.

Although transnational enterprise activities are recognized as beneficial to home and host developed and developing countries, there is a continuing debate as to how these enterprises must best participate in development programs.

The Secretary-General of the U.N. Conference on Science and Technology recognized that the issue of the involvement of the transnationals in development would be an important element in the Conference, and that the transnationals have the potential to play a progressive and significant role in future world development.

He therefore organized a number of individuals from an illustrative group of transnationals to form an Industrial Sector Advisory Group, in order to make a formal contribution to the Conference agenda, and the report is the formal contribution. The mission of the Advisory Group has been to study the part transnationals might play in cooperation with developing countries in applying science and technology more effectively in future world development, and to report its findings for inclusion in the Conference.

The report is a joint product of the senior science and technology and business representatives of a number of leading corporations based in Europe, North America and South America. They have worked together, prepared and signed the report individually. Their corporate affiliations do not mean to suggest specific endorsement by each corporation of every element of the report. But I think this is inevitable in a report like this.

The report considers the principal opportunities and problems in future world development that could be approached with the aid of transnationals. It focuses in particular on the manner in which transnational activities can best meet both the business goals of their respective companies and the development goals of the respective host countries. The report attempts to show the ways and means by which the transnationals' contributions to future world development can be increased.

The report recognizes that with respect to many difficult questions, an approach based on flexibility and understanding of the objectives of a particular transnational in relation to the necessary objectives of the host country needs to be developed through mutual negotiation. Both parties must be satisfied with the arrangement if a successful investment is to be made. Transnationals

[1] See p. 143.

must receive a return for their investment and proprietary knowledge, and certainly the host country's political, social, and economic objectives must be met as well.

In my testimony, I summarize some of the major conclusions of the report: The transnationals recognize that host country governments are sovereign; the transnationals believe that technological development goes hand in hand with economic development; we believe that we are better off if we are dealing with a broad-based stable government in a particular country; we believe we must have good local contacts, most importantly of all in terms of customers, but also from the standpoint of employees, partners and shareholders. Our local identification is often very critical for our success.

We believe that it is important that the host country know what its priorities are and should know what it wants, because then we are better able to judge whether or not we can make a contribution to a particular country.

Finally, with respect to general conclusions, most of the multinationals are interested in building a technological base in each of the developing areas of the world, although not always in each country. The difficulty in most of the developing countries is one of finding or developing a critical mass of scientific and engineering people to begin research and development.

In summary, in my opinion the spontaneous and positive response of the senior executives involved in the Advisory Group to use such a unique channel to provide a direct input to the Conference is proof of the general awareness within industry of the need to make practical contributions for improving and accelerating economic growth in developing countries. It reflects the effort of industry to communicate more closely with the decisionmaking leadership of developing countries and, we hope, to be a good corporate citizen in the societies and communities we serve.

Thank you.

[The statement follows:]

STATEMENT OF JAMES D. GRANT, VICE PRESIDENT, RESEARCH AND DEVELOPMENT, CPC INTERNATIONAL, INC., AND CHAIRMAN, INDUSTRIAL SECTOR ADVISORY GROUP TO THE SECRETARY GENERAL OF THE UNITED NATIONS CONFERENCE ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT

Mr. Chairman, I am James D. Grant, vice president, research and development, CPC International Inc., and for purposes of this testimony I am presenting my views as chairman of the industrial sector advisory group to the Secretary-General of the United Nations Conference on Science and Technology for Development (UNCSTD).

For your information, CPC International is a worldwide set of food and related businesses serving home and industry. Approximately 85 percent of total sales are derived from operations in North America and Europe, with over half our sales outside of the United States. CPC employs approximately 42,000 people worldwide. CPC does business in 45 countries with only about 30 technical or management people from the United States employed outside the United States.

Today I would like to talk specifically about the report of the industrial sector advisory group to the Secretary-General of the United Nations Conference on Science and Technology for development in relation to agenda item 7: science and technology and the future. The report is entitled: "The Contribution of Transnational Enterprises to Future World Development."

Although Transnational Enterprises (TNE) activities are recognized as beneficial to home and host developed and developing countries, there is a continuing debate as to how these enterprises might best participate in development programs.

The Secretary-General of the United Nations Conference on Science and Technology for Development (UNCSTD) recognized that the issue of the involvement of

TNE's in development would be an important element in the conference, and that TNE's have a potential to play a progressive and significant role in future world development. He therefore organized a number of individuals from an illustrative group of TNE's to form an industrial sector advisory group in order to provide a formal contribution to agenda item 7, science and technology and the future. The mission of the advisory group has been to study the part TNE's might play in cooperation with developing countries in applying science and technology more effectively in future world development, and to report its findings for inclusion as part of the formal preparatory documents for the conference.

The report is a joint product of senior science and technology and business representatives of a number of leading corporations based in Europe, North America, and South America. They worked together, prepared, and signed the report as individuals; their corporate affiliations do not mean to suggest specific endorsement by each corporation of every element of the report.

The report considers the principal opportunities and problems in future world development that could be approached with the aid of TNE's. It focuses in particular on the manner in which TNE's activities can best meet both the business goals of their respective companies and the objectives of the developing host countries. The report also attempts to show ways and means by which TNE's contributions to future world development can be increased.

The report recognizes that with respect to many difficult questions an approach based on flexibility and understanding of the objectives of a particular TNE in relation to the necessary objectives of the host country needs to be developed through mutual negotiation. Both parties must be satisfied with the arrangement if a successful investment is to be made. TNE's must receive a return for their investment and proprietary knowledge, and host country political, social, and economic objectives must be met as well.

There are a number of topics which will arise in the U.N. Conference which are covered in the advisory group report. Some of the issues are:

1. The TNE's recognize that host country governments control by law their own territory. If the host country wants to exercise its power, it can do whatever it wishes. The decision the transnational enterprise has to make is whether or not it wants to do business in a governmental environment in any particular host country.

2. The TNE's believe that technological development goes hand in hand with economic development and improvement in the standard of living and quality of life. Technology, however, has to be controlled to maintain and improve the quality of life.

3. The TNE's believe that a broad-based government usually indicates a greater acceptance by the people in the host country and provides for general rules of behavior which will prevail over time. With such broad-based governments companies can better rely on government decisions.

4. The report indicates that most TNE's recognize that good local contacts in the form of employees, partners, shareholders, and most importantly, customers, are the best assurance of future growth in a host country. A local identification is often critical to success.

5. The TNE's further indicate in the report that an effective development plan with priorities can be a valuable asset to enable one to judge better whether or not particular products and services fit the country. The problem, of course, is that the development plan must be practically feasible and not subject to so many bureaucratic impediments as to destroy effective implementation.

6. Finally, with respect to general conclusions, most TNE's are interested in building a technological base in developing areas of the world, although not always in each country where they do business. The difficulty in most of the developing countries is one of finding or developing a critical mass of scientific and engineering people to begin research and development. Hence, most TNE's are willing to engage in R. & D. in developing countries provided ways can be found to make research and development beneficial and effective.

In summary, the spontaneous and positive response of the senior executives involved in this advisory group to use such a unique channel to provide a direct input to UNCSTD is proof of the general awareness within industry of the need to make practical contributions toward improving and accelerating economic growth in developing countries. It reflects the effort of industry to communicate more closely with the decisionmaking leadership of developing countries and to be a good corporate citizen in the societies and communities they serve.

Mr. BROWN. That was a very good statement, Mr. Grant, which we appreciate.

Senator SCHMITT. Mr. Chairman, may I interject one question. Have you, Mr. Grant, and your group made a listing of those fundamental areas that must be treated before a transnational has any interest at all in investing in a host country?

Mr. GRANT. Yes, we have, and it's spelled out in some detail in the report.

Senator SCHMITT. Good. Thank you. I'll read that with interest.

New Mexico has some of the characteristics of a developing country and I'm interested to see whether or not they are the same as the ones I've been given for New Mexico.

Thank you.

Mr. BROWN. New Mexico is about ready to take off.

Senator SCHMITT. Well, we think so. We think we've paid our dues since 1912 and it's probably about time for us to become part of the Union.

Mr. BROWN. Our next witness will be Mr. Don Furlong, vice president of Bechtel, Inc., and manager of corporate marketing. Bechtel is headquartered in California and, of course, I'm aware of the important and large role it plays in international development.

Mr. FURLONG. Thank you, Mr. Chairman.

Gentlemen, the Chair has already introduced me. I'd like to say that my present position is manager of corporate marketing, but for a number of years I was manager for research and engineering for the Bechtel group of companies. Last year I was named to the advisory group to the Secretary General of the U.N. Conference, of which Dr. Grant is chairman. With this recent experience, I appreciate the opportunity to appear before this committee.

In my written statement, I have given the generally broad background of the Bechtel group of companies, indicating its wide experience in over 100 countries on all continents of the world.

Now, the basic subject of the U.N. Conference which concerns a company such as Bechtel is that of technology transfer. The question arises as to just what sort of technology is being transferred.

Essentially, the work of an American engineer-constructor involves generally available technologies relating both to engineering and construction. Civil and structural work is dominant. Process, piping, electrical, instrumentation, and mechanical work of fundamental content is employed. Our important contribution lies in the management and technical experience of American personnel introduced into these projects.

They bring years of know-how, which runs from simple construction techniques to complex analytical programs for the solution of engineering problems, for computerized schedules of multiple, interrelated activities. This knowledge is our stock in trade and the product for which we are basically hired.

Technology transfer takes different forms, depending on the client needs. The facility may be in a primitive environment, where the entire infrastructure must be built from the ground up. Local personnel are hired, trained and upgraded as skills are required. Public health and medical care are introduced. Food is supplied and nutritional standards raised. Roads, schools and hospitals are built. As construction progresses, operators must be trained, many from the local area.

A permanent infrastructure, after the job is finished, remains for local use. Jobs have been created and new trades and skills have been introduced.

In other cases, technology transfer may involve teams of engineers working side by side in the client's offices or in our own. In such cases, basic technical education and ability must exist in the receiving engineers. The ultimate goal is to enable them to carry on the engineering design of their own facilities at a higher level of technology.

Other technology transfer takes place in training schools at construction sites that provide various craft and managerial skills.

In all circumstances, technology transfer involves a person-to-person transfer of knowledge, experience and attitudes. It requires overcoming language barriers, cultural differences, nationalism, racism, religious sensitivity. An environment of cooperation and mutual respect must be established.

Having introduced the subject of technology transfer from our point of view, I'd like to observe, before addressing the committee's questions, that private sector business and industry does seem to be playing a relatively minor role in this conference. It is true that we have been involved in the workshops and meetings.

But, while a majority of the nations in the United Nations seem to be focusing on the alleged inappropriateness of certain technologies, or unfair business terms under which it is transmitted, or on the need for mandatory controls, the holders of much of the world's current technology are generally on the sidelines as spectators, while issues which may very well concern their future operations are debated in Vienna.

Even our well-intentioned Industrial Sector Advisory Group was called into session very late in the game.

Addressing some of the questions and omitting others which have been addressed by others.

Senator SCHMITT. Mr. Furlong, could I interrupt you there just briefly? Don't you find this a characteristic of most of the current international conferences that we are involved in, either under the auspices of the United Nations or under some other auspices. The World Adminstrative Radio Conference has been subjected to the same criticism, that we start late compared to other nations that we really sincerely, I think, want to help.

Mr. FURLONG. Actually, my observation about starting late had to do with this Advisory Committee to the U.N. Secretary General, and not to the U.S. preparations. I think the U.S. preparations have been extensive, and I think very well orchestrated. I think that the difficulties in arriving at a consensus and a plan of action has been described today by the shifting scene in these preparatory meetings, which puts the U.S. delegation at a disadvantage in addressing the new questions that arise.

But my feeling is that industry, which does hold much of the technology which is at issue in these meetings, does sit generally on the sidelines while the political conference deals with the issues which may impact on whether or not business is able to carry on its normal function.

Senator SCHMITT. But do you think that in this case you were invited to participate at an early enough period?

Mr. FURLONG. We were invited to confer with the State Department and others and to input our opinions, but when the conference actually takes place, I'm not, as far as I know, one of the selected delegates.

Senator SCHMITT. Well, that's exactly the case in the WARC Conference. We've been trying to get it changed, but the actual participation is small of those most knowledgeable and most directly affected by the decisions in this country—namely the private sector.

Mr. FURLONG. I then agree with what you stated in your question.

Senator SCHMITT. You would like to see greater integration of the U.S. private sector into these international delegations as working participating members.

Mr. FURLONG. Generally, that creates a problem of, you might say the opposite numbers involved in these meetings. U.S. business operating overseas operates in a free enterprise system. When a company goes overseas and operates it negotiates with essentially a government, most of our overseas clients are governments, so that on the one hand you have governments, on the other hand you have U.S. multinational or transnational enterprises.

This, of itself, creates a rather different set of circumstances. It would seem to me that the U.S. delegation should be heavily weighted with industry representation. But, since it is a government-to-government meeting, it obviously can't be all business.

Senator SCHMITT. Thank you. I'm sure the committee is aware that the Ethics of Government Act has created some problems here, at least for the WARC Conference. I believe we're on the way to having an exemption for the participation in that conference. At least an exemption is contained in a Senate amendment to the authorization bill. It may be that we're going to have to examine that issue more generically.

Mr. BROWN. I'm sure we will. Proceed, Mr. Furlong.

Mr. FURLONG. With respect to the U.S. objectives at the UNCSTD Conference, I think we subscribe to those objectives enunciated in the U.S. national paper. In addition to those three basic objectives I would certainly add that a clear understanding of the conditions under which effective technology transfer takes place should be one of our objectives. Also that mechanisms for increased effectiveness of U.S. development assistance should be one of our objectives, and also, not incidentally, there is strong support for the principle of free enterprise.

On the question of participation, again, of the private sector in preparation for the conference, it seems to me that the volume of rhetoric and writing that has occurred during these preparatory sessions has not changed any of the fundamental positions which were enunciated very early in the formulation of this conference.

On the one hand, there's the call for preferential treatment to bring about a new economic order. On the other hand there is the defense of intellectual property rights and of the need for the creation of a favorable investment environment in the host country.

One of the industry State Department workshops which I attended reached a consensus which I might paraphrase to say that U.S.

industry is opposed to a giveaway program and to further regulation on either side. It finds voluntary guidelines or a code of conduct acceptable. American Industry further pleads for positive U.S. Government encouragement, and if not support, at least removal of impediments to the export of technology.

Industry also recommends that U.S. delegates speak out for the effectiveness of the present system of technology transfer, and the importance of a free market. I think this position is fairly reflected in the U.S. national paper.

Referring to the relationships between UNCSTD and UNCTAD, as a somewhat detached observer of the U.N. process, I find considerable confusion and overlap in the operations of these various conferences and committees. I find difficulty in distinguishing between them in some of their position statements, but I think that as important as science and technology is, it will not provide more than partial solutions to problems of the underdeveloped world, and solutions are needed for a great number of sociological, political and economic problems.

To introduce these additional issues into the deliberations of UNCSTD will make it far more difficult for that conference to achieve any constructive enhancement of the flow of science and technology. As to benefits derived from industry's involvement in UNCSTD, I do feel that considerable benefits have already been obtained during the course of these preparatory meetings in the interaction of companies with each other and with the Government. In the educational process of facing the needs and demands of the poor countries, multinational companies, having been so sensitized, may be able to improve their relationships with host countries.

The U.S. Government, on its part, has obtained industry views and has, in effect, made an inventory of various American aid and technology transfer programs. There is now an opportunity to consolidate these programs when appropriate and to enhance their effectiveness.

With respect to the position on the recommendations regarding transnational corporations being negotiated in the UNCSTD draft program of action, the question was raised concerning the Andean Pact—I would say that the Andean Pact, on the face of it, is a constructive step in mutual support among several LDC's at various levels of development.

It is a more viable grouping and an opportunity to reconcile differing policies. To the extent that a favorable environment is created, entry into the market represented by the five countries would be facilitated. To the extent that it is not, government intervention would create uncertainty, prolong negotiations, and increase the ultimate price to the user.

Steps to insure that subsidiaries carry our R. & D. within host developing countries, and the actions by country governments to secure access to information and data between subsidiaries of parent companies, to all of these, I say that the exposure of confidential business and proprietary information would be a disincentive to transfer of technology, or investment, and to the extent that these proposed initiatives represent that disincentive, they certainly are counterproductive.

With respect to the question on the postion on proposals of the Group of 77, without commenting on them specifically, I note that they frequently deal with technology as a commodity to be purchased or acquired. Technology, of course, may be purchased in special cases, such as a process package that would accompany a licensing agreement; however, more often than not, technology transfer consists of the steps necessary to convert information into a product or system. Throughout this process, there must be a relationship among people in which experience and know-how is passed from one to the other.

This total of knowledge and skills is not susceptible to be bought and sold as a unit, nor is it something to be banked in some way by a U.N. organization. It is also understandable that the question of the untying of aid loans and credits to developing countries could arise. However, there is diversity among these countries, and in the existence of an adequate body of educated managers. Some would apply the transferred funds to the uses intended.

Others would find it expedient to divert the funds to other purposes. From a business point of view, whether private or government, the supplier of the loan or credit will want assurances that the funds would be utilized for the purpose intended.

In conclusion, many of the actions proposed during the preparatory sessions and much of the accompanying rhetoric seem to increase tensions between the industrialized and developing worlds. Many do not suggest viable solutions for basic problems or the underlying cause of the tensions. Most suggestions would result in cumbersome transfer mechanisms, more regulation, which would inevitably raise the cost to transfer technology.

Some technology would simply not enter the marketplace if the incentives were not there. The existing system of technology transfer is working, however imperfectly, and has led to much progress in the world. Rather than reshaping the process, we need to support and expand the system, and if we can, make it work better.

Thank you, Mr. Chairman.

[The statement follows:]

STATEMENT OF DONALD FURLONG, VICE PRESIDENT OF BECHTEL INC., AND MANAGER, CORPORATE MARKETING

Mr. Chairman and Committee Members, I am Donald Furlong, a vice president of Bechtel Incorporated, an international engineering and construction firm, with headquarters in San Francisco, California.

For the past year I have held the position of Manager of Corporate Marketing for the Bechtel group of companies. Prior to that, for some nine years, I was the Manager of Research and Engineering, and its predecessor organization within the company, charged with monitoring, identifying and applying new technology to Bechtel's current projects, or in positioning the company in new technical fields with future promise for major engineering and construction work.

In July of 1978, notice was received by our Chairman of the formation of an Industry Advisory Group to the Secretary General of the U.N. Conference on Science and Technology for Development. In response to the invitation, I was named to that Advisory Group as our company representative. Having had this recent experience, I appreciate the opportunity to appear before this Committee considering U.S. Policies and Initiatives for the U.N. Conference on Science and Technology for Development, and on some of the issues to be addressed in that Conference.

As a starting point, I would like to briefly describe our company. Bechtel is a firm engaged in professional engineering and construction, domestically and abroad. We have been in business over 80 years and during that time have worked all over the globe. We have completed, or have in progress, projects in some 100 nations on all continents. Our organization comprises about 30,000 permanent employees. At any

given time 100,000 manual or contractor personnel may be employed on Bechtel jobs. Today, something over half of our current work originates overseas. Bechtel projects are underway in the Middle East, North Africa, Latin America, Australia, the Far East, and other specific locations.

Until World War II, Bechtel activities were primarily in the continental United States. In 1943, in the midst of the war and its need for fuel, we enlarged the Bahrain Petroleum Company's refinery to produce aviation gasoline. This was followed by other refineries, harbors, and power plants in Bahrain, Aden, and Kuwait.

We began a long relationship with Saudi Arabia immediately after World War II. We designed and constructed the Trans-Arabian Pipeline and the first deepwater port at Jeddah on the Red Sea, followed by the Ras Tanura refinery, power plants and civil projects. Several major projects are currently in progress in that country.

We have been associated with many dams and hydroelectric installations, Churchill Falls in Labrador, for example, and we are, at present, enlarging the Guri Dam in Venezuela. We have planned a steel complex in Algeria, have completed copper facilities in Mauritania and Zambia, nickel in Indonesia, and bauxite-alumina in Jamaica. Rapid transit projects include those in Sao Paulo, Brazil and Caracas, Venezuela.

A number of refineries have been engineered and constructed in various parts of the world, a petrochemical complex in Puerto Rico, a phosphate fertilizer plant in Mexico, a polypropylene plant in Indonesia. Other overseas activities have included oil field development, pipeline, mines, hotels, power plants, marine terminals, water projects and desalting stations, LNG plants, railroads and highways.

From this experience base, I believe we have a generally broad overview of the problems and rewards in the exchange of industrial and commercial technology with the developing nations of the world. I believe that Bechtel has made substantial contributions to the economies and welfare of a number of developing countries through the training of their people and the introduction of facilities, processes, equipment, and systems of operation.

TECHNOLOGY TRANSFER

The subject of the U.N. Conference is Science and Technology for Development. Typically, just what kind of technology are we in Bechtel transferring for development and what is the transfer mechanism?

Essentially all of our technical work, and that of our American engineering/constructor competitors, involves commercial designs, employing generally available technologies. Civil and structural work is dominant; process, piping and electrical systems, instrumentation and mechanical work of fairly fundamental content is being employed.

Our most important and possibly unique contribution to the transfer of technology, and that which has the greatest impact, lies in the management and technical experience of the American personnel that we introduce into these projects. These personnel bring with them know-how acquired over many years, on other work and in many countries. This ranges from simple construction techniques such as shortcuts in preparing concrete forms to complex computer programs for engineering problems or scheduling multiple inter-related activities. This knowledge is our key stock in trade and the product for which we are basically hired—the ability to accomplish things faster, more efficiently, and thus at lower cost. Our American competitors have like attributes; we just try to do a better job at a lower cost to the client.

Technology transfer as practiced by an engineer/constructor may take different forms at varying levels of technical content or detail depending on the particular client or circumstances. One might be the engineering and construction of a major natural resource development facility in a primitive environment where the complete supporting infrastructure must be created from the ground up. Local personnel are hired and trained for simple tasks and upgraded as skills are acquired; public health systems are introduced and medical care provided; food is supplied and nutritional standards raised; roads, schools and hospitals are constructed. As the construction of the plant progresses, operators must be trained and prepared to take over the plant, many from the local area or host country. When the project is completed and onstream, the permanent infrastructure remains in place for the use and enjoyment of the people; jobs have been created and new trades and skills have been introduced. Examples can be cited of major copper facilities created in the jungles of West Irian and Bougainville.

As time goes on, technology transfer is becoming more and more formalized and introduced into contract language. It may take the form of joint teams of engineers working side by side in either the client offices in the host country or our own transferring know-how and skills in the process of doing the work. In such a case an

adequate base of technical training must exist in the receiving engineers but the ultimate goal is to enable them to one day carry forward on their own the engineering design of their own facilities. This will not occur necessarily after one plant experience, but perhaps on the third or fourth. Team transfer arrangements such as this are heppening in the electric power industry in Spain, Mexico and Korea.

Still another format for technology transfer is to establish training schools in conjunction with the project construction site and provide work study experience for various skill levels of craftsmen, laboratory technicians, plant operators and managers. Saudi Arabia and Algeria typify this type of technology transfer as they pursue their development programs.

Essentially, the transfer of technology involves the transfer of knowledge, experience, attitudes and viewpoint from one person to another. This involves overcoming barriers of language, cultural differences, nationalism, racial and religious sensitivities. The parties involved must establish an environment of cooperation and mutual respect.

Whatever the approach or method, the results are mutually beneficial to the United States as well as to the host country. Through such interaction and transfer, the receiving personnel become familiar with U.S. equipment, specifications, and practices. A technological relationship results where future orders flow back to the same equipment suppliers for spare parts, replacements or new installations. More engineering help is needed as the host country's development accelerates and progresses.

Such relationships between the lesser developed countries and U.S. sources of technology need understanding and support on the part of the U.S. government and the U.S. delegation at next month's conference in Vienna.

INDUSTRIAL SECTOR ADVISORY GROUP

The Industrial Sector Advisory Group, of which I am a member, was organized at the request of Ambassador daCosta, Secretary General of the Conference, in the latter half of 1978. An initial general meeting was held in Vienna of the representatives of about twenty-five largely European and American multinational, transnational, or international firms, depending on your definition. Generally the mission of the group was to provide the Secretary General with advice on industries' position with respect to the fourth item on the Conference agenda, "Science and Technology and the Future". On several occasions we met with Ambassador daCosta or members of his staff and a communications channel was also opened between the chairman of our Group, Mr. James D. Grant of CPC, and the U.S. State Department. Representatives of the group met with Ambassador Wilkowski on one occasion in New York.

The product of several general and regional meetings of the Advisory Group was a final report to which all members contributed. This report stresses the necessity for there to be mutual advantage between the transnational enterprise and the host country for effective technology transfer to take place; it stresses the need for the fundamentals of science and technology to be in place before undertaking the more sophisticated types of technology. Consistent with other business or industry statements, it calls for protection of proprietary information and for a minimum of government regulation or other disincentives to the operation of the free market system. It stresses education and a practical approach to science and technology emphasizing those aspects which can be readily assimilated.

As an observation, it would appear that the private sector, business and industry, is destined to play a minor role in the U.N. Conference on Science and Technology for Development. This in spite of the fact that the majority of the nations represented in the United Nations seem to be focussing much of their attention on the alleged inappropriateness of certain technology, or the unfair business terms under which it is transmitted, or on the need for mandatory controls and codes of conduct for the behavior of multinational corporations. Holders of a major share of the world's current technology are essentially spectators while a debate goes on which could severely impact their future operations. Even the well-intentioned Industrial Sector Advisory Group seems to have been called into being rather late in the proceedings and has no official place in the Conference itself.

COMMITTEE ADVANCE QUESTIONS

Relying on this background and my understanding of the Committee's interests. I would like to respond to the questions in your letter of May 18, 1979 and comment on some other aspects of the science and technology for development issue. My comments apply to the exchange of industrial and commercial technology, not military or government-to-government exchanges, and in addition, my perspective

will be from an international engineering and construction point of view and not of an enterprise holding long term investments in the developing world.

A. What should be the U.S. objectives at UNCSTD?

The U.S. National Paper contains a statement of goals to which, I am sure, industry subscribes. In abbreviated form, they are:

Overcoming the worst aspects of poverty by the year 2,000.

Advancing the economic growth of developing countries.

Strengthening networks of scientific and technological relationships that can support more effective efforts to meet the problems of food and water, energy sources, raw materials, population growth, and the environment.

In addition to these overall themes, U.S. objectives should include:

A clearer understanding between governments and business with respect to the conditions under which effective technology transfer takes place.

The establishment of international mechanisms which are conducive to the transfer of technology.

U.S. cooperation with other countries in dealing with problems which affect the quality of life.

Mechanisms for increasing the effectiveness of U.S. development assistance.

Strong support to the principle of free enterprise.

B. Advisability of a reactive, rather than a lead role at the Conference.

The issue of a "new economic order" to be brought about, at least in part, by preferential treatment towards the developing countries in the transfer of technology and the production of new technology has already called forth some sharply differing views and position statements which will be difficult to reconcile. A country such as the United States, taking the lead role, would become the focal point of demands which cannot reasonably be met and ultimately would be charged with failure of the Conference. Unwillingness to concede points would result in the U.S. being branded as insensitive to the needs of the developing world in spite of its record over the years of unselfish assistance.

On the other hand, a purely reactive role might result in conclusions and recommendations shaped by the leadership and accepted by the Conference to the detriment of U.S. interests. Again, a reactive role would reflect an unhelpful, defensive posture, with no new ideas to offer.

The United States has no monopoly on the world's technology or resources. Its proper role in such a Conference, in my opinion, should be to take its place among the leading developed nations and use its strength and influence to enable a working consensus to be reached. The goal should be to avoid confrontation or isolation and to play a supportive role with a show of strength and pride in our past accomplishments. Let the leadership role of the Conference be assumed by one of the "advanced developing" countries, Brazil, Korea or Mexico, who have had it both ways. One of them would be less likely to polarize the Conference into "haves" and "have nots".

C. How have private sector concerns been taken into consideration during U.S. preparations for the Conference?

As you know, preparations for this conference have extended over a period of years. Country and regional meetings have been held, position papers have been prepared and distributed; the Conference organization has issued progress reports on the agenda preparation, and our own State Department has sponsored meetings to solicit industry input and papers to state the viewpoint of U.S. business. From the perspective of our company, we were represented at an early meeting involving industry sponsored by Secretary Kissinger; we provided a case study input to the Council of the Americas; and we attended a regional roundtable in Chicago organized by the State Department. Also, as previously mentioned, I have participated in the work of the Industrial Sector Advisory Group to the Secretary General of the UNCSTD.

The great volume of writing and rhetoric on this subject over the past several years has not seemed to change the fundamental position of the LDCs nor of the consensus of U.S. business. On the one hand, the call for preferential treatment to bring about a new "economic order" and on the other, a defense of intellectual property rights and the need for the creation of a favorable investment environmental in host countries.

Summarizing the results of our Chicago roundtable, U.S. industry (there represented) is opposed to a giveaway program and to further government regulations on either side but finds the idea of voluntary guidelines or a code of conduct acceptable. American industry pleads with the U.S. government for positive encouragement and, if not support, at least removal of impediments to the export of technology, goods, and services. Industry also recommends that U.S. delegates at the

conference speak out for the effectiveness of the present system of technology transfer and the importance of a free market.

This industry position seems to be fairly reflected in the U.S. National Paper.

D. Relationship between technology transfer issues being negotiated in UNCTAD and the concerns of UNCSTD:

From the viewpoint of a somewhat detached observer of the United Nations process, there has been some confusion created by the UN Conference on Trade and Development (UNCTAD) and the UN Conference on Science and Technology for Development (UNCSTD) proceeding in parallel through their various preparatory steps and meetings. It was my understanding that the Conference on Science and Technology for Development would deal mostly with science policy and the ways and means of maximizing this force for developed in the interest of the "new economic order". As one preparatory meeting after another has been held to define the agenda, it would appear that the main thrust of the meeting is tending towards measures and legislation to control the multinational corporations and the transfer of technology. This subject, however counter-productive it might be in any case, would seem to belong in the UN Conference on Trade and Development as part of the larger question of trade and investment between developed and developing countries.

As important as science and technology are to development, they will not provide more than a partial solution to the problems of the under-developed world. Solutions are needed for a great number of other sociological, political and economic problems and to introduce such additional issues into the deliberations of the UNCSTD will make it far more difficult for that conference to achieve any constructive enhancement of the flow of science and technology.

E. Benefits derived from industry's involvement in UNCSTD:

Many of the benefits of involvement in UNCSTD have already been attained. The interaction of companies with each other and with the U.S. government, the educational process of facing the needs and demands of the poor countries of the world, these experiences heighten the awareness of companies of the environment in which they must operate. Multinational or transnational companies having been sensitized in this manner may be able to improve on their relationship with host countries abroad.

The government on its part has obtained the views of industry, and has in effect, made an inventory of all the institutional, academic, private and government programs which constitute the fabric of American aid or technology transfer. The government has a challenging opportunity to consolidate its programs and enhance their effectiveness where this review has illuminated weaknesses.

Other follow-on activities from the Conference may well involve assessment of the impact of restrictive measures adopted, or in counter proposing more acceptable alternatives. I would hope that industry again would have the opportunity to make its views known to the government on such issues.

F. Position on the Recommendations regarding TNCs being negotiated in the UNCSTD draft Program of Action:

1. Regardless of the motivation, and whether by a single nation or a group of nations, measures to regulate the transfer of technology tend to be counter productive. The Andean Pact, in principle, represents a constructive step in mutual support among several LDCs at differing levels of economic development. As such it comprises a larger, more viable grouping, with an opportunity to reconcile several differing policies into one. To the extent that the Pact creates a favorable, receptive environment, entry into the larger market represented by the five countries will be facilitated for foreign investment. To the extent that it does not, the intervention of a government agency will create a climate of uncertainty, will prolong the negotiation process, and will increase the ultimate price to the user. The imposition of unrealistic requirements or the threat of governmental regulation may remove needed technology from the market.

2. Systems of compulsory registration of contracts and other technological transactions between developing countries and foreign suppliers will impede the free flow of information beneficial to user and supplier. Confidentiality is essential in business transactions as well as in licensor and licensee relations to maintain a competitive environment. It is understood that the motivation behind such systems as presently represented by the UN Centre for Transnational Enterprises is to enhance the negotiating position of LDCs. However, the ready availability of business and technical information represented by such a system will greatly reduce the incentive for business enterprises to enter into transfer arrangements.

3. Steps to ensure that company subsidiaries carry out R & D within host developing countries may have some merit where the local society and environment are suitable. Some valuable R & D can, should, and is carried out in developing coun-

tries; mandatory action to force multinational companies or their subsidiaries to carry out R & D within the LDCs, can be self defeating, since the personnel and atmosphere for successful R & D is just not present in many parts of the developing world. R & D does not necessarily provide the solution to specific, local problems since much adequate technology already exists. In-country R & D will not necessarily increase the technology available to a country and may discourage the transfer of much needed technology. However, companies will make the effort to conduct R & D locally to the extent that such activity holds promise of contributing to the economic viability of the enterprise commensurate with the investment.

4. The actions by developing country governments to secure the right of access to information and data between subsidiaries and parent companies and to the results of R & D will tend to inhibit the establishment of subsidiaries as well as the performance of R & D. There is no question of the right of host governments to legitimate financial and tax information, but the preservation of confidentiality in business matters and in the development and application of know-how or new processes is essential for the maintenance of competitive positions or incentives for development. Such requirements for access would represent major disincentives in many cases.

G. Position on proposals of the Group of 77:

Without attempting to comment individually on the various proposals which have been put forward by the Group of 77, they frequently seem to deal with technology as a commodity to be purchased or acquired in some fashion. Technology can indeed by purchased as a package in special cases as for a "process package" to accompany a licensing agreement. However, more often than not, technology transfer consists of the whole series of steps or events necessary to convert scientific or technical information into a product or system to achieve a mutually desired result. Throughout this transfer process, there must be a relationship among people in which experience and know-how is passed from one to the other. This necessary total of knowledge and skills is not susceptible to being bought and sold as a unit nor is it something to be "banked" in some concentrated way by the U.N. organization.

