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INTERNATIONAL TRANSFER OF TECHNOLOGY

Report of the President to the Congress

together with

Assessment of the Report by the Congressional Research Service
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PREPARED FOR THE

SUBCOMMITTEE ON INTERNATIONAL SECURITY
AND SCIENTIFIC AFFAIRS

OF THE

COMMITTEE ON INTERNATIONAL RELATIONS
U.S. HOUSE OF REPRESENTATIVES

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[1] Deceased.

FOREWORD

In August 1977, Congress enacted the International Security Assistance Act of 1977, Public Law 95–92, requiring the President under section 24 to conduct "a comprehensive study of the policies and practices of the U.S. Government with respect to the national security and military implications of international transfers of technology in order to determine whether such policies and practices should be changed." While there were several factors which aroused congressional concern about the issue of technology transfer including Export Administration Act Amendments, the preparations for the U.N. Conference on Science and Technology for Development, General Accounting Office reports on East-West trade, and growing imbalances in U.S. trade, the committee was particularly interested in the impact of defense equipment licensed and coproduction arrangements on the President's policy of conventional arms transfer restraint.

During the spring of 1977 as the committee drafted the International Security Assistance Act for 1977, much attention was focused on the various mechanisms by which U.S. arms transfers might be limited, consistent with the policy articulated by the Congress in the International Security Assistance and Arms Export Control Act of 1976. The President's declaration of conventional arms transfer policy of May 19, 1977, identified several specific measures which would be implemented in addition to a dollar ceiling on the volume of arms sales which would better control and restrain U.S. arms transfers. Among those controls were stringent limitations on the use of licensed and coproduction agreements.

In the long run, U.S. Government efforts to stem the international proliferation of conventional armaments will not be successful unless other arms suppliers agree to multilateral restraints on arms production or transfers. At the same time, it is important that the United States make available under appropriate safeguards those products and technologies which can facilitate economic development throughout the developing nations of the world and promote our country's economic security.

The dilemma posed by technology transfer in the narrow field of conventional arms transfer restraint is repeated in such fields as East-West trade and in our trade with other developed nations. We seek to trade goods, services, and technology in a manner that will promote economic growth and not jeopardize our Nation's military security.

The study requirement posed in section 24 of the International Security Assistance Act of 1977 was framed with these dilemmas in mind. Based on the detailed response submitted by the President in compliance with sections 202(b) and 218 of the International Security Assistance and Arms Export Control Act of 1976 (Public Law 94–329) on arms transfer policy, the committee anticipated a detailed, comprehensive study on technology transfer policies and practices.

Furthermore, the study requirements of the Export Administration Act Amendments of 1977 (Public Law 95–52) as well as additional studies conducted within the executive branch as part of National Security Council proceedings should have created a base from which detailed analysis, facts, and data could be presented to the Congress. The accompanying critique of the President's report prepared by the Congressional Research Service of the Library of Congress describes what it perceives to be, in my judgment, the deficiencies of the President's study.

The problems of technology transfer will not be solved quickly. The following report of the President submitted in compliance with section 24 of the International Security Assistance Act of 1977 and critique of the President's report prepared by CRS illustrate the numerous complex relationships between technology transfer policy, military security, international trade, and economic development of interest to Congress. While the study may not adequately reflect the current state of the executive branch's understanding of these issues, it should be a useful document in helping shape the coming congressional discussions on technology transfer-related legislation.

The views presented in the President's report and the critique of it prepared by the Congressional Research Service are those of the respective authors and do not necessarily reflect the views of the Committee on International Relations or its members.

CLEMENT J. ZABLOCKI, *Chairman,*
Committee on International Relations.

LETTER OF TRANSMITTAL

THE WHITE HOUSE, *August 21, 1978.*

To the Congress of the United States:

I transmit herewith the report on international transfers of technology required by section 24(c) of Public Law 95–92, the International Security Assistance Act of 1977.

JIMMY CARTER.

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REPORT OF THE PRESIDENT TO THE CONGRESS PURSUANT TO SECTION 24 OF THE INTERNATIONAL SECURITY ASSISTANCE ACT OF 1977

1. The Nature of Technology Transfer

1.1 *Definitions.*—"Technology" and "technology transfer" are variously defined depending on the context. "Technology" is essentially know-how—ways of designing, manufacturing, or utilizing things. This definition observes the distinction between science and technology although there are, of course, important interrelationships. In this regard, advanced technologies are frequently referred to as "science-based" technologies. The technologies of primary interest in this report are those having significant national security implications rather than, for example, agricultural, health, or educational technologies. On the basis of this definition, "technology transfer" can be viewed as the act of conveying know-how from one country to another. The means of doing so may involve, illustratively, the export of technical data, equipment, and processes.

The effectiveness of technology transfer depends importantly not only on what is transferred and how but also on the capacity of the receiving country to absorb it and put it to work. It may be necessary to train personnel in the receiving country to operate the equipment and processes being transferred. Moreover, on the receiving end, the capacity to manage technology is a significant factor affecting the success of the transfer. Especially in the case of advanced technologies, it may be essential for managers in the receiving country to have an understanding of the rationale underlying the choices—reflected in the technology—of particular ways of doing things.

"Technology transfer" is also frequently employed in a broader sense to refer to the export of products (end-items) embodying particular technologies. Used in this way, the term generally does not connote the transfer of the capability to manufacture the product but only the product itself. This usage of the term is especially justified where the product embodies technology of a level exceeding that available in the receiving country. In addition, certain types of products (for example, machinery and equipment) may reasonably be considered end-items from the standpoint of the producing country but can significantly augment the technology available to the receiving country. Although this report is primarily concerned with transfers of technology from the United States to other countries, it should be recognized that neither of the foregoing ways of viewing technology transfer should be considered a one-way street. The United States has benefited and continues to benefit from technology transfers from other countries to this country in both senses of the term used above.

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1.2 *Types and conditions of international technology transfers of particular significance to U.S. national interests and military security.*—A broad range of U.S. interests may be affected by technology transfers both in and out of the country. These include:

—The nature and strength of our domestic economy and our position in international markets;
—The character of our political relationships;
—The potential effectiveness of our military capabilities and those of our allies relative to those of potential adversaries;
—The stability of our relations with developing countries and of their relations with each other;
—The character of global challenges (for example, environment, energy) confronting the United States as well as other countries and the effectiveness of response to these challenges.

Economic, political, and military factors collectively affect our national security interests. From this standpoint, three cases of technology transfer should be distinguished: (1) Those to allies may be important to maintain the political strength and economic vitality of alliances and to insure that the most effective defensive capabilities are available to all alliance partners. (2) Those to possible adversaries may affect the texture of political and economic relationships but must also be considered from the standpoint of possible military implications. (3) Those to developing countries may also affect political, economic, and military aspects of our relations.

From the standpoint of our national security interests, the types of transfers of special interest can be viewed in terms of the following principal characteristics:

—Whether the transfer (export) involves weapons or other defense articles or services, whether it has potential dual uses (both military and civil), or whether it is primarily civil.
—Whether only products (end-items) are involved or whether varying degrees of know-how are involved.
—Whether the receiving country is an ally, possible adversary, or nonalined.
—Whether the transfer involves nuclear technology or only nonnuclear technology.

This general typology is directly reflected in the conditions set by the United States to govern exports and in our export control procedures. Commercial exports of all defense articles, services, and technical data are subject to licensing. Sales of major defense equipment of over $25 million to other than our principal allies must be handled through foreign military sales channels. Communist countries (except Yugoslavia) are not eligible to receive such exports. Transfers to allies are vital to collective security and are essential for maintaining a qualitative edge over opposing forces. Transfers of conventional arms to countries aside from NATO members, Australia, New Zealand, and Japan are subject to the requirements of U.S. conventional arms transfer policy, which aims at reducing the worldwide trade in arms.

Controls over the export of defense articles, services, and related technical data (whether to allies or others) are administered by the Department of State. Full records are maintained. Quarterly reports are made to the Congress of commercial sales of defense equipment valued at $1 million or more.

Export of other nonnuclear products and technology considered to be of strategic significance—including dual-use items—is also subject to licensing. Exports to non-Communist countries are permitted either under general licenses which do not require case-by-case review or under validated licenses without interagency review. Exports to Communist countries of strategic commodities and of technical data which have not been made generally available to the public require specific review and approval and the issuance of a validated export license. If the data have been published, they may be transferred under a general license. Approval of exports to such destinations involves the provision by the receiving country of an assurance that the end-use to be made of the export is peaceful in character. In some cases, ways of checking on the validity of the end-use assurances are sought. Control over this class of exports is administereed by the Department of Commerce. Data on licensing activity are available to governmental agencies participating in the review process.

Since the Atomic Energy Act was first enacted, special controls have been imposed on the export of nuclear equipment and technology. On March 10, 1978, the Nuclear Non-Proliferation Act became law. Subsequently, new procedures have entered into force controlling the export of nuclear facilities, equipment, materials, and technology. Given the very recent nature of the legislation, it has not yet been possible to analyze the full impact of the new controls. These controls reflect, in particular, concerns about the proliferation of nuclear weapons. The conditions imposed are designed to provide safeguards against proliferation or other military use of nuclear materials or equipment.

Depending on the specific materials and technology involved, these controls are administered by the Department of Energy, the Nuclear Regulatory Commission, the Department of Commerce and the Department of State. Each of the foregoing control systems and the conditions they impose on technology transfer are based on authorizing legislation.

The interagency subgroup on nuclear energy coordination of the NSC ad hoc group on nonproliferation reviews proposed exports. Data on licensing activity are available to the agencies of the executive branch participating in the review.

Since the United States is not the sole source of most technologies covered by these control systems, the effectiveness of controls depends on the cooperation of other suppliers. In the case of exports to Communist countries, COCOM (composed of NATO countries less Iceland plus Japan) provides the coordinating mechanism for controls on transfers to Communist countries. Data transfers by members of COCOM are available to the licensing authorities of participating countries. In general, other COCOM member countries place less emphasis on controlling technical data although they do control technology related to commodities on the COCOM list. Other efforts to establish common policies among suppliers include the development of common approaches by major suppliers of nuclear technology and equipment and efforts, now underway, to explore the feasibility of harmonizing policies among major suppliers of conventional arms.

Considerable data respecting the various licensing activities described above are available to the Congress and the public. Various statistical series also reflect technology transfers. These include, for

example, royalties and license fees, direct foreign investment, and patent statistics. The adequacy of such measures of technology transfer is considered elsewhere in this report.

Given the extent and complexity of the controls which have been established and the need for effort to improve their effectiveness, an ad hoc NSC technology transfer group has been established to coordinate implementation of planned improvements in the export control system. The group will include representatives of the major interested agencies.

1.3 *Types of transfer mechanisms.*—The definitions of technology transfer presented in section 1.1 cover both the transfer of know-how and production capabilities and also the transfer of technology embodied in various products. The report (February 1976) of the Defense Science Board Task Force on Export of U.S. Technology identifies the following spectrum of technology transfer mechanisms (listed here roughly in order of increasing effectiveness; that is, effectiveness in terms of placing the recipient in a position to use the technology on a more or less self-sustaining basis except possibly for spare parts):

—*Low effectiveness.*—Trade exhibits, commercial literature, undocumented proposals, sale of products without maintenance and operations data.

—*Moderate effectiveness.*—Commercial visits, processing equipment without know-how, documented proposals.

—*Considerable effectiveness.*—Licenses with know-how, consulting engineering documents and technical data.

—*High effectiveness.*—Processing equipment with know-how, training on high-technology areas, technical exchanges with ongoing contracts, joint ventures, licenses with intensive teaching efforts, and turnkey facilities.[1]

This list suggests the broad range of activities which can be viewed as involving some degree of technology transfer. The varying degrees of effectiveness suggested in the breakdown above reflect judgments which are generally realistic. However, as noted in section 1.1, effectiveness depends not only on what is being transferred and how but also on the absorptive capacity of the receiving country.

In the case of the transfer of products without maintenance and operations data or related production know-how, the possibility of reverse engineering arises. This process involves disassembling and analyzing a product or weapon to determine how it was manufactured. However, a country's capability for manufacturing comparable products or weapons may not be adequate. Even in the case of other industrialized countries, special manufacturing techniques or processes may either not be available or not understood. Reverse engineering, therefore, is not a straightforward proposition and may or may not be effective, depending on the item in question.

Analysis of foreign weapons or militarily significant products may, however, have other effects, such as suggesting design changes in the receiving country's weapons or equipment (without seeking to produce the foreign item) or suggesting countermeasures.

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[1] Turnkey facilities are completely equipped production or processing facilities. Training is frequently provided.

The Defense Science Board report also stressed the need to control critical technologies. An interagency task force chaired by the Department of Defense is presently examining ways of identifying and placing special emphasis on controlling critical technologies and associated products.

1.4 *Contribution to the military potential of a country receiving civil technology transfer.*—There are four general ways in which civil technology transfers (that is, transfers for civil purposes) might contribute to the military potential of the receiving country. First, where the technology is embodied in a product which has potential military application it is possible that the product itself might be diverted from an intended civil use to some military use. Second, know-how might be transferred to produce products, such as electronic components, for the civil sector of another country. These products might in turn be applied to military as well as civil uses. Third, know-how supplied for civil purposes might be diffused from the civil sector to the military. The process through which this might occur in other countries is little understood. However, the extent and rate of diffusion would be affected by the level of industrialization of the receiving country and its ability to understand and replicate special processes and equipment involved or find substitutes. Such needs as specialized training for additional personnel may also have a limiting effect. Finally, it is sometimes argued that if imported technology has a resource-releasing effect (through more efficient use of resources), resources released from the civil sector might be redeployed in support of military programs. It is difficult to estimate the potential effects of such a process. Whether it would occur at all would depend on whether the technology, under local conditions, had a net resource-releasing or resource-demanding effect, whether the particular resources were of military use, whether the civil sector had no special claim on the resources, and other considerations. The chain of assumptions involved makes estimates of questionable value.

U.S. laws do not provide for a resource-releasing effect as a basis for denying exports. Under the Export Administration Act, export controls for security purposes are based on findings of resultant contributions to another nation's military potential which would be detrimental to U.S. national security.

1.5 *Extent to which technology is in the public domain, under the control of the government, and in the possession of proprietary concerns.*—There is no precise measure of the extent (in absolute or relative terms) to which technology is in the public domain and in the possession of proprietary concerns.

Certainly, in the United States, much technology is in the public domain, and there is very little the Government can do (even if it wished to) about controlling the flow of information via, for example, technical and trade journals. In many cases, however, technology in the public domain is not the most advanced technology except in fields such as agriculture, health, education, and construction. In the case of expired patents, technology of possible interest from the tandpoint of military application is for most industrial nations requently obsolete. Moreover, as discussed in preceding sections of this report, the most effective forms of technology transfer to involve steps well beyond the transfer of information.

Much technology of potential military interest is proprietary. The concern controlling the technology may, therefore, have a stake in protecting it. Where questions of transferring proprietary technology arise, the controls summarized in section 1.2 are applicable. Moreover, the exercise of controls is probably more effective since the potential sources of technology transfer are limited in number in many important technical fields. Government control is, therefore, not synonomous with Government ownership. In addition to having the authority to control exports, the Government can impose security classification. This mechanism has been used to control the most sensitive military and nuclear technologies.

2. The Effect of Technology Transfer on U. S. Technological Superiority

2.1 *Is U.S. technological superiority declining?*—The concept of technological superiority is inexact. There are no precise measures of the relative overall technological strength of various countries, and relevant data are frequently not available. The problem is especially difficult where the comparison involves countries which are at roughly comparable levels of scientific attainment and industrialization.