On the question of the "untying" of aids, loans and credits to developing countries, it is certainly understandable that the question should arise. There is great diversity among developing countries in their stages of development and the existence of an adequate body of educated managers and leaders. Some would apply the transfer funds to the uses intended, others would find it expedient to redirect the effort in other channels. From a businesslike point of view, whether private sector or government, the supplier of the loan or credit must have assurance that the funds are being utilized for the purpose intended. In the case of supplier credits, they are tied to transactions with the grantor country as a matter of business and self interest.

CONCLUSION

Many of the actions or measures proposed in the preparatory sessions for the UNCSTD, and much of the accompanying rhetoric, would seem to increase the tension between the industrialized and developing worlds. Many do not suggest viable solutions to basic problems or the underlying cause of tensions. Most suggestions would result in more cumbersome transfer mechanisms; the introduction of more regulation and bureaucracy would inevitably raise the cost of transfer of technology. Some technology would simply leave the marketplace if incentives for transfer are not there.

The existing system of technology transfer is working and has led to much accomplishment in the developing world. Rather than reshaping the process we need to support and expand the existing system, and, if we can, make it work better.

Mr. BROWN. Thank you very much, Mr. Furlong.

Mr. Robertson.

Mr. ROBERTSON. Mr. Chairman, the hat I wear today is that of the chairman of the International Subcommittee of the Federal Science and Technology Committee of the Industrial Research Institute. Our institute is an organization of 258 member companies, large and small, which perform over 85 percent of all the privately supported industrial research carried out in the country. Our objective in IRI, very simply, is promoting better research management in all its aspects.

American industry has a major stake in a stable and prosperous world order, which can be assured only if poverty and human suffering are alleviated in the poorer countries. Our technical community believes it has a large role to play. We can provide products better suited to use in less-developed countries. We can supply packages of technology. We can train the people who will be needed to adapt and apply that technology for the needs of the poorer countries. Our companies are willing to consider new institutional arrangements by which we can work with government and private entities in the poorer countries to these ends.

I would emphasize that industrial research managers are much concerned about two issues which have been raised in the preparations for the forthcoming Vienna Conference. Groups in the LDC's and the developing countries have advocated policies which would dilute the proprietary rights of private sector firms in the form of patents and confidential technical information.

These policies would surely be counterproductive at a time when our firms should be encouraged to seek opportunities to provide useful technologies to the poorer countries. They would be a particularly powerful disincentive to our smaller companies which must rely heavily on such proprietary protection, and which have certainly shown their ability to contribute to such fields as agriculture, health care, and light manufacturing, all of vital interest to the LDC's.

Now, as an example, licensing arrangements are one well-established mechanism for transfering technology, and you might get the impression that licensing fees charged by companies in the developed countries are exorbitant. In one of the few studies that I know of carried out on this subject, Professor Gold of Case Western Reserve University found that, "with relatively few exceptions, income from licenses did not cover even the costs of the successful innovation involved, much less the full cost of underlying programs, with their seemingly unavoidably heavy yield of useful but uncommercializable products."

Similarly, compulsory registration of agreements for the transfer of technology could well be a serious breach of the proprietary rights of companies. Many such agreements contain sensitive information of a technical as well as a financial and legal nature, and are tailored to the specific requirements of the supplier and the user.

It's gratifying that our national paper states that the transfer of technology should be an effort "in which private industries or organizations enjoy due protection, and due returns on their investment and inventiveness."

A second concern is that groups in the LDC's continue to indicate that certain methods are to be preferred over others in bringing technology to bear on their problems. Private sector firms, working with governments, or with other private firms in the poorer countries face a great diversity of problems and opportunities.

No one set of policies are a priori the best policies. Demands have been made that our private firms investing in the developing countries be required to carry out some of their R. & D. in the host country. In many cases, this may be feasible, and should be encour-

aged. But as another panelist has already mentioned, much industrial research requires a critical mass of people and facilities for it to be effective, and this may simply not be present.

Another demand articulated in the recent UNCTAD meeting in Manila that patent rights be taken away from foreign firms which do not manufacture locally using the technology disclosed by the patent is entirely unrealistic. Minimum economic size for a manufacturing facility plus the auxiliary services required, may not have been attained. Encouraging industries to invest in noncompetitive manufacturing ventures does a disservice to the host country, as well as to the company owning the technology.

Instead, each opportunity for a relationship of any kind between a U.S. company and the less-developed country must be analyzed in the light of the specifics of the situation: The need to modify the technology, the need to develop new markets, the availability of skilled manpower, the financial arrangements, and other factors. Our national paper recognizes that policies and programs should include a wide range of decisions and actions carried out through diverse governmental, intergovernmental, and private institutions. We should not put our ingenuity in a straitjacket. One of our principal activities in the Industrial Research Institute is the study of the innovation process, and we must recognize that technology is only one element of innovation.

A number of our member companies have participated in programs of research on innovation carried out at leading universities in the United States and Europe. Some of the important findings will certainly be applicable for the developing and the less developed as well as the developed countries.

One essential is to define a real need. This is not always appreciated. I visited Taiwan a few years ago on a mission sponsored by the National Academy of Science for the purpose of enhancing the R. & D. capability of that country's chemical industry. Our hosts wanted very much to assign a high priority to new programs of laboratory research. We found instead a major deficiency in sound market research which could determine what new or modified products could be sold to that country's trading partners.

Effective research must be closely coupled with market need. In studying the application of new technology in Thailand, investigators at the University of Sussex observed that the efforts of a few machine shops which identified an opportunity to modify certain standard equipment in the sugar industry so that it could be used to process tapioca for export as an animal feed ingredient, made a major contribution to the Thai economy. On the other hand, the Applied Scientific Research Corp., of Thailand, with an impressive laboratory building had accomplished little except turning out research papers.

Much has also been learned about technical information and its utilization. The Group of 77 has proposed setting up very elaborate information systems by which the developing countries might become aware of technologies useful to them. Many elements of such a system already exist in governments and in the private sector of the developed countries and need not be duplicated. We have found, however, that little is accomplished by sophisticated information systems if the potential user plays only a passive role.

On the other hand, public and private institutions in the developing countries should equip themselves to seek out new technologies and evaluate them in the light of all the options available.

We must emphasize in this regard the importance of methods, formal or informal, for disseminating technical information to the ultimate user in a form which can be acted upon. As an example, American firms engaged in agricultural research frequently observe that many LDC's lack a system like our network of county agents for instructing the farmer about new practices in terms he can understand.

A key element in accelerating technical innovation is a climate which encourages risk taking. By now, we all recognize that research itself entails many failures, but we must also recognize that applying a technology, new or old, for the first time in a commercial operation is a disruptive process which involves risk for which there must be commensurate rewards.

This basic problem is encountered both in free enterprise and in collectivist economies. In the past few years I have served on a National Science Foundation working group under the able chairmanship of Mr. Carey, in which we've studied the R. & D. process in the Soviet Union. One of the great problems in that country is the lack of incentive for those responsible for manufacturing enterprises to adopt new technology which can only lead to headaches and temporary loss of efficiency.

Finally, the rate-controlling factor for bringing technology to bear on the problems of the developing countries will likely be the availability of people who can manage this process. One hears this comment repeatedly from private companies and from government agencies engaged in technology transfer. One subject on which we need a lot more innovative thinking is ways to identify and train new generations of managers in the developing countries, and your remarks awhile ago, Mr. Chairman, about utilizing our educational institutions were very stimulating.

With regard to new initiatives, the President has proposed—and I believe the Congress is considering—an Institute for Scientific and Technological Cooperation, which should indeed be a means by which the United States can more effectively help the developing countries in creating and applying technology for their needs. We are pleased that Dr. Smuckler and his planning staff for this institute called upon IRI at an early stage for the inputs or representative American research directors, and a number of our suggestions have been incorporated in their recommendations.

The new institute should be a useful bridging effort between the private sector and U.S. government policies, should catalyze interaction between our private sector firms and governments and other institutions in the developing countries, and should be able to involve to a greater degree our small- and medium-sized American companies in this endeavor.

Finally, Ambassador Pickering's staff has suggested that the State Department and the Industrial Research Institute might sponsor a workshop next fall to review the implications of the Vienna Conference for private sector research in the United States. At this point, we feel it should be well worthwhile.

Thank you very much.

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[The statement follows:]

STATEMENT OF NAT C. ROBERTSON

Mr. Chairman, my name is Nat Robertson. I am Scientific Advisor to Marion Laboratories, Incorporated, of Kansas City, Missouri. I am also Chairman of the International Subcommittee of the Federal Science and Technology Committee of the Industrial Research Institute.

The Industrial Research Institute is an organization of 258 member companies—large and small—which perform over 85% of all the privately supported industrial research carried out in the country. Our objective in IRI is promoting better research management in all its aspects.

Last year IRI worked for a brief period with Ambassador Wilkowski in providing case studies from several of our member companies about successful and unsuccessful transfer of technology to the Less Developed Countries for use in planning for the forthcoming U.N. Conference on Science and Technology for Development.

American industry has a major stake in a stable and prosperous world order which, we recognize, can only be assured if poverty and human suffering are substantially alleviated in the poorer countries. Our technical community believes it has a large role to play in helping improve living standards in the less developed, and the developing countries. We can apply our skills to providing products, packages of technology, and training of personnel, which can all help satisfy human needs in vast areas of the world. Many U.S. corporations are entirely willing to consider new institutional arrangements for bringing technology to bear on the problems of the developing countries and will be most interested in exploring new forms of technical collaboration with both governmental and private entities in these countries to their mutual advantage. It is appropriate for the U.S. to participate fully in the forthcoming U.S. Conference and articulate forcefully the views set forth in our U.S. National Paper.

I should point out that industrial research managers in the U.S. are greatly concerned about two issues which it appears will be raised at the Conference: First, certain groups in the developing countries have advocated policies which would seriously dilute the proprietary rights of private sector firms in the form of patents and confidential technical information. Such policies would surely be counter-productive in an era when these firms, along with other institutions, should be encouraged in every way to orient some portion of their technical efforts to respond to the needs of the LDCs. Such policies are a particularly powerful disincentive to the smaller companies, which have shown their abilities to make substantial contributions to technical advances in such fields of vital interest to the LDCs as agriculture, health care, and light manufacturing.

Incidentally, licensing arrangements are a well established mechanism for transferring technology; and one frequently gets the impression that licensing fees charged by companies in the developed countries are exorbitant. In one of the few studies carried out on this subject, Professor Gold of Case Western Reserve University [1] found that "with relatively few exceptions, the income from licenses does not cover even the costs of the successful innovations involved, much less the full cost of the underlying programs with their seemingly unavoidably heavy yield of useful but uncommercializable knowledge."

There are also proposals for compulsory registration of agreements for technology transfer between the supplier of the technology in the developed country and the user in the host LDCs. This would be a serious breach of the proprietary rights of both parties. These agreements typically contain detailed information of a technical as well as a financial and legal nature. Often they are not standardized, but must be tailored to the specific requirements of both the supplier and the user. Disclosure might well be contrary to the interests of both the host country institution and the source of the technology.

Moreover, if the purpose of registration is to enable critics to assess the fairness of the agreement, this can seldom be done without intimate knowledge of a large number of factors which the negotiating parties have had to consider.

It is gratifying that the U.S. National Paper asserts that U.S. businesses "want to insure recognition and protection of industrial and intellectual property rights, just as developing countries want recognition and protection of their natural resources," and that the transfer of technology be an effort "in which private industries and organizations enjoy due protection and due returns on their investment and inventiveness."

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[1] Gold, B., "Research Management," July, 1975, pp. 24–29.

A second concern is that some groups in the LDCs have decided there are certain preferred methods to bring technology to bear on their problems. Again, the National Paper states that "U.S. experience indicates that policies and programs to enhance the contributions of science and technology to development should include a wide range of decisions and actions carried out through diverse governmental, intergovernmental, and private institutions." The U.S. private sector in particular, in working with governments, private firms, or other institutions in the LDCs, faces a great diversity of problems and opportunities. All past experience has taught us there is no one set of policies which are a priori the best policies. We should not put our ingenuity in a strait jacket.

One can sympathizer, for example, with the desire of some developing countries to have foreign firms which invest there also carry out some of their R&D in the host country. In a number of situations, this may, indeed, be feasible and should be encouraged. Much industrial research, however, requires a critical mass of people and facilities for it to be effective, and this may simply not be present at the manufacturing location in question.

Similarly, the demand at the recent UNCTAD meeting that patent rights be taken away from foreign firms that do not manufacture locally using the technology disclosed by the patent, may be entirely unrealistic since minimum economic size for a manufacturing facility plus the major supporting services such as quality control may not have been attained for the country in question. Encouraging industries to invest in noncompetitive manufacturing facilities does a disservice to the host country as well as to the company holding the patent.

Each opportunity for a relationship of any kind between a U.S. company and an institution in the less developed country must be analyzed in the light of the specifics of the case: the need to adapt or modify the U.S. technology, whether markets for the product now exist or need to be developed, the financing, the local availability of skilled manpower, and other factors. One usually thinks of the three simple ways of transferring technology as (a) importing a product which incorporates the technology, (b) licensing of patents and know-how, and (c) investment in manufacturing the product in the host country. However, a situation may arise in which the best interests of the U.S. firm and the host institution are served over a period of time first by importing the product in question, then by setting up a joint venture operation to which the firm conveys its proprietary rights, and finally by the joint venture itself undertaking R&D on its own to improve the technology further as may be dictated by the needs of the particular geographical area and its markets.

With regard to these two concerns about protection of proprietary rights and maintaining maximum flexibility in the systems by which U.S. companies and host country institutions can reach accommodation about technology transfer, we sincerely hope there will be no retreat by our U.S. delegation to the Conference.

One of our principal activities in IRI is the study of the innovation process. We even have a committee for Research-on-Research. In the past two decades, much has been learned about the innovation process—and we must recognize that technology is only one element of innovation—largely through studies in a number of universities in the United States and Europe. Some of our member companies have participated in these studies. We cannot presume that all the findings for the developed countries will be entirely applicable in the developing countries, but the fundamentals are almost certainly valid.

NEED DEFINITION

What is essential is to define a real need—and defining a need in such terms that the technological options for filling the need can be clearly envisioned is not a simple task. Need-pull is consistently more important than technology-push. This is not always appreciated in the developing countries. I visited Taiwan a few years ago on a mission sponsored by the National Academy of Science for the purpose of enhancing the R&D capacity of the Taiwanese chemical industry. Our hosts wished to assign high priority to new programs of laboratory research. We found instead a major deficiency in sound market research which could determine what new or modified products could be sold to that country's trading partners.

The poor countries wish to improve their capabilities for basic research. This is a sound objective since basic research is a large element in training the next generation of engineers and scientists and, indeed, in the very culture of a country. One must not, however, be excessively optimistic about the time lag between basic research and commercial application. A study carried out by the National Science Foundation on ten major innovations in developed countries found that, on the

average, 19 years elapsed between the basic concept and the commercialization of the idea.[2]

Even applied research must be closely coupled with market need. In a study of the application of new technology in Thailand, Bell and Hill of the University of Sussex [3] observed that the efforts of a few machine shops, which identified an opportunity to modify certain standard equipment in the sugar industry so that it could be used to process tapioca for export as an animal feed ingredient, had made a major contribution to the Thai economy. On the other hand, the Applied Scientific Research Corporation of Thailand, with an impressive laboratory building, had accomplished little except turning out research reports.

TECHNICAL INFORMATION

The Group of 77 has proposed establishing very elaborate information systems about technical advances and about specific technologies which might be available for use in the developing countries. Many elements of such a system already exist in both government agencies and the private sector of the developed countries, and expensive duplication should be avoided. All studies have shown, however, that little is accomplished by these sophisticated systems if the potential user of the technology plays an essential passive role.

We would agree, on the other hand, that public and private institutions in the developing countries should equip themselves to seek out technologies which may be useful for them and be prepared to evaluate these technologies and their cost in the light of all the options available. A critical decision, of course, is whether to acquire an available technology or develop new technology independently.

Furthermore, our industrial research managers would stress the importance of mechanisms, formal or informal, for disseminating technical information about products and processes in a form which can be understood and acted upon by potential users. As an example, U.S. firms engaged in agricultural research observe that many LDCs lack a system which might be a counterpart to our network of county agents for instructing the farmer about new agricultural practices and their benefits in terms he can understand.

RISKTAKING

A key element in accelerating technical innovation in any country is a climate which encourages risktaking. Everyone now understands that creating new technology necessarily entails many failures; but we must also understand that utilizing technology—new or old—for the first time in a commercial operation is inherently a disruptive process which involves risk, and there must be rewards commensurate with the risk.

This basic problem is encountered both in free enterprise and in collectivist economies. Those of us who have been studying technological innovation in the Soviet Union find that a very serious problem is the lack of incentive for those responsible for manufacturing enterprises to adopt new technology with all the attendant headaches and temporary loss of efficiency.

In recognition of these risks there might well be a source of funding for the first commercialization of a new or improved technology in a developing country. As a model, some of the developed countries have reported successful experience with agencies which make funds available for pilot operations or for the first commercial demonstrations of new technologies by their citizens. Notable are the National Research Development Corporation in the U.K. and the National Swedish Board for Technological Development (STU) in Sweden. Repayment of this money, plus possibly some additional royalties, is required from successful projects. A critical element in the decision to provide funds is the conviction that the enterprise has the managerial skill set necessary for success.

MANAGEMENT

The National Paper recognizes that creating the necessary infrastructure for useful R&D is a long process in any country. Training institutions, facilities to provide support and maintenance to experimental projects, physical and biological testing laboratories, and information services about new science and technology are properly emphasized and are all important. However, the rate-controlling factor in bringing technology to bear in the LDCs will very likely be the availability of

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[2] Battelle Institute, "Interaction of Science and Technology in the Innovative Process," National Science Foundation Report NSG BCL–C–567–73, Columbus, Ohio, 1973.

[3] Hill, S. C., and Bell, R. M., Research Paper, Science Policy Research Unit, University of Sussex, August, 1974.

managers. One hears this comment repeatedly from private companies and from government agencies involved in transferring technology. Perhaps we need more innovative thinking about ways to identify and train a new generation of managers in the developing countries as well as improve the skills of those now practicing. This training can be carried out in both the developed and developing countries.

With regard to new initiatives, The President last year proposed an Institute for Scientific and Technological Cooperation which should, indeed, be a most useful mechanism by which the United States can more effectively help the less-developed, and the developing, countries in creating and applying technology for their needs.

We are pleased that Dr. Smuckler and his planning staff at ISTC called upon IRI in the very early stages of their activities for the inputs of representative U.S. research directors about the objectives and policies of the Institute. A number of our suggestions were incorporated in the Planning Group's report to the Advisory Committee on Science and Technology for Development. More recently, the planning staff has been informally discussing with us a proposed Cooperative Industries Program according to which U.S. companies operating in the LDCs could make personnel available for help in training technologists and managers in non-competitive industries.

The new Institute should be a useful bridging mechanism between the private sector and U.S. government policy as well as a catalyst for interaction between the private sector and governments and other institutions in the less-developed and developing countries via the participation of U.S. firms in the specific projects of ISTC. The Institute could be especially effective in involving to a much greater degree the small- and medium-sized American companies in solving the real problem of these countries.

Finally, Ambassador Pickering's staff has suggested that the State Department and the Industrial Research Institute might sponsor a workshop this fall to review the implications of the Vienna Conference for private sector research in the United States. We feel this should be well worthwhile.

Mr. BROWN. Thank you very much, Mr. Robertson.

Our last panelist is Mr. Michael Boggs, assistant director of the International Affairs Department of the AFL–CIO. We welcome you here this morning, Mr. Boggs.

Mr. BOGGS. Thank you very much, Mr. Chairman. I won't go into my testimony. I think you've received copies of that previously, and it touches on most of the issues raised here very eloquently by the people who preceeded me.

I would take a very few moments to stress two of our principal concerns with the upcoming Vienna Conference and with the subject of transfer of technology and development in general, if I might.

First, as has been referred to here, some of our affiliates—of which we have some 105 throughout the United States—have tremendous problems with loss of employment owing to transfers of certain types of technology. Obviously when we discuss the whole issue of the definition, to begin with, of technology, one, and the transfer of technologies, two—we're going to touch on this very sore subject which affects, as I point out, some of our members very directly.

We have very well known approaches to this subject, I think, best summed up by a hope that there will be some sort of Government control and accounting of the movement of technology out of the United States in the future. In this good, unplanned economy of which we're all a part, chunks of it have a tendency to fall away at times without our being aware of it. We are one of those chunks—some of us—so we may be concerned about this issue and invest that on different levels before different parts of the Government and the Congress as well.

In terms of our other concern, we have long been involved in the process of development in the American labor movement, both in

our continent, the Americas, and internationally. Development, to us, can be approached a little differently than it has been approached heretofore this morning. It is development which insists upon application in a direct fashion of human rights, labor rights, workers' rights, and the rights of citizenry to participate in the fruits of production. It's an old and hackneyed phrase perhaps, but I think in this age of transfer of technology, it has definite new and fresh application.

Specifically, the basic needs of the recipient countries, where transfers of technology for development are considered, are indeed basic food. Can the populace eat what's grown within the native environment? Equitable income distribution are questions, too, which play a direct role in this complex issue. Internal market development—a direct result of income distribution—these are questions which we in the labor market have approached for a long time and feel very strongly must be approached by the delegation of the United States before this upcoming Vienna Conference.

We're not alone in this feeling. All of the labor movements of the IMEC countries—the industrialized market economy countries—have also borne the role with us over the years of trying to develop representative institutions within developing countries that will permit the wider distribution of income as a result of industry that's implanted in those countries, either by invitation or insistence of some large international corporations.

We would hope that this delegation of the United States to the Conference will keep in the forefront of its discussions by this rather unruly body—which is the best way I think you can describe the Conference which is coming up like all United Nations conferences—the very concept of the application of human rights which this administration has been so forthright in doing since it was elected to office. If there's one place where the human rights doctrine has a direct and easily definable application, it is in the process in developing countries through the development of institutions which defend the rights of workers, one, and, two, help to distribute income in a more equitable fashion. The delegations of the IMEC countries will be participated in by representatives of the labor movements of those countries as well as will our delegation, and I should hope that this point is borne very strongly throughout the work of that Conference.

One of the problems that we're facing here—and I don't think this is a secret to anyone—is that a majority of the states that are participating—the governments that are participating in a conference like this one—are nondemocratic, unrepresentative, and have very little interest in equitable distribution of income, for example, or in a real internal development in many cases of their own national environments because of the fact that the attraction of quick profits and exports back to the world's largest market—which is, of course, us—take precedence over these other more human considerations. That's all the more reason I think we should stress this very important point in terms of the rights of workers and the populace in general to share in any kind of the fruits of production in the transfer of technology.

I think I'll rest on that, Mr. Chairman, not wanting to take more of the time of the committee, and I'd be happy to respond to any questions that you have.

[The statement follows:]

STATEMENT OF MICHAEL D. BOGGS, ASSISTANT DIRECTOR, DEPARTMENT OF INTERNATIONAL AFFAIRS, AMERICAN FEDERATION OF LABOR AND CONGRESS OF INDUSTRIAL ORGANIZATIONS

My name is Michael Boggs. I am the Assistant Director of the International Affairs Department of the AFL–CIO. We are pleased to have this opportunity to address the subject of the upcoming United Nations Conference on Science and Technology for Development. My organization has participated in the work of the steering committee headed by Ambassador Wilkowski on the Conference. Our participation there has suggested some of our concerns with this omnibus venture. Those concerns are rooted in a two-part commitment which we hold: first, to defend and enhance the well-being of our considerable working constituency; second, to continue our long support, on humanitarian grounds, of efforts to help the people of the so-called developing countries of the world. The Conference of Science and Technology for Development is clearly a focal point for both of those areas of concern.

Our first difficulty lies in the definition of the term "transfer of technology". To our knowledge, neither the phrase nor the term "technology" has ever been clearly defined by the U.N. This is the case as well with other large areas of U.N. work, such as its Commission on Transactionals, which after five long years of work, has yet to define "multinational". How does one measure "technology"? How much technology can be transferred before a negative impact is felt here by workers and consumers alike? What kinds of technology have we transferred? What were the costs and benefits? Appropriate technologies, a term that is liberally sprinkled through the literature on the subject, is not what recipient countries are talking about. They've got more than enough of that to suit them. They want the fancy stuff, from which they can build exports to send back to the world's largest market, from whence came the technology to make them. What are developing countries? There is no clear definition even of the would-be recipients of these technologies. Are we talking about Haiti or Brazil? Nigeria or Bangladesh? The Peoples Republic of China or Mississippi?

Further, within a given country, who is receiving the technology? Does it benefit the existing elites? It is transferred to a subsidiary of a U.S. multinational corporation? A primary question regarding technology transfer should be—transferred to whom, from whom and for whose benefit.

One of the most frustrating problems for labor and industry, that is to say, nongovernmental groups, is in attempting to contribute to the discussion that regards all this. The funding for discussions, conferences, workshops and panels that are groping with the protean dimensions of the transfer of technology and developing economies is as diverse as the subject matter. To put the matter succinctly, we don't often know where to find the fora to present our views. In the meantime, the literature grows from meeting to meeting, conference to conference, and rapporteurs of such gatherings faithfully glaze over the words of those sessions until we find unquestioned use of major terms, such as technology and underdeveloped nation. The private sector, in the meantime, finds it increasingly difficult to be heard.

Our position on the question is clear:

1. Workers and their unions basically support scientific and technological progress achieved through research and development. But rapid radical changes in technology often have destructive effects on workers and their jobs. That's why workers and their unions have a vital interest in how computers and automation and new technology in general are introduced in the workplace—to make sure that people don't get squashed, maimed or killed by technology, to make human values prevail over economic values.

2. Collective bargaining has a key role in meeting the challenge of new technology. Labor-management bargaining makes advance planning possible for workers and unions to negotiate and settle with employers on reasonable and humane protections for workers against the potentially dangerous impact of job-destroying technology.

3. Full employment in a healthy, growing economy is the key to scientific and technological progress. A growing economy provides the incentive for innovation. And the job displacement resulting from technological change can be minimized or cushioned in a healthy, growing economy.

4. Research and Development is highly concentrated in the private sector—100 big companies account for 80 percent of industry R&D; 8 account for 34 percent—GM, IBM, Rockwell International, Ford, Lockheed, AT&T, GE, United Technologies, General Dynamics and Boeing.

5. These giant conglomerate Multinational Corporations are expanding overseas activities. They are exporting technology, production and jobs. The U.S.A. is losing its superiority in technology. We are also losing the workers' skills that go with the lost production and lost technology.

6. The export of technology exports production, services and jobs. The accelerating export of technology, production and jobs adversely affects the U.S. economy and the living standards of the citizens of the U.S.A. "Free trade" mythology in the real protected world makes the transfer of technology move faster from U.S. shores.

7. Current U.S. policies—tax deferral, tax credits, Discs—encourage exports of American technology, capital and jobs, while foreign countries try to encourage the entry of technology, the promotion of production, and full employment within their own borders. All economic relations in the world today are strongly influenced by political and governmental decisions.

8. Managers of global Multinational Corporations must NOT be decision-makers for U.S. national policy on technology and international transfer of technology. The U.S. government has the right and the duty to regulate the flow of capital and technology and scientific and managerial know-how. The U.S. government has a responsiblity to its own workers, citizens, communities and taxpayers.

9. The AFL-CIO says regulate export of capital and technology which results in export of jobs; regulate foreign investment in strategic industries or investment that interferes with U.S. economic progress.

10. We need to expand Research and Development for the civilian economy—into housing, transportation, urban needs, pollution control, etc. Domestic social needs involve social values and social choice, and therefore more political decisions and more politics. We must gear R&D and technological progress to full employment.

Deputy Assistant Secretary of Commerce for Science and Technology, Francis W. Wolex, quoted in the July 2, 1979 issue of American Metal Market/Metalworking News said that "There's no point in developing new technologies first if then they go overseas and we find (them being used) to our disadvantage." We couldn't agree more.

This point cannot be overemphasized, since it is central to the transfer of technology discussion.

In specific reference to the Vienna Conference, AFL-CIO Secretary Lane Kirkland wrote to Ambassador Wilkowski in October of last year:

"This country should insist that developing countries benefitting from the transfer of technology operate their technology under the kind of safety, health and environmental standards as are required of American firms. Technologies that do not meet these standards should not be transferred. Strong concern should be expressed concerning the present phenomenon of American firms moving dangerous, unsafe and filthy industries (e.g., asbestos products) to developing countries as an alternative to compliance with U.S. requirements, and marketing their products in the U.S.

"There should be restrictions on the kind of technology that is transferred to developing countries, in the absence of domestic markets for its products. I would look askance at the development of a shoe industry for export only, or the manufacture of television sets in a nation that has no television broadcasting facilities.

"Neither America nor other developed nations jumped into a modern industrial society in one leap. Neither will the developing countries. The importance of applying different approaches to different countries cannot be too strongly emphasized. At the same time the need to assure further technological development in the United States should be implicit in any U.S. paper.

"While the main thrust should be to help developing countries to use science and technology in a manner directly beneficial to their people, there are global issues in which the developing countries might well involve themselves for their own benefit as well as the benefit of the world at large, including the United States. Particularly, I am thinking of the energy problem. Developing countries should be encouraged.

"Lastly, I want to join in your concerns about the development of a dualistic society—a handful of affluent elite as contrasted to masses of poverty-stricken people. The transfer of technology must not be used to perpetuate such a social order where it already exists not to contribute to the development of such a society. This point cannot be over stressed."

The tone of the rhetoric of international meetings held to discuss this issue is increasingly one where the United States is the bad guy doing everyone else in the world in, which is usually followed by a demand for a larger share of the U.S.

market and more technology. At the same time, those same voices know for certain that we are the market. Millions of Americans and billions of their dollars have pursued what they though would prove us "good guys." So it comes to a point where the maintenance of this most important world market is essential to the aspirations of a vast array of economies around the world who look more and more to exports as the panacea for what ails them. Income distribution can be skewed against economic and social benefit. The sad fact is that in transferring technologies, we often find segments of our market weakened. The unemployed do not consume.

There are technologies that can assist nations to develop and to develop internally, not externally, so that their citizenry can participate in the national economy and not forever remain serfs to export-oriented multinationally-funded schemes. That has not been the case in Brazil, nor in Mexico, nor in Haiti, nor countless other loci of multinational, or transnational production and export.

In summary, Mr. Chairman, the scope of endeavor of the upcoming Conference is more philosophical in nature than pragmatic. While on the one hand we find sweeping discussions of the benefits of the transfer of technology the future of developed economies such as our own cast in glowing terms as a service economy as industry after industry leave our shores, characterized by terms which stand meaningless alone (technology, under-developed, multinational), there are real and quite harsh realities that accompany the actual movement of capital and technology around our globe. The two don't seem to meet, if the Department of State Document entitled Science and Technology for Development, prepared for the August U.N. Conference, is any guide. In thirty-five pages of prose, a scant three paragraphs are given over to points of view which the labor movement and other private institutions, both academic and industrial, have tried to sound at various of the meetings referred to earlier in this document. At that, those views are not reported accurately.

Our concern is that the inevitable spread of technologies around the world result in the spread of benefits through equitable income distribution. That requires processes such as collective bargaining and/or codetermination schemes, which is a tall order indeed given the unpleasant fact that most of the governments that will be presented at the August Conference are non-democratic, non-representative, authoritarian regimes which do not view human rights and workers rights as we in the IMEC group do. We believe that this question of transfer of technology must be accompanied, if not dominated, by a discussion of human rights. That is, the rights of workers not to be exposed to dangerous pollution in the workplace, to bargain collectively or be represented in some fashion to assure that the fruits of technological transfer accrue to the workers and not to the vested interests alone. This presupposes ratification, for example, of the basic Conventions of the International Labor Organization, the right to form a union, the right to strike, the right to bargain collectively, the right to unabriged public meeting. Labor's international institutions have worked long and hard to build these democratic, representative organizations throughout the world. If such efforts could be ground into the consciences of delegates at Conferences such as the one we are here discussing, we believe that the entire question of developmental processes would assume new and quite different aspects.

The impact of the transfer of technology, both here and abroad, must be more openly and thoroughly considered. National committees composed of labor, community organizations, business and industrial interests and local and state governments should be able to consider specifically the proposed movement of technologies away from their own communities or out of the country both in the light of potential damage here and that which could in fact occur abroad. Such groups should inevitably weigh the benefits and disadvantages of such transfers, which the U.S. Government has not done.

Such study might in the future avoid more taitis, free zones in the Dominican Republic and two-tiered sweatshops in South Korea by investigating conditions under which such new technologies will be implanted in most environs. Inherent in this point is the fact that the Government of the United States has not played a responsible role in such transfers. There are insufficient safeguards here for displaced workers and an appalling lack of measurement and accounting of the application of technological transfers abroad. We have exported our own most worst ecological and health problems, in many cases, often at the demand of recipient governments.

Finally, there must be continued emphasis by all concerned on the basic needs aspects of this large question. Self-sufficiency in food is clearly more important than exporting baseballs to the U.S. for $5 per six day week. The human rights aspects must be kept clearly in sight. We should not be in the business of reinforcing systems in which serfdom is a continuing factor. Once again, we are facing the

uphill struggle through the United Nations system, in which the majority of its member states reflect precisely that posit.

We must ask ourselves, in view of the August Conference, whether we in the United States really know the limits and meaning of the transfer of technology. We think not. We must ask ourselves whether the American public has been made sufficiently aware of the arguments and risks involved in the broadest interpretation of the phrase "transfer of technology". We think not. We must ask whether our government is developing or even considering broad based policies on the movements in and out of the United States of technology and capital. We think not. We must ask if the transfer of certain technologies leads to development in the real sense abroad. We think not.

We believe, Mr. Chairman, that the labor movement, not just of this country, but of all those represented at the Vienna Conference, should have the opportunity to participate on those delegations. By ignoring them, the hard questions of development and technological transfer are not being addressed. The world's workers, after all, are keyed to the whole process. A paper prepared by the Worker Group of the Governing Body of the International Labor Organization sums the posit up thus:

"Independent organizations, representing working men and women can make a key contribution towards the achievement of development objectives for which technology must be harnessed, thus speeding up progress . . . . Trade unions should therefore be able to participate in identifying basic needs, in setting national targets for growth and development, in organizing all workers and in implementing strategies and employment policies. To allow trade unions to fully contribute towards national development objectives, it is essential that governments respect worker rights as set out in ILO labor standards. Labor rights are universal human rights."

Mr. BROWN. I have read your full statement, Mr. Boggs, and I want to commend you on it. I think it sets forth a very necessary position for the U.S. delegation to consider in the conference that's coming up. I have looked at the questions submitted to you, soliciting your testimony, and I find that all of you have done an extremely good job in responding to the issues that were raised in that material.

It leaves me feeling that it would perhaps be a little superfluous to raise additional questions at this point and, in particular, considering the time.

Let me consult with the staff for just 1 minute.

[Pause.]

Let me just ask this of all of you. You've each heard the testimony of the others, and I trust you didn't all collaborate in your testimony. May I ask if any of you were so stimulated to either object or concur with any of the statements made by the other panelists that you would like to have that reflected in the record? Any outstanding points that you think ought to be emphasized?

Mr. CAREY. I pass, Mr. Chairman.

[The following information was subsequently received for the record:]

AMERICAN FEDERATION OF LABOR
AND CONGRESS OF INDUSTRIAL ORGANIZATIONS,
Washington, D.C., August 15, 1979.

Hon. GEORGE E. BROWN, Jr.,
U.S. House of Representatives,
Rayburn Office Building, Washington, D.C.

DEAR CONGRESSMAN BROWN: Thank you for the letter to me of July 25, 1979 signed by you and Senator Stevenson. In response to the two questions you have posed in your letter to me, I believe the following comments will outline our position on those topics for the Hearing Record:

The AFL-CIO believes that it is necessary and highly appropriate to curb capital and technology transfers that threaten future U.S. job opportunities and fail to build healthy internal markets in the less developed countries.

We are convinced that import restraints may be necessary to accomplish this goal. In economic terms, incentive to develop sound market, adequate wages and living standards and healthy economies in developing countries is undermined when com-

panies move to areas where wages are traditionally low and from where they export to developed countries.

The example of Ford and Volkswagen in Mexico is pertinent to this argument. Only one Mexican in eighteen owns a car: however, since 1964 Mexico has required that a certain percentage of products, such as automobiles, must be made in Mexico in order to be sold in Mexico. Mexico also requires that exports by multinational firms balance imports.

Ford and Volkswagen are exporting parts of cars from Mexico for U.S. assembly. Automobiles and parts are Mexico's largest export. For example, Volkwagen stampings are made in Mexico. Since Mexico regulates all imports and the U.S. is an open market to them, the trade and development prospects do not encourage development of a healthy internal market and therefore discourage more equitable income distribution.

But Mexico's industrialization program includes a variety of requirements, which have effectively industrialized Mexico. It is now one of the newly industrializing countries, according to the OECD. It is no longer a "less developed country" in economic terms. This problem is serious because U.S. economic policies still treat all LDC's the same. But Mexico, India, South Korea, Singapore, Hong Kong and many others trade in highly industrial and sophisticated products. Policies should change so that industrialized countries such as these help the real less developed nations of the world.

The U.S. should recognize these changes and try to achieve a better balance at home and abroad. Firstly, U.S. tax policies should not subsidize the export of U.S. technology and jobs. Secondly, U.S. capital curbs may be necessary. Thirdly, U.S. imports must be regulated to assure a more effective economic balance.

Damage to the U.S. community is more and more the case through technological transfers. There is no system of measurement presently deployed by which the extent of that potential damage can be weighed before certain technologies are transferred. A casual glance at the OPIC list of Insured Projects shows clearly that more and more American firms are moving to Haiti, Taiwan, South Korea, Singapore, Costa Rica, Malaysia, Philippines, Dominican Republic, Brazil, Barbados, et cetera, to produce for export from those host countries to the U.S. and other points abroad, most notable to Europe. There is no doubt that U.S. workers are displaced by these movements: yet no U.S. law or even review process affects such flows of technology and capital. Clearly, the human rights of U.S. workers are abridged in these cold and calculated, profit-motivated transfer schemes.

In our view, human rights are synonymous with workers rights. The International Labor Organization, for example, has operated on the basis of this equation from its inception in 1919. Those human rights are embodied in ILO Conventions and Recommendations, which run the gamut from the right to organize trade unions, to meet in public, to strike, to bargain collectively on the one hand to very specific work standards in which lists are published of carcinogens used in industrial production and noise standards in factory environments on the other. Thus, an established body of well-defined international work standards exists and should be used as a first reference in the consideration of both the political and physical environment in which science and the use of science in technological transfers play a role.

The work environment, in a political sense in terms of a worker's rights to organize and defend his interests and in a physical sense, in terms of the workplace and the community as a whole, is therefore primary to the question of technological transfer.

We believe that Congressional Committees, such as yours, must weigh these two general factors in its work. Specifically, are movements of capital and technology abroad benefiting a society and/or firm in a nation where there are no trade unions? If that is the case, it can be safely assumed that workers are exploited and that working conditions, including in-plant and outside-plant conditions are in all likelihood deplorable. Is the application of this technology or movement of this capital displacing U.S. workers? Can the product that results from this application of money and science be produced economically here? If so, why move in the first place?

In both of these simple tests, there are established measures and informed groups that can be referred to. ILO Standards have long been the measure of workers' rights around the world. The U.S. labor, business and academic communities can attest to the merits or demerits of the second category.

Governments of all of the IMEC group of nations have taken serious note of the changes wrought in the last decade in the world economy. Only the United States, with its decentralized and relatively unrestrictive system of government, stands idly by as thousands upon thousands of U.S. workes lose their livelihoods in the name of profit. None of those IMEC group of governments, however, seems to care much

about the state of workers rights in those nations where their own firms may locate to produce. The U.S. government, with its human rights policies, could pioneer in this area. Your Subcommittee could help to light the path.

Sincerely,

MICHAEL D. BOGGS,
Assistant Director,
Department of International Affairs.

Mr. BROWN. I don't want to belabor this, because I know the hour is quite late. I want to thank you all very much for the contribution and thought which your statements represent. I know that you've all given a great deal of time and effort to do this, and will probably continue to do so through the period of the Conference, and I hope that the committee staff can continue to call on your cooperation, if they need further elaboration.

Thank you all very much. The committee will be adjourned.

[Whereupon, at 12:55 p.m., the hearing was adjourned.]

COMMITTEE ON SCIENCE AND TECHNOLOGY,
U.S. HOUSE OF REPRESENTATIVES,
Washington, D.C., July 16, 1979.

DEAR COLLEAGUE: On April 9, a large bipartisan majority of the House voted in support of a good idea contained in the Foreign Aid Authorization Bill: the establishment of the Institute for Scientific and Technological Cooperation (ISTC). The vote was on an amendment to kill the Institute—and it was defeated 236 to 136 (see enclosure from the Congressional Record).

The Institute will again be before the House on Tuesday, July 17 as an important item in the Foreign Assistance Appropriations Bill (H.R. 4473). We anticipate that another effort will be made to delete or severely restrict appropriations for the Institute. However, we hope that you will join with us in the same display of bipartisan support as in April to retain the Institute.

The Institute has been welcomed as a modest but timely idea by many private and public officials from organizations both in the science and development communities. The ISTC will be a unique element in our dealing with developing countries; when established it will represent a major improvement in linking science and technology to the conduct of our foreign policy.

The ISTC will provide this country with opportunities which must not be overlooked. A new type of cooperation will be established with very important middle-income developing countries such as Brazil and Mexico. At present we are very limited in our ability to enter into mutually beneficial cooperative programs with these countries. Further, the ISTC affords us the capability for putting more of our scientific and technological strength to work on critical problems affecting the U.S. and the rest of the world. These include problems such as energy, food, environment, health, and natural resources.

Finally, the cooperative aspects of these science and technology endeavors will benefit the U.S. both in the short and long run. These benefits will range from enhanced trade to close working relationships between key individuals here and abroad.

We urge your continued support for this very important initiative.

Sincerely,

CLEMENT ZABLOCKI,
Chairman, Committee on Foreign Affairs.
LARRY WINN, M.C.
WILLIAM BROOMFIELD, M.C.
DON FUQUA,
Chairman, Committee on Science and Technology.
GEORGE E. BROWN, Jr., M.C.

P.S. Enclosed is a brief fact sheet on the proposed Institute.

COMMENTS ON THE INSTITUTE FOR SCIENTIFIC AND TECHNOLOGICAL COOPERATION, A KEY COMPONENT OF THE RESTRUCTURED AID PROGRAM

President Carter proposed the Institute for Scientific and Technological Cooperation after studies identified it as a means of significantly improving the U.S. development assistance effort in line with his recently approved Reorganization Plan. At the same time, to hold the line on costs, the President specified that personnel and funds for the new Institute fall within existing foreign aid levels. The ISTC plan follows this mandate.

1. *ISTC does not increase the development assistance budget.* The President required that ISTC be planned within foreign aid funding ceilings. This was done. Thus the ISTC budget request represents a reallocation of funds and functions to improve quality of program, not added funding.

2. *ISTC does not add to the size of the federal bureaucracy.* The President required that ISTC be planned within existing foreign aid personnel ceilings. This was done. The 100 ISTC permanent positions will be transferred from existing AID position

ceilings. Within the 100, about 22 are now vacant and will be filled within ISTC instead of AID during the course of the year. The total is not increased by ISTC.

3. *ISTC adds new strength and focus which are not attainable within AID.* ISTC will be organized much differently than AID, concentrate staff attention in new directions, and add a new set of specialized functions of high priority to the overall U.S. effort abroad. These will include:

A. A new approach to increasingly important middle-income countries—e.g., Mexico, Venezuela, Brazil—where aid programs are no longer appropriate but cooperation in science and technology offers mutual benefits.

B. A sustained R and D effort on targets of immediate importance in developing countries and on problems effecting better use of the world's natural resources. To date such efforts have been piecemeal and inadequate.

C. A new collaborative system designed to focus the best in U.S. scientific and technological strength—both public and private—on development issues and, for the first time, to involve developing country experts directly in advisory and evaluative roles.

Fears of an expanding new bureaucracy are unfounded. ISTC has been cut from the existing program, and any growth of ISTC will be examined and planned within the congressionally approved new foreign aid coordinating structure—the International Development Cooperation Agency. The IDCA budget, coordinated for the total aid program, will be subject to Executive and Congressional controls as in the past. Furthermore, the ISTC is subject to a "sunset" provision guaranteeing thorough review by September, 1984.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE,
Washington, D.C., August 6, 1979.

Hon. ADLAI E. STEVENSON,
Chairman, Subcommittee on Science, Technology, and Space.

Hon. GEORGE E. BROWN, Jr.,
Chairman, Subcommittee on Science, Research, and Technology.

DEAR SENATOR STEVENSON AND CONGRESSMAN BROWN: Your letter of July 25 asked me to submit a response to a specific question, to be included in the record of the UNCSTD hearings as part of my testimony.

I am pleased to submit the attached brief response.

Sincerely,

WILLIAM D. CAREY,
Executive Officer.

Enclosure.

I understand that the Institute for Scientific and Technological Cooperation will have an advisory council of 25 persons, five from the U.S. government; 12 U.S. nationals from industry, universities, non-governmental organizations, and foundations; and eight foreign nationals. This seems to me a good mix and about the right proportion of foreign nations to provide a feeling of partnership and shared interest in the issues addressed by ISTC. Over time, provided that ISTC is adequately funded and competently staffed, the results it obtains should speak for themselves. In the short run, however, the active and responsible participating LDC nationals should help achieve enthusiasm for ISTC and confidence in its work.

The larger issue is whether all "international bodies dealing with science and technology in development" should include scientists and technologists from developing countries on their boards or advisory groups. My answer is yes, and the example of ISTC is a reaffirmation of an important principle. We are long past development as a one-way street. This is a joint enterprise and the stakes and the participation are mutual. LDC representatives will have a lot to say about the most effective way of achieving the development goals we all seek. No country has a monopoly on expertise.

STATEMENT OF MILDRED ROBBINS LEET

My name is Mildred Robbins Leet, the UN Representative for the International Society for Community Development, chairing a Task Force on the Roles of Women in Science and Technology for Development. I speak also as a person who has attended U.N. Conferences on Population, Environment, Food, Human Settlements, and Water, as well as the preparatory meetings for UNCSTD held in New York and a meeting in Mexico.

At most UN Conferences, the United States projects an image of the country best able to advance the goals of the Conference, yet the most unwilling to do so. Obviously this antagonizes the delegates from the developing countries. Quite often the reality is that after the Conference, the U.S. does more than other countries. However, few delegates are fully aware of this, and the Conference image is the one that remains.

It is to be hoped that at UNCSTD the U.S. will be prepared to take positive and constructive positions. Even though we may oppose the creation of a new special agency, we can at the same time make it clear that we will further the goals through UNDP and/or other existing agencies and through bilateral programs.

All countries know that the U.S. possesses a major part of the world's resources of science and technology for development. A constructive plan should be developed whereby the U.S. offers to share information. The U.S. has spent billions of dollars in grants to universities and research institutions, and through government agencies to develop science and technology. Most of the information is in the public domain, and we should make clear our willingness and, in fact, eagerness to share this with others. Other developed countries already have access to this information through our data banks.

We should indicate willingness to help the developing countries to gain similar access. All of this information should be made readily available to both women and men in the developing countries. Both women and men should be trained to utilize it effectively.

It is necessary for the U.S. to make some positive proposals relative to the integration of women in development related to UNCSTD. Concern for women's rights is now an integral part of U.S. human rights policy. Among other ways, the U.S. stresses the role of women in development through the Percy Amendment to the 1973 Foreign Assistance Act. It states that U.S. foreign aid programs will "encourage and promote the participation of women in the national economies of developing countries, and the improvement of women's status as an important means of promoting the total developmental effort."

The U.S. national paper for UNCSTD included the following statements under the general heading, "Avoiding the Negative Impact of Technology: * * * Nowhere is this phenomenon of double effect more pronounced than on the status of women in the less developed countries. In fact, the role of women in development has too often been ignored. Women in less developed countries have done the bulk of the farming and also handled the spinning and weaving, drawing of water, market gardening, and food processing. The ways in which new methods and technologies are introduced has tended to undermine these traditional roles and to restrict the economic independence of women. As development in the Third World has proceeded, women almost universally have lost ground—they are denied advanced training, lack access to credit and money, and are cut off from required technical skills. What is needed are science and technology policies that actively and equally involve and benefit women and open opportunities for them to become part of the modern economic system."

We applaud these comments in the national paper and hope that there will be strong position papers developed reflecting this outlook.

It is essential to think about technology in the context of the cultural and socioeconomic environment in which it will operate, since this environment will influence the lives of women and men, and their families. Not enough attention is given to the link between technological choices and this environment, between specific economic goals, such as increasing export, promoting industrialization, or providing employment, and the impact these choices will have on people—especially women.

Any discussion of science and technology, expecially regarding the need for research and development must begin with the end-user, who is often a woman. The more potential users are involved in identification of their own needs and the choice of technology, the more appropriate the technology is likely to be.

It is a plain fact that women are involved in marketing, in trade and food production, as well as in consumption and population growth. Women are, however, much less involved in planning or decision-making. They carry out what other people—mostly men—decide, and for whom most women's labor in economic terms is invisible. It has become abundantly clear that the Gross National Product does not reflect the labor of women.

Our basic premise is that technology is human knowledge applied to human needs. It is not gender-related, but affects all people and all needs, from the most humble to the most sophisticated. Social and economic development cannot be successful without the participation of women, who make up half of humankind. All

elements of society must be involved in the choice of science and technology for development; all must understand its limitations; and all must enjoy its benefits.

The importance of the roles of women is reflected in the documentation which emerged from the preparatory work for the Conference. Examples follow.

In the Provisional Agency for Vienna/UNCSTD, dated 20 June 1979, item 4, "Science and Technology for Development," states in "(c) Methods of integrating science and technology in economic and social development" that " * * * the Conference is expected to examine problems of applying science and technology to development and means for overcoming the obstacles encountered * * *" inasmuch as "The inadequate use of human resources is one of the main obstacles to the application of science and technology to development * * * [and] the potential of women—half the world's population—is hardly involved in the scientific and technological enterprise."

In Target Area C discussed at the Fifth Preparatory Conference for the projected Plan of Action, item 2.4, "Development of human resources," includes the following: "C.11. The organs, organizations and bodies of the United Nations System should * * * (g) Strengthen support for national efforts to promote the full participation of women in the mobilization of all groups for the application of science and technology to development."

United Nations Conference on Trade and Development: "The question of structural and qualitative changes in absorption, utilization, and endogenous development of technology are of vital importance. The stage is set to proceed in most, if not all, developing countries with: * * * Planning technological transformation ensuring that critical sectors (e.g. agriculture) and specific groups of the working population (e.g. women workers), so far bypassed by technological advance, are given high priority and are fully integrated in the mainstream of the development process."

International Labour Organisation: "First, reference has been made to the unequal access of women to the formal education and training, especially in scientific and technical skills in the modern sector, reinforced by the omission to incorporate women in agricultural training programmes, projects and training schemes. Secondly, some evidence has been examined from the multi-dimensional activities of rural women, especially in food production which indicates that women continue to 'manage' the subsistence economy (with or without skills) with 'traditional' techniques (new technology frequently aiding men's work). Finally, it has been shown from examples of some industries—modern and traditional—that the introduction of new techniques, in a shifting occupational hierarchy continues, to displace women in low skill, low productivity jobs. This process deprives them of the opportunities of upgrading their skills and acquiring technological know-how."

Economic Commission for Latin America: "The question of the inequality of the vast majority of the Latin American female population is indeed closely linked with the problem of under-development, which exists not only becaue of inadequate internal structures but also as the result of a profoundly unjust world economic system. Our region is characterized by a high rate of unemployment and underemployment. This phenomenon is proportionately greater in the case of women, and at times reached rates three times higher than those for men of the same age group."

Economic Commission for Africa: "Agricultural, rural and national development will be a slow and difficult process if the women, who form half of the population and, in some countries, represent up to 80 percent of the agricultural labor force, continue to be denied access to knowledge, credit, agricultural extension services, consumer and producer co-operatives, labor-savings devices and income-generating activities."

United Nations Environment Programme: "In Africa today, nearly eighty percent of the population still live in the rural areas and the majority of these are women. This is most strikingly pronounced in Lesotho, where more than two-thirds of the rural population are women, resulting from high rates of male labour migration to South Africa. In Kenya, where 87 percent of the total population live in the rural sector, women comprise 51 percent of the rural population.

"This situation * * * has resulted in women having to take over jobs abandoned by men now working in the cities or in plantations and mines. To cope with the increasing workload, women are obliged to stop cultivating time consuming crops and replace them with less burdensome crops—but of frequently lower nutritive value.

"Pointing out that women have been totally ignored in the mechanization of agriculture and the larger 'transfer of technology' debate, [it is recommended] that appropriate technology and agricultural education would ease their workloads, allow them to plant, harvest and store nutritious foods for themselves and their family, improve the situation of rural health and generally ungrade living standards—all basic to the achievement of alternate development."

Economic and Social Commission for Asia and the Pacific: "It appears characteristic of the socio-economic set-up in most of the developing countries that women rank inferior in status and opportunity to men. * * * [e.g.] literacy ratios and economically active percentages are much lower in the case of women; * * * In rural areas, women work practically as bonded labour for manual operations in the fields and household chores. They work longer hours, with primitive implements and facilities. Technology has not been applied to eliminate the drudgery of their work; * * * few women can avail themselves of scientific and technological opportunities, particularly for senior positions at the executive and managerial level; * * * only in cases of shortage of manpower are women drawn into other professions. Even in these spheres, e.g., agriculture and industry, as jobs become technology-oriented women are gradually displaced; * * * Apart from its social undesirability, the discrimination against women impedes the application of science and technology by keeping a sizable section of the population from participation in socio-economic development. The situation should be remedied through social reform and legislative action."

United Nations Industrial Development Organization: "It is the women of the developing world who are most concerned with the problems of energy supply and use, because it is they who do the cooking and, in most countries, gather the fuel. Furthermore, it is usually the women who draw and carry the water for domestic use. Thus, although action programmes undertaken to meet the energy problems of rural areas must involve people at the village level during planning and implementation, their impact on women must be taken into account and, indeed, should not be planned or implemented without the significant involvement of women at both the planning level and the village level."

At the United Nations Conference on Technical Cooperation Among Developing Countries, the delegate from Mozambique said: ". . . Women constitute one-half of the world population and one-third of the official labour force; women perform nearly two-thirds of the hours worked; women, according to UN and ILO statistics, receive only one-tenth of the world income and possess less than one-hundredth of the world property; women make up three-fourths of the world's 800 million illiterates; women, together with children, constitute three-fourths of the world's undernourished; women, in the developing countries, form 80 percent of the age group six to sixteen with no schooling. In these halls, like a mirror of the world's reflections on the problems of developing countries, we have nearly forgotten to analyze the place of women in the development process. But it is a fact that the hard core of the development problem is constituted by women. Women are the most unequal among unequals."

For the current World Conference on Agrarian Reform and Rural Development of the Food and Agriculture Organization of the United Nations, consideration is being given in the initial draft Programme of Action to 13 recommendations dealing with specific women's concerns, including "Women's Access to Rural Services," "Women's Participation," and "Improve[ment of] Educational and Employment Opportunities."

The United Nations Development Programme has been in the forefront of encouraging the integration of women into development. As early as 1970, it sponsored the work of Ester Boserup which resulted in publication of her landmark book, "Women's Role in Economic Development."

The foregoing examples all emphasize that it is imperative that women work together with men in the development process. The fact is that women are a constant economic factor that has not been considered in economic growth plans. Women are not a social problem nor a welfare problem, but a human asset that has not been entered on the right side of the ledger.

Therefore, there are certain proposals that the United States can put forward at the Conference on Science and Technology for Development to move the concept of the interdependence of women and men from theory to implementation:

1. The term, "manpower," which appears in many of the UNCSTD documents, is one which lacks precision. To some people it refers only to male activities. To others it has a generic meaning covering activities of both men and women. The use of this term, therefore, obfuscates the meaning of statements and resolutions in the English language. The problem does not exist in Spanish, French, or German. We therefore recommend that in English texts, whenever the term, "manpower," is proposed, the term "human resources," or "personnel," or specific reference to both men and women be substituted. This will contribute both to clarity and to better understanding.

2. Education and training in fields related to science and technology are not made available on an equal basis to women. Even when women gain the necessary education or training, they do not have equal access to career opportunities in scientific and technical fields, including the social sciences. If technology transfer is

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to be successfully implemented, it is imperative that opportunities for appropriate education and training be made available to women—training for both the use and the maintenance of all technology. It is unconscionable to develop a budget without such a stipulation. One has only to look at Three Mile Island, the DC10 incidents, and major power outages to see the importance of continuing training for maintenance.

In many developing countries, access to education at all levels is more readily available to males than to females, and the difference increases with the increasing educational level. Where family resources for education are limited, they are often allocated primarily to male children. Quality of education may also differ for males and females. There is much evidence that the stereotypes regarding male and female roles in many countries lead to different types of education for girls and boys, and these differences often result in female children receiving education which is less likely to prepare them for technical, scientific, social, and professional careers. Particularly neglected is training in analytical thinking, setting of goals and priorities, and making choices. It is important, therefore, that any specific assistance, either for general education, or for specialized technical and scientific training, be given under conditions which will maximize the participation of women and girls.

When women do obtain an appropriate education, they should have an opportunity to use it. Discrimination against women scientists has been extensively documented in developed countries, and the available evidence suggest that the problems is equally severe in many developing nations. To avoid contributing to this problem, certain steps should be taken:

Women should be included in leadership positions on international, national, and local boards, commissions, and advisory groups which make decisions concerning current development projects and plan new, non-traditional ones;

Women should have equal opportunity with men for employment and advancement on the staffs of technical and scientific institutions;

Women scientists should share equally in access to research opportunities, including equal access to funding and facilities. They must have the same opportunities to publicize their work, and their work should receive the same consideration afforded to that of male scientists and professionals;

Women should have equal access with men to technical employment in all development projects, whether funded by governments or privately; and

Monitoring procedures covering all aspects of the employment of women scientists and professionals should be part of all development projects, professionals should be part of all development projects, and appropriate measures should be taken to insure compliance.

Any new agency for science and technological cooperation should strengthen the scientific and technical problem-solving capacities of developing countries, focus increased U.S. scientific attention on development problems, and integrate women and men.

3. The roles of women are interrelated with many of the obstacles cited in the Conference documents in the areas of agriculture, nutrition, food preservation, water, and energy. One specific project that might be developed by the U.S. in consultation with other governments and agencies might be one on rural energy, the development of which is of concern not only to the developing countries, but to developed countries such as the U.S. The rural population is about 75 percent in Asia; over 90 percent in Africa; and about 50 percent in Latin America. Most of these people, about 2.5 billion, continue to rely on non-commercial resources to cook, smoke food, heat water and space, or provide light and safety. These resources are primarily wood and dung.

It is the women in the developing world who are most concerned with the problems of energy supply and use.

The high proportion of fuel (40 to 50 percent) that goes for cooking in the less developed countries suggests that attention must be given to the refinement and/or innovation of technology to make such operations more efficient—in labor saving, in fuel saving, as well as in greater health and safety.

Projects such as the Lorena stove in Honduras and Guatemala, made of indigenous material, built by women trained in construction, will decrease the amount of firewood needed by one-half, encourage the boiling of water, and eliminate smoke in the home.

The issue is not women, but rather the better utilization of natural and human resources together with the application of technologies. The output can make available a variety of solutions drawn from a combination of: (1) centuries-old traditional models; and (2) application of modern technologies, affording a choice of technologies to the user and conservation of natural energy resources.

Anticipated results may be: 1. More efficient use of available energy sources; 2. Decrease in drudgery; 3. Increase in labor productivity; and 4. Increase in income.

The plan would include the correlation of past projects and initiation of national and regional projects utilizing different forms of energies and technologies over a period of ten years.

Studies that have already been made internationally, should be correlated. The UN agencies that have conducted pilot projects on rural energy increase, e.g., wood lots, solar ponds, processing techniques, stoves, etc., should share their information. Such agencies include FAO, UNICEF, UNEP, UNIDO, WHO, UNDP, and UNCTAD. It would seem that such agencies, convinced of the need for women to play a larger role in the development and use of rural energy, should make specific budgetary provisions.

Working through the regional agencies such as ESCAP, ECA, ECLA, and ECWA and their Training and Research Centres for Women, together with international and national Non-Governmental Organizations, and at the invitation of interested national governments, further projects should be initiated, monitored by specialists and by the people the projects are to benefit, and the preliminary results reported to the United Nations Conference on Energy in 1981.

I would like to end by quoting the Ambassador of Libya to the Third Preparatory Conference for UNCSTD. He said: "The Libyan Delegation stresses the importance of human beings in the process of the transfer of technology. There is a great need for giving more emphasis in this sector. On this question I wish to stress the role of women in the field of economic and social development. Many countries such as Libya, have small populations. Women in these societies are half of the people. Therefore, to achieve economic and social development, women must be given more and an effective role in the process of development. The Programme of Action does not reflect this fact adequately."

Let's not leave to Libya the leadership in concern for the Roles of Women in Science and Technology for Development.

STATEMENT OF LIONEL V. BALDWIN, CHAIRMAN, BOARD OF DIRECTORS, ASSOCIATION FOR MEDIA-BASED CONTINUING EDUCATION FOR ENGINEERS, GEORGIA INSTITUTE OF TECHNOLOGY, ATLANTA, GA.

The following proposal which the United States should suggest for discussion and review by the developing nations, could have great practical value immediately. The initiative combines our technological leadership in telecommunication with the educational resources of our fine engineering colleges to provide for mutually agreed programs of shared instructional resources, particularly at the graduate and postgraduate level.

In the past we have often downplayed the practical reasons for the third world to seek a more active role in the development of satellite communications. We have focused to often on the psychological rationale to treat satellites like political carrots. The following proposal has tangible, practical value and should be judged on its merits as an educational program for engineers.

ENGINEERING EDUCATION EXCHANGE

This proposal involves the transfer of technology via scientific and technical education at the post graduate level. Much of service is already in place and it is dealing with a well-understood and much sought after commodity, namely engineering graduate education. A group of U.S. engineering schools have for some time been offering off-campus continuing education courses in engineering subjects via television. In some cases the offerings constitute a complete accredited graduate degree course. Recently these schools have formed the Association for Media-based Continuing Engineering Education (AMCEE). This association permits the group to share resources and serve new geographic areas. A current activity of AMCEE is the development of a specific plan to use satellite communications to extend and strengthen their services. The satellite links will be used to:

Distribute televised course material to member institutions and to industrial sites where engineers enroll in the courses. In some cases the material will be redistributed via the local member institution's broadcasting facilities.

Conduct video conferences and co-produce new video course-ware with more than one AMCEE member participating in the organization.

Provide an interactive data channel between students and AMCEE institutions which can be used to monitor performance, answer questions, provide access to data banks, and permit rapid ordering of new course material.

A proposal that might be appropriate in connection with the UN Conference and Technology Transfer is simply to open AMCEE to participation by foreign universities. In addition, where satellite coverage made it feasible (in Latin America) the satellite interconnection could be established on a realtime basis and a two-way sharing of course material could be initiated. By having the participating local university act as the mediator and reviewer of incoming video course material as well as providing counseling and grading services, it is is possible to avoid the appearance of imposing our educational output directly on nationals of another country. The provision of opportunity for the foreign universities to distribute their own video courseware over the system lends a needed element of reciprocity.

The practical benefit to the U.S. is that a new market would be opended for its higher education products. (The video course offerings can be sold, bringing much-needed new revenues to out engineering colleges, and while we may well buy courses from the foreign universities, it is reasonably safe to assume that the new flow of programming will be away from the U.S. with subsequent gain in our balance of payments.)

U.N. Conference on Science and Technology for Development (UNCSTD): U.S. Participation—Issue Brief No. IB78034

(By Genevieve J. Knezo, Science Policy Research Division)

ISSUE DEFINITION

In August 1979, the United States will participate in a United Nations Conference on Science and Technology for Development (UNCSTD), to be held in Vienna, Austria. This Conference has developed as an international forum to determine both how science and technology can be applied to help promote economic and social development of the less developed countries (LDCs), and also to define public and private programs and policies for cooperation between developed and less developed countries in these areas. Since the objectives of the Conference, at least in the minds of many delegates from the LDCs, seem to be part of demands for a New International Economic Order (NIEO), the conference, according to some, could be dominated by issues of the politics of international development, calls for re-distribution of the world's wealth and for terms of technology transfer more favorable to the LDCs, and not by issues relating to indigenous economic, social, political, and technical obstacles to the growth and utilization of science and technology.

As part of its preparations for participation in the Conference, the United States has been seeking to determine what public and private sector science and technology resources are available to help alleviate development problems in the LDCs. The State Department has used the results of a series of meetings with segments of American society, and of special research projects and interagency working groups to develop initial U.S. recommendations for the Conference. These recommendations were enunciated in the U.S. national paper, published in January 1979. A major element of the U.S. position for the Conference is the planned creation of a Foundation for International Technological Cooperation, now called the Institute for Scientific and Technological Cooperation. Additional policy positions will be determined between now and August 1979. As the preparatory period for the Conference progresses, these issues and others have gained increasing congressional awareness. This brief discusses some of the background events leading to U.S. participation in the Conference and defines some of the issues arising out of the decision to participate.

BACKGROUND AND POLICY ANALYSIS

Overview and current policy issues

This section of the issue brief on "Background and Policy Analysis" contains the following parts:

Overview and current policy issues,
International events leading to the announcement of UNCSTD,
U.S. Reaction to the NIEO and UNCSTD,
The U.S. National Meeting on Science and Technology for Development,
Appointment of a Coordinator of U.S. Preparations for UNCSTD,
Role of the nongovernmental scientific community in the Conference,
CRS seminar on UNCSTD,
Senate hearings on UNCSTD,
Legislation during the 95th Congress, and
Current activity.

Overview

In August 1979, the United Nations will convene a major conference on Science and Technology for Development (UNCSTD). The Secretary General of the Conference is Mr. Joao Frank da Costa; the U.S. delegation will be headed by Ambassador Theodore Hesburgh, President of Notre Dame. Current U.S. preparations are under the coordination and direction of Ambassador Jean Wilkowski, of the Department of State.

According to the Department of State, "the main objectives of the UNCSTD are to: strengthen the developing world's scientific and technological capacity, determine ways to accelerate economic and social development through science and technology, and create appropriate instruments of international cooperation for transferring the necessary capacities and techniques. The conference is not intended to highlight the latest scientific advances, but rather to analyze development problems that might be resolved or alleviated with the aid of scientific and technical expertise. It will focus on the interrelationships among the political, scientific, and technological components of socioeconomic development."

According to many proponents of the Conference, the Preparatory Period before the Conference may well be more important than the actual Conference. The belief is that during the course of preparing their national and regional papers, participating countries will inventory both strengths and weaknesses in their science and technology (S and T) infrastructure, their technological base, and their policies for cooperating in the development of other countries. During this period, the United States will attempt to arrive at a set of policies indicating how U.S. scientific and technological expertise and experience may contribute to alleviating the development problems of the LDCs.