Judgments concerning relative technological strength are sometimes based on highly visible differences such as the emergence of an advanced technology in one country and its absence or late introduction in another, or the level of sophistication of the technology known or estimated to be embodied in various end-items, including weapons. The demand for U.S. products embodying advanced technologies remains substantial; clandestine efforts to secure such products or the underlying technologies usually are prompted by technical deficiencies or desires to develop countermeasures to U.S. systems. On the basis of such indicators, it is fair to say that the United States retains important technological (qualitative) advantages in a number of important fields.

On the other hand, there is no room for complacency. The 1976 (bicentennial) report of the National Science Board [2] reflected a number of concerns about the state of research and development in the United States (without comparing the situation there with that abroad). Moreover an examination of the state of United States and European science and technology in connection with the 20th anniversary of the NATO Science Committee suggested less vitality in Western science and technology today than in the 1950's and 1960's. Nevertheless there was no suggestion that the West's position in science and technology, capable of outstanding achievements in certain fields, remains hindered by a system which tends to discourage technological innovation. Most recently the American Association for the Advancement of Science conducted a meeting which expressed concern about the decline of U.S. technological superiority. Assessments such as these are, of course, intended to provide a stimulus to remedial action. They are not necessarily intended to represent projection of an inevitable downward trend for the United States or the West.

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[2] Science at the Bicentennial.

U.S. technological and industrial strength is vital to the security of the NATO Alliance and our other alliances. Regarding the weapons available to members of NATO in comparison with those of the Warsaw Pact countries, Dr. William Perry, Under Secretary of Defense for Research and Engineering, has stated:

> In most cases * * * new Soviet equipment is on a par with corresponding NATO equipment, so the existing qualitative edge of deployed NATO equipment can be expected to degrade as the Soviets replace deployed equipment. The principal alliance qualitative advantages will continue to lie in weapons which rely on miniaturization, large scale integration, advanced sensors, digital computers, and displays. The NATO technology base is superior to that of the Warsaw Pact in each of these areas, but the lead is fragile, and may be threatened by a Soviet military research and development effort which significantly exceeds that of the United States.

In the case of NATO in particular, sharing advanced weapons technology strengthens the common defense. One of the most common forms of the transfer of weapons-related technology among allies is the licensed manufacture or coproduction of advanced weapons systems and components. Data transfers and cooperative research and development are also used. In the case of transfers from the United States to European members of NATO, the benefits to the alliance are that the Europeans do not have to wait to deploy such advanced weapons until U.S. forces have been supplied. In some cases, the alternative to the sharing of technology and coproduction arrangements is not for the Europeans to purchase weapons and equipment from us but rather for them to produce a European version meeting the same requirements. Where licensing and coproduction are accepted, we gain some sales and royalty fees; where a European system is produced, we end up with no sales at all (other than possibly the sale of certain components).

In some instances, the United States has itself accepted weapons or equipment of European design and is engaging in joint developments. Such approaches contribute to making the most effective use of allied capabilities from the standpoint of our mutual security interests. U.S. firms participating in cooperative developments share the technology, profits, and work opportunities. Where joint developments are undertaken or the United States produces European-designed items, greater means are available to the Europeans to purchase other defense equipment from the United States. Although coproduction frequently involves sophisticated hardware, by the time production know-how is transferred through licensed manufacture abroad, we are usually working on the next generation of technology. The process, therefore, has to be viewed as a continuing one.

In the case of dual-use technologies—those having civil uses but also potential military applications—the transfer process from the United States to countries other than Communist countries is largely determined by judgments made by private concerns (for example, the judgment that a subsidiary must be established abroad in order to maintain a share of a particular market which might otherwise be lost). In the past, licensing and other arrangements leading to the transfer of technology abroad frequently did not not involve the most advanced technology available to the firm having proprietary control of the technology. However, more recently, other industrially advanced, resource-rich nations have been seeking advanced U.S. technology and in some cases have had the leverage to obtain it from private firms.

In the case of both weapons-related and dual-use technologies, it should not be assumed that efforts to retain specific technologies in the United States would insure technological superiority. Such efforts alone might be counterproductive. The temptation to rely on existing technology, coupled with decreased Government research and development funding, might lead to a slowing of efforts directed toward the research, development, and continuing technological innovation that are essential to continued U.S. technological superiority. It is under such circumstances (rather than as a result of the transfer of technology abroad) that loss of U.S. technological superiority might occur.

2.2 *Do weapons sales degrade U.S. superiority?*—One issue in considering requests for advanced weapons is whether their export could result—directly or indirectly—in the leakage of critical technology to possible adversaries, in particular the Soviet Union.

As discussed above, if an example of an advanced weapons system were obtained by a possible adversary, three possibilities would arise: An effort might be made to copy the system; some of its design features might be added to indigenously developed and produced weapons; and pointers for the development of countermeasures might be uncovered. These are clearly risks we wish to preclude or minimize. However, the realization of these potential gains is by no means automatic. For an adversary to capitalize on the acquisition of a weapons system he may, for example, require highly sophisticated manufacturing techniques and processes.

Moreover, while we clearly wish to avoid any contribution to the improvement of the Soviet Union's military capabilities, it should be recognized that there are ways of compensating for lack of sophisticated technologies. Highly effective weapons can be developed by stressing simplicity, commonality, redundancy, and incremental change in design philosophy and quantity in deployments. Where risks of leakage are considered to be present in the sales of weapons, they must be weighed against the value to the United States of making our enhanced military capability available to allies and friends.

This consideration is frequently judged to outweigh the risk of leakage. We require, however, that efforts be made to protect against leakage, and control is exercised over the reexport of weapons and over the export of U.S. designed weapons manufactured abroad.

2.3 *Which mechanisms of transfer are most detrimental to U.S. superiority?*—From the standpoint of our national security interests, the mechanism of transfer of technology is of secondary importance. Where decision is made that transfer of technology is to be subject to control, no effort is made to differentiate between transfer mechanisms. We would not wish to see the technology transferred through any mechanism.

It remains true, of course, that there are gradations of effectiveness, as discussed above. A casual conversation or visit to a factory is a far less effective way of transferring technology than the export of a turnkey plant, together with the training of persons in the importing country to operate and maintain the plant. Fortunately, many of the more effective transfer mechanisms are susceptible to effective, enforceable controls.

Other aspects of the problem are, however, of greater significance than the transfer mechanism. First, it is basic to the entire process to identify the technologies which are critical and should be controlled.

This is a continuing process and is reflected in detailed definitions in regulations on the control of exports. Special efforts are, however, being made to review the question of what technologies are critical in the light of the report of the Defense Science Board Task Force referred to above. Second, in most instances of dual-use technologies which are controlled, the United States is not the only potential supplier. Other Western countries and Japan are frequently potential sources of the similar technologies. Therefore, their cooperation is essential.

In the nuclear area all significant cooperation must be pursuant either to a bilateral agreement for cooperation or through the International Atomic Energy Agency. The mechanism through which the technology is transferred depends on the sensitivity of the technology and the strength of the assurance that a technology will not be used for military purposes. The most sensitive technology is not exported. Other sensitive technology may be exported pursuant to a bilateral agreement usually with some type of multilateral control.

2.4 *Effect of SALT on our technological superiority vis-a-vis third countries.*—SALT I froze United States and Soviet ballistic missiles quantitatively, not qualitatively, and froze ABM's qualitatively as well. Both sides remained free to continue modernization and research and development, and both sides have done so. Thus, SALT I has had no effect on U.S. technological superiority. In some areas of strategic weaponry, we have improved our position (for example, cruise missiles); in others, such as MIRV's and accuracy, our lead has narrowed.

SALT II will include qualitative limitations in certain areas. However, research and development will not be precluded. Therefore, there is no reason to suppose that there will be any erosion of our technological position in areas vital to our interests. Technology transfers, under appropriate controls, consistent with the provisions of a SALT II agreement, would not undermine our technological position vis-a-vis the Soviet Union or any other country.

Few countries aside from the United States and the Soviet Union are developing significantly strategic forces. The United Kingdom and France already have limited strategic forces, and we see no prospect that these will achieve advances of a character which would outdistance U.S. forces technologically. Similarly, the People's Republic of China has achieved initial strategic capabilities, but it has a technological base many years behind that of the United States. Given the pace of our research and development effort, U.S. superiority will be maintained with respect to these and other countries. SALT will have little if any effect on this relationship although it will affect the incorporation of certain advances in specific weapons systems.

3. The Rationale for the Transfer of Technology From the United States to Foreign Countries

3.1 *Relationship between security rationale and commercial rationale for facilitating or restricting technology transfer.*—From the standpoint of the principal concerns considered in this report, the primary factors influencing U.S. technology transfer policies are, on the one hand, national security factors (including political, economic, and military

aspects) and, on the other, the traditional reluctance of the Government to intervene in private commercial transactions unless clearly necessary (that is, the desire to provide as broad a scope as possible for private initiative in support of a dynamic economy).

In the case of dual-use technologies having potential military as well as civil application, the Government reviews and occasionally intervenes in decisions of private firms to transfer technologies. Proposals by private firms to transfer dual-use technologies to Communist countries are properly subject to Government control and are reviewed on a case-by-case basis, as are proposed transfers of particularly sensitive technologies to non-Communist countries.

Where weapons or military equipment and related technologies are involved, the Government invariably exercises control. There have been a number of cases where private concerns have sought to sell abroad conventional weapons systems and equipment which the Government considered inadvisable under the circumstances existing in the receiving country or region, or untimely from the standpoint of other security or political considerations. To relieve the pressures which may be generated to approve such transfers after sales presentations have been made abroad, Department of State approval is required before proposals or presentations are made to foreign governments looking toward sales (valued at over $7 million) of significant combat equipment or related technical data.

3.2 *Is U.S. security enhanced by promoting foreign dependence through weapon sales or by promoting military and industrial self-sufficiency of friendly foreign countries?*—When the United States is the major supplier of weapons and military equipment to a country, the relationships developed in this way can generally afford the United States a degree of influence over certain types of actions of the importing country. For example, we can seek to insure that the weapons and equipment transferred are used only for legitimate purposes which do not harm our own security interests. In limiting the type and amount of support—such as training, maintenance, and spare parts—of some weapons systems, we may be able to control to some extent the employment of the weapons and equipment and the possibility that they might be retransferred.

On the other hand, our military supply relationships are important but not controlling factors in how others respond to major political and economic issues. Moreover, in times of crisis or in negotiations affecting an importing country's vital interests, that country may arrive at decisions on grounds wholly or largely independent of the continuation of supplies by the United States. Under such circumstances, efforts by the United States to impose its own views through threatening to terminate supplies or actually doing so may not only fail to achieve the immediate objective but also sour relations on a broader front.

Promoting the military and industrial self-sufficiency of friendly foreign countries in any full sense of the term would be in important respects an unrealistic objective. Among our principal treaty allies, only France and the UK field a full range of national (or coproduced European) weapons and military equipment. Other allies (Italy and Germany in particular) have significant defense industries, and Japan, of course, has an industrial base of great significance. For a variety of reasons, however, these countries do not seek to field a full range of

domestically produced weapons and equipment. Beyond these countries, there are at this time few countries which could aspire to self-sufficiency in the foreseeable future although varying degrees of self-sufficiency may be sought.

Objectives short of helping others achieve self-sufficiency can be served by such steps as transferring production know-how through licensed manufacturing agreements. Within the constraints of U.S. arms control policy, such arrangements can help allies and friendly countries achieve enhanced military capabilities at an earlier time than might otherwise be possible. In addition, when the United States plans to terminate production of specific items important to a friendly country, we may wish to permit licensed production abroad in order to insure the continued effectiveness of the forces of that country.

3.3 *Does the risk of leakage to the East through third countries warrant increasing U.S. controls on exports to other Western Countries?*—There is very little hard evidence that technical data of U.S. origin have or have not leaked to the East through third countries. Controls are imposed on retransfers or reexports. Most cases of diversion of U.S. products to the East do involve third countries in one way or another. However, the number of proven cases of such diversions is quite limited.

Other industrialized NATO countries and Japan cooperate with the United States in COCOM to coordinate controls on the export of strategic products and technologies. Interpretation and enforcement of the embargo does vary from country to country, but there is a large measure of agreement on what should be controlled. Present U.S. controls require U.S. Government authorization for the reexport of strategic U.S. origin goods or technologies or for the export of the product of previously exported U.S. origin technologies. Nonalined Western countries of course do not participate in COCOM. For their own reasons, however, they too control certain exports.

In the case of weapons systems and equipment, tight controls are exercised, and retransfers of significant items require advance approval by the United States. There is no evidence of significant retransfers to the East.

Even taking into account the possibility that some leakage in both of the foregoing categories may have occurred without the knowledge of the United States, there is no apparent need for tighter controls vis-a-vis other Western countries. Any effort to impose such controls would have disruptive political and economic effects and would have the potential for undercutting—rather than strengthening—cooperation with other nations controlling exports.

3.4 *How does the Soviet technological relationship with developing countries affect U.S. interests?*—The Soviet Union uses both military assistance and sales and economic assistance to bolster relations with its client states and with other countries. In general, military assistance and sales substantially exceed economic assistance.[3]

The Soviet Union has been willing to sell sophisticated weapons to almost any developing country, has accepted somewhat lower prices than those for comparable Western equipment, and has been able to make fast deliveries. Where arms deals require sophisticated training, personnel from developing countries are brought to the Soviet Union.

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[3] For estimated amounts for 1976 and prior years see: "Communist Aid to the Less Developed Countries of the Free World, 1976," Central Intelligence Agency (Unclassified).

In addition, military technicians are sent to developing countries. East European countries, of course, engage in similar efforts, and Cuba also provides military technicians.

SOVIET MILITARY DELIVERIES TO THE THIRD WORLD

[In millions of U.S. dollars]

	1972	1973	1974	1975	1976
Africa	55	75	235	600	1,070
Latin America	0	10	25	55	80
Middle East	970	2,655	1,785	850	830
South Asia	180	270	205	180	210
Total	1,205	3,010	2,250	1,685	2,190

The United States and the Soviet Union have initiated talks concerning possible restraints on conventional arms transfers. At this juncture, it is not possible to forecast the outcome of these talks.

Soviet economic assistance to developing countries has included major technology transfers such as heavy industrial and powerplants. In and of themselves, such transfers are not destabilizing. To the extent that such transfers may make a real contribution to the development of particular countries, there is no reason for the United States to consider that its own interests have been harmed even though such transfers are frequently designed for political impact and to provide an underpinning for client relationships. Indeed, the "Downing Street Summit" (May 1977) invited CEMA countries to increase the flow of aid and other real resources to developing countries.

Although the Soviet Union tends to prefer bilateral arrangements, it contributes to the United Nations and its multilateral North-South programs. In these the Soviet Union frequently supports positions of the developing countries while at the same time taking a conservative financial line. Participation by Soviet delegates to such United Nations conferences as the decertification and water conferences and in preparations for the U.N. Conference on Science and Technology for Development has been low key and professionally competent. It is possible that at some future time joint United States/Soviet efforts in various scientific or technical fields may benefit developing countries.

3.5 *Are U.S. military technology exports intended to increase or decrease foreign dependencies on the United States?*—Decisions concerning U.S. military technology exports are not based on hypothetical concepts of increasing or decreasing dependence on the United States. The primary motivation of such exports has been and remains to strengthen security relationships of direct importance to the United States and to improve the military capabilities of our allies. This is particularly important in NATO where standardization improves collective military capabilities. By far the largest part of our military technology exports has gone to our major allies, in particular our NATO allies, or to friendly countries confronted with military needs. Meeting the needs of other friendly countries also underlies our military technology exports. As noted in the response to section 3.2, there are limits both to the influence that can be exerted through military technology exports and to the self-sufficiency that most other countries could achieve through local production of weapons.