The preparations for the Conference have already raised many issues for such sectors of the Nation as Government, business, labor, and the scientific community. The Congress has already enacted legislation dealing with support for NSF-sponsored research on the Conference and directed that the government emphasize "light capital technologies," in preparing for the Conference (Sec. 507, Public Law 95–105). The Congress has passed legislation encouraging and endorsing U.S. participation in and financial support for the Conference. This endorsement is found in Sec. 103 of the Foreign Relations Authorizations Act for 1979 (Public Law 95–426, H.R. 12598). $945,000 is earmarked for the UNCSTD.

The fifth preparatory meeting prior to UNCSTD was held in New York from June 25–July 6, 1979. The fourth preparatory meeting was held from Apr. 23 to May 4, 1979. The third preparatory meeting was held in New York City, Jan. 22 to Feb. 2, 1979. The major objective of the meetings was to help draft a tentative agenda for UNCSTD so that unexpected policy demands and disagreements could be negotiated before the August meeting in the hope of avoiding political stalemate. The U.S. position was enunciated in the U.S. National paper published in January. Discussions at the "Prepcoms" centered on the positions of the participating nations as represented in each nation's national paper and in a preliminary draft program of action prepared by the UNCSTD secretariat at the United Nations. The U.N. draft was intended to be a summary interpreted by the U.N. planners of positions espoused in national and regional papers.

According to most observers of the meetings, there was a considerable divergence of views and demands between the United States and the LDCs and between the U.N. planning office and the LDCs.

The United States' paper contained the following as initiatives needed to promote effective development and use of science and technology in the LDCs:

(1) strengthening international collaborative research and development and infrastructure or capacity building activity, partly by creation of a Foundation for International Technological Cooperation, which would serve as a focal point in the United States for private and public research collaboration between American and LDC experts. (Funding for this initiative was included in the FY80 budget, and the House has passed a modified version of a proposal that the President presented to the Congress to create the organization. It is now called the Institute for Scientific and Technological Cooperation. The legislation adopted by the House is Title IV of H.R. 3324, which authorizes appropriations for fiscal year 1980 and fiscal year 1981 for international development and economic assistance programs, passed Apr. 10, 1979.) The United States also encouraged other nations to establish similar international cooperative mechanisms for aiding LDCs.

(2) calling on the developed nations to take individual steps to promote growth and use of science in technology by adopting programs in the following areas: strengthening indigenous science and technology capacity, evaluating and updating education and training of scientific and technical manpower, promoting more "on-site" indigenous research, forcing LDCs themselves to define ways to overcome

obstacles to the use of science and technology for development, and strengthening the international science and technology promotional mechanisms of the United Nations.

The draft U.N. program contains language far more supportive than the U.S. paper of LDC demands consonant with the philosophy of the NIEO. For instance, the U.N. paper calls for changes in terms of technology transfer and trade which would allow LDCs to obtain technical information free of charge or paid for with local currencies. It also contains proposals for contributions from developed nations for R&D support in LDCs and supports additional aid for infrastructure development. Even though it contains such demands, some critics say it does not appropriately reflect the real demands made by the LDCs or the programs and policies which would need to be met to promote more effective growth and application of science and technology. Expecially criticized in some news articles are calls in the U.N. paper for creation of high-level bureaucratic planning or science policy mechanisms in LDC governments or in the United Nations. especially neglected, it is said, are the needs to create small-scale R&D units essential to the growth of some countries, such as agricultural research stations, or the development of programs to train middle level managers or entrepreneurs.

The Lund Letter on Science, Technology and Basic Human Needs faults the U.N. document for neglecting to "group countries, to see where political alliances are forming and to identify the main areas of potential conflict." Plans for development, it continues, must account for differentials among nations according to size and levels of economic development. The U.N. document is perceived as treating all LDCs as an homogeneous grouping. (Discussed in: Stephanie A. Yanchinski. UNCSTD's action program off-target. New Scientist, v. 81, Feb. 1, 1979:330.)

Statements made by the U.S. delegation to the UNCSTD "Third Prepcom" also fault the U.N. and LDC positions. The U.S. delegation apparently felt that these papers did not give sufficient attention to identifying and overcoming indigenous economic, political, and social obstacles to using science and technology and to enhancing the capacity of LDCs to generate and use science and technology in pursuit of identifiable economic and social development objectives. It also faulted the LDCs and the U.N. for not coming up with concrete proposals for action in specific areas of application, such as food and nutrition, health, population, energy, environment, and education. The U.S. delegation also said that the draft program of action "does not give balanced attention to the constructive role and contributions of the total private sector throughout the world." It also faulted the U.N. paper for including recommendations which it feels are not appropriate for the agenda of the UNCSTD—issues which are being negotiated in other fora, such as the Code of Conduct for technology transfer, restrictive business practices, standards and practices of transnational enterprises and intellectual property rights. (See Statement by Ambassador Jean Wilkowski, U.S. Mission to the United Nations Press Release, Jan. 30, 1979.)

It is conceivable that the Congress might consider legislation to deal with these issues and to define better such areas of conflict in U.S. positions as between labor and business sectors, which have different views on promotion of technology transfer. There is also a difference of views between some parts of the private and public sectors on the emphasis that should be given to solving problems of basic infrastructure and human needs as opposed to emphasizing development of commercial technological sectors in the LDCs. A congressional statement clarifying governmental policies may be warranted. Senate action is awaited on House-passed legislation to create the Institute for Scientific and Technological Cooperation. There may also be a need for increased appropriations in one or several of the Federal agencies' international programs, possibly a transfer of funds from one program to another, a consolidation of international assistance programs, or a new office to administer programs that emerge following the Conference. Some observers from the private sector anticipate a need for close examination of the incentives and barriers posed in the existing Internal Revenue Code and patent legislation. Others say that any more regulation by the Federal Government would strangle further technology transfer from the private sector. (See the discussion below on the proposed Institute for Scientific and Technological Cooperation.)

International events leading to the announcement of UNCSTD

The first major U.N. conference on science, technology, and development was held in 1963—the U.N. Conference on Application of Science and Technology for the Benefit of the Less Developed Areas. It is almost universally considered to have been less than successful since the increased awareness of the links between science and development made at the meeting were not translated into practical action.

On May 1, 1974, at the Sixth Special Session of the U.N. General Assembly in Manila, the "Group of 77" (a term adopted by the LDCs whose number now exceeds

100) presented a summation of demands to the developed countries. Resolutions 3201 and 3202 contain the "Declaration and Program of Action on the Establishment of a New Economic Order" (also called the Manila Declaration). Although the declaration covered a broad array of issues, the primary focus was on commodities, technology, and debt. Section 5 of the declaration addressed technology transfer and included the following demands:

(1) Cooperation from the developed countries in the following ways: unrestricted access to existing technology regardless of the ownership of such technology; establishment of industrial technological information banks and centers for the development and transfer of technology; and attempts to discourage exodus of scientists and engineers from developing countries.

(2) Decisions on a Code of Conduct for the Transfer of Technology and a decision on the modalities for its establishment;

(3) Actions to be undertaken by the United Nations Council on Trade and Development (UNCTAD) with respect to the economic, commercial, and development aspects of the international patent system in the context of the ongoing revision of that system; and

(4) That the forthcoming U.N. Conference on Science and Technology direct some attention to the problem of reverse transfer of technology resulting from Brain Drain.

Initially, the demands set forth in the Manila Declaration received little attention in the developed countries. In the period following the Arab oil boycott in the fall of 1974, the developed countries began to reconsider their response to the New Economic Order (more commonly referred to as the New International Economic Order, NIEO).

This changing response was noticeable at the Seventh Special Session of the U.N. General Assembly in September 1975. At that session, the General Assembly approved Resolution 3362 on International Development and International Cooperation. Paragraph 7 of section III of this resolution provided that a U.N. Conference on Science and Technology for Development be held in late 1978 or 1979. The decision to hold UNCSTD was the culmination of activity within the developed countries and a response to the demand, in the Manila Declaration, that the next U.N scientific conference address the problem of development in the LDCs. Then Secretary of State Kissinger officially announced U.S. support of the Conference in his September 1 speech to the Assembly—an endorsement which initiated U.S. preparations for the Conference.

United States reaction to the NIEO and UNCSTD

The first series of U.S. proposals regarding a New International Economic Order, and UNCSTD, were articulated by Secretary Kissinger at the Fourth Ministerial Meeting of the United Nations Conference on Trade and Development (UNCTAD IV) in Nairobi, May 1976. Speaking on behalf of the U.S. Government, Dr. Kissinger showed a willingness to reach some accommodation with the LDCs regarding the list of demands noted in the Manila Declaration. He offered the following proposals:

(1) The establishment of a network of research institutes at local, regional, and international levels including an International Industrial Institute, an International Energy Institute, programs in satellite technology, and water resources development and oceans research;

(2) Improved availability of technical information to the LDCs;

(3) Training of future generations of technologists and technical managers;

(4) Improvement in the effective of technology transfer including a voluntary code of conduct; and

(5) The establishment of goals for achievement before and during the UNCSTD.

Dr. Kissinger also announced that the United States would hold a National Conference on Science and Technology for Development, and also an earlier national meeting on the same subject in November 1976 to enlist support and elicit ideas from all sectors of U.S. society.

Between UNCTAD IV and November 1976, an AD Hoc Planning Group under the Under Secretary for Economic Affairs began preparations for the national meeting. This group was also responsible for synthesizing comments from the national meeting and for proposing alternative arrangements for the national conference.

The United States national meeting on science and technology for development

In November 1976, Secretary Kissinger hosted a National Meeting on Science and Technology for Development at the Department of State as a follow-up to his initiative at Nairobi. Attendees included representatives from industry, universities, foundations, research institutes, private voluntary organizations, and labor unions. The goal of the meeting was to begin framing principal issues and alternatives for a

U.S. National Conference on Science and Technology for Development tentatively scheduled for late 1978.

As evidenced by the participation of more than 700 persons at the meeting, the private sector seemed genuinely interested in the UNCSTD, although there was a lack of consensus on the issues. For example, opinions differed on whether the major role should be played by the public or private sector. Representatives of labor questioned the wisdom of any increase in the technology currently being transferred abroad, and opinions differed as to whether initial emphasis should be placed on meeting "human needs" or promoting technological growth.

The meeting was hosted by the Ford Administration just before going out of office during the transition to the Carter Administration. The Ad Hoc Committee at the State Department, that had prepared for the November 1976 meeting, completed a report on its activities and submitted an agenda of items in need of further study to all conference participants. Subsequently, several influential persons in the scientific, academic, and nongovernmental communities corresponded with the newly elected Administration, advising it of their ideas for the Conference. For example, several past presidents of the American Association for the Advancement of Science sent a joint letter to Secretary of State-elect Vance, expressing concern that a disporportionate reliance was being placed on the transfer of proprietary technology. They suggested that greater emphasis be placed on public technology and recognition that the developmental problems of the LDCs would probably require new types of technology. Also, Dr. Frederick Seitz and Mr. Rodney Nichols, both of whom served on the U.S. delegation to the U.N. Committee on Science and Technology, wrote a letter [on behalf of a number of scientists, engineers and physicians] to President-elect Carter, deploring the lack of scientific and technological considerations in U.S. foreign policy dealings with the LDCs. They suggested specific areas warranting attention in light of LDC needs in a working paper entitled "An Outline of Issues and Suggestions for the United States to Consider in Programs of Science and Technology to Meet the Goals of Developing Nations."

Appointment of a coordinator of U.S. preparations for UNCSTD

During early 1977, preparatory activity continued in nongovernmental organizations, academia, and scientific societies. In May 1977, President Carter announced his appointment of the Hon. Jean Wilkowski, a career diplomat, as Ambassador in charge of coordinating U.S. preparatory activities for UNCSTD. (An appointment of a coordinator with the status of Ambassador had been one of the recommendations of the Ad Hoc Committee.)

Ambassador Wilkowski's office was established at the Department of State, responsible to the Under Secretary of State for Security Assistance, Science, and Technology, Lucy Wilson Benson. The Bureau of Oceans and International Environmental and Scientific Affairs and the Bureau of International Organization Affairs were given primary responsibility for substantive support to the Coordinator's Office. A central task of the Office was to prepare a National Paper for the United States. Similar papers, with drafts which were due originally in May 1978 and final reports which were due in August 1978, are required of all the participating countries in UNCSTD. These papers are expected to be a review of each country's needs, resources, experience, and potential for dealing with development problems.

The Coordinator's Office was established in July 1977. Its staff has established liaison with all of the government agencies concerned, and particularly with the National Science Foundation and the Office of Science and Technology Policy. Liaison activities with other parts of the Government were formally recognized in February 1978 with the establishment of the Interagency Policy Group and Interagency Study Groups on U.S. preparations for UNCSTD. These groups, among other things, will cooperate in preparing a U.S. Government survey on programs for international cooperation in science and technology to be used in support of UNCSTD. The following groups were created: education and training for S and T intrastructure; food, soil, industrialization and trade; health, nutrition, and population; energy, natural resources, and environment; and employment and manpower utilization. The groups will also contribute to formulation of a Presidential Review Memorandum (PRIM No. 33) expected to be released defining U.S. positions for the Conference. In addition, Ambassador Wilkowski has contacted many members of Congress whose interests and areas touch on the subject.

The major role of the Coordinator's Office has been to coordinate a national assessment of U.S. resources and capabilities and to outline policy options and recommendations for the U.S. position at the Conference. Initial activity of the Office has included the following efforts. First, as preparation for the National Paper, the Office contracted a study with the National Research Council, funded by the National Science Foundation, on U.S. resources and capabilities which could be applied to priority needs of LDCs. The study: "U.S. Science and Technology for

Development: A Contribution to the 1979 U.N. Conference" was released by the Academy in April 1978. It recommends practical cooperative action, research, and institutional changes needed to meet S and T initiatives in five areas relevant to development of the LDCs: (1) industrialization (2) health, nutrition, and population (3) food, climate, soil, and water (4) energy, natural resources, and environment (5) urbanization, transportation, and communications.

Dr. H. Guyford Stever, former Science Advisor to the President and Director of the National Science Foundation, was chairman of this task force.

Second, with funding from the National Science Foundation, the Coordinator's Office accepted a research proposal from a consortium of the Fund for Multinational Management Education, the Council of the Americas, the United States Council of the International Chamber of Commerce, and the George Washington University to undertake a project on "Transfer of Technology and the U.S. Private Sector." The project has involved approximately 200 American business firms in a series of meetings and workshops on the constraints and incentives in technology transfer to the LDCs. The final meeting took place on Mar. 14, 1978, and the findings and conclusions were released in a 4-volume study titled "Public Policy and Technology Transfer: Viewpoints of U.S. Business."

As a third activity, the Office of the Coordinator has sought to promote the conduct of policy research required to strengthen the base of analysis supporting U.S. preparatory activities for the Conference. In its final report, the Department of State's Ad Hoc Committee recommended priority research areas. In support of this, the National Science Foundation requested and received congressional approval for funding at the level of $1.2 million in fiscal year 1978 studies in support of State's efforts for the UNCSTD. Research offices in State, AID, the Patent Office, and in other Government agencies are supporting or conducting research which the Coordinator's Office will synthesize on behalf of forthcoming U.S. regional meetings on UNCSTD and other policy formulation efforts. It has been announced that the CIA is doing a study to help identify LDC expectations for the Conference and also the varying expectations of LDC countries which have achieved different levels of development. Studies underway, or completed by or for other agencies, address such topics as effects on domestic employment of exports of technology, identifying and coping with transfer mechanism innovations devised by developing countries (such as import controls and licensing), industrial processing trends in developing nations, overseas R and D activities of transnational companies, and the role of U.S. universities in U.S. S and T policies and programs. The Coordinator's Office has also identified other areas on which research is needed. Some of these areas include: information systems relevant to LDC development, evaluation of experiences of S and T institutional development in LDCs, and understanding constraints to application of S and T to development. Funds are not yet available to meet all of these desired research initiatives. The Coordinator's Office has also discussed possible projects with the Engineers Joint Council (on manpower training) and with the Aspen Institute (on agribusiness training).

As another activity, the Coordinator's Office has announced plans to sponsor a series of about 20 conferences and workshops throughout the country as a means for the nongovernmental community and the public to contribute to preparations for specific aspects of U.S. policy formation on UNCSTD. Managers of the meetings include the Office of Public Affairs of the State Department, the American Association for the Advancement of Science, the International Management and Development Institute (for business and the industrial community), the Department of Commerce, and the National Association of State Universities and Land-Grant Colleges. (See the Chronology section for information on meetings already held or scheduled.)

Role of the nongovernmental scientific community in the Conference

During an address made to the American Association for the Advancement of Science on Feb. 14, 1978, UNCSTD Secretary General da Costa publicly reiterated a theme which has caused concern among some members of the science and technology communities. He said that the obstacles to the application of science and technology to development tend to be political, social, institutional, or cultural rather than scientific or technological. Application of science and technology to development will be a focus of the forthcoming Conference, but economic, social, and political issues affecting applications constitute equally important agenda items for the Conference. The U.S. State Department and some developing country spokesmen have reiterated this theme, stressing that the major obstacles to the application of S and T in the LDCs are more political than scientific or technological. As a result, a feeling is prevalent among some scientists and technologists that important aspects of S and T will be neglected or inappropriately relegated to a secondary status in national papers.

Although the issue of the emphasis to be given to S and T has not been resolved, various accommodations have been made to give representation to scientists and technologists. A 4-day meeting was held in Geneva in November 1977 at Mr. da Costa's invitation to permit scientists to discuss provisional item #4 of the Conference, "science, technology, and the future." National papers apparently will not be required to deal with this topic, therefore it is being handled separately. Attendees at the November meeting recommended the structure and contents of an "experts" report on S and T, and the future which will be aimed at the decisionmakers attending the 1979 Conference. This report is intended to provide them with a basis from which to assess short-and long-term potential applications of S and T to development.

Several major international scientific meetings will precede UNCSTD. Three are being sponsored by or are affiliated with the U.N. Advisory Committee on the Application of Science and Technology to Development (ACAST). These are:

"Science and Technology for Solving Global Problems Facing Mankind," sponsored by the Soviet Academy of Sciences and ACAST, at Talling, in the Soviet Union, scheduled to have been held Jan. 8–12, 1979,

"Technology for Development," sponsored by the U.N. Department of Technical Cooperation and Development and ACAST, at Abidjan, Ivory Coast, Apr. 9–13, 1979; and

"Science and Technology in Development Planning," sponsored by El Colegio de Mexico, ACAST, and the U.N. Department of Technical Cooperation and Development, scheduled for Mexico City, May 28–June 1, 1979.

As another approach, the International Council of Scientific Unions (ICSU) announced plans to sponsor an international colloquim to help crystallize opinion and input from the scientific community to the UNCSTD. The ICSU meeting, with contributions expected from 16 other international organizations, was scheduled to be held in Singapore Jan. 21–28, 1979. 150 scientists were expected to attend.

The Pugwash Conference on Scientific Cooperation and World Affairs has taken a different approach, trying to identify ideas that can help promote application of S and T to development. A series of seminars held or planned throughout the world, have generated such suggestions as finding specific ways to promote application of S and T and utilization of worldwide laboratories to refine these ideas. The Pugwash Group has also been attempting to identify frutiful areas for collaborative research between scientists of developing and developed countries. In May 1978 the Pugwash group prepared and published an interim draft of "Guidelines for International Scientific Cooperation for Development." Covered are politically sensitive North/South issues such as resource sharing, technology transfer, and scientific cooperation. It seems obvious that scientist-members of this group feel comfortable in the political arena.

It is expected that the recommendations of these several more technically oriented meetings will be fed into a formal U.N.-sponsored colloquium to be held immediately before the UNCSTD. The technical meeting on "Science, Technology, and Society: Needs, Challenges, and Limitations" will be sponsored by the U.N. Advisory Committee on the Application of Science and Technology to Development (ACAST). It will be held in Vienna from August 13–17, just before the UNCSTD. It remains to be seen whether scientists' and technologists' demands for more representation at UNCSTD will be satisfied by these alternative sessions.

A group of approximately 50 American scientists and technologists have formed a nongovernmental group to advise and counsel policymakers on issues related to the Conference and related topics. The group, called the "Council on Science and Technology for Development," is chaired by Dr. Frederick Seitz, with funding supplied by private foundations. The Council has presented policy papers to the Department of State and the Office of Science and Technology Policy in the Executive Office of the President on such topics as objectives and strategy for the U.N. Conference; the proposed International Development Foundation; relations with middle income countries; priorities for policy research relating to science, technology, and development; and assessment of the corporate role in developing governmental policies for technology transfer and for developing science and technology infrastructure in developing countries.

CRS seminar on UNCSTD

An opportunity for an interchange between executive branch officials, representatives from industry, labor, and the scientific community, with present and former members of Congress, staff from all concerned committees and CRS, OTA, and GAO was provided at a CRS seminar on the 1979 United Nations Conference on Science and Technology for Development held in November 1977. The seminar dialogue reemphasized the necessity, for those responsible for planning for the Conference, to involve in advance of the meeting, all segments of the United States whose coopera-

tion is needed in order to assure that U.S. policy positions agreed on with respect to assistance to the LDCs may have an expectation of being translated into actions subsequently.

Senate hearings on UNCSTD

On Dec. 15, 1977, the Senate Committee on Commerce, Science, and Transportation/Subcommittee on Science, Technology, and Space held a full day of hearings on the UNCSTD. Chaired by Senator Adlai Stevenson III, the lead witnesses were Under Secretary Benson, Ambassador Hesburgh, and Ambassador Wilkowski, each of whom testified on the current status of U.S. preparatory efforts. Other witnesses included Dr. Seitz and Mr. Nichols of Rockfeller University; Mr. Benjamin Sharman representing a labor viewpoint from the International Association of Machinists and Aerospace Workers; Dr., William Carey, Executive Officer of the American Association for the Advancement of Science; Dr. Guyford Stever, Chairman of the Task Force on the National Paper; Dr. Harvey Averch, Assistant Director, Directorate for Scientific, Technological and International Affairs, National Science Foundation; Mr. Paxton Dunner, Chief Economist, U.S. Council, International Chamber of Commerce; Mr. Harvey Wallender, Vice President, Council of the Americas; Mr. Marcus Finnegan, Sr. Partner, Finnegan, Henderson, Farrabow and Garrett; Dr. Robert Stein from the International Institute for Environment and Development and Mr. William Ellis, Coordinator for Transnational Network for Appropriate/Alternative Technologies (TRANET).

In general, the hearings summed up the status of activity as of the end of 1977 on preparations for the Conference. Further, the testimony indicated the range of issues that has emerged during the past 2 years of preparatory activity.

Some of the issues discussed and raised at the hearings were as follows:

Is the United States obligated to respond to the demands for a New International Economic Order? To what extent should this country feel it has an obligation to respond to each of the specific demands raised in the Manila Declaration, especially to the controversial demand for a mandatory code of conduct for international technology transfer?

What is the best institutional response for any increased U.S. transfer to the LDCs? Should such assistance programs such as AID, assistance be on a bilateral or multilateral basis or both? If the former, can the U.S. effort be handled through existing assistance programs such as AID, or is there a need for a new agency? If the latter, what agency will play the lead role in coordinating an effort under the U.N auspices?

Should the major responsibility for the technology transfer be that of the private sector? The LDCs seem to feel that technology transferred by the private sector is superior to that by the public sector. Many LDCs wrongly assume that the developed countries' governments control all research and development within their borders, i.e., they can make it available at will. In fact, in many of the developed countries, such as the United States, the private sector owns most of the research and development.

Many sectors of American labor view the technology transfer that might result from the Conference as a threat to the U.S. technological position and its labor force, by enabling the LDCs to share our technology without allowing sufficient lead time to develop new technology, and by creating competitive job markets that will advesely affect U.S. labor.

What is "appropriate" or intermediate technology? Is small-scale, labor-intensive technology more suitable to the LDCs than large-scale, capital-intensive technology and should such intermediate technology be stressed in the U.S. Conference position and aid program?

Should the initial thrust of technology transfer to the LDCs be towards meeting such basic human needs as food, population control, housing and health care, or should it focus on the requisites for a scientific and technological infrastructure?

How many and which international assistance programs are currently in existence in the United States that might be restructured or broadened to meet the needs of increased U.S. assistance to the LDCs?

Legislation during the 95th Congress

A provision endorsing the United Nations Conference on Science and Technology for Development and emphasizing that the U.S. delegation should promote proposals for S and T cooperation between developing and developed nations passed the Senate on June 29, 1978, as sec. 420 of the Senate Foreign Relations Authorization Act, S. 3076. The proposal was considered as an amendment introduced by Sen. McGovern. The Senate bill was substituted for the House bill, H.R. 12598, which did not have similar language, but which authorized $945,000 for UNCSTD activities. The House and Senate versions were included in the conference report (H. Rept. 95-

1535). Both Houses agreed to the conference report, and the Act became public law (Public Law 95–426) on October. 7, 1978.

In related action, Chairman Olin E. Teague of the House Science and Technology Committee sent a letter to President Carter soliciting information regarding planning for the Conference and requesting review at the presidential level. The Assistant Secretary for Congressional Relations replied instead of the President. The response emphasized that the proposed Foundation for International Technological Cooperation would serve as a cornerstone for U.S. policies relating to the UNCSTD. When answering questions about attention at the highest levels in formulating U.S. policies for the meeting, the response referred to a forthcoming meeting between the President and State Department officials concerned with the Conference. It also referred to a mid-February 1978 interagency policy review, which is still unpublished (this presumably is PRM 33).

Also at his instigation, Sen. Charles Percy exchanged with Ambassador Wilkowski correspondence about the UNCSTD, as printed in the Congressional Record of July 11, 1978. In response to the Senator's questions, Ambassador Wilkowski described efforts being made in her office or by researchers affiliated with the Conference to meet the Senator's concerns for appropriate technology and for technology transfer. Ambassador Wilkowski also indicated that LDCs are not enthusiastically supportive of emphasizing appropriate technology in the Conference, as endorsed by the U.S. Congress. She reasoned "U.N. planners for the Conference are trying to exchew use of the term 'appropriate technology' in favor of 'choice of technology.' There is much sensitivity in some countries as to who says a technology is appropriate; also both high technology and low technology are considered appropriate, depending upon local circumstances in [a] developing country's economic and social goals." [Congressional Record, July 11, 1978]

The Congress took action on special funding for the Conference. The House Foreign Relations Authorization Act earmarked $945,000 for the UNCSTD for fiscal year 1979 (H. Rept. 95–1160:4). The House passed the bill on May 31, 1978, and the item was retained by the House and Senate conferees in the conference report on the Foreign Relations Authorization Act for fiscal year 1979 (H. Rept. 95–1535, sec. 103), signed as Public Law. 95–426. The House Appropriations Committee deleted the conference funding item from its appropriations bill for the State Department, saying that funds for planning for UNCSTD should come from amounts recommend for State Department "Salaries and Expenses" (H. Rept. 95–1253:9–10). According to an article in Science Magazine. "proponents of giving UNCSTD planning a priority see the action as a slight by State and the Office of Management and Budget in their not supporting the line item, as well as by the Committee. They fear that the UNCSTD item will lose out in the departmental competition for funds. Money for a series of scheduled meetings in coming months to involve U.S. industry and governmental organizations * * * are thought to be particularly vulnerable. In the Senate, an effort, led by Senator Adlai E. Stevenson * * * is being made to restore the line item at a reduced level of $785,000. Even if the line item does not survive in the final funding measure, the effort could raise the consciousness of State budgeteers about UNCSTD."

Current activity

(1) *Special Studies and Reports:* Results of the studies now underway on behalf of conference preparations bear close attention since they are intended to help focus discussions in workshops, seminars, and other preparatory activities now scheduled before the UNCSTD is held in Vienna in August 1979. These studies include the National Research Council report, the joint report of the project on Technology Transfer and the Private Sector, and the agency-sponsored studies being completed for the Office of the Coordinator of the UNCSTD. (These include several NSF-funded studies and a special interagency inventory of programs budgeted for the fisca! year 1980 in science and technology for developing countries which the UNCSTD Coordinator's Office wishes to use to better define the position the United States will put forward at the Conference.)

(2) *The Status of Required U.S. Reports:* The U.S. national paper went through several drafts, but was not finished in time to meet the original U.N. deadline of Aug. 1, 1978. It was originally anticipated that the national papers would be discussed at the "Third Prepcom," originally scheduled for Sept. 18–29, 1978. Delays in paper preparation caused a postponement of the meeting, which was rescheduled for Jan. 22–Feb. 2, 1979. The official U.S. paper was finished in time for this meeting. A "Fourth Prepcom" was held between between Apr. 23 and May 4, 1979.

Some spokesmen have attributed the delay in preparation of the U.S. National Paper to difficulties policymakers encounter in trying to reach consensus in writing "PRM 33," the Presidential Review Memorandum planned to enunciate U.S. policies responsive to the North/South dialogue and to other policy requirements in order to

develop a U.S. position for science, technology, and development. The PRM was scheduled to be finished in early summer. Apparently, the draft has not yet been agreed to by involved Federal agencies.

A combination of the delays in U.S. action and in the actions of other governments have caused some critics to question whether the intent of the Conference is being prejudiced. A report in the LUND letter of Science, Technology, and basic Human Needs notes:

" * * * [T]he draft plan of action, that the UNCSTED secretariat was to have ready for the third meeting, will thus be several months delayed (due to rescheduling of the 3rd "Prepcom). The hope of having the preparatory committee "open the doors" and make the pre-UNCSTED year a time of widespread and open international debate on the issues of science and technology for development has suffered a setback * * * [Furthermore] the 10,000 to 15,000 individuals involved in UNCSTED preparations in 150 countries have not been taken into confidence to hear the reasons for the delay is extremely unfortunate * * * in the dark. Participatory democracy in preparation is a basic resource to ensure the success of UNCSTED. [Letter No. 7, September 1978]

Proposed Institute for Scientific and Technological Cooperation: While he was in Caracas, Venezuela, in March 1978, President Carter made two proposals which undoubtedly will warrant additional attention. The first was to emphasize the importance of U.N. conferences, like the UNCSTD, in relation to U.S. policies for development of the LDCs. The second was to create a new Foundation for Technological Collaboration (now called the Institute for Scientific and Technological Cooperation), is still in the planning stage. Funding for the Foundation is included in the fiscal year 1980 budget, at the level of $25 million. The Foundation planning office anticipates that $80–90 million of additional funding will consist of funds transferred from the Agency for International Development. The proposal was presented to the Congress in an Administration bill as well as in the President's plans for reorganization of development-assistance activities. The House passed a modified version of the proposal on Apr. 10, 1979, as Title IV of H.R. 3324 (see Issue Brief 79033, Institute for Scientific and Technological Cooperation).

The U.S. national paper prepared for the UNCSTD included the Foundation among the major initiatives the United States would be able to introduce during the meeting. The U.S. paper describes the Foundation as follows:

"The primary purpose of the Foundation is to improve the availability and application of technology, and to expand knowlege and skills needed to meet these problems. The Foundation would work with all developing countries, including middle-tier countries, in collaborative programs for this purpose. It would address problems of mutual concern to the United States and the Third World including the still unmet pressing needs of nutrition, health, and education and the major global problems of energy, natural resources development, and environmental protection. The Foundation would be specifically structured to have developing country experts participate at all levels of the Foundation's planning, programming, and evaluation to ensure a truly collaborative method of operation."

Among the specific activities planned for the Institute are:

Capacity building to aid LDCs develop an ability to generate, adapt, utilize, and diffuse technologies as needed for their development goals,

Cooperative research and development with LDCs,

Fostering linkages between the scientific and technological communities of the Third World and those of the United States for joint research and problem solving,

More harmonious planning of U.S. developmental programs,

Strengthening capabilities of U.S. scientific and technical institutions to work more productively with developing nations, and

Involving the private sector in meeting Government objectives.

It is also acknowledged that the proposal constitutes an important new facet of U.S. foreign assistance efforts and signifies that U.S. scientific and technological strength can contribute to development and to an improved international posture. According to some observers, concerted action to institutionalize such an agency would serve also to increase opportunites to act upon recommendations made during the UNCSTD.

(4) *Congressional Action on ISTC:* On Feb. 13, 14, and 15, 1979, the House Committee on Science and Technology and on Foreign Affairs held a joint seminar with private sector experts and executive branch officials on the topic of preparations for the United Nations Conference on Science and Technology for Development (UNCSTD). The proposal to create the Institute was discussed by several witnesses, but especially by Dr. Ralph Smuckler, chairman of the Development Coordination Committee. A major policy initiative, according to current planning documents, of the United States at the forthcoming UNCSTD meeting is creation of the Institute.

Congressional hearings on the Administration bill to create an Institute for Scientific and Technological Cooperation and on the congressional versions of the bill introduced by Sen. Stevenson and Rep. Brown, were held by the House Committee on Foreign Affairs on Mar. 29 as H.R. 3324. H.R. 3324 was passed on Apr. 10, 1979.

Hearings were held on Apr. 24, on S. 499 (the Stevenson bill which was referred to the Governmental Affairs Committee) by the Subcommittee on Energy, Nuclear Proliferation, and Federal Services of the Senate Committee on Governmental Affairs. The Administration bill (S. 588), as amended, was reported favorably to the Senate by the Foreign Relations Committee on May 11, but referred to the Governmental Affairs Committee with an order to report no later than June 4, 1979. S. 588 was reported favorably, with minor amendments, on May 29, 1979 (S. Rept. 96-196).

During Senate debate on the bill, the Senate adopted an amendment introduced by Sen. DeConcini to eliminate Title II, creating the Institute. His objections and those of colleagues endorsing his amendment centered on duplication with the Agency for International Development, avoiding needless federal foreign assistance expenditures in an effort to comply with stringency in federal budgeting, and the need to overcome administrative problems in A.I.D. before transferring some of its personnel and funding to a new agency. The amendment was adopted as a roll-call vote of 58-42. The Senate substituted its amended version of S. 588 for the House-passed bill, H.R. 3324. Conferees were named.