3.6 *How do the benefits of improved relations with adversaries resulting from technology transfers compare with the risks*?—Military technology is not considered available for use as a means of improving relations with possible adversaries.

In the case of other technologies of potential strategic significance, in particular dual-use technologies, controls have been imposed but can be adjusted in either of two ways. First, the controls have been revised over the years to reflect technological developments and periodic reassessments of what is of strategic significance. A few items have been dropped; and a few new items have been added; but most changes have been in the form of increasing the technical limits in embargo definitions. This permits the benefits of trade in older technologies. Second, exceptions to the controls are made on a case-by-case basis largely on the same reasoning. Such exceptions are considered both within the U.S. Government and in COCOM. Improvement of relations with the countries of concern may sometimes result but has not been a primary consideration. In the case of both of the foregoing approaches, risks are carefully and deliberately weighed and the overall context of our relationships are taken into account.

As a general matter, it is clear that obtaining increased access to Western (including United States) technology has provided one motivation for Communist countries to seek improved relations with the West, and expanding technological relationships with Communist countries can be regarded up to a point as a reasonable and useful concomitant of efforts to improve relations. In the case of countries not regarded as potential adversaries, foreign policy goals can be advanced on occasion by transferring various technologies, including military technologies. Especially with regard to the latter, the weighing of risks and benefits takes into account the specific circumstances of each case.

3.7 *What is the proper balance between foreign countries' perceptions of needs for strategic technologies and our perceptions?*—In the field of military technology, requests for transfer are evaluated in the Departments of State and Defense and in certain instances ACDA, CIA, Commerce, Department of Energy, NASA, Treasury, OMB, OSTP, and the NSC staff. The mechanism for internal U.S. review depends upon the nature of the technology—whether it is old or new, whether it has significant political and economic as well as defense implications, and the character and state of our relations with the proposed recipient. Proceedings vary somewhat depending on whether the proposed transfer is to be government-to-government or commercial.

Interagency consideration of major cases is coordinated through the Arms Export Control Board, an advisory committee chaired by the Under Secretary of State for Security Assistance, Science and Technology. No change in these procedures is considered necessary. The internal review process frequently does lead to perceptions and conclusions different from those of the proposed recipient country. In these cases, transfers are denied or government-to-government discussions are held with a view to arriving at a course of action acceptable to both parties.

In U.S. and COCOM cases involving dual-use technologies of strategic significance, extensive internal governmental reviews are conducted under the leadership of the Departments of Commerce and State. The primary objective of the review is to consider the risk of

military uses of the proposed transfer which might be detrimental to our national security interests. Lack of evidence that the recipient perceives a military need for the technology is not regarded as removing the risk of military use. On the other hand, experience has shown that credence can usually be given to assurances by the recipient of civil use. Transactions of this character are carried out through commercial concerns, and although government-to-government talks are occasionally held, questions raised about proposed transactions are generally conducted by the commercial concern involved and the prospective purchaser. For example, an export which is considered unacceptable in the form proposed might be regarded as acceptable if modified.

In the field of nuclear energy, international institutions reflect varied perceptions. An explicit function described in the charter of the International Atomic Energy Agency, established in 1957 and now having a membership of 109 nations, is to promote the peaceful use of nuclear energy worldwide and "(to) foster the exchange of scientific and technical information" to that end. The Agency is also charged with the task of detecting any diversion of nuclear materials for military purposes. The prospect of detection may deter efforts to divert materials.

The Treaty on the Non-Proliferation of Nuclear Weapons similarly entails a dual purpose: To prevent military use while encouraging peaceful use of nuclear energy. One hundred and two nations have ratified the treaty.

Disparate views have occurred not only between nuclear suppliers and recipients but also on occasion among suppliers. In the wake of the 1974 Indian nuclear test, however, all major nuclear suppliers formed a group which has succeeded in narrowing supplier differences to the point where a consensus on guidelines for the export of nuclear technology was attained in 1977. Currently, the 2-year international nuclear fuel cycle evaluation is the central avenue through which suppliers and recipients of nuclear energy technology are attempting to understand mutual perceptions of the need for and danger of the transfer of certain technologies (such as uranium enrichment and plutonium reprocessing).

4. The Benefits and Risks of Transfers

4.1a *What is the danger of the loss of strategic U.S. technology to hostile nations through the various forms of transfer?*—All exports of strategically significant technology are subject to licensing. The risk that private concerns will engage in unlicensed activities does exist but is quite limited. The most effective mechanisms of technology transfer—such as the export of turnkey facilities—would be exceedingly difficult to carry out on an unlicensed basis without detection at some stage. This is not, of course, the case with less effective types of technology transfers.

4.1b *What factors in addition to military should be taken into account in applying the test "may adversely affect the national security of the United States"*?—In addition to military factors, political and economic factors are relevant in judging the relationship of a proposed transfer of technology to our national security. Transfers are, of course, made to allies and friends that would not be permitted in the

case of a possible adversary. Even in the latter case, however, a balancing of the several aspects of our security interests may lead to the conclusion that permitting a transfer to proceed may have a reasonable prospect of favorably influencing our relations with a possible adversary without entailing major military risks. If significant military risks were considered to be present, a negative judgment would necessarily be reached despite favorable political or economic aspects.

4.2 *Do technology transfers contribute to the internal stability of the recipient country*?—It is difficult to generalize about the effect on a nation's internal stability of imports of various types of technology. In the case of military technology, transfers to our major allies can have positive effects in a variety of ways: For example, licensed manufacturing agreements can have positive economic and other benefits.

The potential effect of the transfer on military technology to other than our principal treaty allies is in some cases more questionable. the effects on regional stability must be taken into account. Guidelines for the review of proposed transfers require an evaluation of each request in terms of such factors as the economy of the country involved and the regional military balance.

With respect to transfers of dual-use technologies of strategic significance, centrally planned economies frequently experience difficulties in making effective use of new technology because of the rigidities of the production planning process. There is, therefore, to some extent a tension between the desire to make the most effective use of new technology and the system within which the technology is placed. The introduction of new technology may broaden the horizons of the recipients, but it has not been a major destabilizing factor. Even the inefficient use of the technology may increase productivity and provide benefits not otherwise obtainable.

4.3 *Does transfer of technology to our allies enhance U.S. military security*?—Transfers of military technology to our allies have to meet the tests of fulfilling a genuine military requirement and enhancing our collective security. We have a direct security interest in insuring that our closest allies have the most advanced conventional weapons and equipment available.

Our policy vis-a-vis countries other than our principal allies (that is, excepting NATO, Australia, New Zealand, and Japan) is that we will not sell advanced weapons until they are operationally deployed with U.S. forces, and coproduction of significant weapons, equipment, and major components will be permitted only on determination of an exception to the policy by the President. This avoids an excessive demand on U.S. resources that could adversely affect U.S. security. The implications of such transfers are also weighed in terms of their regional impact since destabilizing effects in a particular region might also have adverse implications for our security interests.

4.4 *Does standardization of allied military equipment benefit the United States?*—The military capability of NATO to maintain an effective common defense is hampered by the great diversity of equipment. The cost of end items is increased because of duplicative research and development programs and small production runs. As prices go up, the number of items that can be accommodated by limited defense budgets goes down. The United States, on its own, cannot make up for allied deficiencies, and where our weapons differ from those of our allies,

reinforcing or reequipping them in time of need would be more difficult. Standardization can, therefore, benefit the United States as well as other NATO members by enhancing the collective capacity for self-defense.

4.5 *Implications of transfer of nuclear technologies.*—Exports of the current type of nuclear power reactors utilizing slightly enriched uranium fuel do not in themselves pose a significant proliferation threat, provided that care is taken in the selection of the recipient state, that the state has agreed to adequate controls, and that the export takes place under international safeguards.

Under this administration, the United States has instituted special controls over the export of highly enriched uranium (HEU) and plutonium, including the requirement that any export requests for more than 15 kgs of HEU must obtain Presidential review. In addition, under the Nuclear Non-Proliferation Act of 1978 special controls have been placed upon the export of any components specially designed or prepared for use in nuclear facilities. Components for uranium enrichment facilities, fuel reprocessing facilities, or heavy water production plants can be exported only when specifically designated in the agreement for cooperation.

The United States recognizes the proliferation dangers inherent in the spread of certain sensitive technologies (uranium enrichment, reprocessing, and heavy water production) and has maintained a policy of not authorizing the export of such facilities and of urging other supplier nations to exercise similar restraints. Through the Nuclear Suppliers Group, agreement has been reached on the need to exercise restraint in the export of certain sensitive technologies, and the major nuclear suppliers have agreed upon a "trigger list" of items which are not to be exported without safeguards.

4.6 *What types of technology should be transferred to the People's Republic of China*?—The same ground rules that apply to the Soviet Union and other Communist countries apply in the case of the People's Republic of China. These ground rules preclude the transfer of military technology and provide for the control of transfers of dual-use strategically important products and technical data. The foregoing restrictions do not preclude the export of a wide range of nonstrategic technologies which can benefit both the People's Republic of China's further development and the economic and commercial interests of the exporters.

4.7 *Contribution of scientific and technical information exchange to Chinese military potential.*—Intergovernmental programs of scientific and technical cooperation are not yet carried on by the United States and the People's Republic of China. A small number of Government-facilitated exchanges takes place each year involving a wide range of scientific, technical, and social fields. These exchanges are of short duration and are primarily directed toward basic research. They are not considered to have any significant impact on the military potential of the People's Republic of China.

4.8 *Does Chinese reluctance to accept foreign aid affect its receptivity to transfer of U.S. technology?*—The Chinese have traditionally emphasized self-reliance, and, except for a period during the 1950's when assistance from the Soviet Union was received, have refused to accept foreign aid, in the sense of accepting financial

assistance from foreign governments. The People's Republic of China has, however, been willing to engage in deferred payment and banking arrangements that are essentially private supplier credits.

The People's Republic of China has made large-scale purchases of Western machinery and equipment (including some purchases from the United States), and this can be expected to continue under the present government, which is placing new emphasis on scientific and technological achievements. The recently concluded National Science Conference in Peking demonstrated the seriousness of the intent of the current leadership of the People's Republic of China to "learn from the advanced science and technology of other countries."

4.9 *What are the implications for U.S. interests of the effect of technology transfers on the internal economic and potential patterns of developing nations?*—Technology transfers may help promote economic and political development in developing countries. However, the history of technical assistance efforts as well as transfers of private technologies makes clear the uncertainty of the effects in particular cases. Political progress and economic progress do not necessarily go hand in hand. Moreover, the extent to which various sectors of the population of developing countries participate in possible economic gains is typically quite uneven, and the political course of developing countries is sufficiently turbulent to necessitate caution in generalizations.

4.10 *Effects of controls on incentives for innovation.*—There is little evidence that present U.S. controls have the effects of discouraging innovative effort on the part of U.S. industry. This is because the controls are centered on a single group of countries—the Communist countries. If an effort were made to preclude the transfer of technology to non-Communist countries as well, it is likely that the effect on innovation within the United States would be stultifying—with continuing reliance placed on increasingly obsolescent technologies (although this has been avoided in the case of sensitive nuclear techniques).

At present, we do restrict certain teaming arrangements due to military sensitivity of ancillary data that would require transfer under a teaming arrangement. Also, losing competitors for U.S. systems are usually denied the opportunity to offer their losing design to other nations.

Export controls may stimulate some countries to which exports are restricted to develop and produce embargoed items indigenously. To the extent that this is the effect, fixed levels of controls in place for many years tend to lose their utility. However, unless the indigenous Eastern research and development not only reproduces the items previously embargoed but also keeps up with new Western advances, an embargo would still be useful provided it were periodically revised to cover the new advances. Furthermore, the embargo might perhaps have caused a diversion of Eastern resources to accomplish the indigenous development.

4.11 *Evaluation of U.S./U.S.S.R. cooperative programs.*—The United States and Soviet Union are currently engaged in cooperative scientific and technical efforts under 11 bilateral agreements. The activities under those agreements generally involve exchange of information and experience and basic—and sometimes applied—research.

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Although the Soviets in some areas have sought activities more directly related to production technology, they have accepted U.S. insistence, and sometimes insisted themselves, on more basic research efforts.

The results of joint research are regularly published in professional journals or as separate documents. Both sides try to translate the most important material exchanged, but the expense of doing so limits the extent to which this can be carried out. Cost also limits distribution of reports, studies, and meeting records. Dissemination in the United States of results under the science and technology agreement is now being improved by means of a newsletter and increased funds for translation. A continuing effort is made to insure that gains under all agreements are reciprocal, equal, and mutually beneficial.

The first consideration in evaluating U.S./Soviet scientific and technical cooperative programs is whether they are scientifically and technically valid. Thus, both sides must be able to contribute substantially; the prospective results must be mutually beneficial; access to qualified people and institutions must be reciprocal; and artificial barriers must not be raised against a genuine exchange. Projects are reviewed on a continuing basis, and where results are not satisfactory, projects are dropped or revised.

With respect to costs and benefits, each project is evaluated on its merits, in some instances taking into account benefits of related projects. The U.S. share of the costs of these projects is funded by National Science Foundation or by various other scientific and technical agencies. Neither these agencies nor individual scientists would wish to participate if useful results were not forthcoming.

The cooperative programs and projects are reviewed periodically on an interagency basis. Special interagency reviews are conducted in connection with decisions on whether to continue or modify agreements. In this regard the Department of State is charged with insuring that technology transfer assessments are included as a part of this review. A special panel established by the National Academy of Sciences reviewed the basic agreement on scientific and technological cooperation in 1977 before it was renewed.

4.12. *Evaluation of transfers to the U.S.S.R. of hydrocarbon technology.*—Soviet petroleum production has grown at a rapid rate. Most of the needed technology has been developed indigenously. However, the relatively small amount of technology imported from the West has included important items. The imported technology has contributed to oil and gas production.

In the early 1960's, Western controls on the export of wide-diameter pipe were dropped. Controls on exports from the United States to the Soviet Union of petroleum exploration and production equipment were discontinued for a time but have recently been reestablished.

4.13 *Are Soviet technology imports more resource demanding or resource releasing?*—No study of overall Soviet technology imports has been made from the standpoint of determining whether they have more resource-demanding or resource-releasing effects. It is not clear how such an overall evaluation could be made. However, there appear to have been some major cases where imports for civil purposes have been resource demanding. As a case in point, Western technology has been imported for the production of automobiles and trucks. This has required the allocation of substantial domestic resources (including

skilled workers) for production and also for various elements of the infrastructure necessary to accommodate increased numbers of motor vehicles. In these cases where the effect may be resource releasing, it is indeterminate whether the released resources would be made available to the military sector rather than to other civil needs.

4.14 *How would LDC proposals on technology transfer affect the U.S. domestic economy?*—Developing country proposals on technology transfers are focused on formulating a code of conduct on the transfer of technology. They seek a mandatory code which would establish rules to bind enterprises in negotiating and carrying out transfer agreements. The most important rules would require that enterprises include in their agreements a long list of guarantees, and that they also avoid a number of restrictions or conditions sometimes associated with patent licensing and know-how contracts. The codes would apply to all international transfers of technology, including those among developed Western countries and between the West and Communist countries. In the view of developing countries, the code's provisions would also apply to domestic transfers where one of the parties is foreign controlled.