(5) *Other Activities:* As noted above, congressional action to the meeting, in the form of legislation endorsing the objectives of the Conference and authorizing funding, has been passed. It is possible that legislation could be introduced in the 96th Congress to help clarify the roles of the several Federal agencies involved in the meeting. Oversight of executive branch conference activities is occurring in the form of a GAO study of the emphasis to be given in U.S. conference planning and policy formation to "light capital technology." Some observers also believe that congressional action may be necessary to help focus the thrust of U.S. policies for the meeting and to help resolve some of the major policy differences being faced as policymakers attempt to develop coherent strategies for science, technology, and development programs and policies. These problems include: definition of the appropriate balance between the roles of the private and public sectors in policy for the Conference, and enunciation of strategies appropriate to cope with divergent views regarding how development might better be promoted i.e., by using science and technology to meet basic human needs (infrastructure development) or by promoting the growth of private sector technological capability in the LDCs (with private industry playing a dominant role). Congressional attention to these issues may help to ensure that the UNCSTD does more to promote development of the LDCs than previous U.N. science and technology conferences.

The Congress may also wish to follow the outcome of the U.N. Conference on Technical Cooperation Among Developing Countries (TCDC) meeting from Aug. 30 to Sept. 12, 1978, in Buenos Aires. Aimed at promoting international technical cooperation, the Conference was organized by the LDCs. However, the United States was also represented.

Apparently after difficulty in reaching consensus, conference participants did agree on a plan of action for activities at national and international levels. However, all actions agreed to are to be done on a voluntary basis, probably minimizing chances for adoption. However, the conference finding that subsequent TCDC meetings should involve high political level planning ministers, may bode well for the future and give the issue more political visibility and attention.

LEGISLATION

Public Law 95-105 (H.R. 6689)

The Foreign Relations Authorization Appropriations Act for the Fiscal year 1978 was signed by the President on Aug. 17, 1977. Sec. 507 requires that the President insure that emphasis be given to light capital technology in defining the U.S. position for the U.N. Conference on Science and Technology for Development. Mr. Clarence Long was the original sponsor of this section. The full bill was introduced on Apr. 27, 1977. The House Committee on International Relations reported the bill on April 29. House passage, with amendments, followed on May 4. A Senate measure, amended, was passed on June 16, 1977. Conference reports were issued on July 28 in the Senate and on August 3 in the House. The bill was singed by the President on Aug. 17, 1977.

Public Law 95-426 (H.R. 12598)

The House Foreign Relations Authorization Act for the Fiscal year 1979 was introduced on May 8, 1978. Section 105 earmarked funding of $945,000 for the State Department in connection with preparatory conferences, seminars, and other activi-

ties for the United Nations Conference on Science and Technology for Development. The bill was reported from the Committee on International Relations, amended, on May 15, 1978 (H. Rept. 95–1160). The measure passed in the House, amended, by roll-call vote on May 31, 1978, and was referred to the Senate Committee on Foreign Relations on June 5, 1978. The measure was passed in the Senate on June 28 after the Senate amended it by substituting its bill, S. 3076. S. 3076 did not contain provisions to earmark funds for the Conference; it does contain specific provisions endorsing the U.N. Conference on Science and Technology for Development [see below]. House conferees were named on July 10, 1978. A conference committee meeting was held, resulting in issuance of conference report (H. Rept. 95–1535). Provisions relating to the UNCSTD are included in section 103. The conference committee version incorporates both the earmarking or $945,000 (including funds for preparatory conferences and seminars) contained in the House version and the findings and policy statement endorsing the UNCSTD, as contained in the Senate amendment (original bill S. 3076). The conference report was filed in the House on Sept. 6, 1978, and agreed to on a roll-call vote on September 19. The Senate agreed to the conference report on September 20. The Act became public law on Oct. 7, 1978 (Public Law 95–426).

Public Law 95–431 (H.R. 12934)

The bill appropriating funds for the State Department and other agencies was introduced on June 1, 1978, and reported from the Committee on Appropriations on the same day (H. Rept. 95–1253). The bill did not contain any special fundings for the U.N. Conference on Science and Technology for Development. In the words of the report, the Committee said it endorsed participation in the Conference, but expected funding for preparations and for emphasis to be given to light capital technology (purusant to sec. 507 of the Foreign Relations Authorization Act for '78) to come from the normal amount recommended for salaries and expenses. The measure passed the House by roll call vote on June 14 and was referred to the Senate Committee on Appropriations on June 19, 1978. The Senate Appropriations Committee approved H.R. 12934, with amendments, on July 26, 1978 (S. Rept. 95–1043). The Senate passed the bill, amended, on August 7. All amended versions of the bill were reported by the Conference Committee (H. Rept. 95–1565) as agreed to by the Senate on Sept. 30, 1978, and by the House on Sept. 29, 1978. The President signed the bill into law (Public 95–431) on Oct. 10, 1978.

S. 3076 (Sparkman)

Section 420 of the Senate Foreign Relations Authorization Act for the fiscal year 1979 is a provision endorsing the U.N. Conference on Science and Technology for Development and emphasizing that the U.S. delegation should promote proposals for S and T cooperation between developing and developed nations. The proposal had been introduced by Sen. McGovern as an amendment on the floor. The amended bill was considered in the Senate and substituted for the House bill, H.R. 12598. After amendment in the nature of a substitute, the House bill was passed in lieu of S. 3076 on June 28, 1978. The bill had been reported from the Committee on Foreign Relations on May 15, 1978 (S. Rept. 95–842). House conferees were named on July 10, 1978; Senate conferees were named on June 28, 1978. The House and Senate conferees reported a compromise version on September 9 (see Public Law 95–426, H.R. 12598, above).

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CHRONOLOGY OF EVENTS

April 23, 1979 to March 4, 1979—The "Fourth Prepcom," or fourth meeting preparatory to the Vienna UNCSTD meeting, was held at the United Nations in New York City.

April 10, 1979—The House passed legislation creating an Institute for Scientific and Technological Cooperation to become part of the proposed International Development Cooperation Agency, as proposed in President Carter's plans for reorganizing federal development assistance efforts. The Senate has not yet acted on this legislation nor on a similar proposal, which Senator Adlai Stevenson and Representative George Brown, Jr. introduced to create a far more independent agency.

February 13, 1979 to February 15, 1979— The House Committee on Science and Technology and the House Committee on International Relations held a 3-day seminar to acquaint Members of Congress with the issues to be discussed at UNCSTD and to review the Administration's preparations and policies for the Conference.

February 12, 1979—Announcement by the Coordinator's Office of a program of workshops in support of the UNCSTD, with the aim of eliciting information to determine U.S. positions for the Conference and to stimulate a dialogue on conference issues with various sectors of the American community. Four meetings will be cosponsored by the American Association for the Advancement of Science and will be held in Washington: (1) the Role of Women in Science and Technology for Development, Mar. 29–30, (2) Building National Institutions for Science and Technology in Developing Countries, Apr. 18–19, (3) Issues for Labor in Science and Technology for Development, Apr. 26–27, and (4) Science and Technology and Professional Groups: Building Linkages with Developing Countries, May 7–8. An additional workshop, cosponsored by the American Association of Land-Grant Colleges and State Universities, to be held in April, will involve 11 Black Colleges of the South in examing "The Experience of the Black Colleges of the South—A Resource for Development."

January 22, 1979 to February 2, 1979 The "Third Prepcom," or third meeting preparatory to the Vienna UNCSTD meeting, was held at the United Nations in New York City. Delegates to the meeting reviewed a "Preliminary Draft Programme of Action," for the Conference, which was submitted by the Secretary-general. This paper was presented as ". . . a theoretical and conceptual framework and recommendations for concrete measures for action at the national, subregional, regional, interregional and internatonal levels, covering the items of the agenda of the Conference and, in particular, the development, adaptation, application and transfer of science and technology for development of developing countries, in order to facilitate negotiation and achievement of maximum possible agreement on substantive issues, prior to the Conference." Delegates also debated recommendations for action contained in national (review) papers, and assessed the work of the Panel of Experts on Agenda item 4, "Science and the Future." The Fourth "Prepcom" meeting is scheduled tentatively for May 1979. It is planned to adopt a final version of a conference "Programmee of Action," prior to the convocation of the UNCSTD, scheduled for Aug. 20–31, 1979 in Vienna. It is hoped that adoption of a firm agenda before the UNCSTD will facilitate negotiations at the Conference.

January 20, 1979—Release of the fiscal year 1980 budget, which included funding at the level of $25 million for creation of the Foundation for International Technological Cooperation, probably a major programmatic initiative of the United States in connection with the forthcoming UNCSTD. Documents released by the planning office for the Foundation indicate that additional initial funding will consist of $80–90 million planned to be transferred from the Agency for International Development. The agency is now proposed to be called the Institute for Scientific and Technological Cooperation.

December 6, 1978—Fifth meeting of Ambassador Hesburgh's Steering Committee, officially called for the United States Steering Committee concerned with U.S. Preparations for the Conference. The meeting as was held to discuss especially the issues of the North-South dialogue as related to science and technology for development, and planning for the Foundation for International Technololgical Cooperation.

November 6, 1978 to November 17, 1978—A series of four workshops, managed by the International Management and Development Institute, were held to involve corporate leaders from the U.S. business community and representatives from the developing countries. Meeting for two days regionally, in New York, Chicago, Los Angeles, and Atlanta, leaders discussed issues likely to emerge at UNCSTD and which affect the operations of American business in dealing with developing countries. The workshops were held on behalf of the UNCSTD Coordinator's Office at the State Department. A final report was published, "Science, Technology, and Development," January 1979. The report stressed that the meetings underscored the positive contributions that private enterprise can make to development (not the negative aspects such as that of MNC operations.) It underscored that private industry has a right to expect a return on investment or resources. Major recommendations consisted primarily of promoting technology transfer by using the skills and experiences of American businessmen to hasten the development of LDC managerial and technical manpower skills.

October 16, 1978 to October 17, 1978—Convocation of a workshop on "The Technological Knowledge Base for Industrializing Countries," co-sponsored by the National Bureau of Standards and AID. The workshop was structured to examine measurement capabilities, standards, quality control, and other knowledge required for developing commercial industrial technology.

September 7, 1978—Announcement by the Coordinator's Office of a series of workshops in support of the UNCSTD by several professional groups to elicit information about U.S. positions at the UNCSTD and to stimulate a dialogue on Conference issues with various sectors of the American community. Workshops include: Four workshops to be held between March and May 1979 cosponsored by the American Association for the Advancement of Science on: (1) issues for organized labor in utilization of science and technology for development; (2) the role of women in science and technology for development; (3) scientific and engineering professional societies: the role in building developing country linkages; and (4) building development country institutions and indigenous capacities in science and technology. One workshop to be co-sponsored by the American Association of Land-Grant Colleges and State Universities, to be held in Washington to examine "The Experience of the Black Colleges of the South—A Resources for Development."

August 30, 1978 to September 12, 1978—Meeting in Buenos Aires of the U.N. Conference on Technical Cooperation Among Developing Countries (UN-TCDC). The Conference is intended to promote cooperation and coordination among less developed countries in the fields of technology and development. The United States was represented at the meeting.

August 1, 1978—Deadline for submission of the final versions of national papers. The United States had prepared several drafts of its national papers by this date. No version was found acceptable to U.S. policymakers causing the State Department to redraft the paper.

June 21, 1978—Third meeting of Ambassador Hesburgh's Steering Committee on U.S. preparations for the UNCSTD, held at the Department of State.

June 1, 1978 to September 1, 1978—Scheduled meetings of the regional Economic Commissions (ECE, ECA, ECLA, ECWA, ESCAP) to review national paper drafts and to prepare regional papers. Regional papers will be due in the fall of 1978. It is intended that they will deal with policies and plans of actions to deal with problems at a regional level and will be submitted during the third prepcom.

May 1, 1978 to September 1, 1978—It was expected that Secretary-General da Costa of the UNCSTD would draft a Program of Action for the Conference based on proposals made in national and regional papers. The Program of Action would incorporate information about the S and T development activities of the U.N. and other international bodies. The draft program and report were to be presented to the Preparatory Committee for UNCSTD at its third prepcom scheduled for Sept. 18-29, 1978. The prepcom has had to be rescheduled because many countries, including the United States, have not met the deadline for submission of national papers.

May 1, 1978—Deadlines for each participating country to submit a draft of its national paper to the UNCSTD Secretariat. The national paper should identify each country's goals, policies, and capabilities or needs in relation to science and technology for development.

April 28, 1978—Release of National Research Council report on U.S. Science and Technology for Development: A Contribution to the 1979 U.N. Conference, commissioned by the Office of the Coordinator UNCSTD, Department of State.

Conclusion by the State Department of agreements with several nongovernment organizations, including the American Association for the Advancement of Sci-

ence and the International Management Development Institute, to manage conferences and workshops to elicit nongovernment views and to encourage nongovernment participation in the U.N. Conference on Science and Technology for Development.

March 29, 1978—Speech by President Carter before the Venezuelan Congress in Caracas, Venezuela, emphasizing the need for a new U.S. Foundation for Technological Collaboration between the United States and developing countries, and reiterating the importance to U.S. S and T cooperation of U.N. conferences.

February 27, 1978—Establishment of the Interagency Policy Group and Interagency Study Groups on U.S. preparations for UNCSTD and assignment to prepare surveys to inventory: (1) current Federal activities relating to S and T for development and (2) exisiting activities relating to international cooperation in science and technology. The interagency work also involves conduct of a preliminary appraisal of the recommendations in the NRC report (Report of a Study on U.S. Development). The Under Secretary of State, Lucy Benson, authorized establishment of the groups.

February 16, 1978—National Security Council directive for a Presidential review (memorandum) which, among other things would provide policy guidance for the U.S. position at the U.N. Conference on Science and Technology for Development, for completion and discussion by June 1, 1978.

February 15, 1978—First UNCSTD inter-agency briefing session by Office of the Coordinator of UNCSTD, Department of State. Selected congressional staff members were invited, in addition to selected agency officials.

February 7, 1978—Awards announced by NSF for special research projects in preparation for the UNCSTD.

January 23, 1978 to February 3, 1978—The Second Session of the Preparatory Committee for UNCSTD met and selected five development problems to be the focus of attention at the Conference. The Committee agreed on the preparation of the Program of Action by the UNCSTD Secretary-General, adopted provisional rules of procedure for UNCSTD, and adopted a provisional agenda for the third session of the Preparatory Committee.

January 1, 1978—Initiation of publication of "Update." Issued by the United Nations Centre for Economic and Social Information [dealing with] the Conference on Science and Technology for Development. Contains information on U.N. meetings, conferences, seminars, documentation, and other aspects of official U.N. preparations for the Conference.

December 15, 1977—Senate Committee on Commerce, Science, and Transportation/ Subcommittee on Science, Technology, and Space held hearings on the U.N. Conference on Science and Technology for Development.

The U.N. General Assembly voted to accept Austria's offer to host UNCSTD. Mexico, the Philippines, and the United States had also offered to host the meeting.

November 21, 1977 to November 25, 1977—Meeting of the Special Panel of Experts on the UNCSTD Agenda Item Four, on "Science and the Future." The panel, created by UNCSTD Secretary-General da Costa, will recommend the framework for discussing the subject.

November 9, 1977—Congressional Research Service held a siminar on the 1979 United Nations Conference on Science and Technology for Development. Participating in the interchange were Ambassador Wilkowski and other State Department representatives; spokesmen from industry, labor, and the scientific community; present and former members of Congress; staff from all concerned committees; and representatives from CRS, OTA, and GAO.

November 7, 1977 to November 18, 1977—Meeting of the U.N. Advisory Committee on the Application of Science and Technology to Development (ACAST) to prepare recommendations for UNCSTD. [ACAST is composed of experts in the field of S and T—as differentiated from the Committee on Science and Technology for Development (CSTD), which is composed of representatives from member States of the United Nations.]

October 7, 1977—Ambassador Rev. Theodore Hesburgh sworn in as Chairman of the U.S. delegation to the 1979 Conference.

October 1977 to December 1977—Meetings of the U.N. Regional Economic Commissions. Participants included countries within each region and interested U.N. organizations. Using suggestions made by member countries, each commission proposed five topics to be included in UNCSTD's agenda. The proposals were approved by the Preparatory Committee of UNCSTD at its January 1978 meeting. [The U.N. Committee on Science and Technology for Development (CSTD) functions as a U.N. Preparatory Committee for the UNCSTD. While CSTD has only 51

members, all U.N. member states are allowed to participate when it functions as the Preparatory Committee for UNCSTD.]

August 17, 1977—Enactment of Foreign Relations Authorization Act for FY1978 (Public Law 95-105, 91 Stat. 844. Section 507) dealing with the United Nations Conference on Science and Technology for Development, which stated in part, "The President shall take appropriate steps to ensure that, at all stages of the United Nations Conference on Science and Technology for Development, representatives of the United States place important emphasis, in both official statements and informal discussions, on the development and use of light capital technologies in agriculture, in industry, and in the production and conservation of energy." (Principal sponsor of the section was Mr. Clarence Long.)

July 12, 1977—Ambassador Jean Wilkowski was sworn is as Coordinator of U.S. Preparations for the U.N. Conference on Science and Technology for Development.

July 12, 1977—Initiation of publication of "The Lund Letter on Science, Technology and Basic Human Needs: Notes on Preparations for the 1979 United Nations Conference on Science and Technology for Development," by the Research Policy Program, University of Lund, Sweden. Intended, in part, to provide for representation of a wider range of views than presumably could be heard in official U.N. forums. Also intended to serve as a communications network, especially for alternative views, on the Conference.

November 16, 1976—Secretary of State Kissinger hosted a National Meeting on Science and Technology for Development to elicit attitudes and ideas from U.S. business, academia, and labor on a National Conference on Science and Technology for Development.

May 6, 1976—At the United Nations Conference on Trade and Development (UNCTAD IV) meeting at Nairobi, Secretary of State Kissinger offered a series of U.S. proposals as a response to the demands for an NIEO, and announced that the United States would hold a national meeting to discuss plans for a National Conference on Science and Technology for Development.

September 1, 1975—Secretary of State Kissinger announced full U.S. support for the U.N. Conference on Science and Technology for development in a speech to the U.N General Assembly.

September 1975—At its Seventh Special Session, the U.N. General Assembly decided to hold a conference on science and technology for development in late 1978 or 1979.

September 10, 1974—The Arab Oil Embargo commenced. The developed countries became aware of the potential power of the Third World, when unified.

May 1, 1974—The "Group of 77" presented a summation of their demands for a New Economic Order (also referred to as New International Economic Order (NIEO)) at the Sixth Special Session of the U.N. General Assembly.

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CENTER OF CONCERN,
FOCUS: TOWARD A WORLD THAT IS HUMAN,
Washington, D.C., April 23, 1979.

UNCSTD Memorandum No. 6.
From Jane Blewett, Jim Gudaitis and Pete Henriot.
Re Review of US National Paper.

INTRODUCTION

As the UN Conference on Science and Technology for Development (UNCSTD) approaches (August 20–31 in Vienna), the National Papers requested from all participating member nations of the United Nations in preparation for the Conference become more important. This is particularly true of the United States' National Paper, since this country plays such a central role in the global development discussion. The Center of Concern, as one among many NGO groups focusing attention on UNCSTD, has already laid out its own theoretical approach to the value/social justice issues related to science, technology, and development considerations. (See UNCSTD Memorandum No. 4, December, 1978.) In the present Memorandum, the Center applies its value criterion to the National Paper of the United States. This is not an attempt at a detailed analysis of the National Paper, but rather an effort to highlight the key points which are to be affirmed as well as the areas where we feel the US has either not responded adequately or has neglected to respond at all. The Memorandum is the outcome of our own analysis, the evaluation of other groups, and the reflections of a number of Washington-based NGOs gathered by the Center on March 1. It is offered as an additional step in the on-going discussion of US policy for UNCSTD.

Before beginning our comments, it is important to clarify the following:

The official UN Guidelines for the National Papers did not request or require that all issues relating to science and technology for development be addressed, but limited the scope to the three major Conference agenda items, namely (1) the role of science and technology in the development effort, (2) institutional arrangements and international cooperation in the application of science and technology, and (3) the role of the United Nations and other international organizations.

The National Paper is not intended to be the official US policy position for UNCSTD: it is presented as a working paper to be used as input for developing the UNCSTD Draft Plan of Action.

It is important to recognize that the US government itself is by no means involved in all the activities relating to science and technology—major segments of these activities are completely in the hands of the private sector.

THE U.S. VIEW OF THE PROBLEM

The United States has made it very clear at the outset of its National Paper that it regards the UN Conference to be of the utmost importance because of the focus on the areas of science and technology as they relate to development. How can the forces of technology be harnessed to advance the elimination of poverty in the world, to meet the basic human needs of over one billion people living in conditions of absolute poverty? The US also declares the benefits of technology to be the "common patrimony" of the human family, meant for the well being of all nations.

There is recognition of the interdependent relationship of many global issues at this point in human history, along with a call for the joint efforts of industrialized and developing nations in the common project of conquering disease and providing adequate food and energy for all. Science and technology are seen as useful instruments in this task, but are not presented as panaceas for all the world's ills. Nor does the US view its own role as primary or superior to the perceived concerns and chosen priorities of the developing world. If science and technology are to play

increased roles in the Third World, the need for expanded and strengthened national institutions and personnel resources is evident. All of these views of the National Paper are to be commended.

It is clear, however, that the authors of the National Paper think of "for development" in the Conference title to apply only to the Third World. There seems to be a basic assumption that the flow is from the United States out, toward the less developed nations, with little or no opening for any reciprocal movement. This may be understandable from the point of view of capital resources and sophisticated technical know-how concentrated in the US. Yet one wonders if there can be any reality to "joint efforts" to solve global problems without a clearer recognition by the US that its own "developed scene leaves much to be desired and that the Third World may well have resources that can be tapped to create a more integrated, human and humane development process for all. A tone of looking for and openness to Third World insights which might expand the definition of development is completely lacking.

Moreover, the US Paper never indicates that something more fundamental than "addressing problems" is being called for by the Third World in their repeated demands in preparation not only for this Conference but for all others since the 1974 UN Sixth Special Session. These are the demands, of course, for the creation of the structures of a New International Economic Order (NIEO). Mention is made of the "masses of underemployed, unemployed and idle" as the "world's latent economic potential," but no linkage is made relating these "masses" to the global structures within which 80 percent of the world's trade and investment, 93 percent of its industry and almost 100 percent of its research is controlled by the industrial rich who are only 30 percent of the world's people. (These figures were cited, for instance, by Tanzanian President Julius Nyerere in his February opening address before the Group of 77, gathered in Arusha, Tanzania, to prepare for UNCTAD V.)

Again, the US government proceeds as if the global problematique can be addressed in piecemeal fashion rather than by situating UNCSTD issues within the larger context of systemic socio-economic structures. To take a more holistic appoach means that trade, the international monetary system, debt relief, global decision-making apparatus, etc., are all integral to the UNCSTD discussions. While it is true that UNCSTD cannot take up all the issues treated at all the other Conferences, it is disappointing that the US National Paper does not make more explicit in its framework the structural linkage of these issues.

DEVELOPMENT AND THE U.S. EXPERIENCE

To track the evolution of the development of science and technology in the US, the National Paper does a brief overview from 1776 to current times. The story is truly impressive as one event after another is touched upon to highlight the unfolding of what has become the preeminent role of the US scientific community and the miracle of modern US technology.

Yet what the review fails to include, however, is any indication of the costs—social as well as economic—incurred in the pursuit of these advances. Indeed, one should be expected to speak more cautiously today when so-called "advances" are measured against the ever-rising level of pollution, of resource waste and misuse, of ecological damage, of traffic congestion, blackouts and damages to worker's health and safety, not to mention the price society at-large pays in increased alcoholism, anomie, alienation, loneliness, drug abuse and divorce rates. It is inaccurate, of course, to pin all these ills on the development of high technology in the US. But surely there are costs, heavy costs, and it is inaccurate if not misleading not to have them pointed out explicity in the National Paper.

Nor is any recognition given to the serious questions being raised on many sides today of that particular kind of technology—being developed especially in the US—which is more and more capital intensive, eliminating the need for human labor. What justification is there for increasingly sophisticated technology when more and more people experience themselves as superfluous and insignificant? One would have hoped for some expression of concern in the National Paper with regard to this development of technology, and even more, for some initial statement of specific domestic development goals for this country. Nowhere are these to be found. Lack of attention to this point reveals not so much the failing of the Paper's authors as the absence of any coherent national science and technology policy articulated by the US government.

The interplay of the public and private sectors in the US experience of its own growth and development is made clear in the Paper and their separate roles contributing to the creation and expansion of US scientific and technological know-how are described at some length. In this Memorandum we will look at these two

sectors in reverse order from the way they are presented in the Paper, i.e., we will treat the Public Sector first.

THE PUBLIC SECTOR

Under the heading of the Public Sector, the National Paper does a sophisticated critical review of the past thirty years of US development assistance. In an honest and straightforward fashion, it describes the model pursued and its impact on the Third World. Achievements are recognized, but shortcomings and failures are not ignored. The "trickle down" strategy, both in broad development terms and more specifically in the area of science and technology, is identified as having led "in many developing countries, to even more dualistic societies where the benefits that accrued to one sector did not automatically improve the conditions of the majority of people or other sectors of the economy." The assumption that the industrialized countries could be role-models for the developing nations is acknowledged for the error that it is.

It is highly commendable to read in an official government document an admission of ineffective directions and policies employed in the past with the intention of shifting models for the future. This kind of thoughtful reflection on historical mistakes demonstrates why new initiatives are needed and should be helpful to policy-makers in this country. It will surely be welcomed by many Third World leaders. The latter will also note with appreciation a recognition in the US Paper of the growing phenomenon of expanded technological cooperation among developing countries themselves. (See, for example, our UNCSTD Memorandum #3, November, 1978, on the "TCDC" concept of technological cooperation among developing countries.)

However, in describing new directions and unfolding initiatives, the US Paper continues to talk in terms of "research institutes, scientific knowledge, trained personnel" with little or no emphasis on the kind of unskilled, grassroots involvement that still remains beyond the formal structures and institutions but which is indispensable for improving the lot of the vast majority in most low-income countries. The "survival mechanisms" and adaptive techniques and technology employed among the rural population need to be studied for their significant contribution to the lives of the rural poor. These can be improved or adjusted with on-going consultation and consent by the local people. This kind of sensitivity to the genius of creation which has emerged among people who have minimal resources is not apparent in the language of the US Paper. This is understandable when one considers the resource base out of which most US scientific and technological know-how has developed. But it points to an important area in need of further exploration if science and technology are really to be "for development" in its most human sense.

THE PRIVATE SECTOR

In contrast to the frankness and recognition of past mistakes outlined in the Public Sector paragraphs of the National Paper, the Private Sector review has a much more guarded and protective tone. What becomes apparent immediately is a kind of "double standard" applied when describing the role of US government toward private enterprise as it has and continues to operate in this country versus its involvement in the latter's operations overseas. On the one hand, historically within this country—despite constant language that speaks of the "free market"—the government has entered aggressively into the marketplace to protect the common good. The Paper indicates four areas wherein this has occurred: (1) anti-trust regulations; (2) health, safety and environment standards; (3) production incentives and disincentives; and (4) patent laws, copyright regulations, etc.

This kind of protect of the common good is seen as a proper role for government to play vis-a-vis the business community in this country, hand-in-hand with a series of Federal and State policies that facilitate business operations. But when reviewing the role of government toward business in the latter's overseas operations, the National Paper hints at no such protective role. In fact, a "code of conduct" to regulate and control the activities of private business enterprise abroad—something long sought after by Third World nations and a basic point in the call for a new international economic order—is not even mentioned, much less supported.

Instead, the National Paper only highlights mechanisms to ease and expand US business in the Third World, e.g., the Overseas Private Investment Corporation (OPIC) and the Export-Import Bank. None of the critically honest review which characterized the Public Sector remarks is made of the impact of multinational corporation (MNCs) in Third World countries. This glaring omission cannot help but confirm the suspicion of many from the developing nations who feel themselves victims of, not partners in, the global development process. One can only question

why this Private Sector discussion of the National Paper differs so markedly from the other sections.

INTERNATIONAL INSTITUTIONAL ARRANGEMENTS

The National Paper allots only minimal space to a discussion of global institutional arrangements. Yet it is to be commended for supporting a greater thrust toward more horizontal networking internationally among both public and private institutions, instead of the traditional vertical patterns of the past. Similarly, it rejects institutional models that can supposedly be applied to all regions of the world without differentiation. Instead, there is support for organizations that are pluralistic in their approaches, adapting to differing geographies and needs.

In addressing the United Nations as institution, the Paper rightly points up organizational inadequacies—particularly in the UN's inability to evaluate, direct and monitor its own scientific and technological activities. This is due in part to the many bodies and specialized agencies within the UN through whose channels these kinds of projects flow. There is little sympathy, however, on the part of the US for the creation of any new, separate division or body of the UN for centralizing science and technology. Rather, the call is for more effective managerial control and accountability in the existing set-up.

It is important to recognize that this resistances on the part of the US to the creation of new entities within the UN, played out in many recent UN arenas, is not shared by spokespersons from the Third World. These would argue persuasively that power and control in several of the present UN units continue to reside in the hands of the industrialized North. Unless there are new structures, new mechanisms, to break prevailing patterns of decision-making, representation, voting, etc., the nations of the South cannot hope to assume their rightful positions in a body of sovereign nations states.

It is much the same issue as the South's call for new global economic structures to reflect the new realities of the world community, i.e., over 150 independent nations, two-thirds of whom have emerged in the last 30 years, having to operate within systems created for very different times by a handfull of leaders from the rich North. Just as the US government has not yet faced head-on the possibilities—as well as the problems—of the NIEO, so too in this National Paper, it gives little attention to the over-all structural context within which the Third World nations must operate vis-a-vis their scientific and technological needs as well as all other issues.

What is particularly striking in light of US disenchantment with new UN units is the government's own intention to create a new US organization—the Institute for Scientific and Technological Cooperation (ISTC) with an initial proposed budget of 25 million for fiscal year 1980 and 40 million for fiscal year 1981—to improve the effectiveness of US technological relationships with the developing countries. This new Institute is presented as a major response from the US to the whole UNCSTD process. Surely some of the same sort of questions should be raised about it as the US raises about the UN. Why set up a new institute when the Agency for International Development (AID) already exists through whose channels improved availability and application of technology to Third World issues could be directed? What guarantee is there that a new million-dollar-plus institution located in the rich North, under the control of US leadership and finances, can ever truly be oriented first and foremost to the concerns of the developing world?

The ISTC has not yet been approved by the US Congress (and perhaps never will be). Yet even to see it being put forward as the major US initiative raises serious questions about much of the direction in other parts of the National Paper. Talk about self-reliant development, "TCDC", priorities being established by recipient countries themselves, technology appropriate to the lived reality of the world's poor—it is not clear how these points are to be reconciled with the philosophy and style of operation of the ISTC.

CONCLUSION

The US National Paper, long-awaited and written after a protracted and tedious process within the US State Department, contains many good points and directions. In fact, in light of the many forces involved in its production, it is better than expected. It does demonstrate, however, a lack of consensus within the Government itself on a general science and technology policy. Such a lack of consensus is evident both in the Paper's failure to reflect a critical evaluation of domestic science and technology development and in its inability to come to grips with the issues raised in the Private Sector—specifically, the issue of the role of multinational corpora-

tions. Furthermore, the Paper falls short in situationg the UNCSTD debate within the wider debate on restructuring the international economic order.

In this Memorandum, the Center of Concern has endeavored to point to the many positive features of the US National Paper, while still taking into account those features we consider to be either negative or simply missing. As a strong hint of formal US policy for the Vienna meeting of UNCSTD in August, the Paper is important. We will be following more closely the evaluation of the US policy and welcome reactions and suggestions relevant to the value/social justice directions contained in this Memorandum.

CENTER OF CONCERN,
FOCUS: TOWARD A WORLD THAT IS HUMAN
Washington, D.C., June 5, 1979.

UNCSTD Memorandum No. 7.
From James Gudaitis.
Re Review, Reservations, and Recommendations on The Institute for Scientific and Technological Cooperation.

INTRODUCTION

In an address in Venezuela in March, 1978, President Carter announced that the United States intended to establish a new organization to improve its technological collaboration with the less developed countries (LDCs) of the Third World. On May 11, 1979, U.S. Ambassador to the United Nations, Andrew Young, in his statement at UNCTAD V in Manila, recalled the President's proposal for a new U.S. Institute for Scientific and Technological Cooperation (ISTC) to help strengthen the scientific and technological capacities of LDCs and focus increased world attention on development problems. The legislation establishing this proposed Institute is now before Congress, where its passage appears to be highly likely.

The ISTC is regarded as a major response from the U.S. government to the August meeting in Vienna of the United Nations Conference on Science and Technology for Development (UNCSTD). Because of that, the Center of Concern feels it is important that the larger community following UNCSTD should be informed both about the structure of the Institute and about some of the serious questions raised regarding its philosophy and operation. This present memorandum will: (1) provide an overview of the ISTC proposal; (2) distinguish it from AID efforts; (3) express some of our concerns and reservations; and (4) offer a few specific recommendations to improve it.

The Center of Concern focuses on the ISTC proposal as part of our on-going discussion of the values/social justice issues relating to UNCSTD and offers our observations as additional input into the debate over U.S. policy for the Vienna meeting. Readers' reactions and suggestions are welcomed.

PURPOSES AND FUNCTIONS OF THE INSTITUTE

According to the proposed legislation currently before the U.S. Congress, the Institute for Scientific and Technological Cooperation has three purposes: "to strengthen the capacity of the many people of developing countries to solve their development problems through scientific and technological innovation, to foster research on problems of development, and to facilitate scientific and technological cooperation with developing countries. * * *" To carry out these purposes, the Institute has six functions, as presented in the U.S. National Paper, which fall under the following headings:

1. Capacity building—assist LDCs to strengthen their own capacity to generate, adapt, utilize, and disseminate knowledge and technologies necessary for their development.

2. Research and development—support research, in the U.S. and LDCs, on critical development problems, with emphasis on those problems which affect the lives of the rural poor.

3. Building cooperative linkages—foster linkages between the scientific and technological communities of the Third World and those of the U.S. in order to promote the joint solution of problems of mutual concern.

4. Marshalling U.S. agency resources—advise and assist other U.S. agencies in planning and executing policies and programs of scientific and technological cooperation with LDC.

5. Building U.S. competence—strengthen the capabilities of U.S. scientific and technical institutions so that they may work more productively with LDCs in joint research, training, and other cooperative efforts.

6. Involving the private sector—facilitate the participation of the private sector (institutions, businesses, and individuals) in research, training, and other cooperative efforts.

It should be pointed out that a difference exists between the six functions of the Institute as spelled out in the U.S. National Paper for UNCSTD (repeated in the Congressional Presentation on ISTC) and in the functions as they appear in the proposed legislation now being considered by Congress. In the former, the functions appear as stated above; in the latter, the fifth function, "building U.S. competence", has been replaced by "access to technical information—gather, analyze, and disseminate information relevant to the scientific and technological needs of LDCs." This change in the stated functions of the Institute can be seen as an improvement in that it would have the Institute address more the interests of the LDCs, for access to information, than U.S.-based interests.

STAFF AND STRUCTURE

The Institue will be headed by a Director, appointed by the President, who will have stature and exercise responsibility equal to the chief executives in each of the agencies reporting to the Director of the proposed International Development Cooperation Agency (IDCA). A Council on International Technological Cooperation will be established to advise the Director and make recommendations on matters involving the activities, policies, procedures, and resources of the Institute. These recommendations must be received by the Director before she or he acts on a new program or initiative, though they do not have binding force. The Council will consist of up to twenty-five persons selected by the President, with up to one-third being citizens of foreign countries and up to five being officials of the U.S. government. The remainder will be U.S. citizens recognized for their knowledge of science and technology, especially as these relate to the problems of LDCs.

The principal office of the Institute will be located in Washington, D.C., with five to seven field offices overseas. The field offices will be headed by U.S. citizens (because of fiscal responsibilities) but the remaining staff, where possible, will be made up of local persons.

BUDGET AND FUNDING ALLOCATIONS

As currently proposed, the budget for the Institute for FY 1980 is $25 million for new program initiatives; for FY 1981, the proposed budget is $40 million. In addition to this $25 million, ISTC will assume responsibility for approximately $66 million of AID's activities that are consistent with the Institute's program areas. The $25 million is divided among ten program areas which the Institute has initially identified for its concern. These ten program areas are:

Increasing agricultural productivity and income,
Improving health conditions in LDCs,
Improving population programs,
Nutritional improvement,
Strengthening indigenous science and technology capacity,
Improved processes of technological cooperation,
Communications and information systems,
Energy planning and new energy supplies,
Environmental protection and natural resource management, and
Non-agricultural employment.

For purposes of analysis, these program areas and the funds allocated to each from the $25 million, can be clustered within one of the six functions of the Institute. For example, five program areas (increasing agricultural productivity and income; improving health conditions in developing areas; improving population programs; nutritional improvement; and non-agricultural employment) can be clustered under the function "research and development," which supports research on the development problems that affect the lives of the rural poor. The resulting prioritization of the functions, starting with the largest recipient, is as follows: research and development (54.4 percent); building cooperative linkages (17.6 percent); marshalling US agency resources/involving the private sector (12 percent); capacity building (8 percent); and access to information (8 percent). If the $66 million from AID are included in the analysis and assuming these monies currently support projects on development problems, i.e., "research and development", then the result is an even greater disparity between the largest recipient and the remaining five functions.

HOW ISTC DIFFERS FROM AID

There has been considerable debate over the question of whether it is necessary to establish a new Institute when the US Agency for International Development

already exists. Could not the availability and application of US technology to the development problems of LDCs be directed through improved channels of AID? Though the purpose of ISTC are spelled out in the same legislation that authorizes AID, i.e., the Foreign Assistance Act, the ISTC Planning Office has identified four characteristics of ISTC that distinguish it from AID. These are: (1) nature of ISTC; (2) types of program areas; (3) type of cooperation; (4) and style and collaborative effort. The explanations given by the Planning Office are summarized as follows.

Nature of ISTC.—The primary focus of the Institute will be on science and technology; it will be the principal research and development agency within the US development assistance community. ISTC will concentrate on problem areas (the ten mentioned earlier) and its staff will work with the local scientific and technical personnel. Because of the complex nature of development problems, ISTC will be structured for the precise purpose of providing long-term support for research on development problems, thus increasing the likelihood of attracting quality scientific and technological personnel. On the other hand, AID, offering primarily bi-lateral assistance, has focused on country-level problems and on working mainly with government officials. AID's focus on the management of country programs has led it to contract for outside technical expertise. This tendency has sharply reduced the number of technical experts within AID itself.

Types of Program Areas.—As AID's "New Directions" mandate focuses on meeting the basic human needs of the poorest of the poor, it has been able to proceed with research in the areas of food and nutrition, health and population, and education. Congress has since recognized other areas—energy, environment, and natural resources—that are important components in our relations with LDCs. These problem areas represent a different type of problem from the first group in that they are problems of mutual interest between the US and the LDCs and they indicate a need for a greater efficiency in the use of the world's resources. Rather than have AID proliferate activities in all these areas, ISTC is specifically structured, with its interdisciplinary body of experts, to work on these global maintenance problems as well as on the problems which directly affect the poor.

Type of Cooperation.—AID's mandate is directed toward working with the poorest of the LDCs and its relationship to these countries may be expressed as "donor-recipient." The more advanced, "middle-tier" countries no longer need this type of assistance. On the other hand, these countries are beginning to work on problem areas that more directly impinge upon US economic and social interests (e.g., energy, urban problems, non-agricultural employment), and the US would like to cooperate in these efforts. As AID's concessional aid arrangements would be inappropriate for this task, "post-AID" mechanism needs to be established. ISTC would be such a mechanism, involving cooperative work on a cost-shared basis.

New Style and Collaborative Effort.—AID's decision-making process does not lend itself to participation by LDC experts and specialists. Borrowing from the experience of the Canadian International Development Research Council (IDRC), ISTC plans to incorporate input from LDCs' experts into its policy-making process at several levels in planning, programming, and evaluation activities. An illustration of this is the inclusion of foreign experts on the Council. Though the ISTC Planning Office admits that the amount of input to date from LDCs has been insufficient, the increasing likelihood of ISTC becoming a reality has spurred a more active outreach for LDC input. In addition to the direct involvement of foreign experts, ISTC plans on working closely with the US private sector. Unlike the larger AID, the relatively small ISTC will allow direct institution-to-institution contacts and relatively uncomplicated cooperation.

CONCERNS ABOUT ISTC

Since the final legislation establishing it has not yet been approved by Congress, ISTC is still in the planning/proposal stage. This provides the wider community of non-governmental groups interested in development issues an opportunity to voice its opinions, reservations, and recommendations about the Institute to the Planning Office and to appropriate Congressional committees. In this section of our memorandum, the Center of Concern identifies several questions which we have regarding the structure and philosophy of ISTC, in hopes of surfacing some of the key issues around which the discussion, debates, and decisions should focus.

1. A first concern is the place of ISTC in the on-going North/South dialogue. Such a significant initiative as this—coming in conjunction with a major United Nations conference—must be evaluated in terms of its impact on the wider structural questions of relationships between the industrialized world and the nations of the Third World. The most controversial of these questions is, of course, the establishment of a New International Economic Order (NIEO), which raises all the issues of trade, aid, debt, investments, monetary relations, technology transfer, decision-

making power, etc. It is disturbing to note that the explanations of ISTC offered by the Planning Office have not explicitly nor in detail situated the Institute in the context of the NIEO discussion. Even more disturbing were some recent remarks of Ambassador Andrew Young at the UNCTAD V meeting in Manila. Noting the US government's opposition to the Group of 77's proposal for a "second window" to the Common Fund (an effort on the part of the LDC's to stabilize their economies in the face of fluctuating commodity prices), Young went on to say, however, "It (ISTC) will be prepared to join with the second window in organizing, manning, and financing specific research and development projects related to commodities." It would seem that the only relationship the US government is interested in with the Third World is one in which the US does the organizing, manning and financing—in other words, where it is in control. This raises serious question about the direction of an Institute which has in its very title on emphasis upon "cooperation." Since the NIEO issues will be critical to the Third Development Decade opening next year and to the 1980 UN General Assembly Special Session on the development strategy for DD–III, it is imperative that the ISTC effort be more explicitly linked to these issues.

2. A second concern is the amount of autonomy from AID which ISTC will have. As mentioned earlier, the funds being transferred from AID to ISTC will represent over 70 percent of ISTC's budget. These AID funds will bring with them a number of AID personnel, representing about 70 percent of ISTC's personnel. Numerically, of a total staff of 140, 100 of these positions are AID-designated (though only 78 of these 100 are now filled). With such a sizable percentage of the staff being personnel previously associated with AID, it is possible that an "AID mentality" could permeate the thinking and future direction at ISTC. In light of the credibility problem that AID-sponsored projects have in certain sectors of the Third World, an "AID mentality" could seriously hamper the initial effectiveness of ISTC in working with LDCs.

3. A third concern is the type and amount of foreign input that ISTC solicits and attracts, and the type and number of foreign personnel ISTC employs, funds, or works with. The Planning Office acknowledges the level of input from the LDCs has so far been insufficient, and it is planning a series of visits to LDCs wherein the field offices will be located. Though these visits are certainly a step in the right direction, final judgement should be withheld until it is learned who in these countries will meet with the Office. If a guess can be hazarded, however, the "who" will probably be technocrats and researchers—middle-class, western-educated—who have had little direct experience with the needs of the poor. More than likely, they will be highly-skilled in problem-solving but have only minimal (if any) skills in problem-identification—a skill which requires more immediate involvement with the day-to-day process of development amidst the poor. A similar difficulty will present itself when the time comes for appointing foreign citizens to the Council. Because these citizens must be knowledgeable or experienced in the application of science and technology for development, as well as fairly well-known, it is highly unlikely that they will be from the poorest and neediest sectors of the LDC society and/or immediately familiar with the needs of the poor.

4. A fourth concern is the role ISTC will play in coordinating and linking other US government agencies, as well as private sector institutions, whose research, though intended to serve domestic needs, may have direct relevance to the LDCs. If ISTC is to bear this responsibility for the mobilization and improved coordination of US research, it is important to be aware of the skepticism expressed by more than one person familiar with such government efforts in the past. The red tape of coordination can have a deadening effect on an agency's imagination and creativity in dealing with development problems.

5. A fifth concern relates to the nature of the research and development capacity of ISTC and to the type of problems it will investigate. Given the lack of interest the US science and technology community has previously exhibited in working on the development problems of LDCs when few incentives were provided, it is at least questionable whether their involvement and research, prompted now by incentives from ISTC, will be directed more at their own interests or at the needs of the LDCs. The experience of funding under Title XII of Foreign Assistance Act might lead one to conclude that the real beneficiary of the research and development efforts will be the scientific and technological community itself, though some of their findings may "trickle down" and benefit the LDCs. Nonetheless, this structure of problem-solving only widens the technological gap between the North and South. It may be true that such legislation is originally intended to share US problem-solving capacity so that a larger number of poor people can live in more humane situations. Yet there is considerable danger that such sharing only perpetuates dependency. The US may be, as Dr. Frank Press, director of the President's Office of Science and Technology

Policy, declares, "the world's preeminent scientific and technological nation," and thus technically more capable of solving some development problems. But development in the LDCs will never really become a self-sustaining process unless the people of these countries control their own affairs and actively participate in solving their own problems. The establishment of a new, large research and development institution in a rich country to assist the development needs of poor countries does run the danger of creating dependency relationships.

6. A sixth concern, closely related to the type of problem ISTC investigates, is the type of research it will fund or be involved in. It is important to emphasize the need for applied, not basic, research. ISTC should be involved in the application, not the generation, of science and technology since it is here that major gains can be made in the alleviation of the worst physical manifestations of poverty. Unfortunately, applied research has never enjoyed the status that basic research has in the S & T community, and it is against this mindset that ISTC must labor from the start. Also related to this concern is the question of where the money eventually will be spent. The Planning Office estimates that 75 per cent of ISTC money will go overseas. Again, though this is a step in the right direction, a more full judgement will depend on the types of problems—basic human needs or mutual interest—investigated and the type of research—applied or basic—conducted.

7. A seventh concern relates to the promotion of the TCDC concept. The US government has expressed particular interest in working with "middle-tier" income countries. The ISTC Planning Office contends that technological cooperation on a shared-cost basis with these countries will support the concept of "technological cooperation among developing countries" (TCDC) put forth at the United Nations meeting on this topic last August in Buenos Aires. But in fact it may do just the opposite. ISTC is one of the US institutions that has agreed to act as "third party" in a "trilateral approach to technical cooperation"—two Third World countries and one industrialized country (see Center of Concern UNCSTD Memorandum #3). Though this three-way model may create a partnership approach to meeting the "mutual interest" problems (e.g., energy) it does little to strengthen the scientific and technological infrastructure of the LDCs or to redistribute the concentration of research and development away from the US and toward the Third World.

8. An eighth concern is the proposed allocation of funds. As noted earlier, one function of ISTC, "research and development," is allocated over 50 per cent of the $25 million; if the $66 million is also considered, the percentage increases to over 85. In either case, only $11.4 million remain for the other five functions. The disproportionate share of funding going to research and development raises questions about which functions are being prioritized at ISTC, and whether the functions receiving the greater emphasis increase or decrease the technological dependency of the Third World on the US.

9. An ninth and last concern—though this may also be a promise of ISTC—is the latitude being given to the Director by the pending legislation for implementing ISTC. Though it is desirable to allow the Director maximum autonomy and freedom in establishing the direction and philosophy of ISTC, it is also necessary to ensure that ISTC be a mechansim that promotes self-reliance and, in the long run, narrows the technological gap between the Third and First World. As Charles Maynes, Assistant Secretary of State for International Organization Affairs, stated recently at a United Nations Association Conference on "Science and Technology," ". . . the real issue is not what science and technology do to meet the basic human needs of the poor but how best the poor can use science and technology to meet their own basic needs." The legislation lacks the guarantee that ISTC will in fact promote this call for self-reliance, and for that reason the role—and philosophy—of the Director becomes very important.

RECOMMENDATIONS FOR ISTC

Though the preceding section listed several major reservations which the Center of Concern has about ISTC, it should be noted that expression of these questions indicates the seriousness with which we view the proposal. Thus, our remarks should not be taken as criticisms which dismiss ISTC out-of-hand, but rather as cautions that should be responded to prior to the establishment of the Institute. Central to our reservations is the question of the development philosophy underlying ISTC. Evidence so far indicates a development model which gives insufficient attention to self-reliance and breaking the ties of dependency. This does not auger well for the future. As the US National Paper for UNCSTD forthrightly admitted, the experience of foreign assistance programs has been mixed as regards actual benefits coming to the Third World. (See Center of Concern Memorandum #6.) With that experience behind us, we cannot but ask some searching questions for a new,

broad—scale venture such as the Institute for Scientific and Technological Cooperation.

The following list of recommendations from the Center of Concern incorporates most of the points expressed earlier in this memorandum. The question of how beneficial ISTC is to the LDCs may, in the end, depend largely on the action it takes in responding to this list:

Situate ISTC within the NIEO discussions so that it is related to the key structural issues of North/South relationships in order to promote a world of greater social justice.

Emphasize process of development rather than development problems, that is, assist the LDCs in strengthening their capacity to acquire and adopt a process that enables their own people—especially women, children, and the elderly—to learn, to invent, to create their own appropriate technologies.

Emphasize basic human needs problems—problems that directly affect the day-to-day lives of the majority of people in the Third World—rather than mutual interest problems which may be more directly rich-world oriented.

Emphasize applied, rather than basic, research.

Ensure a variety of viewpoints on development strategies on the ISTC Council and include representation from outside the scientific and development establishments.

Ensure that those on the Council have had "hands-on" experience with real life problems and have demonstrated a concern for meeting basic human needs and human rights.

Ensure that the outreach of the field offices extends to all segments of society, especially women, children, and the elderly since they are the experts in problem-identification.

Ensure that the field offices have the managerial competence to mobilize and network the "problem-identification" experts (e.g., villagers) and the "problem-solving" experts (e.g., technological specialists).

Affirm the TCDC concept wherever possible as a primary principle governing the types of research and development efforts undertaken.

Support and assist "trilateral approach to technological cooperation" where there is potential for reducing dependency and promoting self-reliance.

Use US problem-solving capacity to assist, not dominate, the poor in solving their own problems.

In short, if ISTC can reach the largest number of poor, and provide them with the skills to solve their own problems, it can be a success. It can be a major contribution by the United States not only to the UNCSTD process but also to the efforts of the Third Development Decade. We at the Center of Concern wait to see the outcome—with reservations but also with hopes.

Weekend Edition -- 1 July 1979

CURRENT NEWS

WEEKEND EDITION

A Global Information Complex

Reprinted from page 7-F

by Howard and Harriet Kurtz

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The following are excerpts from testimony prepared for the House Subcommittee on Space Science and Application of the 94th Congress. In view of impending space legislation, they are presented to spark creative ideas and suggestions from IEEE membership.

EXPANDED GODDARD SPACE CENTER: WINDOW TO THE FUTURE

Goddard Space Center in the Maryland outskirts of Washington, D.C. already is the nerve center through which global remote sensing space technology data are transformed into information serving the needs of an increasing number of world-wide users.

Although thousands of creative persons in NASA and in the other government departments and agencies as well as in corporations and research centers working under contract to NASA have for more than ten years envisioned and developed the awesome and unprecedented capabilities of earth-orbiting meteorological and communications and earth resources survey and other humane applications satellites, the leadership to these new realities has eminated from the scientists, engineers and experts at Goddard.

We are suggesting now that the size and the facilities and the mission of Goddard Space Center be greatly expanded to provide the same leading edge for a new generation of all-nation, or global, research, development, testing and evaluation (and eventual shared operation with other nations) of space systems and institutions serving the common needs of all nations, large and small. This center should coordinate the facilities of other government departments and agencies dealing with space applications.

The President and Congress could focus world attention on Goddard as the coordinating center for a historic commitment of the American people to a new American purpose . . . a decade of gradual redirection of American creativity and power to the pioneering of global systems and structures to serve the basic needs of all nations for progress and independence and security.

As its function expands Goddard will be opened up to the people of the world. All work will be conducted with information which is in the public domain. No classified information or national secrets of any nation will be allowed into the new *GLOBAL INFORMATION COMPLEX*. On a large scale the activities of the new complex will with its many layers comprise a center of concern for humanity.

1. *Continued Research and Development*

Budgets for pro-human applications satellite development will be increased to four or five times the present modest amounts, as a validation of the American national commitment. Goddard will continue to set the forward creative pace, not only for American research and development in this area, but for the creative people of all nations who will be invited and welcomed.

Governmental or independent research organizations of all nations will be invited to establish their own subsidiary groups of their own research centers located in or near the Goddard *GLOBAL INFORMATION COMPLEX*, to work cooperatively in joint or common new directions with the scientists, engineers and professional experts of all pertinent disciplines from all interested nations.

Facilities will be maintained to bring in experts from anywhere in the world for shorter periods of consultation.

Facilities will be maintained for representatives of scientific and professional societies in all pertinent fields, from all nations, to maintain liaison offices within the complex. Science advisors from all embassies in Washington will be welcome.

2. *Storage of Scientific Information*

At the present time at Goddard there is a National Space Science Data Center, where refined basic scientific information and data are stored for reference and future use for all outer-space science activities.

On a far larger scale a new *EARTH APPLICATIONS SPACE DATA CENTER* will be created to become the central reservoir of accumulated knowledge relating to space programs and applications directed toward the earth and its populations. Libraries and universities and laboratories of all nations will have access to this reservoir of knowledge, and ways will be developed to create similar satellite data centers in other regions of the planet, linked to the central information storage.

A technical information facility will be maintained to assure maximum cooperation with all other channels for the communication of technical information to scientists and engineers and professional specialists and individuals, world-wide, as an expansion of the present NASA Technical Information Facility.

3. *Active Interface with Users*

The breakthrough technologies to serve the needs of nations and people are of little value, until the organizations and nations and people who could use the new intelligence understand what new services are within their reach, and they learn how to make maximum utilization of the services. This involves a world-wide

two-way continuous communications network (1) with the creative research center understanding the needs of potential users everywhere, and (2) the potential users everywhere learning how to take maximum advantage from the services.

This back and forth dependence upon each other will require continuing active interface and liaison between the Goddard *GLOBAL INFORMATION COMPLEX* and local governments, state governments, regional institutions, national governmental departments and agencies, universities, high schools, corporations, and individuals within the United States . . . and through proper channels with the same sectors of all other nations around the world . . . and through other channels with the pertinent structures within the United Nations and other world institutions (such as, for example, the World Court in relation to future litigation). All of these activities are being pioneered on small budgets by NASA, by the Agency for International Development, by the Department of the Interior, by the Department of Agriculture, etc. . . . but the nations of the world have become confused and discouraged in the last year as they learned that the Office of Management and Budget in the White House was threatening to kill *all* budgets for future LANDSAT satellite development. The new Goddard Complex and be evidence before the world that the United States and the American people have made a long range, sustained, continuing national commitment to the welfare of humanity.

Experts and students will be brought in from other nations, sent by their own governments, to study the uses and the new techniques continually being developed . . . and experts and teachers will be sent out at the request of other governments to conduct training and education in the areas of the users.

Two-way communication will bring all complaints and inadequacies from the users around the world to the creative center at Goddard, with answers or improvements flowing back to the users.

Nations or organizations will be expected to pay their expenses and the costs of training, but policies will be developed for those deserving but unable to pay, with the provision of fellowships and other aids.

4. *The Global Information Sciences Institute*

Universities and institutes within all nations will be invited to assign advanced students and professors to study or to instruct at a new *GLOBAL INFORMATION SCIENCES INSTITUTE* at Goddard, and to work cooperatively with the research centers of the *GLOBAL INFORMATION COMPLEX* to both lead and follow the creative pioneering probes into future prohuman and life-supporting space systems.

5. *Global Information Conference Centers*

Facilities will be created at Goddard where multinational or all-nation symposia and conferences may be held at regular intervals to clarify and communicate the latest developments . . . where policy review conferences may be held among the governments of the world and the space information experts . . . where conceptual conferences can call upon participants to project the future operational requirements for as-yet-unthought-of future space projects . . . where experts in space information services for the planet may work in frequent interface with experts in many other fields of the emerging world community of nations.

6. *The Public Experience*

A very, very large exhibition hall and information display center will be built which might become the greatest tourist center in the world. The creative imagination of the public information professionals already translating space efforts into visual displays, if invited to offer ideas, could make the public rooms at Goddard more exciting than any world's fair.

Large and vivid audio-visual displays will give the public the vicarious experience of looking down upon mankind on the Spaceship Earth, and experiencing the almost-impossible-to-describe realities of what can be "seen" and discerned and recognized to serve the needs of humanity on the Earth below.

Large information display walls will allow the public to look (in real time or in later replay from computers) down upon events unfolding on the Planet Earth.

The press corps, with journalists from all nations, will have full access to the inflow of open-to-the-public global intelligence. Television networks and stations of the world will have direct electronic connections to the satellites in orbit, so that world events or disasters or dramatic rescues or battlefields or earthquakes or just the awesome and wonderous beauty of the Earth from space may be seen in real time on the TV screens of the world.

Students with dreams of future careers committed to making the Earth a safe and decent place to live will come to the visual experience center and may see openings for their own personal career commitments . . . taking home the preliminary literature and elementary books on sale at the *IN ORBIT BOOK STORE* connected to the looking-down-on-planet-earth public experience center.

Students at the *GLOBAL INFORMATION SCIENCES INSTITUTE* might earn tuition by answering questions from the peoples of the world moving through the exhibit and taking home a picture postcard of their own home town, anywhere, taken from outerspace.

7. *New Ideas . . New Opportunities . . New Hope*

Throughout the ages whatever people have been able to envision, eventually they have been able to create. The shocking new reality of modern creative research and development power is that humanity for the first time in history can create any kind of future world order it can envision, and is willing to make the massive commitment to achieve. Looking at humanity and looking at the Planet Earth from the new vantage point of instruments in outerspace, one's imagination is released to begin envisioning dozens or hundreds or thousands of new ways to help all humanity live through crises and develop unprecedented well-being, as readily as military planners can envision new ways to kill more people in less time over a greater distance.

As at first hundreds, then thousands, then millions of people encounter the personal experience sensations of the Goddard audio-visual information display complex, the creative imaginations of human beings will be released and humanity gradually will envision, and then create, the institutions, the systems, the structures, the devices, the tactics, the jobs related to a safe and decent future for humankind, trapped and forced to live on Planet Earth. There is valid reason for hope, but too few people are able to experience this reason for hope.

The great global defense/space/communications/command control and other systems teams will be put to work on an unprecedented scale, doing what they do best . . . pioneering utterly complex global systems.

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Global Information Systems
Foundation for Civilized World Order

In past issues of this *Journal* we have published articles and discussions concerning the need to proceed from the experimental NASA Landsat Earth resources satellites to fully operational systems. The following commentaries—consisting of a brief introduction by ASP Past President William A. Fischer; a letter from Astronaut Russell Schweickart, published in the Winter 1978-79 issue of *Co-Evolution Quarterly;* and a concluding statement by Howard G. Kurtz—are included here as providing still another perspective on the uses of an operational global environmental monitoring and information system. Your comments will be welcomed.

—The Editor

Introduction

Senator Adlai Stevenson, Chairman of the Senate Subcommittee on Science, Technology and space, is holding hearings on his Bill calling for the mobilization of remote sensing satellite systems into an Earth Data and Information Service. The purpose of this publication is twofold: (1) to call attention of the photogrammetric community to the dedicated efforts for more than 12 years by Howard and the late Harriet Kurtz to widen professional and public discussion of an almost identical concept they called *A Global Information Cooperative* or *Life Support Systems for Planet Earth,* and (2) to alert photogrammetrists that their basic mission may have a far greater impact on our world than the making of maps.

World War II misunderstandings about the generalizations of enemies as "beasts" or "monkeys" will no longer 'wash.' The reason is clear. We have improved factual communication among all peoples of all nations, and our knowledge of each other is increasing. If lasting world peace ever is to be achieved, there is an imperative for ever-increasing knowledge of the human and physical resources for the entire planet.

Mr. Howard and Rev. Harriet Kurtz (now deceased) embarked many years ago on a personal endeavor to eliminate war by improving the full transfer of information and knowledge among and about people and resources . . . world-wide. Remote sensing satellites for the first time in history are providing global power tools which could transform such vision into operational reality. Others have embraced and espoused similar views. It is the "Open Skies" policy advanced by President Dwight Eisenhower, but now magnified a thousand times by space intelligence and information gathering and communications systems.

Some years ago the United States Geologic Survey chose to include the Kurtz's concept in their congressional testimony. Their story is of interest to all of us in ASP.

—William A. Fischer

Commentary by Russell Schweickart

In the last six months a series of events has occurred triggering within me disappointment, frustration, and concern bordering on alarm. I see a red warning light flashing on the control panel signaling trouble ahead unless immediate attention is given to the situation.

What concerns me is the growing militarization of space, and concomitant blurring of the heretofore clear distinction between the civil and military space programs. Subtly related to this concern is the astounding ommission of an operational civil remote sensing satellite system (or even a commitment to one in principle) in President Carter's just-announced space policy.

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Without going into detail, let me simply refer those interested to the rapidly increasing number of technical articles and papers on anti-satellite weapons, particle beam and laser space weapons, etc., in the technical trade journals. The appearance of articles such as these historically reflect official (though not always publicly announced) interest or policy. The first evidence of this shift appeared as the classified Presidential Review Memorandum (PRM) 23 back in May of 1978. It is not available to the public, the press, or even the Congress (except in unclassified briefing form) because of its security classification but it raised wide concern among many of those who became aware of its contents and implications. The most recent evidence of the reshaping of space policy is the President's carefully-worded, heavily-caveated space policy statement which, while not actually applying the scalpel, sets up the civil space program for cutback while calling for the potential merging of civil weather satellites, etc., with the military. All in the name of economy, of course.

I believe this shift of national policy in the way the U.S. will develop and utilize the space environment should be of concern to everyone, but it is of special concern to me. I became a NASA astronaut in 1963 with the words of John F. Kennedy ringing in my ears, "We set sail on this new sea because there is new knowledge to be gained and new rights to be won, and they must be won and used for the progress of all people. For space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force of good or ill depends on us, and only if the United States occupies a position of preeminence can we help decide whether this new ocean will be a sea of peace or a new, terrifying theater of war . . . Space can be explored and mastered without feeding the fires of war, without repeating the mistake that man has made in extending his writ around this globe of ours."

My ten days in orbit around the Earth on Apollo 9 converted that hopeful challenge of JFK's into a lifelong commitment to see that the development of this new ocean of space proceeds in a life-enhancing and ennobling manner. The exciting and challenging opportunities in space exploration and development should call forth the best in us as intelligent and loving beings—not the worst as fearful and suspicious animals.

But lest I be branded a wildly idealistic anti-militarist, let me move back toward the (co-evolutionary) middle. I do not believe for a moment that the military will not be or even should not be in space. In fact, global stability has been enhanced if not preserved in recent years by the "spy" satellites of both the U.S. and USSR which have substituted (in part) real information for fearful or self-serving speculation. And although it seemed almost trivial to many, I believe President Carter significantly opened the door to forth-right discussion of global security when he acknowledged publicly the use of and benefits derived from intelligence-gathering satellites.

What bothers me and what dominated the total life of Howard and Harriet Kurtz (Harriet died in 1977) is the unbelievable opportunity which the federal government has ignored which could save billions of tax dollars, enhance national security and global stability, provide valuable information on global resources and environmental conditions, and stimulate a vital but sadly declining U.S. industry.

I refer not to some airy-fairy futuristic concept but to the NASA Landsat satellites which have produced hundreds of thousands of Earth images since 1972 which have been utilized by hundreds of nations around the world for environmental monitoring, crop production forecasting, forest and crop disease monitoring, resource surveying, and many other beneficial uses.

The opportunity available is to unilaterally establish a global environmental monitoring and information system which would make high-quality, dependable, timely data available at a very low cost to anyone who wanted it. The groundwork for this capability has been well laid by the experimental Landsat satellites, especially such sticky issues as the policy of open data availability. More than 100 nations, including Russia and China, have bought Landsat images from the EROS Data Center, Sioux Falls, South Dakota, the principal U.S. archiving and distribution center. In addition, Brazil, Argentina, Italy, Zaire, and others have built or begun to build their own satellite receiving stations and obtain (or will be obtaining) data directly from the satellites.

But the satellites are still maintained on an experimental basis with no commitment to continuation and very little improvement permitted in resolution (ability to see small objects) or timely delivery of data. Despite the recommendations of innumerable councils, interagency committees, study groups, commissions, and panels to the contrary, President Carter declined to commit to an

operational system, relegating it once again to an experimental limbo and establishing yet another interagency task force.

Howard Kurtz has argued for years that a global system of this kind would not only benefit all nations in terms of resource management and environmental monitoring but would also enhance global security and mutual trust in a way no weapon system (offensive or defensive) could ever hope to do. If the resolution were improved slightly and all nations were given direct access to the satellite data, speculation about the action of perceived or real enemies would be replaced by knowledge, not just by the two contending parties, but by all, thereby enhancing everyone's security.

The technology exists for such a venture though the data handling and processing requirements would stretch our inventiveness (another benefit). But how about the cost? Less, I would venture, by an order of magnitude, than the same increment in national security available by adding additional life-destroying weapons to our already substantial arsenal. For example, the whole system could be designed and put into operation for less than one-tenth the cost of the nuclear aircraft carrier which was the subject of a recent confrontation between the President and the Congress. Would another aircraft carrier, in addition to the twelve we already have, enhance our security more than a global information cooperative which would cost one-tenth as much? I can't find any absolute yardstick to measure by but I seriously doubt it.

More important—the information system is life-enhancing, benefits all people, reduces international tensions, would be used continuously to serve people, and emphasizes our planetary interdependence. The defense system is life-threatening, benefits only us, increases tensions, would hopefully never be used, and emphasizes national differences and distrust.

This is the vision Howard Kurtz has carried into the offices of government officials and dignitaries, into editorial rooms, and onto occasional interview shows. He and Harriet totally dedicated themselves to this single goal. They had and still have no organization to fund their efforts. For years they spent their personal savings, they attended every Congressional hearing on NASA's programs, they gathered information incessantly and wrote and talked to all who would listen, and Howard now continues the effort alone.

I am awed and inspired by this dedicated man of vision whom I came to know during my work with NASA in Washington, D.C. And I thank you, Stewart, for bringing to the *CQ* family a man who has given himself fully to JFK's vision of a vast new ocean which must be mastered by us for the benefit of all people.

—Russell L. Schweickart
Assistant to the Governor
for Science and Technology
Sacramento, California

Conclusion

Throughout the ages, whatever people have dared to envision, eventually they have been able to create. The American people can now dare to envision, and to work toward, unprecedented future world-sized systems serving the economic, security, and other needs of the people of all nations (as Air Traffic Control guards the safety and progress of the passengers in all airplanes in a cloud).

For the first time in history, today President Carter and Congress (based on American leadership in space research and development) have the power (1) to meet requirements for national defense and, *in addition*, (2) to lead the world in a new direction by releasing the creativity and power and character of America for a new-generation experimental development of global intelligence and communications satellites and other systems to assist the people of all 157 or more sovereign nations in their struggles for food, clothing, housing, energy, clean air and water, health, education, and national security.

Let there be no doubt: If the U.S. does not seize upon this humanistic purpose for man's advancing knowledge and skills in all fields, other nations will. Each year the U.S. is losing its position of overwhelming world leadership in global systems professions and management skills. If we fail to grasp this opportunity for world statesmanship, this may be our last chance.