As proposed by developing countries, the code would have important disruptive effects on domestic licensing/know-how operations of U.S. enterprises, on their relations with foreign subsidiaries, and on international technology flows generally. By lowering the rate of return on sales of existing technology, the code would also affect our domestic innovation by reducing the profitability of generating new technologies.

4.15 *In what ways should the United States take into account the state monopoly feature of the Soviet economy?*—Concern has frequently been expressed that private U.S. exporters would be at a disadvantage in dealing with Soviet governmental purchasers, and prospective Soviet purchasers to use tactics (also familiar in domestic U.S. transactions) of trying to play one bidder off against another. A broad cross section of U.S. industry which has had dealings with the Soviet Union was queried on the subject. They unanimously rejected the notion that trade transactions were needed to redress the supposed imbalance in bargaining power. What U.S. companies have to offer is attractive enough and U.S. businessmen are skilled enough negotiators so that profitable results can be obtained.

The executive branch can and does provide to U.S. businessmen information on the Soviet Union and its trading organizations which may be helpful to business.

From the standpoint of our security interests, one hypothetical risk is that the process of playing one bidder off against another might lead to Soviet requests that U.S. industry offer items which we would necessarily decline to license. However, the knowledge and responsible character of U.S. business interests minimize this risk.

5. Trends in Technology Transfer by the United States and Other Countries

5.1 *Data base concerning past technology transfers and controls.*—Given the varying definitions of technology and technology transfer and the broad array of mechanisms through which technology can be transferred with varying degrees of effectiveness, there is no single set of records or statistics which mirrors the complete flow of tech-

nology to or from the United States. Indeed, there is no way of measuring activity through a number of mechanisms (such as seminars, discussions, trade journals, and so forth); generally, these are, however, less effective transfer mechanisms.

One relatively broad measure is found in Standard International Trade Classification (SITC) categories 7 and 8, subsets which cover machinery and instruments. These subsets offer a general guide to the flows of technology and can also be analyzed in terms of items considered to incorporate advanced technology (judged to amount to around one-fourth of the total volume of STIC 7 and 8 exports). These data tend to show that worldwide demand for U.S. technology remains substantial (an indication of continuing U.S. technological strength). In the context of East/West trade, however, the United States remains the supplier of origin of only a small percentage of the East's needs. This situation is illustrated in the following table:

U.S. EXPORTS AS PERCENTAGE OF EXPORTS FROM OECD COUNTRIES

	1965 to the—		1975 to the—	
	World	East	World	East
Total	23	3	19	10
Technology	26	1	22	8
Advanced technology	34	1	31	8

These figures are somewhat understated because of transfers of U.S. technology recorded as exports from Western Europe and Japan. Even taking a high estimate for such trade, however, the U.S. percentage of OECD technology exports to the East would only increase from 8 to 10 or 11 percent.

The cost of technical data is generally included in the price of commodity sales. Statistics reflecting the value of technical data transferred independently of commodity sales are not readily available. Data on receipts from royalties and fees provide another set of available information on technology transfers. These data are available only on a highly aggregated basis, and it is not clear whether reported receipts from foreign affiliates of U.S. companies (80 percent of all payments) reflect the actual value of the technology transferred, or decisions by individual enterprises on how much foreign source revenues generally is to be returned via the royalties channel. However, it is not clear how fees and royalties are precisely determined, either from affiliates or nonaffiliates (for example, cost of transfer; opportunity cost; share of research and development; value to recipients; a standard figure common to a particular industry, and so forth).

The data base on export controls, however, is extensive because of the records maintained by authorities concerned with licensing, regulation, and intelligence. There are, on the other hand, aspects of technology transfer controls which are inherently difficult to measure. For example, intelligence estimates suggest that perhaps $150 million of Western embargoed goods were illegally shipped to the East between 1973 and 1977 (in comparison with $150 billion in legal shipments of which about $45 billion was for machinery and equipment). While this is regarded as a generally accurate order of magnitude figure, it is apparent that the nature of clandestine efforts precludes wholly accurate measures.

In the case of military technology, quarterly reports are provided to the Congress on every license or technical assistance agreement valued at over $1 million. Annual reports are provided on actual exports. An automatic data processing system is being installed by the Department of State which will eventually include all records of technical data transfers in the munitions field.

5.2 *How should technology transfers be measured?*—The preceding section considered several gross measures of technology transfer and noted that data are not available which reflect the flow through each potential technology transfer mechanism.

For most purposes such gross measures are adequate. In any event, it would be neither practical nor useful to seek precise measures of the flow of all relevant data and information through journals, casual conversations, and so forth. To provide a better understanding of trends and implications, qualitative information should—when possible—be used to supplement quantitative information. For example, although difficult to prepare, estimates of the effectiveness with which transferred technology is being absorbed by and diffused within the receiving country would be useful. Data suggesting the productivity effects of transferred technology are also difficult to obtain, but any available indicators might be analyzed.

From the national security standpoint, current interest in identifying critical technologies and keystone production equipment suggests the possibility that more effective controls might result from a sharper focus on a limited number of highly significant technologies. Collection of data could also be more sharply focused if this general approach proves practical. However, even if technical agreement is reached on what technologies are critical, it will remain difficult to quantify how much the effectiveness of weapons and other military systems of possible adversaries would be enhanced if such technologies were transferred.

5.3 *Cooperation with other key suppliers in controls.*—The United States cooperates with other NATO countries (less Iceland) and Japan in COCOM, which coordinates the national export controls of its members. Agreement is reached on the items to be controlled, and the list is reviewed and revised periodically. These arrangements are wholly voluntary.

Members of COCOM are free in specific cases to ask for exceptions. These do not constitute a large percentage of COCOM exports. From 1971–75, the $600 million of exports which COCOM approved as exceptions from the embargo was less than 1 percent of the $86 billion total exports from COCOM countries to the East for these years. The value of cases denied by COCOM was only 4 percent of approved cases. In the 1970's the U.S. share of exports to the East approved as exceptions from the embargo has exceeded that of any other country and is now more than 40 percent of the total.

In most technological areas, the United States is not a unique supplier. U.S. leadership in advanced computers is, however, a major example of technological superiority. Other leading exporters of advanced items are Germany, Japan, France, and the United Kingdom. Several countries outside of COCOM are able to supply advanced items. While they are neutral or nonalined, they control exports for their own reasons.

The primary Western producers of advanced weapons and weapons technology, in addition to the United States, are the United Kingdom, France, and to a lesser extent, Germany and Italy in NATO, Sweden, and Switzerland. The U.S./European weapons technology balance varies considerably from system to system. American technology is far advanced in some areas such as precision-guided weapons and some electronics and missiles, and there may be a lead in other areas such as air frames and jet engines. However, there are also areas where the technology balance is relatively even (tanks, tank guns) and some where there is a European lead.

5.4 *Trends in exports with significant military implications.*—The controls exercised by the United States and other members of COCOM are designed to withhold militarily significant exports. Since many technologies have potential civil as well as military uses, the review process necessarily seeks to determine whether legitimate civil uses can be accommodated without significant military risks.

Much discussion of export control issues has centered around exports of computers, for which there are many bona fide civil uses. Computers and computer peripherals account for more than half the total of COCOM approved exceptions cases. Where such exceptions are made, however, it is because the circumstances or conditions of the export make clear that the exports would not have adverse military implications.

Since the agreement of all COCOM members is needed for exceptions, the United States is able to exercise a veto if necessary. On a very few occasions, COCOM members have licensed transactions without prior approval pursuant to COCOM's procedures. However, the number of such cases has been small, and there is no trend in this direction at the present time.

5.5 *Correlation between military technology transfer and regional stability.*—There is obviously some correlation between areas of tension and requests received for weapons and military equipment. There are, however, no generally accepted criteria on which to base judgments concerning whether weapons transfer will be stablilizing or destabilizing. Each request must be weighed in the light of the situation and intentions of the government making the request, the capabilities and intentions of possible regional adversaries, and such factors as whether the proposed export will help achieve or maintain the local balance or will introduce new, more advanced capabilities which might start a new cycle of a regional arms race. Moreover, it is apparent that the spread of nuclear weapons would be highly destabilizing. Major efforts have been underway for years to discourage their further proliferation.

5.6 *Implications of Soviet sales of military technology.*—The United States and Soviet Union have initiated talks on constraints on conventional arms transfers to third countries. The outcome of these discussions cannot be predicted at this time.

5.7 *International cooperation in the control of nuclear energy.*—Close and effective cooperation among the United States and other major nuclear supplier states has been developed in the Nuclear Suppliers Group, whose major effort thus far has been development of guidelines for the transfer of nuclear technology and materials. The guidelines, which have been accepted by nearly all significant supplier states, call for the application of international safeguards (International Atomic Energy Agency safeguards) on transferred technology

and materials and for the exercise of special restraint in the export of certain sensitive technologies such as reprocessing, uranium enrichment, and heavy water production facilities.

These voluntary controls considerably raise the difficulty and cost of a would be proliferation of embarking on a significant nuclear weapons program. There have, of course, been some major disagreements between the United States and other suppliers in the past. At present, the general harmonization of policies is considered satisfactory.

6. The Need for Controls on Transfer of Technology

6.1 *Past experience and recommended criteria.*—The effectiveness of controls in the past needs to be considered from several points of view. On the one hand, in terms of controlling the outflow of militarily significant technologies, the controls can be judged to be reasonably effective. There have been some known violations of the export control system, but these have been relatively infrequent (undetected violations may also have occurred to some extent). On the other hand, export controls have not precluded possible adversaries from acquiring significant military capabilities by drawing on technologies available to them. Moreover, export controls have not prevented clandestine efforts to acquire technology. In any event, export controls are not a substitute for continuing technological advances on the part of the United States and its allies in order to provide a sustained qualitative edge over possible adversaries. It may be possible to increase the effectiveness of existing export controls by focusing them more sharply on a limited number of highly significant critical technologies. This is being examined.

In implementing this legislation, the identification of items to be controlled has been based on judgments as to: (1) Goods and technologies principally used in peacetime for the development, production, or utilization of arms and weapons systems; (2) goods from which technology of military significance might be extracted; and (3) goods and technologies of military significance in which the Communist countries have deficiencies. The state of the art in the receiving country and the level of its production capabilities, if any, must be considered.

In reviewing proposed exceptions, the particular circumstances of the case are considered, and approvals are based on judgments of minimal risks of diversion to significant military use, taking into account the technical specifications and quantity proposed for export and the end user and end use. Where relevant, political and economic factors affecting our security are also considered so that a full view of our security interests can be obtained. If there were evidence of past adverse applications of Western technology to military purposes by Communist countries, contrary to the understandings on which exports were based, such experience would tip the scales heavily in favor of denying comparable exports in the future. However, there are few instances where we have evidence of such misuse.

In the case of munitions list items, commercial export of all technical data on every item is controlled through a formal process. Export of the data is approved only for specific destinations and specified purposes. Neither technical data of this type nor products resulting from its utilization may be transferred to third countries without U.S. approval. Foreign companies or governments must agree to this in writing prior to receipt of the data.

6.2 *Effectiveness of controls on nuclear weapons technology.*—In general, it is believed that controls on nuclear weapons technology as such are quite effective at the present time. This is in part because of the security classification imposed on weapons technology.

6.3 *Adequacy of COCOM controls.*—The export controls of other COCOM countries are based on the list of controlled items negotiated in COCOM and are thus as restrictive as those imposed by the United States, except for the relatively few items which the United States controls unilaterally. Other COCOM countries apply fewer resources to the enforcement of controls than does the United States. However, the effectiveness of controls depends on these countries, as in the United States, primarily on the desire of the vast majority of exporters to comply with the regulations adopted by their governments in the interest of security.

Some U.S.-origin embargoed goods and technologies do find their way to the East via Western European countries and Japan. U.S. consultants with the governments of those countries do result in the improved efforts to preclude the recurrence of such situations. Tighter controls on U.S. exports to Western countries would involve a disproportionately high political cost in terms of weakening our alliance relationships and would therefore adversely affect our security interests. National controls coordinated by COCOM, while susceptible to improvement, are adequate to achieve the primary objective of slowing down the rate of transfer to the East of military significant technology.

6.4 *Are controls on subsidiaries needed?*—The ability of U.S. firms to establish subsidiaries abroad has been an important factor in many instances in opening up certain markets and maintaining access to others. In general, these activities of U.S. concerns have contributed to the strength and vitality of the American economy. There is no evidence that these activities have otherwise adversely affected our national security interests. In fact, parallel export controls administered by COCOM member countries have made it unnecessary for the United States to control exports of strategic items from U.S. subsidiaries located abroad to COCOM-proscribed destinations.

Host countries of subsidiaries understandably resent U.S. extra territorial controls as an infringement of their sovereignty. This resentment can be decreased by harmonization of policies. Where subsidiaries abroad conduct research and development, the United States stands to gain from the results. Therefore, it would not be correct to assume that the establishment of subsidiaries abroad means only an outflow of technology from the United States.

An effort by the Government to review and regulate decisions by private firms to establish subsidiaries abroad (in effect, to substitute the Government's judgments for those of private managers) would move the Government far in the direction of major intervention in what has been traditionally considered an area of private decision-making. Moving in that direction is not justified. If we were to do so, we would probably experience retaliatory actions on the part of other major countries including some of our principal allies. However, in the case of munitions list items, controls apply to all exports abroad, including those wholly owned subsidiaries or branches of American firms, and controls are imposed on nuclear facilities wherever they may be located.

6.5 *U.S. Government role in facilitating the contribution of technology to development.*—Since the point 4 program, the United States has provided technical assistance to developing countries. This assistance has been provided through bilateral assistance programs and includes the training of many students from developing countries in various fields of science and engineering. Recently, a planning office has been established to outline operations for a new Foundation for International Technological Cooperation to be established in 1979 to assist developing countries. Most Foundation program areas will involve public sector technologies such as agriculture, health, and population. The United States has also supported multilateral programs, including those of the United Nations. Since much American technology, especially industrial technology, is in private hands, decisions on transfers through various mechanisms are made primarily by the private sector.

6.6 *Private versus public sector interests.*—The Government should and does control the transfer of technology of strategic significance as well as the transfer of weapons and military equipment. The private commercial orientation of U.S. technology does not significantly detract from the viability of controls. Although the private sector and the Government on occasion disagree about the implications of specific proposed transfer, the private sector does not challenge the need for the Government to exercise controls to protect our security interests.

Even though most license applications are processed promptly, significant delays sometimes occur, and it is possible that less critical items could be removed from control more rapidly than is sometimes the case. However, the essential character of governmental involvement does in general reflect an appropriate balance between private sector and public sector interests.

6.7 *U.S. restrictions versus development of allied military and industrial strength.*—Present U.S. restrictions on technology transfer do not preclude our allies from acquiring technology necessary for conventional military strength, although delays in releasing advanced technology sometimes occur. They may feel that such delays affect their ability to field needed systems in a timely manner.

Regarding military capabilities, technology sharing offers the means of avoiding waste and duplication among national defense research, development, and acquisition programs. We are increasing the extent of sensitive technology, including production technology, we are prepared to release in cooperative programs in NATO. Our willingness to move in this direction depends on the prospect that the cooperative programs will enhance the military effectiveness of the alliance with reasonable cost savings. NATO is currently conducting a study of measures that could ease legal and bureaucratic impediments to cooperation in all member countries. We will review its recommendations carefully.

6.8 *Leakages through third countries.*—Since many advanced technologies are diffused throughout the industrialized countries of the West, coordination of policies is needed to preclude the release by some countries of technologies which others believe should be withheld from Communist countries. This is, of course, the function of COCOM. As long as COCOM remains relatively effective, the risk that militarily significant technologies will move from the United States to Western Europe and Japan and then leakage to Communist

countries will remain limited. This does not mean that all leakage can always be precluded but rather that the problem can be contained. Leakage from developing nations to the Soviet Union is not a major problem since developing nations for the most part do not require the advanced technologies that are of greatest concern.

With respect to the possibility of leakage through cooperative agreements, activities under scientific and technical cooperative agreements with Communist countries generally involve basic research although some applied research is also involved, and the agreements are structured to avoid sensitive or proprietary information. Where technology is involved, exchanges are reviewed in advance, taking into account the usual export control strategic criteria. In the case of munitions list items, U.S. consent to third party transfers and non-transfer assurances from the recipient are required before any retransfer can take place.

6.9 *Should the United States limit technology transfers for politically and economically competitive reasons?*—The United States has long favored an open international economic system, including an open system for technology transfer except in cases involving weapons systems, military equipment, or strategically significant technology. This has reflected the basic belief that our own economic interests are served by an expanding world economy in which other countries are increasingly able to buy our products, and in the case of technology, by our being able to receive and utilize technological advances made abroad (rather than depend solely on indigenous advances). There are, of course, concerns about the economic effects of outward technology transfer; concern about effects on employment are discussed below.

To the extent that our leadership in various technologies is an important source of our political strength, it is generally more important to insure continuing technological advances in the United States than to try to hoard technologies. In general, our political relations with other countries can be strengthened through active technological relationships.

6.10 *Correlation between technology transfer and U.S. jobs.*—It is not clear that the transfer of U.S. technology overseas has, historically, resulted in a net loss of jobs in the United States. The net effect over the years may have been to increase exports and jobs. Historically, relatively standardized technologies have been licensed, sold, or traded in exchange for market access or venture capital. At the time of their release, the technologies represented production processes for fairly mature product lines for which competitive production processes had been developed overseas. The release of such processes (to developing countries in particular) had initially been beneficial in spurring demands for U.S. capital goods, exports, and managerial services.

Historically, the U.S. comparative advantage has been in technology-intensive product lines. As relatively sophisticated technology diffuses to other countries, demand for U.S. exports in specific labor-intensive products falls as other factors (wage rates, productivity) dominate and U.S. exports of capital-technology-intensive manufactured goods continue to grow. Unless U.S. firms begin to license, sell, or otherwise transfer recently developed techniques—well in advance of competitive development of similar technologies elsewhere—U.S. transfer of technology will continue to have only a limited overall impact on loss of U.S. jobs.

The United States is participating in studies by the OECD of the long-term impact of technology transfer to developing countries on the economies and industrial structure of the present industrialized countries. Coproduction of armaments is severely restricted, except in the case of our major allies. Where coproduction is undertaken, the alternative is frequently not the outright purchase of items manufactured in the United States but production of a competitive system or item of equipment designed by our allies.

6.11 *Should U.S. Government R. & D. be increased?*—Government support of research and development is important for many reasons, and the President's budget requests call for our increase in support of basic research. The fiscal year 1979 request is for an 11-percent increase in basic research and a 6-percent increase in total research and development expenditures.

Adequate support of research and development—by Government and the private sector in combination—is needed to insure continuing technological advance, including advances in militarily significant technologies. Clearly, our security interests would not be well served if we relied primarily or exclusively on controls to sustain our relative military strength. Technological advances elsewhere might outdistance our own capabilities without sustained effort on our own part. In addition to maintaining strong research and development programs, it remains important to slow the rate of transfer of carefully selected, particularly sensitive, advanced technologies of military significance to Communist countries. Strong research and development programs and effective export controls should therefore be viewed as mutually reinforcing rather than as alternatives.

6.12 *Evaluation of U.S. Government financial incentives to transfer technology abroad.*—In general, the United States offers only limited incentives for the transfer of technology abroad. In the case of the Export-Import Bank, most of the exports supported by the Bank are capital goods and thus to a degree entail the transfer of technology. However, it is not appropriate to characterize the Bank's programs as "incentives" to transfer technology abroad. Rather, the Bank's activities are relevant to the question of who will export the capital goods in question (the United States or a competing industrialized country). A recent study by the Treasury Department indicates that in the Bank's direct loan program, in 64 percent of the cases, the export would not have taken place without the loan. It is reasonable to assume that in a number of these cases, the business might well have gone to another country.

The primary purpose of the Overseas Private Investment Corporation (OPIC) is to stimulate flows of U.S. private capital and skills to friendly developing countries in support of their economic and social development. It does this by insuring eligible U.S. investments against the political risks of expropriation, war damages, and inconvertibility of local currencies. Eligible investments can take the form of either traditional equity contributions or assets such as patents, processes, and licenses. Pursuant to congressional directions, OPIC scrutinizes closely projects involving advanced technology and declines to provide assistance if it concludes they might have undesirable effects on the U.S. economy.

In the case of tax policy, the U.S. objective—as far as influencing investment decisions of U.S. multinational firms is concerned—is to

achieve tax neutrality between investment at home and abroad. Current and proposed U.S. tax policy comes very close to achieving this neutrality standard.

The most important provisions favoring domestic investments are the Domestic International Sales Corporation (DISC), the investment tax credit (which does not apply to foreign investment), the accelerated depreciation of certain classes of domestic investments, and the limitation of foreign tax credits to the rate of U.S. corporate income tax. The most important provisions favoring foreign investment are the foreign tax credit, tax deferral on unrepatriated foreign profits, and creditability of income taxes paid to foreign subnational governments, while State and local taxes paid within the United States can only be deducted from taxable income.

In proposals submitted to the Congress in January 1978, President Carter recommended that both DISC and deferral be phased out over a 3-year period. These provisions now roughly balance each other. The elimination of both would leave the overall impact of the remaining provisions very close to the neutrality standard. However, a number of multinational enterprises have complained that their ability to conduct research and development on behalf of their foreign subsidiaries is being inhibited by a recent IRS regulation which requires parent companies to allocate a portion of research and development expenses to their foreign subsidiaries for the purpose of research and development deductions against U.S. tax liability. They argue that the tax laws of many developing countries do not permit foreign subsidiaries to deduct the research and development expenses allocated to it but performed in the United States. In the view of these corporations, the result is that the enterprise as a whole is deprived of a portion of its research and development deductions, and that an incentive for innovation is thereby reduced.

6.13 *Should the U.S. Government encourage more effective means of technology transfer?*—In general, there is no reason for the Government to encourage transfer or know-how rather than the export of products. Technology licenses do not necessarily result in lower foreign exchange earnings over the long run than do exports of products. But neither is there a clear case that export of know-how would maximize U.S. benefits. In the case of weapons systems, however, our security interests are sometimes best served through coproduction arrangements. This does not reflect a conscious choice of transferring technology in preference to selling products but rather a recognition that allied needs can be met most effectively in this way.

6.14 *Under what conditions should the most effective means be used in transfer to the U.S.S.R.?*—The Soviet Union has on a number of occasions sought turnkey facilities from the West. This approach involves one of the most effective forms of technology transfer, and where the facilities do not have adverse implications from the standpoint of our security interests, it has been possible to approve the necessary exports. Although effective, this is also a highly expensive approach. Where the Soviet Union, for reasons of its own, has sought technology through less effective means, the U.S. Government has not tried to redirect the procurement to more effective approaches. It is not clear that any useful purpose would be served by this kind of intervention.

6.15 *Significance of technology imports from the East.*—The United States imposes no restrictions on the importation of technology from Communist countries although tariffs do apply. Since 1964 (but with most of the activity occurring since 1970), U.S. firms have purchased 26 licenses, at an estimated cost of about $14 million, for the use of Soviet technology, mostly mining, metallurgy, medical equipment, and pharmaceuticals. This is small in comparison with U.S. payments of $434 million in license fees and royalties to foreign companies worldwide in 1975 alone. Nevertheless, there is a growing awareness that the Soviet Union has something worthwhile to offer.

7. The Effectiveness of Existing Organizational Arrangements in the Executive Branch in Regulating Technology Transfers From the United States

7.1 *Adequacy of intelligence on foreign misuse of U.S. technology.*—The broad flow of technology, the difficulty of determining actual misuse, and higher priority demands on intelligence capabilities are limiting factors. Nonetheless, U.S. intelligence does focus its attention on requiring information relevant to assessing the possible misuse of critical U.S. technology and has been successful in identifying significant cases of misuse in support of export control efforts.

7.2 *Adequacy of Western coordination of technology transfer controls.*—In the past the United States has recognized that unilateral controls on technology transfers, including exports of advanced products, would be largely ineffective. For this reason, for almost three decades, the United States has cooperated in COCOM with other NATO countries and Japan in coordinating controls on exports to Communist countries. This coordination has been reasonably effective. In any event, there is no realistic alternative course of action open to us. The effectiveness of controls is improved by refining the list of products and technologies subject to control. Periodic list reviews are conducted with this in view. They generally result in the deletion of some items which are no longer considered necessary to control and the addition of new products or technologies. The list reviews provide an opportunity to resolve possible disagreements over including or excluding certain items. It is frequently up to the United States to make the strategic case for retaining items on the list or adding new ones.

7.3 *Adequacy of interagency coordination of controls.*—The Department of State administers export controls on munitions list items; the Department of Commerce, on general purpose items (including dual-use items); and the Nuclear Regulatory Commission, on nuclear material, reactors, and certain components, and the Department of Energy, on nuclear technology and technical information. Each of the license issuing agencies receives advice from other interested agencies, including the Departments of State and Defense. There may, of course, be disagreements about how significant any security implications are, and procedures have been established for resolving such issues at a high level when they arise.

The Nuclear Non-Proliferation Act mandates procedures, including an interagency reviewing mechanism. Export licenses are transmitted from the licensing agency to the other agencies participating in the reviewing process (State, Defense, ACDA, Commerce, Energy, and NRC).

Each agency provides its views as to whether the export or subsequent arrangement is in some way inimical to the interest of the United States including the common defense and security. When a disagreement exists the case is referred to the Subgroup on Nuclear Export Coordination, and a mechanism exists for the resolution of disputes at higher levels when agreement is still not reached.

7.4 *Correlation between arms control policy and export controls.*—ACDA has been an active participant in the review of export control policies, nonproliferation policy (which has an important bearing on nuclear exports), and conventional arms transfer policy. It participates actively in the review of proposed nuclear exports and conventional arms transfers and will participate in review of other exports which have significant arms control implications.

7.5 *Options for coordinating policy on private commercial transfers of technology to the U.S.S.R.*—As a general rule, companies doing business with the Soviet Union seek advice from the Government concerning the relationship of their activities to broader national policies. In the case of specific proposed transactions the Department of Commerce provides advisory opinions upon request. The Government is informed in detail about all exports from the United States to the Soviet Union requiring validated licenses. This includes transfers of technology.

Pursuant to article 4 of the recently renewed 1972 U.S./Soviet Agreement on Cooperation in Fields of Science and Technology, both parties encourage cooperation between their respective firms and enterprises. Although a number of article 4 agreements have been signed between U.S. firms and Soviet enterprises, they are largely expressions of intent. Any actual transactions under these agreements are subject to export controls.

8. The Adequacy of Existing Legislation and Regulations with Respect to Transfers of Technology from the United States

8.1 *Adequacy of legislation, regulations, and procedures to identify strategic technology.*—Existing legislation and regulations provide an adequate basis for the identification of strategic technology to insure that national security implications are properly considered by the Government. Strategically important technology is protected in several different ways. Some information is classified for security reasons. Even unclassified information, products, and technologies are subject to export control regulations, although the Freedom of Information Act may have an effect in this case. The Arms Export Control Act, Atomic Energy Act, Nuclear Non-Proliferation Act, Mutual Defense Assistance Control Act, and Export Administration Act provide an adequate legislative basis for necessary controls. This legislative authority has been translated into effective regulations which are reviewed and modified periodically, particularly as they relate to adding and deleting specific items from controls.

8.2 *Form and control of desirable technology transfer policy statements.*—Basic policy on technology transfer is set forth in the governing legislation. Different Government departments do have different perspectives on what actions may best serve our security interests. Interagency arrangements provide a full opportunity for all points of view to be heard. There is no way of imposing a rigid single point of view on all interested agencies through a detailed policy statement,

and it would be undesirable to attempt to do so. Diversity of viewpoint is not evidence of lack of coordination. Indeed, such diversity is essential to achievement of a proper balance of all relevant factors.

8.3 *What types of items should be included on the munitions list?*—The munitions list is not a list of items with formal nomenclature but rather a list of 21 broad categories of equipment which is designed to include items ranging from small-caliber target pistols to equipment or technical data for design and testing of nuclear weapons.

The list is revised as necessary to keep pace with advances in weapons technology. These broad categories help to prevent inadvertent omissions which could occur in a detailed equipment list which would have to be updated continuously. At the same time, the Department of State, in consultation with Defense and Commerce, processes requests for commodity jurisdiction decisions on specific items to determine whether they are to be controlled by State or Commerce.

Any classification of items on the munitions list, such as lethal-nonlethal, sophisticated-simple, obsolete-modern, offensive-defensive, implies varying degrees of control. While these factors may bear on any given decision, neither the items nor the control process lend themselves to differing degrees of control. A simple .45-caliber pistol, designed in 1911, can become sensitive depending on its destination. Much electronic equipment is nonlethal but generally either protects lethal equipment or multiplies its effects. Tanks and strike aircraft are usually considered archetype offensive weapons, but no modern army would willingly fight even a clearly defensive war without both tanks and strike aircraft.

Given the ever present danger of illegal diversions and of unauthorized transfers to third countries, all munitions list items and technical data on them must be subject to equal control and illegal acts involving them subject to the same stiff penalties. The existence of some type of secondary, less stringent controls would inevitably weaken the licensing system.

9. The Possibilities for International Agreements With Respect to Transfer of Technology

9.1 *What should the United States do to promote international cooperation in restraining arms sales, coproduction agreements, and other transfers of technology considered destabilizing or detrimental to U.S. interests?*—The United States has initiated a dialog with key arms supplier nations. For example, we have been holding talks with the Soviets. We felt that it was important to include the Soviet Union, the world's second leading arms supplier, in the multilateral restraint effort. The United States has also been in touch with the principal Western suppliers on a continuing basis. We have explained our restraint policy in detail to the principal suppliers and have sought their cooperation in working toward multilateral restraint of conventional arms transfers.

With respect to recipients, we support all approaches which lead toward restraint by purchasing nations. Regional limitations, such as the 1974 Ayacucho Declaration by the leaders of eight Latin American nations, reaffirmed in June 1978, represent the type of effort which we wholeheartedly support. Reaching any multilateral agreement or arrangement on restraint will be difficult and will take time to achieve.

The subject involves many vital political, economic, and security interests of both suppliers and recipients. However, we are hopeful that the process, once begun, will gain momentum and that our efforts will lead to multilateral cooperation.

In the case of dual-use items and technologies with extensive civil applications, controls may be desirable for items and technologies having particularly significant military applications. However, the case for unilateral national action is weak. Most technology is so widely diffused in the industrialized countries that unilateral controls would be ineffective. Exports of items for apparent civil use are considered part of normal trade, with far less political and military significance than exports of arms. In the absence of international agreement on export controls, the question is raised as to why our exporters should be denied profitable sales opportunities not denied to their competitors in other countries.

It is important to persuade our allies in COCOM to impose parallel controls on exports to the East of dual-use items we believe warrant control. They do respond positively to well reasoned presentations to support proposals for controlling carefully selected, well defined items. Several Western countries do not have legislative authority to control the export of technical data. Legally enforceable controls are more orderly and clear cut. However, the absence of legal authority does not mean the absence of control capability. The advanced technologies of greatest concern are held by only a relatively few companies. These companies wish to cooperate with their governments in the interests of security. Therefore, even in the absence of a legal compulsion, they voluntarily control the transfer of technologies recognized to be of security significance.