Photogrammetry can play a crucial leading edge role in this endeavor.

In an effort to stimulate pro and con and creative discussion in the many different professions involved, Harriet and I through the years have found editors of journals who desired to widen their specialized discussions to their global limits, serving the needs of humanity.

—Howard G. Kurtz

Partial list of publications of conceptual projections by the late Harriet B. Kurtz, and Howard G. Kurtz co-founders of War Control Planners, Inc., Box 19127, Washington D.C. 20036 on the next-generation challenge for advancing science, technology and management skills:- GLOBAL WAR PREVENTION SYSTEMS . . .ALL-NATION SECURITY AND DEVELOPMENT SYSTEMS . . . LIFE SUPPORT SYSTEMS FOR PLANET EARTH . . .GLOBAL COMPASSIONATE POWER SYSTEMS.

January 1979 SEA POWER (The Navy League) "Satellites for Peace" pg 14

Winter 1978/79 CO-EVOLUTION QUARTERLY (a) Draft Speech 1966 for possible delivery in 1966 by President Lyndon B. Johnson (b) editorial by Stewart Brand (c) perspective by Astronaut Russell Schweickart (d) up-date by Howard G. Kurtz 12 years later. (Above placed in Congressional Record for February 13,1979 by Congressman George E. Brown, Jr. (Dem.Cal.) with his own added perspectives.

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September 1957 AMERICAN ENGINEER (National Society of Professional Engineers) "ENGINEER VS. WAR" a pioneering probe into the phenomenon of "war-peace-war-peace-war-peace" which has plagued all history, and clarifying the disiplines required to bring the plague to an end, before it destroys world civilization.

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The Contribution of Transnational Enterprises to Future World Development

A Report

prepared by the Industrial Sector Advisory Group to
the Secretary General of the United Nations Conference
on Science and Technology for Development in relation to
Agenda Item 7: Science and Technology and the Future

United Nations Conference on
Science and Technology for Development
Vienna, 20–31 August 1979

The Contribution of Transnational Enterprises to Future World Development, a Report prepared by the Industrial Sector Advisory Group to the Secretary General of the United Nations Conference on Science and Technology for Development in relation to Agenda Item 4: Science and Technology and the Future. Responsible for the Contents: James D. Grant.
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SUMMARY

Developing countries and transnational enterprises (TNEs) share a common interest in their concern for an increasing rate of economic development. It is well established that TNEs are effective contributors to the acceleration of economic growth in both advanced and developing countries. This effectiveness of the TNEs often depends on the creation, management, and use of technology in their business activities in home as well as in host countries. Thus, the interests of developing countries in applying modern technology appropriately to further the advance of economic and social conditions can coincide with the interests of TNEs in expanding business opportunities and markets through competitive technology.

Considerable diversity exists among developing countries in the degree of their development and in their national goals, just as there are wide differences in the character, size, and objectives of TNEs. Both are alike in that they are independent entities. Whether or not the host country or the TNE will choose to develop an activity in a given host country, and whether or not that activity can be sustained, depend on two factors. The first of these is the establishment of mutually satisfactory objectives. The second is the conclusion of negotiations in an atmosphere of respect, complete understanding, and flexibility to achieve a mutually beneficial agreement.

The Secretary-General of the Conference, João Frank da Costa, recognized that the issue of where the balance of compromise should lie would be raised in the Conference. To assist the member states in selecting the most promising areas for improvement when discussing action for the future, he perceived the need for a better understanding of the experience of TNEs in negotiating and operating in developing economies. Such understanding should include the TNEs' perceptions of how their own and host country interests might better coincide in the future. Mr. da Costa felt it was imperative to indicate how TNEs with their so important potential could play a progressive role in future world development, taking into account in particular the need for scientific and technological development in developing countries.

Accordingly, Mr. da Costa suggested that an Advisory Group of senior technology and management executives examine the part TNEs might take in engaging more effectively in future world development. He requested that they prepare a report which would be illustrative of the thinking within a broad spectrum of TNEs without claiming in the least to be representative of all positions in the Industrial Sector. The resulting report would be made widely available and be included in summary form for the information of the member governments, as an official contribution to the Conference Agenda, Item 7 - "Science and Technology and the Future." The Advisory Group was drawn from an illustrative range of TNEs based in Europe, North America, and South America.

Technology is a body of knowledge, or the "know-how," which permits the application of scientific findings to the creation of a specific product or performance of a specific task. While science is knowledge as well, and may suggest what is possible, technology translates the possible into the practical through the embodiment of planning, engineering, and management.

Creation of new science occurs across a wide spectrum of institutions--universities, government laboratories, institutes, and industrial research centers. Much governmental and institutional efforts are directed towards the development of infrastructure necessary to receive and apply technology, particularly in areas such as education, communication, transportation, health and agriculture. Such efforts are supported largely with public resources and the results are widely disseminated. The generation of technology or know-how for commercial application, on the other hand, has been undertaken predominantly by private industy as a key component of the process of providing competitive goods and services. Such know-how involves technology transfers within a firm in a complex array of coordinated activities and investments including specific technical processes, skilled personnel, marketing capabilities, and competent management. Consequently, the development and adaptation of technology requires the investment of human and capital resources by the developer who then has a proprietary interest

in the technology. Even non-proprietary technology may have proprietary know-how elements which allow its efficient, safe and non-polluting use.

TNEs have developed successfully the capability of extending transfers of know-how beyond a firm's activity within its own country to affiliated facilities in other countries. Thus, the experiences and knowledge of the TNEs are available as an important resource to meet the technological needs of developing countries.

Because of the investments necessary to generate technology, its transfer between firms, whether within the same country or across frontiers, must be accompanied by some form of return to the originating company that is appropriate to the initial investment, the additional costs involved in the transfer, and the accompanying risks. All enterprises, large as some of them are, have limits to the resources that can be committed at any one time, and their managements must decide which investments and activities should receive priority. The decision of an enterprise to establish an activity in a developing country and subsequently to transfer technology, therefore, will include an assessment of the risk involved in committing the required resources. The mechanisms by which a transnational enterprise can assist in the transfer of technology vary in degree from licensing to direct investments, including joint ventures.

An essential step for the host country is to set priorities consistent with its national objectives and to choose the technologies which will give the highest probabilities of success. Such a step would logically be part of national plans for development taking into consideration such criteria as natural resources, employment needs, physical as well as institutional infrastructures, market and the technological level of the host country work force. Equally important is the choice of transnational partners for each particular case. Again it must be clear at the outset what the needs of both parties are, and what their individual contributions must be, and that the requirement for flexibility is essential in all phases of the project.

The detailed report includes a number of examples of TNEs' experiences describing some operations with developing countries. These

examples show that successful projects meet certain basic requirements. They provide a competitive return on investment to the TNE. They also meet equally important objectives of the host countries of a social, environmental and economic nature.

Experience therefore shows that the transnational enterprises involved in the transfer of technology nearly always serve the host countries to which they introduce new methods and techniques at the same time they serve their own commercial and financial interests. When the transfer of technology works well there are substantial benefits for both sides.

Specific commitments of transnational enterprises in host countries include these

- o To make investments in the long term, helping to build up the country's basic infrastructure.
- o To aid in meeting the goals of local governments by paying taxes and thus providing revenues, by increasing employment, and by developing local sources of supply; in so doing they contribute to the productive capacity and economic growth of the country.
- o To train, develop and advance local personnel, thus adding to the pool of technologically qualified persons available to the country.
- o To provide channels through which new technology can be funneled into the country.
- o To make available to the host country a range of human resources, particularly managerial and technical personnel, that would not be readily accessible under other circumstances.
- o To provide an opportunity for the exchange of ideas and information with local scientific and research institutions, thus enriching the research environment.

Similarly the successful collaboration between the host country and TNEs call for certain commitments by the host countries

- o To create in the host country an inviting and attractive business environment, i.e. the probability of a transnational enterprise receiving satisfactory return on its investment of

funds, technology and people in a given project. An overriding consideration for a transnational enterprise is the promise of stability of policies, attitudes and relationships on the part of the host country government. Features which contribute to such an attractive environment are the ability to achieve a pragmatic approach to regulation, the acceptance of international arbitration in disputes and freedom to repatriate a reasonable level of funds.

- o To recognize the high value TNEs place on patents, trademarks and the protection of proprietary know-how.
- o To improve the standard of technological and managerial education and also skills training. Cooperation with transnational enterprises on specific programs will accelerate such educational programs; furthermore, the existence of such programs can contribute to the ability of a host country to participate further with transnational enterprises.

Most TNEs have progressively developed high standards of business conduct outlining their responsibilities towards their owners, customers, employees and the communities within which they operate in their home countries. These standards are also the basis of positive guidelines for the development of their business relations with other countries. The TNEs, in endeavoring to support the national objectives of host countries and at the same time maintain their own business standards, often defer immediate financial returns for longer range benefits.

The report concludes with a look at possible future technical developments, not all of which will come to commercial fruition. Transnational enterprises will undoubtedly play a key role in the development of many of these concepts into working technologies available to all countries.

INTRODUCTION

This report deals with the continuing contribution transnational enterprises (TNEs) could make to future world development. Such enterprises have in the past contributed substantially to the development of many countries in most parts of the world involving most industries -- mineral extraction and processing, manufacturing, agriculture, food processing, transportation, communications and numerous others. Many of these economic developments would never have succeeded if it were not for the cooperation between TNEs and their local public and private partners.

Although TNE activities have been beneficial to host countries, both developed and developing, there is a continuing debate as to how these enterprises might best participate in future development programs. This question will be one of the principal topics at the United Nations Conference on Science and Technology for Development to be held in Vienna in August, 1979.

To address the issue effectively, it is essential to have as much factual information on the question as possible. It is apparent that part of the difficulty in reaching concensus on the role of transnational enterprises in world development derives from an incomplete awareness of how such enterprises must, by their nature, operate in order to fulfill their responsibilities towards their customers, owners, employees, business partners and communities in home and host countries.

The Secretary-General of the Conference, João Frank da Costa, recognized that addressing this issue would be an important element in the Conference, and that transnational enterprises have the potential for playing a progressive and significant role in future world development. He therefore invited a number of individuals from transnational enterprises to form an Industrial Sector Advisory Group in order to provide a formal contribution to Agenda Item 7 -- "Science and Technology and the Future." In particular, the Group was asked to

study the part TNEs might take in cooperation with developing countries in applying science and technology more effectively in future world development, and to report its findings for inclusion as part of the formal preparatory document on Agenda Item Four.

The report is the joint product of senior science and technology and business representatives of a number of leading corporations based in Europe and North and South America. They worked together, prepared, and signed this report as individuals; their corporate affiliations are listed for identification only, without meaning to suggest specific endorsement by each corporation of every element of the report.

The report considers the principal opportunities and problems in future world development that could be approached with the aid of transnational enterprises. It focuses in particular on the manner in which TNE activities can best meet both the business goals of the TNEs and the objectives of the developing host countries. The report also attempts to show ways and means through which TNE contributions to future world development could be increased.

To understand this common interest one must examine the concerns of developing countries and the basic factors inducing TNEs to establish themselves in foreign markets and to engage in the transfer of technology. Each partner in a technology transfer makes a valuable contribution. The TNE puts in its resources, personnel, expertise, patents, trademarks, and reputation. The host country enterprise in turn provides, for example, personnel, raw materials, a favorable geographic location, and markets for the new business establishment.

The benefits to the host country may include improved technological, managerial and planning know-how and skills, access to foreign markets, an increase in national foreign exchange income, additional employment and a series of other positive by-products such as the development of local suppliers, broadened education and training opportunities, improved communications, and a closer link to the global scientific and technical community.

The TNE investing abroad seeks a satisfactory return on investment through developing new markets, obtaining raw materials or increasing production capabilities.

Successful TNEs are aware of the social forces at play which today affect business activities. They realize that their roles in providing goods, employment and new technology bear directly on the well-being of the host nation's people, on its natural resources, and on the environment.

Experience has shown that when an attempt is made to establish a new enterprise in a developed or developing country without assuring comparable benefits to all parties concerned and without the cooperation or at least the sanction of the host government, the venture will almost certainly fail. Such failures should be avoided by all means as they frequently result in a climate in which future attempts are less likely to succeed.

"Each side contributes and each side benefits" may be suggested as a mutually acceptable guideline. Thus the key issue for both host countries and TNEs is whether and how a workable balance among interests can be achieved and maintained in a given situation. Will the effectiveness of the enterprise's activity be sufficient to provide acceptable benefits to each of the partners involved?

Although the ultimate test for each enterprise is whether or not it makes an adequate profit, host countries will not measure TNEs by their profitability alone. They will rather measure the enterprise by the tax revenues it generates to fund public services, the stability of its employment, the benefits it offers to employees, the various opportunities it provides for local people, and the sense of civic responsibility it displays. These are the extra dimensions business can and should bring if the host country business community, government and civic groups cooperate in providing the kind of environment that will permit companies, national and foreign, to operate profitably.

While experience shows that TNEs can make valuable contributions to development, they have certain limitations due to their economic nature, to their limited supply of resources of all kinds, to their individual areas of know how, and to the nature of their technology which is not readily disassembled and reassembled to fit every new situation. Furthermore, there are certainly some technological needs which will have to be identified and met through means other than the TNE.

This report is divided into two sections:

Section I deals with the interrelationships of transnational enterprises and developing countries in the transfer and application of technology.

Chapter 1 examines science and technology and their interplay with the processes of development. It describes the practical activities involved in the transfer of technology among institutions within countries and internationally.

Chapter 2 lists the benefits developing countries can expect from TNE activities, analyzes the decision-making process leading to cross-border business ventures and describes some experiences. It stresses the necessity to balance the interests of TNEs with those of the host countries in planning and in practice.

Chapter 3 focuses on the role of developing countries in gaining the most from the presence of TNEs. It describes the business environment conducive to the transfer of technology.

Section II examines global problems and specific development needs to which science and technology should respond in the future. It considers trends and potentials in relevant fields of science and technology.

SECTION 1 TECHNOLOGY, TRANSNATIONAL ENTERPRISES, AND DEVELOPING COUNTRIES

Chapter I

Technology -- Its Creation and Transfer

What is Technology?

Because of the central significance of this concept, it is important to make clear the meaning of the word "technology" as used in this report. Technology is the know-how for the application of scientific knowledge to the creation of a specific product or performance of a specific task. It may encompass thousands of detailed steps that are necessary to develop and manufacture a product from the design and development of manufacturing processes and equipment up through a successful marketing capability. While science is knowledge, and may suggest what is possible, technology translates the possible into the practical through the embodiment of planning, engineering, and management.

The bulk of civilian technology in market economies is developed by private enterprises at their own expense; they therefore expect compensation for making it available to others. Some important technologies have also resulted from government projects, as in defense and space exploration. Such technologies generally have also been adapted for civilian use at considerable expense by private enterprise.

The other significant generator of technical information is the University. Certain of their resulting technologies have been directly transferred into practical use -- especially in fields like health care and agriculture. However, the larger part of University contributions to scientific knowledge again requires further investment and development by public or private enterprises for successful commercial application. Because of these significant investments in time, highly qualified personnel and important financial resources, technology developed by commercial enterprises is usually not available without cost.

Fundamentals of Technology Development

One of the prerequisites for the development of the technologies chosen in a particular country is a population that includes a sufficient number of people adequately educated in science and engineering. The availability of good scientists and engineers is no assurance, however, that the technologies desired will be produced. There are examples of countries with high standards of scientific and engineering knowledge which have contributed few technological innovations.

The translation of scientific knowledge into products and processes, then, necessitates additional steps beyond merely gathering a group of persons knowledgeable about science and engineering. Such an additional requirement is their ability to conduct product and process development. For this to be accomplished properly, those conducting the work need to be thoroughly familiar with the requirements, the everyday problems, and the potentials, of the users. It is important that they be able to identify possible needs and, from those, identify promising solutions or markets. This kind of user orientation is an important stimulant to the innovative spirit of development scientists. Process and product development also require the collaboration of technical persons trained in a broad spectrum of scientific disciplines, and of production and marketing specialists. The effective coordination of this complex array of technical activities and resource investment also requires the kind of expert management which has been highly developed in the TNEs.

If the application of the new technology is to result in the production of a machine, or a consumer product, or simply a set of understandable instructions to operate a system, it will be necessary to set up an organization or a facility to produce the desired end product. Problems of raw material costs, capital investment, labor supply, and the efficiencies of the available infrastructure all need to be considered. This production phase may give rise to many other technological information needs not anticipated in the initial technology development.

The next step may be setting up an adequate organization to distribute the material and, in the case of a novel product, to register it with what is usually a multitude of government agencies. It may then be necessary to work out optimal ways of applying the product

under different environmental conditions and, finally, to educate the potential user on how to use and maintain the product safely and efficiently.

When a new technology is acquired rather than developed in a country, these steps are sometimes taken in a different order. Nearly always, whatever the situation, there is a necessity for the existence or creation of an educational infrastructure adequate to receive and to apply available technologies. This activity can take from a few months -- in a country which already has good educational facilities or is the recipient of a less complex technology -- to several years.

Important also is the need to establish whether there is a potential demand for the product or process among the people of the country. In the case of new products, it may be necessary to provide in-depth instruction on the uses, maintenance and repair of the product by the producer or distributor. If a careful effort is not made to determine the market and to instruct the potential customers in the use of the product, the whole effort may falter.

The choice of the appropriate product and process technologies can only be made after market needs have been identified. The choice will be governed by any number of factors, including availability and skills of the labor pool, the size of the market and possibilities for export, costs of materials, government requirements, and potential competition. When decisions on these matters have been made, it is usually necessary to adapt and develop existing technologies to local conditions with assistance from experienced industrial enterprises.

The final phase will be the design and construction of production facilities themselves, which can be a long and time-consuming process.

Setting Priorities

Science and technology are inherently associated with progress, and progress is another term for socioeconomic development. Where nations have applied science and technology for the benefit of their people, development has occurred. Some examples are improved crop yields and the resultant reduction of malnutrition, improved control of disease, provision of better transportation, and the establishment of new job creating industries.

The adoption of new technologies by a developing country is an exercise of the management and planning disciplines referred to earlier. It requires an assessment of both natural and human resources, infrastructure, markets and technological capability. The analyses required to produce the national papers assembled for this United Nations Conference are valuable in this kind of assessment.

The minimum scale of economic operation for some industries is too large for the size of the market of many of the smaller developing countries. For some high-technology industries even large countries could represent too small a market. In such cases, regional plants might be built to serve world markets. There are other kinds of projects, however, particularly those associated with agriculture and some food products, which can be adapted for even the smallest countries.

Certain technologies are viewed as prestige projects or symbols of self-reliance by some countries. The burden of such a project on finite manpower and financial resources may impede rather than facilitate economic development. A frequently attempted justification for obtaining a prestige project is to base the plan on export of production and services to major markets of the world. While this seems to offer a tempting approach it often fails because the product thus exported is not cost-competitive with those of larger, more efficient, more centrally located producers, usually established in larger or more developed countries.

Choice of Technology

There is need for great care when making a choice among different technologies. There are some that are too advanced, others that are not yet fully proven, still others that are not sophisticated enough for a country's situation. It is because of this abundance of choice, and the many possibilities for going wrong, that skilled nationals, who know their country's capacities and needs, are so badly needed for the planning process and the assessment of the various possibilities.

In general, it has been found prudent to select a technology which has already been field-tested and proven rather than deciding on a newer approach which might seem more advanced but may not work out.

Established technologies have the advantages of being more widely employed and more fully understood. Often, they have been adapted to a variety of situations or applications which may save the developing country the time, trouble and expense of working out an adaptation for itself.

In this connection, it is striking to note that even the most sophisticated industrial enterprises in highly developed countries buy substantial amounts of the technology they use. They have found that in many cases it is quicker and cheaper to license or purchase proven technology already available than to labor through the costly research and development process. In some instances the opportunity that occasions the start of the research and development has disappeared by the time the work nears completion. Great Britain and France both paid almost as much for acquired technology in a recent business year as they received in income for their own technology sold outside their borders.

The developing country can sometimes profit from the examples of its neighbors and its counterparts in other regions, studying what appears to work and why, and what fails, and why these failures occur.

Avenues for Technology Transfer

Many institutional mechanisms exist through which technology can be transferred from country to country. They may involve separately or in combination government, industry, academic institutions, research and consulting institutes and even individuals on either side of the boundary across which technology is transferred. Each of these institutions has a role to play under widely differing sets of conditions. For example, where a technology to be transferred is one resulting from government sponsorship, the government usually is the owner of the proprietary rights and, therefore, must be a party to any efforts or agreements to transfer that technology. Similarly, a research institute in a developing country may be involved in the transfer because it is in a good position to understand, utilize and adapt a new imported technology.

Only in rare cases, however, is the government or a research institute the owner of technology applicable to commercialization. Their work is usually directed towards the development of the basic infrastructure necessary to receive and apply technology. It is the TNEs who have developed and who possess such technology and are the most experienced agencies in effecting successful technology transfer. They have personnel trained in understanding and managing the technology within their organizations. They also have the needed research and development, financial, marketing and planning capability.

Cooperative Approaches

The world is now so economically interdependent that the application of science and technology can benefit almost all economies. The transnational enterprise can play a useful role in furthering international cooperation among market economies, centrally planned economies, and developing countries. In considering such cooperation, those involved in the applications of technology should recognize that technology itself is always changing and evolving. It is by its very nature dynamic. Therefore, the technology transferer and the host country users will benefit by constantly evaluating and upgrading the technology already transferred. In order to do this it might be necessary to organize suitable research and development (R&D) programs.

Long experience in industrialized countries has shown that in order for any R&D organization for technological development to be successful, it has to exceed a certain minimum critical size. It has furthermore been recognized that such an organization does not thrive well in isolation. This means that the success of an R&D facility is dependent on close contact with other parts of the enterprise, in particular with production and marketing units. R&D activities are also stimulated by the proximity of universities, engineering schools and training centers for technical staff.

Choice of Partners

An all-important decision in a transfer of technology is the selection of partners, both from the developing country receiver's viewpoint and

from that of the transnational enterprise. The technology itself may be suitable, the opportunity promising, the market receptive, the labor supply ideal, but without a good working relationship between the host country technology receiver and the TNE, success is unlikely.

The technology recipient should learn as much as possible about the TNE with which he proposes to deal. He should also carefully scrutinize other alternatives. A nearby country may be planning a similar installation which could provide all of the production the region would be able to absorb in the foreseeable future. Or the market for the product may be threatened by new developments meeting the same needs at lower cost, making the planned installation uneconomical and short-lived.

Successful transfers have two notable qualities in common; they offer substantial, enduring benefits for both sides, and they are based on a mutual understanding of the participants objectives and desires. Flexibility of approach appears, from study of many such transfers, to be an essential ingredient. Flexibility is the willingness on the part of the respective business partners to try to accommodate new elements that have entered into a situation. It is required during the negotiating stage, and just as importantly, in the operating stage. As the enterprise matures and changes occur in the country's economy, markets or currency exchange relationships, flexibility to face and manage such changes will be decisive.

Flexibility fundamentally entails observing the spirit of the agreement originally reached between the transnational enterprise and its host country partners. The intent in such agreements is that mutual interests be served, that the TNEs and their counterparts in the host country continue to benefit in ways that are important to them.

Chapter II
The Role of Transnational Enterprises In Accelerating Development

Mechanisms of Transfer

Scientific discoveries and technological applications have played central roles in development in the 20th century. There is pressure in most, if not all, countries to raise the standard of living, the educational level, the standard of health care and income levels -- in general, the quality of life. Practically all of these sought-after improvements can benefit from the application of science and technology.

Disinterested study of the mechanics by which technology is transferred has shown that transnational enterprises are often the most effective transfer agents, their effectiveness being due to their structure and objectives. In a successful corporation the management must obtain the most productive use of research and development through planning, manufacturing, marketing, and distribution. The resulting product or service has to be of a competitive quality for the markets concerned.

The present store of technology was created primarily by successful companies operating under the competitive market system. It was competition that proved so effective in developing useful technology. It is the rewards that result from successful competition that have given entrepreneurs the incentive, the opportunity and the resources to innovate -- to introduce new products and services and new solutions to problems.

Competition exists even within TNEs themselves, for example, for access to capital with which to finance projects. If they are profitable, enterprises have the resources to try new methods and to develop better ways of doing things. Even so, all enterprises, large as some of them are, have limited resources that can be committed at any one time, and their management must decide which investments and activities should receive priority.

Among elements influencing the decision of an enterprise to establish an activity in a developing country, and to subsequently transfer technology, is the assessment of the risk involved in committing the

required resources. Here again, it is the competitive market system with its built-in checks and balances that has proven itself a valuable safeguard against unwarranted risks and major losses. Most TNEs expect and even welcome fair competition which often results in an expanded market. Competition from local enterprises is part of, and enhances the growth of, the economy of a host country and thus improves the quality of the infrastructure and expands the size and purchasing power of the market in which the TNE operates.

The fact that each enterprise has to continuously keep proving itself to avoid going out of business, has caused the development of certain sequences for investigating foreign business opportunities. In the area of consumer or capital goods this sequence will usually begin with the company exporting its products. If the sales of the imported product in the host country are successful and if the level of demand is promising, the company may evaluate the advantages of local production. At that point, the TNE and the possible host country partners may decide together what specific action should be taken.

In a natural resource industry such as mining, the initial step is different in that a considerable investment abroad will have to be made with subsequent differences in the risk assessment.

All such actions would involve a transfer of know-how in some form, including patents, technical knowledge, capital equipment and various management and technical skills. Even when the seller of the technology is from a planned economy where the technology ownership may not be considered private property, an analogous process would have to be followed.

When discussing specific commitments both sides must recognize that risks and rewards are involved. The seller will risk invested resources if a reasonable opportunity for an adequate return exists. For the host country partner, the commitment of its resources must also entail a reward commensurate with its own risks.

Experience has shown that return on investment, protected ownership, and political stability are major factors lessening the risks and providing incentives for TNEs to expand existing arrangements and to establish new ones.

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In practice, transnational enterprises also introduce new technology into countries in ways other than manufacturing. A type of transfer of resources and of technologies without manufacture is the training of local personnel and management, and of public and private sector customers and suppliers in the use of machinery, equipment and processes. To contribute to the local pool of skilled personnel for future employment, TNEs frequently stimulate and participate in the expansion of national educational facilities, and members of their staffs themselves engage in various training programs, either locally or abroad.

The transfer of skills through training and education is a constant process that TNEs carry out in the normal course of business. Similarly most TNEs have a need for local suppliers to manufacture high quality products. This need usually results in an enhancement of supplier operations and the creation of new local skills and jobs.

Although some kinds of decisions must be made centrally by TNEs in order to coordinate their activities on a worldwide basis, proven management principles call for decision making to be decentralized as much as possible. Great efforts have been made and are being made by TNEs to train citizens of host countries who are familiar with local conditions to assume decision making responsibilities. This ultimately contributes to the efficiency of the operation. It is also a contribution to the human resources of the country.

Some of the individuals so trained assume positions of responsibility elsewhere in TNEs where their knowledge of developing country needs and modes of operation enhances further cooperation between TNEs and developing countries including their own.

Scientific and technological capabilities of the country are built up by TNEs even at the cost of lower initial profitability. Customer service, qualification of suppliers, and quality and environmental controls, all of which may not be immediately profitable, must be established. On these may be built more complex functions of process improvement, product improvement, alternative products, and finally new product lines to meet needs peculiar to the particular country. All of this requires an increasingly competent supply of scientists and managers and considerable local freedom to choose and market products. The end result is

enhanced development and reduced dependency of the country on external technology.

Finally, it cannot be emphasized enough that there are few issues, if any, that arise in negotiations between TNEs and prospective host country partners that are unique to developing countries. Essentially the same range of issues arises within industrialized countries, whether market or planned economies.

Common Objectives of Host Countries and TNEs

The history of TNEs operating in developing countries has shown again and again that transfer of technology, if it is to be successful, should serve the economic and social objectives of the host country, its technology-receiving partners, and the TNEs' own commercial and financial interests. Among the benefits most frequently sought by developing countries and provided by TNEs are

- Long-term investments, helping to build up the country's industrial structure.
- Increased revenues which can be used for general government purposes.
- Improved balance of payments through import substitution and exports.
- Enhanced employment opportunities.
- Availability of a range of human resources, particularly of managerial and technical personnel that might not be readily accessible under other circumstances.
- Development of new local productive capacities, e.g. sub-contractors and other suppliers.
- Training facilities for local personnel on all levels, thus adding to the pool of available managerial and technologically qualified persons.
- New channels for access to technology.
- Opportunities for local scientific and research institutions to exchange ideas and information with their counterparts in other countries.
- Improved working environment.

In working with host countries towards providing these benefits the TNEs have demonstrated their adaptability to a variety of social and governmental systems and changes and have made a positive impact for the benefit of all. In so doing they have reinforced the developing countries in pursuing the objectives of a New International Economic Order. The TNEs believe that the real challenge is the creation and development and distribution of new wealth. The TNEs will continue to be a vital force for the solution of this world problem.

Some Illustrative Experiences

Many countries have benefited from rapid technological development in recent decades, resulting in improved standards of living, higher income levels, and greater degrees of self-sufficiency. These advances have been particularly striking in several Latin American, African, and Asian countries.

The case history of a multinational mining company which developed the mineral resources of an African country offers a textbook example of mutual accommodation of differing cultures and ways of doing things in order to get a job done. The willingness of the TNE and the host country government to take into consideration the wishes and goals of the other side created a harmonious relationship which clearly benefited both parties.

> The history of Halco (Mining) Incorporated in Guinea goes back more than fifteen years. It represents one of the first efforts to create a partnership between a technology-rich TNE of the developed world and a resource-rich developing country. The word "partnership" is used advisedly: the enterprise is a true joint venture, in which Guinea supplies the basic resources, bauxite and the manpower to extract it, while Halco provides the financing, does the construction, and supplies the technology.
>
> The company is responsive to the need to transfer technology to the host country and to increase the role of local employees in directing the operation. The company agreed to establish a manufacturing plant in the country for the fabrication of consumer articles made from aluminum, and agreed to use nationals in all jobs not requiring specialized knowledge and to set up a program of progressive Africanization. Other provisions of the agreement were that the company would work out plans with the government to build refining and smelting plants, that it would buy goods and services it needed in the country

to the extent possible, and would ship much of its production in vessels under Guinea's flag.

Halco took every opportunity to transfer technology to the host country, by training on the job and in formal technical courses, and training of nationals at private firms outside the country. Its philosophy is that if the skills of technicians and administrators within the country are increased, the company's operations there can be conducted more efficiently and more profitably. The scope of the training offered attests to this: the company has arranged and paid for training outside the country not only for mining technicians, but also for medical technicians, warehouse operators, accountants, refrigeration engineers, harbor masters, and airplane pilots.

The enterprise has been successful: the mining operation will reach its design capacity of 9,000,000 metric tons in 1980, seven years after production began. The country's government has a strong regard for the commitment it made in the basic agreements. For its part, the mining company has reduced the number of expatriate employees to less than 10 per cent of its work force. It has more than 1,800 African employees, including a vice president, an office supervisor and the corporate controller. One third of all the supervisory positions are filled by local employees.

The mining company operation in Africa has worked despite different political and economic philosophies because both sides were willing to make concessions in order to achieve progress together. The same sort of pragmatic acceptance of differing approaches in order to accomplish specific goals is seen in the experience of the Philips' Gloeilampenfabrieken Company in the development of manufacturing activities throughout the world.

The Philips' Gloeilampenfabrieken Company, the Dutch transnational firm, has systematized its transfer of technology activities with the use of a pilot plant which assists in the development of manufacturing activities for various developing countries. The plant serves as a center of information for industrial activities in countries with limited industrial possibilities, and transmits the know-how of the Philips Group.

Among its activities are developing manufacturing technologies that are suited to local circumstances and small production runs, simplifying equipment to ease operation and repair, producing technical manuals that are more easily understood, helping in training and selecting of personnel, and providing continuing assistance with the transfer of know-how. The plant has helped develop manufacturing activities in more than 20 developing countries since it was opened in 1961, and will continue its work with those and other countries as new technological needs evolve.

Two cases involving major transnational enterprises in Mexico illustrate how transferred technology can stimulate the growth of new industries and how the highest levels of technical expertise can be conveyed to persons with little previous training.

The Bata Shoe Organization, of Canada, decided on the basis of a study that a promising market existed in Mexico for all-plastic injection-moulded footwear. A multinational team including a Mexican engineer was sent to France for training on Bata equipment there. Production in Mexico was begun with 15 workers in 1959, when 93,000 pairs of shoes were produced in a rented warehouse. By 1963, four years later, the company was up to 125 employees and was producing at the rate of 1.8 million pairs per year. The need its management had detected was clearly a real one.

The explosive rate of growth continued so that by 1979, after building a new plant and introducing new, more sophisticated moulding equipment and a new product line, the company has 1,200 employees and is making 9 million pairs yearly. Nine of the top ten executives reporting to the company manager are Mexicans, all trained and developed within the company. The ripple effect of Bata's presence is striking. There are now some 15 other manufacturers making the new type of shoe in Mexico alone, with total annual production of more than 30 million pairs, and the spread of injection-moulding has generated thousands of other jobs outside the shoe industry.

The General Electric Company (GE) began operations in Mexico in 1896, but only started making incandescent lamps there in 1930, in the city of Monterrey. Light bulbs look simple enough but, in fact, they must meet extraordinarily exacting specifications if they are to provide long service. GE, which now employs 900 persons in its Mexico lamp department, sought to make most of the components of the lamps from local sources in Mexico. The special glass required is made in the plant, starting with silica sand, and the glass ovens were built in the plant following GE designs. The factory has reached such a high level of performance that the bulbs made in Monterrey meet export standards for Germany and France.