Most significant transfers of technology also involve the export of production equipment. Tangible equipment is easier to define and to control than is technology. Therefore, it is particularly important to reemphasize and refine internationally agreed controls on unique and critical items of production equipment.

9.2. *Code of conduct for technology transfer to developing countries.*—Developing countries are advocating a code of conduct on the transfer of technology to improve the ability of their enterprises to acquire and utilize relevant technologies on less costly and restrictive terms. Together with stringent national regulations of technology transfers and multinational operations generally, as well as proposed revisions in the Paris Convention for the Protection of Industrial Property, the code of conduct is part of a broad effort by developing countries to restructure customary private practices and international ground rules which they believe retard their growth.

Negotiations on a code began in 1975 in an expert group under U.N. auspices. Although only limited progress has been made in drafting a code, the developing countries successfully sponsored a resolution in the United Nations General Assembly (the United States reserved its position) calling for a conference in the fall of 1978 to complete action on the code.

The prospects for agreement on a full text by fall are dim. Among the outstanding issues are whether the code will be voluntary or binding and whether obligations proposed for multinationals will be balanced in any way by the inclusion of obligations recognizing the interests of technology suppliers as well as responsibilities addressed

to governments. The United States supports the adoption of appropriate voluntary guidelines which are balanced in substance and addressed to all parties. Our objective is a code that would enhance the mutual confidence of parties to technology transactions and to improve the overall transfer climate. Such a code could be of mutual benefit. A one-sided, highly restrictive code would be self defeating from the standpoint of the developing countries' interests. In developing our approach to this matter, we are working closely with other industrialized countries in the OECD.

9.3 *Evaluation of U.N. Conference on Science and Technology for Development.*—Efforts of developing countries to achieve growth have been hampered by the lack of an adequate scientific and technical base. Improved indigenous scientific and technical capabilities as well as improved access to existing technologies have become important to the developing countries. Considerations such as these led the U.N. General Assembly's Seventh Special Session (1975) to call for a U.N. Conference on Science and Technology for Development. The conference will be held in Vienna in late summer 1979.

U.S. planning for participation in the conference is now well underway. In addition to developing its own approach, the United States is participating in the work of the U.N. Preparatory Commission for the Conference and in discussions with developing countries at meetings of the U.N. Regional Economic Commission and in meetings in the OECD with other industrialized countries.

9.4 *Evaluation of international arrangements to facilitate and control nuclear transfers.*—The principal international arrangements for facilitating and controlling nuclear transfers are:

—The arrangements established through the International Atomic Energy Agency (established in 1956) which both facilitate and safeguard nuclear transfer;

—the Limited Test Ban Treaty which precludes nuclear weapons tests except for underground tests;

—the Non-Proliferation Treaty, which precludes nonnuclear weapons states from acquiring nuclear weapons and includes an undertaking that all parties will facilitate and have the right to participate in the fullest possible exchange of equipment, materials, and scientific and technological information for the peaceful uses of atomic energy; and

—the Treaty of Tlatelolco (Latin American Nuclear Free Zone).

In addition to the foregoing, major nuclear suppliers reached agreement in September 1977 on certain guidelines respecting future transfers. Currently, some 40 countries are participating in the International Nuclear Fuel Cycle Evaluation which is exploring ways of making nuclear power available without the increased risk of further proliferation of nuclear weapons inherent in certain advanced technical developments. Negotiations looking toward a comprehensive nuclear test ban are also underway.

If these are successful, a further step will have been taken toward establishing an international regime within which the benefits of nuclear power can be achieved and the risks of further proliferation of nuclear weapons held to the minimum. As this summary suggests, the development of international arrangements in this field has continued over the past two decades. We expect that this evolutionary process will continue.

ASSESSMENT OF THE EXECUTIVE RESPONSE TO SECTION 24 OF THE INTERNATIONAL SECURITY ASSISTANCE ACT OF 1977

(Prepared by the Congressional Research Service of the Library of Congress)

Introduction

Congress has expressed growing concern during the last few years regarding the far-reaching efforts of U.S. exports and imports of technology. In 1977 several legislative provisions were enacted requiring the executive branch to study and report to Congress on various aspects of U.S. technology transfers. Section 24 of the International Security Assistance Act of 1977 (Public Law 95–92, 91 Stat. 614, approved August 4, 1977) directed executive branch attention to the national security and military implications of international technology transfers.

SEC. 24 (a) The President shall conduct a comprehensive study of the policies and practices of the United States Government with respect to the national security and military implications of international transfers of technology in order to determine whether such policies and practices should be changed. Such study shall examine—

(1) the nature of technology transfer;

(2) the effect of technology transfers on United States technological superiority;

(3) the rationale for transfers of technology from the United States to foreign countries.

(4) the benefits and risks of such transfers;

(5) trends in technology transfers by the United States and other countries;

(6) the need for controls on transfers of technology, including controls on the use of transferred technology, the effectiveness of existing end-use controls, and possible unilateral sanctions if end-use restrictions are violated;

(7) the effectiveness of existing organizational arrangements in the Executive branch in regulating technology transfers from the United States;

(8) the adequacy of existing legislation and regulations with respect to transfers of technology from the United States; and

(9) the possibilities for international agreements with respect to transfers of technology.

(b) In conducting the study required by subsection (a), the President shall utilize the resources and expertise of the Arms Control and Disarmament Agency, the Department of State, the Department of Defense, the Department of Commerce, the National Science Foundation, the Office of Science and Technology Policy, and such other entities within the Executive branch as he deems necessary.

(c) Not later than the end of the one-year period beginning on the date of enactment of this section, the President shall submit to the Congress a report setting forth in detail the findings made and conclusions reached as a result of the study conducted pursuant to subsection (a), together with such recommendations for legislation and administrative action as the President deems appropriate.

On August 21, 1978, the President submitted his response to Congress. This report will assess the Executive's compliance with the assigned tasks in general terms, make observations regarding Executive responses to specific questions raised in the act, note other related studies, and provide some overall comments.

A. The Task Set for the Executive Study

As noted by Chairman Clement J. Zablocki:

The Congress mandated under section 24 of the International Security Assistance Act of 1977 a comprehensive Presidential study of U.S. Government policies and practices with respect to the national security and military implications of international transfers of technology. The congressional intent in mandating this study is to obtain information necessary to understand the many complex issues relating to technology transfer, and if necessary, to consider appropriate changes in legislation governing international transfers of technology.

At my request, the Congressional Research Service of the Library of Congress has prepared a study of the issues raised in section 24 of the International Security Assistance Act of 1977. The purpose of the CRS study is to identify further the range of issues and problems relating to international technology transfer.[1]

The Executive report transmitted by President Carter acknowledged the task set by Congress.

This report was prepared in response to section 24 of the International Security Assistance Act of 1977. The outline of the report corresponds to the provisions of Section 24. The specific questions and issues covered were drawn from the report entitled "International Transfers of Technology: An Agenda of National Security Issues" prepared by the Congressional Research Service (CRS) for the House Committee on International Relations. In addition, discussions were held with the staff of the CRS and the committee.[2]

From the specific study requirements mandated by the International Security Assistance Act of 1977, elaborated by the House Committee on International Relations and the Congressional Research Service, and acknowledged by the President's response, it seems clear that the intent of Congress was clearly expressed and accepted as the basis for response.

B. General Compliance of Executive Study to Congressional Mandate

The task required of the six executive agencies by section 24 of the International Security Assistance Act of 1977 was complex and demanding. A full and detailed reponse to all of the pertinent issues was beyond reasonable expectation for a 1-year effort. Therefore, this assessment will only make general comments concerning significant policy statements and major shortfalls or omissions in the Executive response.

1. COMPREHENSIVENESS

Section 24 mandated a "comprehensive study" of policies and practices of the U.S. Government in regard to the national security and military implications of international transfers of technology "in order to determine whether such policies and practices should be changed." This wording indicates that Congress expected an analytical, probing report of reasonable breadth and depth. The purpose was to determine whether any U.S. policies and practices should be changed and also to indicate whether Congress should take an initiative in changing such policies or practices by legislation or other action.

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[1] U.S. Congress. House. Committee on International Relations. International Transfer of Technology: "An Agenda of National Security Issues." Committee print. Prepared by the Congressional Research with foreword by Chairman Zablocki. Feb. 13, 1978, p. III. (Hereafter referred to as Agenda.)

[2] Transmitted to Congress Aug. 21, 1978, by President Jimmy Carter, "Report to the Congress in Response to Section 24 of the Internal Security Assistance Act of 1977." (Hereafter, Report.)

Although the report addresses most of the issues raised by the law and by the CRS agenda of issues, the lack of data and analytical depth indicate that this report does not reflect a comprehensive study. A considerable portion of the text is taken by description of existing organizations and procedures for controlling U.S. technology exports and asserting their adequacy and propriety. Significant policies are overlooked or given minimal treatment.

The document transmitted by the executive branch provides few insights to the following issues that were raised by Chairman Clement J. Zablocki of the House Committee on International Relations:

—The economic and social impact of the transfer of technology on the recipient countries;
—Impact on the economies of the recipient countries of restrictions on the transfer of dual purpose technologies (technologies with civilian and military applications);
—Impact of the restriction on the transfer of dual-purpose technologies on the military capabilities of potential adversaries;
—Effect of the transfer of technology on the U.S. economy and on U.S. international competitiveness; and
—Advantages and disadvantages of U.S. participation in international scientific and technological activities.

2. EXECUTIVE AGENCY PARTICIPATION

The report gives no indication of specific participation in a study or in the report by the Arms Control and Disarmament Agency, the Departments of State, Defense, Commerce, and Energy, the Office of Science and Technology Policy, and the National Science Foundation, which was required by the act. There is also no indication whether any or all of these agencies concurred with what the President reported.

However, since the report was signed by the President, it can be taken as a definitive summary of the administration's thinking on international transfer of technology. As such, it provides a baseline for further congressional consideration of this matter.

3. MILITARY AND NATIONAL SECURITY DISTINCTIONS

Congress focused special attention on the need to examine technology transfer from a broad context of national security. The Presidential report arguably does not respond to this guidance. Rather it stresses Government control over the transfer of military technology and gives little attention to the transfer of those civil technologies which could affect future balances of industrial and military strength. Likewise, the full impact on U.S. security of modifications in the economic, military, and social systems of countries receiving U.S. technology and in U.S. economic competitiveness, industrial strength, employment rates, and the research environment are not fully considered.

4. GLOBAL TRANSFERS

The House Committee on International Relations identified the major areas of concern in the study of technology transfer as: North-South, West-West, and West-OPEC. These global areas were subordinated in the study to East-West technology transfer. Moreover, in consideration of East-West transfers, primary attention was given to U.S.-

U.S.S.R. relations. Many important considerations that were not given attention were specifically of interest to the Congress, as spelled out in the formal and informal guidance prior to the study.

5. MEANS OF TECHNOLOGY TRANSFER AND THEIR IMPACT

Congress emphasized its need for information and analysis on transfers of technology involving people and systems as well as those concerned with hardware, data, and technical information. The Department of Defense Science Board study (the "Bucy Report") also emphasized the importance of such active forms of technology transfer. The executive report summarizes the gradations of effectiveness which were described in that report but takes the basic position that "from the standpoint of national security interests, the mechanism of transfer of technology is of secondary importance." The report reflects the Government's primary concern with controlling the export of critical defense technologies and provides few insights on the means of transferring technology. If the report had fully treated the positive aspects of certain technology exports and imports, it might have been more inclined to evaluate the means by which technology can best be transferred.

6. RECOMMENDATIONS FOR LEGISLATIVE ACTIONS

Although section 24 called for a study that would facilitate determinations of whether U.S. technology transfer policies and procedures should be changed, there is little suggestion in the report that Congress should consider amending any existing laws or passing any new law. In a few instances, the report indicates that some changes might be made and declares that the Executive is looking into such possibilities. The report's general tenor implies that current policies and procedures are working reasonably well and that there is little need for congressional concern or involvement in the issue of international technology transfer.

C. Specific Observations on Individual Questions

Section 24 sets out nine general topics of inquiry, and the agenda spelled out specific questions implied by these general topics. Some specific observations are made below on the Executive responses to each of these nine topics:[3]

1. THE NATURE OF TECHNOLOGY TRANSFER

The response represents a good description of factors which should be incorporated into a statement of U.S. policy regarding technology transfer. The definition given is better than some definitions of technology transfer in that it goes beyond concrete technology transfers to include such factors as flows of scientific and technical information and recipient's capacity to absorb technology. The report lists several U.S. national interests that may be affected by technology transfers and refers to some basic factors for differentiating cases of technology transfer: The political and economic status of the recipient; whether

[3] Specific page references are not made to each reference in the executive report as they are organized by the nine topics and readily identifiable by reference to the report.

the technology involves defense articles or services, civil articles or services, or has potential applications for both; whether end items or know-how are involved; and whether nuclear technology is involved. Rather than providing a comprehensive statement of the nature of these types of transfer, the report discusses U.S. export controls. This section tends to indicate that current practices and policies are effective and suitable for U.S. national security interest, without identifying any major problems. The discussion does not provide an inventory of major U.S. policies regarding technology transfer for example, the elements of U.S. policy of promoting opportunities to increase the variety and volume of U.S. exports, and of promoting certain transfers that will help our less developed friends and allies strengthen their economies.

In specific response to the legislative mandate, there are some omissions. There is insufficient information in topic 1 on the nature of technology transfer to provide a basis for analysis of U.S. policies and various alternatives. Also there are no criteria given by which U.S. technology transfer policies could be measured for compliance with national security interests and by which needed changes could be identified. No suggestions are given to facilitate improvements in the measurement of technology transfers and of the domestic, foreign, and international consequences of such flows; for example, the impact on U.S. employment, impacts on resource releasing abilities of receiving countries, or impacts on military and civilian advance. It seems that a comprehensive Government study of technology transfer would develop, in cooperation with industry, a system for measuring technology flows and their impact on U.S. national security and foreign policy. Also, it can be argued that the report is not responsive when it maintains that the difficulties of measuring technology transfer information flows preclude measurement of such flows. Numerous studies have been made of this subject with significant developments in at least concept formation. The issue of appropriate technology could have been discussed in detail and additional attention to the special issue of technology transfer flows to third and fourth tier developing countries would have been responsive to congressional interests.

Concerning nuclear technology, the study notes the special controls under the Atomic Energy Act of 1954 and, most recently, under the Nuclear Non-Proliferation Act. The administration says it is too early to judge the effect of the new procedures under this legislation. Of this, the report says:

> * * * Given the very recent nature of the legislation, it has not yet been possible to analyze the full impact of the new controls. These controls reflect, in particular, concerns about the proliferation of nuclear weapons. The conditions imposed are designed to provide safeguards against proliferation or other military use of nuclear materials or equipment.

In an effort to lend credibility to its policy of controlling nuclear exports in order to discourage the development of plutonium fuel cycles, including fast breeder reactors, the executive branch has sought to restrict the development of such reactors in the United States. An evaluation of this self-denying measure as a method of implementing a policy of blocking the spread of nuclear weapon capability, would be important to a study of nuclear technology transfer controls.

The study mentions that an interagency Subgroup on Nuclear Energy Coordination of the National Security Council's ad hoc Group on Non-Proliferation reviews proposed nuclear exports. It also calls attention to an ad hoc NSC Technology Transfer Group "to coordinate implementation of planned improvements in the export control system." The study further mentions that an interagency task force chaired by the Department of Defense is examining ways of identifying and placing special emphasis on controlling critical technologies and associated products. Although no further details are given about these ad hoc bodies, additional information would seem appropriate.

2. THE EFFECT OF TECHNOLOGY TRANSFERS ON U.S. TECHNOLOGICAL SUPERIORITY

The President's report indicates that technology transfers are less threatening to U.S. technological superiority than is a reduced rate of U.S. technology innovation. Of this it says:

> In the case of both weapons-related and dual-use technologies, it should not be assumed that efforts to retain specific technologies in the United States would ensure technological superiority. Such efforts alone might be counterproductive. The temptation to rely on existing technology, coupled with decreased government research and development funding, might lead to a slowing of efforts directed toward the research, development, and continuing technology innovation that are essential to continued U.S. technological superiority. It is under such circumstances (rather than as a result of the transfer of technology abroad) that loss of United States technological superiority might occur.

In another section of the study, it is stated that, "There is little evidence to indicate that present U.S. controls have the effects of discouraging innovative effort on the part of U.S. industry." However, these judgments are not supported in the report by data or case studies. Also absent are data on the levels of U.S. efforts in research, development, and technological innovation as compared to other advanced countries (for example, the Soviet Union, Japan, Federal Republic of Germany), although it indicates that these are key factors in technological superiority.

The report does not undertake an overall assessment of the status of U.S. technology, although it does report the concern held by the American Association for the Advancement of Science about "the decline of U.S. technological superiority," and quotes Under Secretary of Defense Dr. William Perry as saying, "The existing qualitative edge of deployed NATO equipment can be expected to degrade as the Soviets replace deployed equipment." Although several areas of technology are mentioned in which the United States retains superiority, the report says that most new Soviet equipment is on a par with corresponding NATO equipment, and mentions no area of technology in which the Soviet Union or other nations may have an advantage over the United States. It discounts claims that the United States is losing technological superiority by saying the concept is inexact. Of this it says:

> * * * There are no precise measures of the relative overall technological strength of various countries, and relevant data are frequently not available. The problem is especially difficult where the comparison involves scientific attainment and industrialization.

And also:

* * * On the basis of such indicators, it is fair to say that the United States retains important technological (qualitative) advantages in a number of important fields.

* * * an examination of the state of United States and European science and technology * * * suggested less vitality in western science and technology today than in the 1950's and 1960's. Nevertheless, there was no suggestion that the West's position in science and technology, capable of outstanding achievements in certain fields, remains hindered by a system which tends to discourage technological innovation.

A careful evaluation of the comparative technological postures of the United States and the Soviet Union, including an assessment of trends, could be undertaken as one yardstick against which official decisions on technology might be made.

The report lacks a comprehensive analysis of the status and trends of U.S. technological superiority, technology transfers, technological innovation, and the relationships among these factors.

Various military and economic advantages associated with the export of U.S. military or strategic technology are discussed in the study, but the specific impacts of these transfers on U.S. technological superiority are not examined. There is no summary of the impact of weapon sales and coproduction agreements on U.S. technology. Exports of dual-use technologies (those with civil and military applications) are, according to the report, "largely determined by judgments made by private concerns." Still remaining is the issue raised by Congress of the "effect of technology transfers on U.S. technological superiority."

In addressing nuclear weapons technology, the study says that SALT II controls on technology transfers will not undermine the U.S. technological position vis-a-vis the Soviet Union or other countries, but it does not refer to clauses in the agreements which may limit or prohibit the transfer of weapons or technology from the United States to its allies. Such controls may not affect U.S. technological status but could degrade the security position of the United States by limiting improvements in the military posture of our allies. However, it is recognized that arms control tradeoffs could justify or compensate for such restrictions within the context of the SALT II agreements, assuming they are eventually completed.

The President's study notes that all significant nuclear cooperation must be under the auspices of either a bilateral agreement for cooperation or the International Atomic Energy Agency. The most sensitive nuclear technologies (uranium enrichment, spent fuel reprocessing, and heavy water production) may not be exported except as provided in an agreement of cooperation or with authorization of the Secretary of Energy. The report does not discuss the effect of U.S. nuclear exports on U.S. nuclear technological standing.

3. THE RATIONALE FOR THE TRANSFER OF TECHNOLOGY FROM THE UNITED STATES TO FOREIGN COUNTRIES

In this section the administration discusses reasons for governmental restrictions of technology exports from the United States, briefly mentions "the traditional reluctance of the Government to intervene in private commercial transactions unless clearly necessary," and describes certain reasons for exporting U.S. technology. Concerning the latter, the report makes the following five points:

(1) A limited degree of foreign influence can be achieved by exporting military weapons and equipment;

(2) Transferring production know-how through licensed manufacturing agreements can help allies and friendly countries achieve enhanced military capabilities at an earlier time than might otherwise be possible;

(3) The primary motivation of military technology exports "has been and remains to strengthen security relationships of direct importance to the United States and to improve the military capabilities of our allies";

(4) In a few cases, foreign policy goals can be advanced and foreign relations can be improved by transferring various technologies; and

(5) A function described in the International Atomic Energy Agency is to promote the peaceful use of nuclear energy worldwide and to "foster the exchange of scientific and technical information" to that end.

However, the study does not examine the basic, general rationales for the transfer of technology from the United States to foreign countries. That such rationales exist is made evident by the fact that the U.S. Commerce Department conducts trade shows, technology is exported under foreign assistance programs, and preferential treatment given some technology exports by the U.S. Export-Import Bank and the Overseas Private Investment Corporation. A discussion of U.S. rationales for technology transfers might suggest the need for a positive and coordinated policy supporting the export of certain technologies. It would seem appropriate for the administration to have discussed the effect of U.S. technology exports on the economic strength and industrialization of our allies and friendly countries and the effect of those qualities on U.S. national security, if such factors are involved in U.S. rationales for exporting technology.

The report defends the U.S. policy of not using technology transfers for the improvement of relations with adversaries:

> Military technology is not considered available for use as a means of improving relations with possible adversaries.
>
> In the case of other technologies of potential strategic significance * * * improvement of relations with the countries of concern may sometimes result but has not been a primary consideration.

Later in the study, the position is taken that, "In general, there is no reason to encourage the transfer of know-how rather than the export of products." This position appears to contradict certain U.S. policies that encourage technology exports (primarily for the development of friendly LDC's).[4]

This section of the report sheds little light on the effect on U.S. interests of Soviet technology transfer relationships with developing countries. It discusses none of the dangers, which have been seen by Congress, in Soviet military assistance relationships and says Soviet economic assistance and civil technology transfers are not, in and of themselves, destabilizing:

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[4] Technology transfers are encouraged by certain foreign economic assistance and security assistance programs, NATO standardization programs, and by some Eximbank actions.

To the extent that such (civil) transfers may make a real contribution to the development of particular countries, there is no reason for the United States to consider that its own interests have been harmed even though such transfers are frequently designed for political impact and to provide an underpinning for client relationships.

As for dual-use technologies, which include nuclear energy, according to the report, the Government may intervene in reviews and occasionally in decisions of private firms to transfer technologies.

In discussing transfers of dual-use technologies of strategic significance, the report fails to note a rationale for such transfers and instead describes extensive internal governmental reviews under the leadership of the Departments of Commerce and State for considering the risks of military uses of a proposed transfer which might be detrimental to national security interests. "Lack of evidence that the recipient perceives a military need for the technology is not regarded as removing the risk of military use." On the other hand, the report also says experience shows credence can usually be given to assurances of civil use.

Concerning transfers of nuclear technology, the report describes the functions of the International Atomic Energy Agency in fostering exchange and in detecting diversion of nuclear materials for military purposes. It mentions the dual purposes of the Non-Proliferation Treaty to prevent military use while encouraging peaceful use of nuclear energy. However, it does not assess the effectiveness of these measures in preventing use of nuclear power technologies to acquire nuclear weapons.

4. THE BENEFITS AND RISKS OF TECHNOLOGY TRANSFER

The discussion of topic 4, the benefits and risks of technology transfers, probably best illustrates the general deficiencies in the study. Logically, the authors might have begun by addressing the central question: What are the major benefits and risks of technology transfer? In attempting to answer this central question, they might have arrived at the comprehensive study mandated by the law. Instead, the comments in topic 4 consist mainly of short, unsubstantiated generalizations. The comments on various aspects of the subject appear not to be integrated into a unified and comprehensive analysis.

Taken together, the individual comments seem to suggest that the risks of technology transfers are either nonexistent or quite limited. If this is the conclusion of the authors, some attempt needs to be made to counter the arguments of many observers that there are considerable risks. For example, some critics of current policies maintain that the export of modern industrial techologies is harmful to the domestic economy and to the U.S. competitive position in international markets. This risk is not dealt with in topic 4 (though it is referenced briefly elsewhere in the report). Similarly, many critics of present U.S. policies maintain that militarily significant technologies are being exported to potential adversaries. The response of the report is that the risk is not great because such technologies are subject to licensing. No effort is made to provide evidence to the reader that the licensing process is effective.

The report states that "In addition to military factors, political and economic factors are relevant in judging the relationship of a proposed transfer of technology to our national security." But it does not explain what kinds of political and economic factors are considered in the export control process or how the economic benefits and risks of civilian technology transfer can be taken into account under present laws and regulations.

The statement on standardization of allied military equipment does not address the possible risks of sharing U.S. military technology. For example, does standardization increase risks of disclosure of military secrets?

The evaluation of U.S.-U.S.S.R. cooperative programs includes no discussion of complaints from some U.S. participants that the U.S. side is benefiting less than the Soviet side. The statement on transfers of hydrocarbon technology to the U.S.S.R. falls short of being an evaluation. It does not state what kinds and how much hydrocarbon technology has been exported; it does not assess the national security implications; nor does it explain why procedures for controlling this technology were recently changed. The report's treatment of nuclear technology transfers is brief and general, and contains little discussion of the benefits and risks of nuclear transfers. Nor does it reflect the abundance of information, analysis, law, and regulation available on this subject in congressional, executive, and non-Government literature.

The report states that exports of nuclear reactors using slightly enriched uranium for fuel do not pose a significant proliferation threat, provided that care is taken in the selection of the recipients, that the recipient has agreed to adequate controls, and that the export takes place under international safeguards. This is an interesting statement because it implies that the administration might choose not to permit transfer of nuclear energy technology to some states. The report then describes U.S. controls over export of nuclear materials and components. It mentions unspecified proliferation dangers in the spread of certain sensitive nuclear technologies and says U.S. policy is not to authorize export of facilities associated with these technologies and to urge other suppliers to exercise restraint.

Of nine suggested questions on this topic in the CRS report, the President's report does not discuss eight at all, and only indirectly discusses the remaining one, as shown in table I.

TABLE I.—*Coverage by the President's report of questions posed in item 4.5 of CRS report on international transfer of technology*

CRS Question	*President's report coverage*
(1) What is the link between nuclear technology transfer and proliferation?	Not discussed.
(2) How does proliferation affect U.S. military security?	Do.
(3) Under what conditions does proliferation affect U.S. military security?	Do.
(4) How would proliferation by specific countries affect U.S. military security?	Do.
(5) How dependent are other countries on transferred nuclear technology?	Do.
(6) What are foreign reactions to U.S. regulation of nuclear technology transfers?	Do.
(7) What are foreign policies of other countries for control of nuclear technology transfers?	Indirectly discussed in connection with information on the Nuclear Suppliers Group.
(8) What is the effect of foreign nuclear technology transfer policies and actions on U.S. security?	Not discussed.
(9) What is the effect of technology transfers for uranium mining?	Do.

The treatment of the effects of technology transfer controls on innovation, under topic 4 (benefits and costs) of the President's report, has some implications for nuclear technology. The report says there is little evidence that present U.S. controls discourage innovative effort by U.S. industry because the controls are centered on a single group of countries, the Communist countries. It then conjectures:

> If an effect were made to preclude the transfer of technology to non-Communist countries as well, it is likely that the effect on innovation within the U.S. would be stultifying; with continuing reliance placed on increasingly obsolescent technologies (although this has been avoided in the case of sensitive nuclear techniques).

Continuing, the report says that U.S. export controls may stimulate some countries to develop and produce the embargoed items indigenously and might thereby cause a diversion of foreign resources. However, an embargo would remain useful only if it were periodically revised to cover new advances. This official statement of the President is important if one applies the reasoning to the possible cutoff of U.S nuclear transfers to those countries which will not agree to conditions of the President and of the Nuclear Non-Proliferation Act. Will such embargoes stimulate those countries to develop indigenous nuclear technology?

The discussion in this section barely touches the complex issues involved with transfers of technology in the form of hardware and information to the People's Republic of China (PRC). The limited

comments are outdated because it is now clear that the People's Republic of China is anxious to proceed with liberal technology transfers on a number of levels including exchange of personnel, importation of hard goods, and cooperation with foreign enterprises of various kinds. Since the President's science adviser and several high level science and technology officials recently visited China, much more information should be available. There are far-reaching political and security implications of the relationships between the United States and the People's Republic of China that are intertwined with the issue of technology transfers.

The report's statement that "The same ground rules that apply to the Soviet Union and other Communist countries apply in the case of the People's Republic of China," also appears to have been overtaken by events. With the new procedures for administering controls on exports of oil and gas technology to the U.S.S.R., the People's Republic of China appears to be receiving better treatment than the U.S.S.R. This would be an appropriate place to discuss whether the various Communist countries should receive differential treatment. Differential treatment would appear to be consistent with the provisions of the Export Administration Amendments of 1977. The Executive may not have wished to give more than a safe, noncontroversial answer on what is or can be a sensitive subject in a public report. However, the subject of U.S. technology transfer to China is one of considerable political importance that should be explored in depth, with a full appreciation of its complexity and gravity.

5. TRENDS IN TECHNOLOGY TRANSFER

Topic 5 of the President's report deals with trends in technology transfer and makes the observation that the Government maintains no single set of records or statistics reflecting the complete flow of technology to and from the United States. The President's report sees existing disparate measures of technology transfer (data on licenses, commodity trade, royalties, and intelligence on foreign transfers) as adequate for most purposes and would discourage extensive additional collection:

> * * * In any event, it would be neither practical nor useful to seek precise measures of the flow of all relevant data and information through journals, casual conversation, and so forth.

The report proposes a sharper focus by the Government on a limited number of highly significant technologies and a more sharply focused collection of data, but cautions that:

> * * * even if technical agreement is reached on what technologies are critical, it will remain difficult to quantify how much the effectiveness of weapons and other military systems of possible adversaries would be enhanced if such technologies were transferred.

These comments on the data base and measurement of technology transfer are among the most complete in the report. This is one of the few discussions that provides much factual data, albeit limited. One notable omission is lack of comment on the results of recent studies on international technology flows sponsored by the National Science Foundation. A discussion of those studies might beneficially have been included in the report.

Also the discussion of exports of military technology by the United States, and other industrial countries, including the Soviet Union is minimal. The report could usefully provide some statistical data on trends and discuss the past effects of military technology transfer on the stability of various regions.

Concerning international cooperation in the control of nuclear energy, the report notes the role of the Nuclear Suppliers Group whose major effort has been to develop guidelines for the transfer of nuclear technology. These are briefly summarized in the report but are not discussed nor compared with the United States own policies for transfer of nuclear technology. The report notes that these voluntary controls raise the difficulty and cost of a would-be proliferation of a significant nuclear weapons program. It notes too, without detail, that there have been major disagreements between the United States and other nuclear suppliers in the past, but states, "At present, the general harmonization of policies is considered satisfactory." The President's report does not mention the U.S. problems with France and West Germany in their controversial arrangements to export sensitive nuclear technology and products to Pakistan and Brazil respectively. It does not mention what progress has been made meeting the directives in the Nuclear Non-Proliferation Act which call on the President to negotiate with other countries to obtain binding international commitments on control of transfer of nuclear technology and nuclear products. It does not mention possible transfers of heavy-water-reactor technology by Canada nor the situation regarding nuclear fuels reprocessing technology.