This level of technological achievement was reached by painstaking training and careful work. The company conducted a series of courses on elementary statistics and quality control techniques for machine operators and supervisors, with higher level courses for managers and engineers in the plant. These were worked out in cooperation with the leading local university. The company has found there is an intense interest in the courses; the training and development programs have been so popular that in recent years the amount of worker time devoted to them reached a peak of more than 140,000 hours per year.

These examples illustrate that when a technology transfer agreement is mutually beneficial the relationship created can develop and broaden very rapidly.

> Dunlop Limited reached an agreement in 1971 with a Yugoslav entity to establish a plant for production of high pressure braided wire hydraulic hose and hose assemblies. Dunlop had sold such hose to Yugoslavia for some years and wanted to serve the regional market but could not penetrate that market on its own. Dunlop Limited provided the technology and training as well as some of the capital. Since 1974 capacity has been substantially increased, product range extended and employment almost doubled. Sales are not only in Yugoslavia, but also in Eastern and Western Europe through harmonized export arrangements.
>
> The working agreement has created a commercially successful venture with steady growth, an excellent reputation for quality, an acceptable profitability for all partners and a base on which to build other high-technology businesses.

This example and the case below also show that enterprises from market economy countries and centrally planned nations can work rewardingly together.

> International Harvester (IH), seeking to establish markets in Eastern Europe, reached an agreement with a Polish company for the manufacture of heavy agricultural and construction equipment. The Polish Company, Bumar, was to obtain the necessary technology from IH under a ten-year licensing agreement, and was to make machines for the COMECON market and components for IH factories in Western Europe. Later, when Bumar had sufficient experience and had developed the technological skills necessary, it would make complete machines which would bear the IH trademark and would be sold in IH's traditional marketing areas.
>
> The advantages for Poland include a major technological advance that might have taken years to accomplish without the training and expertise furnished by IH, and the acquisition of vital machinery needed for construction projects with only limited spending of scarce hard currency. Poland has acquired what is virtually a new industry which provides a large number of jobs, generates substantial local income, and teaches skills that will be useful in many related areas of industry. International Harvester describes the operation as having become a unique relationship which has the potential of even greater cooperation between the two participants in the future.

These case studies were deliberately drawn from successful experiences. Certainly there have also been failures for which each of the parties may

have been at fault. What the success stories should indicate is that when specific critical conditions can be established and adhered to, failure will be avoided.

Transfer Decisions in Practice

Before deciding to enter into an agreement with a partner in a host country, a transnational enterprise will typically designate a team of experts to assess the opportunities of establishing a business in a particular country. The preliminary investigations are determined by the size and scope of the prospective investment. Such advance studies may go on for more than a year.

The team members seek out and study economic, social and political data. The following illustrates some of the questions and conditions such a team might study

- Is the market potential large enough to permit economies of scale that will make profitable operation likely?
- Will conditions be such that the TNEs will be permitted to make a satisfactory return on investment?
- Is total or majority ownership available to the TNE? If not, are capable business partners available so that minority ownership, joint venture, licensing or franchising might be acceptable?
- What is the nature of the competition?
- Are there likely to be changes in taxation which would affect private corporations,. and if so, when, and how severely?
- Are there restrictions on remittances, on production and on prices and if so, would they endanger an equitable return on investments?
- Is foreign exchange available to import raw materials?
- What other problems may affect access to raw materials?
- Are there requirements for the use of locally produced components in finished manufactured goods? If so, can they be met?

- What are the social conditions including education, training, medical and welfare institutions?
- Is there a local requirement to export a percentage of manufactured goods?
- Is there a history of political stability?
- Is there security of proprietary technology? Will company assets be vulnerable to seizure?
- Is there a sound basis for mutuality of interest? Is it understood?

Two of these criteria warrant special commentary. One is the matter of requirements for locally produced components in manufactured goods. TNEs understand that these requirements are imposed both to improve the balance of payments and to foster the development of local industry. They note, however, that the costs to the host country of such requirements may, in particular cases, far outweigh the anticipated benefits. Excessive costs or quality problems can discourage planned expansions and cancel additional job opportunities.

The other point warranting special comment is a requirement to export a fixed portion of the local production. Such a demand would become a problem if the product should become non-competitive in world markets. Inflexibility concerning this requirement may influence a TNE's decision to proceed with a project.

Generally a TNE has four basic aims wherever it operates.

One is to achieve its economic objectives.

A second is to produce a product or service of value and quality that meets the market needs.

A third aim is to ensure that the motivation of its employees world-wide is stimulated by appropriate wages and working conditions.

Its fourth aim is to fulfill its responsibilities as a good corporate citizen in communities in which it operates.

Many large TNEs have established programs and functions specifically designed to cooperate with home and host governments in reaching country goals. An example may be to locate plants where they will help to achieve general development plans.

Most TNEs have progressively developed high standards of business conduct outlining their responsibilities towards their owners, customers, employees and the communities within which they operate in their home countries. In effect, these standards are also the basis of positive guidelines for the development of their business relations with other countries. Common among these is insistence on compliance with local laws and design and operation of plants in host countries to meet safety and environmental standards consistent with those in the home country. The TNEs, in endeavoring to support the national objectives of host countries and at the same time maintain their own business standards, often defer immediate financial returns for longer range benefits.

It is not the role of TNEs to attempt to influence a host country's political affairs either on their own behalf or on behalf of their home countries. As good corporate citizens they can provide leadership in establishing and maintaining sound business policies, and in so doing, will communicate their views of what economic policies would benefit both their own operations and the host country.

The preceding discussion has demonstrated that within a business environment favorable to all parties, the experience, knowledge and technological capabilities of TNEs can make substantial contributions to accelerating development.

Chapter III
The Role Of Developing Countries

Transferring technology between countries is a complex endeavor. Differences in social, economic and legal systems must be bridged for a smooth transition. Diversity is also great among industries. Agriculture is different from consumer goods. Within agriculture, farming is different from food processing, which is different again from distribution and marketing. All these differences are naturally taken into consideration by developing countries seeking transfer of technology through the activities of transnational enterprises.

Technology and Development Planning

Essential for the successful transfer of technology is effective planning. An important service to nations participating in the United Nations Conference on Science and Technology for Development was undoubtedly the self-analysis called for in the preparation of their national papers. To the extent that a country comes to a real understanding of its resources and its needs, and of the adaptability of its institutions to meeting them, to that extent will it be able to develop an effective national plan. With this plan it can then choose the proper technology to contribute to its development objectives.

An effective development plan is, of necessity, related to the nation's financial and other resources. The technology component of a development plan should provide the incentives to create, or attract from the outside, resources it needs. Assessments must be made of the benefits of labor intensive versus capital intensive technology. Other decisions involve balancing the needs of the local market and the need for exports.

In considering the role of technology in the national plan, of prime consideration are the human and material resources available. For example, a mining enterprise must be supported by mineral resources extensive enough to warrant major investments. A highly technical development will require a supply of educated/technically trained personnel. Thus, in preparing their national plan a country will want to examine its infrastructure capabilities -- its transportation, communications, educational levels. Where the infrastructure in a country is more developed the accessability

of the country to available technology is greater and the transfer process is less costly.

Economic and social objectives enter into the planning process in important ways because again they bring up the central question of choices. An economic objective of high priority might, for example, be the increased flow of hard currency. The government might therefore decide to stress the development of tourism over other industries. Social objectives might suggest emphasis be placed on construction of new housing thereby reducing resources available for other government programs.

All of these considerations have parts to play in the over-all strategic plan designed for the nation. This means setting goals for the country and selecting strategies. The specific goals, and the measures taken to reach them, will of course vary from country to country, but the need for planning remains constant.

In working out details of the plan, a critical question will involve the means of acquiring technology. The alternatives are to license or buy it, to arrange with owners of technology to bring it into and manage it within the country, or to develop it locally.

Under any of these alternatives, it is usually desirable to put emphasis on the development or acquisition of technologies which draw on locally available resources. This approach has the double effect of taking advantage of local assets and limiting the need for imported products, thus reducing dependency. A good example of this is Brazil's "gasohol" program, which substitutes alcohol for gasoline. The alcohol is produced from locally available and previously under-used resources and its use as fuel cuts down on the need to import petroleum.

Another example, which has the additional advantage of increasing export earnings, is the adaptation of imported spray-drying technology to the production of instant coffee.

Management and planning as disciplines have reached a high level of refinement in certain transnational enterprises. Expertise in these disciplines could be made available to developing countries as a form of technical assistance. Many transnationals are prepared to lend planning personnel to host countries to assist in the planning process. The developing countries may do well to consider soliciting the services of designated TNEs in

a consultative role without necessarily committing either the TNE or the country to longer-term business involvement.

Education and Training

Many developing countries recognize the critical need to improve the standard of technological and managerial education, training and organization. This improvement is needed to gain the expertise for understanding, choosing, assimilating, implementing and adapting evolving technology to individual needs.

The range of development includes training in basic skills for industrial workers, operators, first-line supervisors, and the necessary supporting specialists. Much of this can be done in cooperation with international agencies, technical and training institutes, as well as with transnational enterprises. At least as much emphasis should be placed on this kind of training as on the establishment of university research in basic sciences. A pool of appropriately trained people is a tremendous asset in achieving technological development.

The range of developmental education and training required in a country will vary but in general it covers a span from basic through advanced skills, covers crafts and technical work, and includes scientific and management training. Research experience is an especially valuable prerequisite for advanced technologists. The availability of an array of trained and skilled persons reduces the demands on the firm transferring technology, and reduces the number of foreign scientists, engineers, managers and other employees needed to fill positions, and thereby decreases the cost of transfer.

A special effort should be made both by the TNE and the host country to provide instruction and practice in foreign languages to present or potential members of the technological work force. The ability to understand and to communicate readily can speed up the transfer of technology significantly. It can cut costs by limiting the need for interpretation and translation, as well as by reducing the number of expensive mistakes made due to misunderstandings.

A training tactic that has proven particularly rewarding for developing country personnel involved in a new technology activity is instruction at the home plants, offices or laboratories of the transnational enterprise

supplying the technology. This experience usually provides a clearer idea of how the completed process functions, and very importantly, it provides a better understanding of the philosophy and the motivations behind the corporation's management system.

Business Environment

A developing country that wishes to maximize the contributions of TNEs to its development should attempt to create as inviting a business climate as possible.

A reduction of administrative approvals needed from multiple ministries such as tax, foreign exchange, environment, or customs would greatly contribute to more effective transfer of technology. Regulations governing technology transfer should be flexible, allowing both the transnational enterprise and the local authorities to modify their positions on specific questions so as to achieve the basic objectives of development.

An environment characterized by the consistent honoring of agreements -- by private parties and by governments -- is as important as a good system for enforcing agreements.

Even with the best of intentions and good will, disputes will sometimes arise. Insistence on resolution of such disputes within the country, rather than before some impartial international body, is seen by transnational enterprises as placing them at a distinct disadvantage. In fact, such insistence often inhibits reaching an agreement, rather than facilitating it. The impartiality of a national board or group adjudicating a matter of interest to the nation, with a foreign company at the bar, is often seen as doubtful. Arbitration by recognized international bodies should be acceptable. Their decisions can be enforced in the courts of most industrialized countries, so the developing country is not by any means without recourse. It should always be recalled, however, that a cooperative spirit maintained by both sides has often overcome difficulties not foreseen in laws or legal documents.

An understandable concern among TNEs is the question of equal treatment, including comparable taxation, of foreign and domestic enterprises. If the foreign companies are made to meet different, more demanding, standards than domestic companies, they are placed at an immediate disadvantage that may dissuade them from setting up operations.

As already mentioned, companies must have the right to repatriate profits. The activities of local affiliates are evaluated by TNE headquarters management on the basis of contribution to the total enterprise.

Patent and Trademark Rights

An effective patent system is one of the best incentives for technology transfer. It is of as much value to local enterprise as it is to foreign technology suppliers, since it helps develop indigenous technological capabilities. If local ingenuity and investment are to be encouraged, inventors must be able to disclose their inventions in a protected manner with a reasonable expectation of reward.

The inventor trades the disclosure of his invention, which has never before been known, for a limited term of exclusivity. The disclosure, in turn, provides technical information on which other technical and business people can build. The patent system thus encourages the dissemination of information which tends to be particularly concerned with resources and needs of the country -- information which otherwise might be held as a trade secret.

The reduction of patent terms by some countries in recent years has effectively removed the patent incentive for all but the simplest of inventions. Studies show that it usually takes ten years and more for high-technology inventions to give rise to a commercial return. The recent weakening of patents in a number of developing countries, shortened terms, denial of patents for certain businesses (notably agricultural chemicals and drugs), and compulsory license provisions beyond those sanctioned by the Paris Convention, have deprived those countries of a valuable tool for technology transfer and infrastructure development. Transnational enterprises engaged in pharmaceutical production have been particularly affected. Such weakening of patent provisions reduces the willingness of TNEs to supply technology.

Once a patent has expired, it is available to all with no fees required. Thus, the technology represented by expired patents represents a potentially valuable resource to developing countries.

Trademarks, unlike patents, do not create exclusive rights to the goods themselves. The identical goods (or services) may be sold under

any other trademark, or no trademark. Trademark rights are granted to protect the public, by serving as symbols reflecting the quality standards of the producer.

Availability of trademark protection encourages foreign investment for local manufacture. A trademark license must be accompanied by quality standards, and the instruction in the manufacturing techniques required to create and maintain the standards is a valuable form of technology transfer. Thus a system for the effective protection of trademarks, in addition to being valuable for specific needs of development, is also of general benefit to the entire country.

TNEs place a high value on the know-how they have developed and the protection of it when the information is proprietary in nature. While some technology being transferred for development needs is not proprietary, even in those cases, the relevant know-how to allow its efficient, safe, and non-polluting use may well be proprietary.

SECTION II FUTURE IMPACTS OF SCIENCE AND TECHNOLOGY

Introduction

The application of science and technology has been such an obviously vital factor in the rapid economic and social development in some parts of the world that there is a popular tendency to attribute all such development to the forces of science and technology. It is natural, therefore, to expect that science and technology can be called forth to solve all of mankind's needs. While this is true in some respect, there are practical limitations when attempting to apply science and technology universally to societal development.

Following is a brief summary of some particular global and societal needs which appear to lend themselves to solution through science and technology. Some future advances in science and technology may hold promise for addressing human needs. On the other hand, many apparently promising new technological developments may have practical and economic limitations. TNEs have considerable prior experience concerning such practicalities which may be of value when attempting to use technology as a vehicle for national development. Perhaps the most important lesson learned in technology development and transfer is that economic development on a national scale should be based on well developed, economical technologies of proven practicality rather than on futuristic technological promises.

Population Growth

Specific global needs calling for applications of science and technology relate to the supply of the vital elements of clean air, water, food, clothing, shelter, energy, resources, a benign environment, stable land, and unpolluted sea and space. Application of science and technology has alleviated many problems in these areas. But most fundamental to all of these concerns is maintaining the size of the total human population within tolerable limits. Over the next 25 years world population is expected to increase by 50 percent, with a majority of the increase occurring in developing countries. In order to cope with such growth, it is necessary to expand food supplies and distribution networks, and to increase utilization of all types of natural resources. Concurrently, there is a need to protect the natural environment and conserve resources for future use.

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Human reproduction rates in many regions hinder efforts to attain adequate levels of reliable food supplies and nutrition. They likewise hinder a country's over-all economic growth rate, and its efforts toward reduction in the level of unemployment, and the improvement of other aspects of individual and family well-being.

Advances in biological sciences over the past decade have resulted in technological developments that offer a variety of means for the control of human fertility. It is now widely recognized, however, that while such technological offerings are functionally acceptable, they are hardly sufficient for effective family planning. In both advanced and developing countries experience has shown that the availability of a technological means of fertility control at low cost to individual families does not necessarily lead to a reduction in family size. A complex of other factors -- educational, cultural, religious, moral, traditional, and economic -- control the decisions and behavior of men and women with respect to how they choose to constrain the number and timing of their issue. The nature and relative importance of these factors vary widely among countries.

In the light of such factors, transnational enterprises involved in marketing or producing chemicals or devices for fertility control in developing countries have recognized the desirability of working cooperatively with the government agencies responsible for family health care and planning in each individual country. In this way, both the enterprises and the countries concerned are most likely to find their respective commercial and development objectives served to their mutual satisfaction.

Food Supply

Food shortages, nutritional deficiencies, and inadequate food distribution networks continue to pose major problems despite all the technological advances made thus far. Although global land resources should be adequate in theory, if population stabilizes, to meet the requirements of food production, there is need for more effective distribution of water, fertilizer, and agricultural technology. Losses to plant disease, weeds, and insects account for an estimated 35 percent of production during the growing period. Post-harvest losses due to all causes, such as rodent infestation, fungus infections and weathering account for another 10 to 20 percent of

the total. This means that as much as 50 percent of food produced never reaches the consumer.

The world cannot afford such an enormous drain on its food supply. There is perhaps no more essential concern on which to concentrate the potential of science and technology than this. Improving the world's nutrition and food supplies is dependent upon recognizing the basic need for calories and a balance of proteins, carbohydrates, fats, vitamins, minerals, and water.

Technological developments can contribute through impacts upon climate, ecology, natural resources, fertilizers, agricultural practices, food distribution and marketing. Agricultural technologies increasing yield, economies in water use and distribution, improved soil management, and the reduction of crop and post-harvest losses, all have helped to increase the food supply significantly. Soil preparation and fertilization, harvesting, transporting, processing, and distribution of foodstuffs all require substantial energy. Consequently, all future agricultural technology developments will include recognition of energy costs and supply limitations.

A research area with large potential future impact in plant and animal breeding is the development of genetic recombinants of different species or even different genera. Such techniques may enable faster adaptation of wheat, soybeans and other crops to specific local conditions. Through genetic recombinations it may eventually become possible to modify crops such as corn to fix nitrogen biologically, as do legumes. If research towards this objective proves successful, requirements for ammonia, urea and other energy-intensive fertilizers could be reduced.

The use of chemical pesticides and other control agents is not economically feasible in all parts of the world because of costs and transportation problems. Pesticides are being developed, based on steroids, for example, which interact with insects but will not harm vertebrates. Work is currently in progress to develop resistant plant strains. Another line of research concerns the application of pheromones, which interfere with the reproductive cycle of insects. Such research, if eventually successful, may enable economic control of plant crop losses worldwide.

Water Resources

One of the indispensable resources needed for economic development is plentiful fresh water. Unfortunately its distribution worldwide is uneven and in many developing countries it is in critically short supply. The development of water resources, their distribution and application lend themselves to technological solutions, but massive capital investment and large-scale engineering are required to bring such projects into being.

The developments required for power generation, flood control and irrigation frequently require the cooperative action of two or more countries or regional groups. The feasibility of such projects and cooperative arrangements is well established. It is essential that initiatives be undertaken to commission studies and plan the financing for such major developments to avoid continual waste of this vital resource. Where energy resources are relatively inexpensive, desalination of sea water or of brackish ground water can add vital fresh water supplies for agricultural and municipal use. Future development in such technologies may reduce the cost of water purification, but this is expected to be limited to incremental and minor reductions. Increasing costs of primary energy supplies limit the potential of this source for general application.

Energy

Energy supply is a key element in economic development. The problem is assuring the availability of energy for the world's population, where it is needed, at an affordable price. There is sufficient energy potential in various forms -- nuclear, fossil, solar -- and there is promise of new technological approaches which will tap other energy sources, but the scientific and engineering barriers to these reservoirs are formidable and practical solutions to all problems are not certain.

Probably no aspect of technology has been subject to more discussion and publication within the past decade than energy generation and utilization. This emphasis has arisen from recognition that economic growth for any society is critically dependent upon an adequate and growing supply of energy. This realization is equally true for both industrialized and developing countries, although the forms and magnitudes of the problems can be quite different. Further, dramatic shifts in petroleum distribution

and cost caused by geopolitical events and a slowdown in nuclear development in response to sociopolitical forces have served to accentuate the problem.

Any plan to increase the energy supply system raises the question of availability of the basic resource. For large power systems at industrial or municipal magnitude there is no significant short-term (up to year 2000) alternate to fossil fuel, hydro, or nuclear energy. For this time period and scale of application, the impact of newly developing or "soft" energy sources such as solar, wind, tidal, etc. will be limited to technology feasibility demonstrations and some marginal applications to space and water heating. These latter applications may make some minor contribution to total energy requirements thereby reducing somewhat the growth requirements for large scale energy systems.

For nonurban and nonindustrial segments of developing countries some of these newer developments may be able to contribute in local areas. Here, the major needs are for small, self-contained energy systems operating on natural resources--solar, wind, fossil fuels, or biomass. Current technologies appropriate to these systems are largely available but over-all systems applying such technologies require further development to reduce cost and improve efficiency.

However, much research and development work is under way and it can be expected that significant advances in the cost, performance, and reliability of these isolated power systems will be achieved.

Direct electrical generation by use of photovoltaic devices, while attractive for small systems because of simplicity and low maintenance, is currently prohibitive in cost. However, the economic and technical parameters affecting thermal solar collectors will show continued improvement as a consequence of large R&D programs now under way worldwide.

Solar or wind generators provide only intermittant energy and require the development of systems for storing energy over periods of darkness or no wind. Considerable R&D is being directed at this problem but current systems are expensive and only marginally economical.

The possibility of biomass utilization is also receiving substantial attention and may prove attractive under some special circumstances. Biomass conversion to gaseous or liquid fuels is feasible with existing

technology. Process improvements will permit this resource to be used when the biomass material such as agricultural or forest products waste is available. The biomass-to-alcohol program for motor fuels in Brazil is particularly notable.

Other energy resources such as geothermal and tides are receiving increasing attention. Using current technology, electric power plants are in use in several parts of the world where geothermal steam or hot water reserves occur near the surface. Technology under development may make it possible to tap the inner heat of the earth through deep wells into hot rock. Similarly, tidal power plants operate in special areas where physical conditions of tides and currents are suitable. Such sites are limited worldwide but the enormous energy resource in ocean waves and tides continues to attract the attention of inventors. Practical engineering applications at commercial scale are long-range possibilities.

For the future, past the year 2000, technological developments may make it possible to augment dwindling fossil fuel resources through advances in solar, geothermal, and nuclear applications. Breeder reactors can extend limited uranium resources for nuclear power. The ultimate promise of fusion power, while theoretically possible, requires major breakthroughs for proof of scientific feasibility, followed by the solution of formidable engineering problems before it can be commercially significant.

All too often the costs in time and capital required to implement any new energy supply technology, to the scale required to make a significant impact on a society, are ignored or treated lightly.

Also, it must be understood that major impediments to energy growth are institutional and political as well as economic. The control of markets and prices of energy, the environmental impact of energy developments and utilization all influence the rate at which new developments can be introduced and contribute to over-all energy supplies.

Admittedly while new technological developments will make available additional options for generation, distribution, and utilization and may result in some changes in current economics, nothing is foreseen which will effect significant reductions in the investment or operating costs of energy systems.

Environment and Natural Resources

Problems arising from application of science and technology are being increasingly recognized. Principal among these are limits to the extent to which undesirable materials generated through technology can be accommodated in the physical environment without substantial negative impact on humans and all the biological world. Much has been said and written elsewhere on this topic of increasing concern. A great deal of scientific and technical effort is now being directed at minimizing environmental impact of all kinds of technological activities, but details are beyond the scope of this report.

It is fundamental to recognize that utilization of technology for societal development unavoidably carries along the requirement to address associated environmental impacts. The extent of such impacts are just now becoming fully recognized in highly industrialized countries. An opportunity exists, therefore, for developing countries to benefit from previous undesirable experiences in this regard by addressing environmental aspects at early stages of development. If this is done, the costs of environmental protection can be minimized.

Global limits for all kinds of natural resources are also becoming more widely recognized and acknowledged. Moreover, natural resources are not uniformly distributed in the world. Consequently, developments utilizing science and technology must be based on local availability of natural resources and must also recognize eventual global limitations of all types of natural resources. This subject has also been given extensive attention elsewhere.

What is pertinent here is the extent to which transnational enterprises can provide experience and means for dealing with natural resource conservation. In light of compelling and sometimes overwhelming current human needs, it is tempting to dismiss natural resource conservation as a lesser concern but this would be hazardous over the long term. Experiences in developed countries can provide valuable guidance for developing countries planning technology-based developments. Again a detailed treatment is beyond the scope of this report. It is sufficient to recognize that resource conservation can and should be taken into account in technology and business development.

Education

A social factor intimately related with application of science and technology is the level and type of education available in many parts of the world. The introduction of new technology in many instances may depend on developing the level of education sufficiently for people to accept and utilize new technology. Educational changes may also be needed to encourage local entrepreneurial development which in turn may enhance adaptation of new technologies. Educational concerns may also contribute to the so-called brain drain, because persons from developing nations who attend advanced learning institutions in industrialized nations are often reluctant to return to conditions with relatively limited facilities and intellectual stimuli.

Here, as in many cases, a dual dependency exists: improved education is necessary to increase the level of technology development; and increased technology application is necessary to raise the level of education. Probably the most important technology segment supporting educational development is that of communications. A recent innovation in this area is the use of satellite terminals to bring televised programs of an educational nature to all segments of a population, urban and rural.

Health

In many developing countries, health problems are associated with shortcomings in nutrition, sanitation, water supply, sewage disposal, and food storage and handling. Great sections of the developing world are receiving only the most rudimentary of medical care, with wholly inadequate numbers of hospital beds and doctors, and insufficient pharmaceutical resources. World statistics indicate that there is still a severe level of malnutrition and even periodic starvation, despite years of vigorous effort by public and private organizations all over the world. An inadequate diet not only saps physical vitality but it hampers mental activity, hence it may underlie many of the other human problems and needs of the developing countries.

Applied research holds promise for improving the health of people in developing countries. The people of many developing countries suffer from endemic diseases which could be reduced or possibly eliminated. This

goal perhaps can be accomplished through technology directed toward eradication of the causative organisms and through immunization.

Treatment of physical illness is changing and will change even more as a result of scientific advances in biochemistry.

Most pharmaceutical research and development in the industrialized world, although concentrated on health problems most prevalent in those regions, is also applicable to needs in all nations. Prominent areas include cancer, hypertension, gastrointestinal ulcer, and atherosclerosis. The pharmaceutical industry is also conducting research in parasitic and bacterial diseases of the tropics. The objective is to develop new and improved drugs effective in alleviating the morbidity and mortality caused by such diseases as malaria, leishmaniasis, filariasis, leprosy, trypanosomiasis and schistosomiasis.

Treatment of mental illness may be vastly improved as a result of investigations of chemical origins for many aberrant behaviors previously thought to be psychiatric in origin. A more complete understanding of the importance of minute quantities of chemicals in neural transmission of normal impulses may lead to chemical cures for such mental disorders as manic depression and paranoid psychoses.

Newly emerging computer technology will have an increasingly significant influence in medicine. Growing use of microcomputer-based medical systems over the next decade will result in more rapid diagnosis at lower cost, thus aiding and extending the talents of medical professionals. Computer applications in microbiology, virology, serology and urinalysis will be forthcoming, for example. Microcomputer techniques combined with ultrasonics using opto-accoustic transducers are under development to facilitate low cost, external diagnosis of bone and tissue disorders. Equipment of this type may become available for clinical testing within the next decade, and perhaps may be available worldwide by the end of this century.

As this brief itemization of some new developments toward improved health care may suggest, there is no shortage of invention or discovery in the world of medical research. For developing countries, of prime concern is the ability to deliver effective medical care to masses of people. Such health services are usually limited by economic, educational, cultural and social factors. For each particular national situation, technology may also contribute indirectly to elimination of such constraints.

Transportation and Communication

The global need for effective worldwide communication and transportation networks needs little discussion. To make such systems truly viable requires intracountry networks that adequately serve the local population and that have the proper gateway interfaces to the world network.

Technology for improving communications and transportation can make direct contributions to the economics of developing countries and play an important role in the development of infrastructure. The importance of these prerequisites for development cannot be overemphasized. In addition to the general movement of people, goods and information, such systems are basic to the establishment of training and education systems. In fact, a significant index to the state of development of a society is represented by the state of development of communication and transportation systems within that society.

The technology trends in the transportation and communication segments are well documented. Some of the typical trends are outlined here.

Product development in transportation will be dominated by the needs for energy conservation, increased safety and improved operational efficiencies.

In mass transit, a development of particular importance involves VTOL/VSTOL (Vertical and Very Short Take Off & Landing) aircraft, which will make air transportation available for a broader range of service -- geographically and functionally -- in all countries.

Highway vehicles will benefit from important technology developments in engines, frame and body, and in operational controls. In the 1980's, major improvements will be incorporated in the diesel engines and spark-assisted diesel engines to enhance fuel economy, reduce exhaust pollutants, and extend reliability.

Post-1980 engine technology developments will be directed toward products such as gas turbine engines and electric battery powered engines. Specific technologies related to the electric engine are those involving high energy batteries such as nickel-zinc cells and high temperature sodium-sulfur cells.

To reduce weight and improve performance characteristics of vehicle frame and suspension elements, manufacturers will use composite material

technologies. Similar improvements in body design will result from advances in plastics and plastic processing.

A major advance in highway vehicle performance will be the application of solid state, multi-sensor, stored-program control systems to maximize operational and maintenance efficiencies over the life of the vehicle.

Technological research is underway to improve telecommunications networks providing the following operational efficiencies:

- o Spectrum efficiency -- to permit more telephone channels to be accommodated in available frequency bands.
- o Energy efficiency -- to reduce energy requirements to operate a network.
- o Terrain and environmental efficiency -- to allow communication channels to be used over a broad spectrum of geographic characteristics and for a wide range of climatic environments.
- o Connectivity efficiency -- to provide communications to a large number of subscribers and to provide for connection to the world telecommunication network.

Major telecommunications technology developments are directed toward network architectures that use microwave and maintainable satellites for transmission and digital time switches for switching.

Terrestrial microwave transmission systems will use very large scale integration and very high speed integration solid state digital technologies to achieve bandwidth and energy efficiencies. Specific technologies include optical fiber and laser technologies which are being developed to provide special purpose links between the terrestrial system and satellite ground terminals.

Communications satellites that can be launched and maintained by space shuttle missions will achieve vastly improved launch and operational costs and will have much longer life and higher reliability than current systems. Such satellites will incorporate improved solar cell power to achieve energy and performance efficiencies.

In the context of this report, it is important to re-emphasize that communication systems such as those described support the needs of both developing and developed countries with regard to

- o Broadcast communications for personal education and entertainment.
- o Local and long distance telephone service.
- o Business and government data communication.
- o Medical and other data monitoring systems.
- o Necessary access to remote data for efficient technology transfer.

Typical examples are the application of low cost satellite terminals to bring televised programs to all segments of a population, urban and rural, and application of telecommunication systems that provide access to educational material in all parts of the world. Another communications-related development currently in use, but which will become more widely available and will assume broader applicability, is the earth resource satellite system. This system is used for locating natural resources, predicting weather patterns, and mapping territories. Improved electro-optical sensors, and the ability to tie information into a multiplicity of communication systems, will allow practical use by developing countries. Regions that are little known or difficult to reach can be scanned to determine availability of minerals, fuels, or water power, and can be mapped in terms of significant physical features.

Urbanization and Industrialization

Given its geography, climate, and natural resources, the state of a local economy is determined to a considerable extent by government financial policy, laws, and regulations concerning domestic and international commerce. Population distribution will be significantly affected by employment opportunities, education availability, and cost and availability of energy, all of which will encourage settlement in compact or urban communities.

The contributions of technology to economic and industrial development, as well as to the solutions of problems related to urban development, are varied, and for the most part, indirect. Some examples of such areas are

- o Development of local industry, with choice of appropriate technology, energy, and in some cases natural resources.
- o Application of technology, a trained work force and local material to develop products for local use to minimize imports and conserve hard currency.

- o Use of technology to contribute "value added" processing to materials for export -- for example, smelting tin or copper rather than exporting the unprocessed ore.
- o Low cost production of goods for foreign markets.
- o Development of low cost, serviceable housing.
- o Development of improved transportation and communication systems.
- o Development of improved health care and sanitation systems.

The Practicalities of Technology

The preceding sections contain a sampling of technologies which appear to be emerging at the time of this writing. No such list can ever be complete, since new technologies are continually appearing in different parts of the world. Nor can this or any such brief compilation address those technologies which are necessarily suitable and appropriate for use in specific developing countries. It is important to stress again that the needs of various countries are highly diverse, based on differing climates, cultures, areas, populations, forms of government, resources, and histories. Consequently, the specific usefulness of any emerging technology for a given country must be carefully studied and evaluated.

If there is any one overriding element of previous technological experience which can be of benefit and importance to developing countries, it is that economic and practical constraints have to be considered when selecting technologies upon which to base national development plans.

Choosing technologies for development is a matter of judgement not without risk. Even with the most sophisticated technological personnel, experience in industrialized countries has shown that unfortunate choices have been made surprisingly often on the basis of convincing but overly optimistic scientific expectations. Many of the technologies included in the preceding compilation may not become practical or economically viable for any use at all within the foreseeable future.

Emerging technologies inevitably involve uncertainties regarding their ultimate practicality and economic potential which can be resolved only through continued development and trial applications. Many, in fact, may require some breakthrough, yet to be accomplished, before practicality is attained. One particular instance of this is fusion energy utilization.

Even with the necessary breakthroughs, the time needed for development, practical dissemination and large scale introduction of any major new technology is generally measured in terms of decades. Consequently it is important that economic planning for development not rest on unreliable assumptions that any new or emerging technology not yet in wide practical use can be selected for application in the near future. Rather, experience indicates that national development should be based solely on technologies whose economic performance has been proved in practical applications.

Whatever may be the starting point for development, particular areas of research, technology and development have to be selected which are suitable for specific, current national needs. This may require that the very newest, most innovative technology be rejected in favor of less advanced but well-proven alternatives. In this manner, the substantial costs and valuable development time associated with implementing new, unproven technology can be avoided.

Well chosen science and technology, prudently applied, can be a boon to mankind, but they do not offer a universal solution to all of man's problems.

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