As for the three specific questions posed by the CRS agenda report, the President's report indirectly replies to one, does not discuss one, and mentions another in passing, without detail. (See table II.)

TABLE II.—*Coverage by the President's report of questions on nuclear technology posed in topic 5, issue 7, of the CRS report concerning trends in technology transfer*

CRS Question	*President's report coverage*
(1) The extent to which other supplier states control nuclear technology exports to prevent proliferation.	Indirectly discussed in connection with information on the nuclear suppliers group.
(2) Instances of other supplier policies or actions at variance with U.S. nonproliferation aims.	Not discussed other than in general remarks about some major disagreements in the past.
(3) Efforts to harmonize nuclear export policies.	Mention of nuclear suppliers group, with no details.

6. THE NEED FOR CONTROLS ON THE TRANSFER OF TECHNOLOGY

Much of the discussion in topic 6 is clearly expressed and straightforward, though some important issues are treated with little detail. There appear to be deficiencies in the report's response to individual questions.

In raising the question of limiting technology transfer for politically competitive reasons, the report makes explicit the linkage of technology exports to political relations with individual countries. However, linkage is not pursued, although it is a timely subject that deserves more attention.

The report suggests that only mature, standardized technologies have been transferred abroad, and that such technology transfer should have no adverse effect on U.S. employment "unless U.S. firms

begin to license, sell or otherwise transfer recently developed techniques * * *." There is some evidence not cited in the report that U.S. firms have begun to export advanced technologies.[5]

The report's paragraph on the U.S. Export-Import Bank is general and sometimes confusing. Eximbank finances the export of over 20 percent of all U.S. capital goods (the most technology-intensive exports). The Bank's importance in U.S. technology exports suggests that it deserves much more attention.

The authors assert that it is not appropriate to characterize the Bank's programs as "incentives" to transfer technology abroad. Since the Bank provides financing at better terms than exist in the private financial market, the characterization seems entirely appropriate. The authors also cite a Treasury Department study which concluded that "in the Bank's direct loan program, in 64 percent of the cases, the export would not have taken place without the loan." If the Bank does not provide incentives to export, why would 64 percent of Eximbank-assisted exports not have taken place without the Bank's participation? It is not clear what meaning is assigned by the authors to the word "incentives."

The statement on the use of effective (active) mechanisms for transferring technology to the Soviet Union appears to miss the mark. The issue has been not whether the U.S. Government should promote the use of active mechanisms in United States-Soviet commercial relations, but whether such mechanisms should be more tightly controlled. The latter approach was recommended by the Defense Science Board report on the export of U.S. technology.

Topic 6 of the President's report judges present technology export controls to be reasonably effective for controlling the outflow of militarily significant technologies, noting that there have been some known but infrequent violations of the export control system. "Moreover, export controls have not prevented clandestine efforts to acquire technology." Unilateral U.S. export controls, also, have not precluded possible adversaries from acquiring significant military technology from other sources.

Export controls, the report emphasizes, are not a substitute for continuing technological advances by the United States and its allies to provide a sustained qualitative edge over possible adversaries. Export controls may be increased in effectiveness by focusing them more sharply on a limited number of highly significant critical technologies. This, says the report, is being examined, but the report does not say who is making the examination, when it will be completed, or whether or not its results will be reported to Congress.

The application of tighter controls on U.S. exports to Western countries is rejected by the report on the grounds that it would involve a "disproportionately high political cost in terms of weakening our alliance relationships and would therefore adversely affect our security interests." The uniformity of this policy, however, is open to question in the light of the unilateral tightening of U.S. export controls for nuclear technology and products.

The President's report deals with controls for the export of nuclear weapons technology, in four lines:

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[5] See Jack Baranson, "International Transfer of Industrial Technology by U.S. Firms and their Implications for the U.S. Economy," prepared for the U.S. Department of Labor, Bureau of International Labor Affairs, December 1976.

In general, it is believed that controls on nuclear weapons technology as such are quite effective at the present time. This is in part because of the security classification imposed on weapons technology.

One feature of the Nuclear Non-Proliferation Act is title V, which provides for U.S. initiatives to help developing countries find non-nuclear energy sources, largely through a substantial technology transfer effort. The President's report is silent on this directive.

7. THE EFFECTIVENESS OF EXISTING ORGANIZATIONAL ARRANGEMENTS IN THE EXECUTIVE BRANCH IN REGULATING TECHNOLOGY TRANSFERS FROM THE UNITED STATES

In response to the seventh issue raised by section 24 of the International Security Assistance Act of 1977, the Presidential study provided an abbreviated description of executive branch organizational arrangements for regulating U.S. technology exports but does not provide an analysis of their effectiveness.

No analysis is given of the effectiveness of the leadership of the Departments of Commerce and State, the bureaus of those Departments, or any interdepartmental groups in conducting reviews of U.S. and COCOM cases involving dual-use technologies of strategic significance. Neither does the study assess the effectiveness of the Arms Export Control Board in coordinating interagency consideration of major cases of military technology transfers or the effectiveness of departmental participation in this process. Also the study does not describe the circumstances under which the ad hoc National Security Council technology transfer group was established "to coordinate implementation of planned improvements in the export control system," or in what ways the modified system will be more effective or efficient than previous systems.

The study asserts with no support that U.S. intelligence "has been successful in identifying significant cases of misuse" of critical U.S. technology. But without further information, it is not clear whether this judgment is best considered an indication of an effective intelligence organization or ineffective laws, controlling regulations, and organizational arrangements.

This section also states that the international COCOM arrangement for coordinating controls on exports to Communist countries "has been reasonably effective," and adds, "In any event, there is no realistic alternative course of action." No explanation is given regarding the organization's implied shortcomings or the reasons why other alternatives (for example, a system of sanctions against COCOM members that violate the group's rules) are not realistic. The report observes that unilateral controls on technology, including exports of advanced products, would be largely ineffective.

The report does not discuss the issues raised in title V of the Foreign Relations Authorization Act of 1978 which gives the State Department new coordinating and reporting responsibilities concerning science and technology arrangements and activities between the United States and foreign countries, international organizations, or commissions. In passing these legislative provisions, Congress indicated its dissatisfaction with Executive arrangements for the application of science and technology to U.S. foreign policy.

In discussing the U.S. Government's role toward developing countries, the President's report notes under the previous topic (p. 25 above) that since the point 4 program, the United States has provided technical assistance and that a planning office recently was established to outline operations for a new Foundation for International Technological Cooperation to be established in 1979.

8. THE ADEQUACY OF EXISTING LEGISLATION AND REGULATIONS WITH RESPECT TO TRANSFERS OF TECHNOLOGY FROM THE UNITED STATES

In response to the legislative requirement for examining the adequacy of existing legislation and regulations governing U.S. technology exports, the Presidential report stated:

> Existing legislation and regulations provide an adequate basis for the identification of strategic technology to insure that national security implications are properly considered by the Government.
>
> The Arms Export Control Act, Atomic Energy Act, Nuclear Non-Proliferation Act, Mutual Defense Assistance Control Act, and Export Administration Act provide an adequate legislative basis for necessary controls.
>
> This legislative authority has been translated into effective regulations which are reviewed and modified periodically, particularly as they relate to adding and deleting specific items from control.

The administration takes the position that neither the categories of military equipment included on the munitions list nor the arms export control process lend themselves to differing degrees of control. And the report says that further classification of the items according to terms such as lethal or nonlethal, sophisticated or simple, obsolete or modern, or offensive or defensive, would imply various degrees of control.

The study does not evaluate the adequacy of existing legislation and regulations that tend to create variations in the degrees of control applied to munitions list items by classifying them into groups such as significant combat equipment, major defense articles or services selling for $25 million or more, and major defense equipment selling for $7 million or more. Variations in the export control process reflect these differentiations, as do differences among requesting countries (category A and category B request review procedures have been established to provide varying treatment of requests).

The report questions the desirability of one central point of control for technology exports, saying:

> * * * There is no way of imposing a rigid single point of view on all interested agencies through a detailed policy statement, and it would be undesirable to attempt to do so. Diversity of viewpoint is not evidence of lack of coordination. Indeed, such diversity is essential to achievement of a proper balance of all relevant factors.[6]

While the report speaks of the value of an active diversity of viewpoints among the various executive branch departments, it does not provide the impression of a widely based evaluation of U.S. technology transfer policy as set forth in legislation. At this point in American history when many questions are being raised about the effectiveness of U.S. technology policy, the role of the Government in science and technology, and the role of science and technology in American diplomacy and security programs, it can be argued that the administration's discussion of their issues is not adequate.

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[6] Report, p. 40.

9. THE POSSIBILITIES OF INTERNATIONAL AGREEMENTS WITH RESPECT TO TRANSFERS OF TECHNOLOGY

Section 9 deals with international agreements for technology transfers. Here the President's report hints at the need for some additional controls:

> In the case of dual-use items and technologies with extensive civil applications, controls may be desirable for items and technologies having particular military applications. However, the case for unilateral national action is weak. Most technology is so widely diffused in the industrialized countries that unilateral controls would be ineffective. * * * In the absence of international agreement on export controls, the question is raised as to why our exporters should be denied profitable sales opportunities not denied to their competitors in other countries.[7]

The report also addresses international arrangements for control of nuclear transfers. Here it notes the roles of the IAEA, the Limited Test Ban Treaty, the Non-Proliferation Treaty and the Treaty of Tlatelolco (Latin American Nuclear Free Zone), but gives no details. It also mentions again the Nuclear Suppliers Group agreement, the ongoing International Nuclear Fuel Cycle Evaluation and negotiations for a comprehensive nuclear test ban treaty. No evaluation appears for any of these. The report only says that development of international arrangements has continued over the last 2 years and that the administration expects this evolutionary process to continue. It does not mention the directives to the President in the Nuclear Non-Proliferation Act to negotiate with other countries to obtain binding agreements on conditions for nuclear exports.

The separate parts of answer 9 provide little detail of U.S. policy positions that would permit the Congress to judge whether existing policies are adequate or need to be changed.

Certain omissions in specific responses to the legislative mandate:

(1) As with other parts of this study, the first topic indicates that the author or the policymakers endorsing the report are sanguine about policies for technology transfer of arms and existing arms control technology. Is there room for improvement?

(2) The material relating to the code of conduct for technology transfer does not appear to be sufficient to answer the questions raised in the CRS agenda of issues. The answer indicates that the only policies the Government has toward the demands being made in UNCTAD are negative, or something called promotion of "appropriate voluntary guidelines." But what are these? What is appropriate? Should the Government not attempt to encourage or discourage certain behaviors on the part of the private sector in dealing with the developing countries?

(3) The paucity of the material dealing with the U.N. Conference on Science and Technology for Development may reflect an inadequacy of activities in the executive in preparation for the Conference. The fact that the United States has no clearly enunciated policy for the Conference is reflected also in the apparent difficulty the administration has faced in writing other executive studies which set forth U.S. policy guidelines for the Conference and Presidential Review Memorandum 33 dealing with the technology transfers to the LDC's.

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[7] Report, p. 41.

(4) Assessment is lacking of the relative importance to both science and foreign policy of different types of formal agreements and of cooperation in promoting technology flows in cases where such agreements have been reached. Important here is the comparison of the effectiveness of bilateral and multilateral mechanisms. This section of the report does not address topics identified as salient in the CRS document: United States-Soviet agreements and "spy in the sky" technology. Although topic 4 of the President's report does discuss some considerations involved in United States-Soviet agreements, section 9 failed to answer the following questions:

Should the United States make further science and technology exchanges contingent on the principle of joint research? Is an emphasis on exchanges of basic research rather than industrial applications prudent in terms of safeguarding national security and proprietary interests? How should exchange activities be financed? How should information generated by such activities be disseminated? How can the language barrier be overcome? How does the United States assure itself of a quid pro quo? Is the quality of Soviet science relative to U.S. science sufficient to justify joint cooperation? What benefits accrue from these agreements? [8]

D. General Compliance With Legislative Requirements of the Export Administration Act of 1969 as Amended (Public Law 91–184) and of Export Administration Amendments of 1977 (Public Law 95–52) [9]

On July 17, 1978, the Secretary of Commerce submitted a report entitled, "Simplification of the Export Administration Regulations" to the Congress in response to the requirement of section 7(e) of the Export Administration Act of 1969 (as amended by section 114 of Public Law 95–52). The report was referred to the Senate Committee on Banking, Housing, and Urban Affairs. It will be published by the House Committee on International Relations as an appendix to committee hearings on export control policy.

On July 10, 1978, the President submitted a report entitled "Special Report on Multilateral Export Controls" to the Congress in response to section 117 of Public Law 95–52. The report was referred to the Senate Committee on Banking, Housing, and Urban Affairs.

On June 27, 1978, the Chairman of the U.S. International Trade Commission submitted a report entitled "Technology Transfer: A Review of the Economic Issues" prepared by the Departments of Commerce, Labor, and the International Trade Commission, to the Congress as a response to section 119 of Public Law 95–52. The study was referred to the Senate Banking, Housing, and Urban Affairs Committee. It appeared in a hearing of the Subcommittee on International Finance on "Export Policy" (May 16, 1978).

There are three studies relating to export control policy and technology transfer required by the Export Administration Amendments of 1977 that must still be submitted:

(1) The Secretary of Commerce is to submit a study on the transfer of technical data and other information to any country to which exports are restricted for national security purposes.

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[8] Agenda, p. 20.

[9] See Agenda, pp. 22–24, for a more specific discussion of studies to be conducted, interagency reviews, and reports to Congress as required by Public Law 95–92 (International Security Assistance Act of 1977) and Public Law 95–92 (Export Administration Amendments of 1977).

The Commerce study also is supposed to review problems of the export by publications or any other means of public dissemination of technical data the export of which might prove detrimental to the national security or foreign policy of the United States. Required by section 120 of Public Law 95–52, this study is likely to be submitted to the Congress as part of the semiannual report on the Export Administration Act required by section 10 of that act.

(2) The President will report to the Congress no later than December 31, 1978, the results of his review of U.S. export policy toward individual countries, as required by section 4b of the Export Administration Act of 1969 as amended.

(3) The Secretary of Commerce will submit to the Congress a study which investigates whether the U.S. unilateral control or multilateral controls in which the United States participates should be removed, modified or added to protect the national security of the United States. This study required by section 118 of Public Law 95–52 must be reported to Congress no later than December 31, 1978.

These studies mandated by legislation should have been referenced and drawn on in the executive branch response to section 24 of the International Security Assistance Act of 1977.

E. Concluding Observations

The issues concerning national security and military implications of international technology transfer are remarkably complex. A great deal of analytical effort would be required to conduct a comprehensive study of these issues, and some aspects of it would probably elude definitive treatment. Though difficult, such a study was deemed necessary by the Congress as a basis for proper evaluation and, perhaps, modification of U.S. policies and practices regarding international technology transfers, and was mandated by the International Security Assistance Act of 1977.

The executive branch response concentrates on two of the many aspects of the subject: East-West technology transfers, and U.S. export controls covering military and related technologies. The narrow focus of the executive report does not allow full consideration of the potential advantages and disadvantages of transferring civil technology to allies, friends, and adversaries. Specifically, the report does not appear to resolve several issues raised by Committee on International Relations Chairman Clement J. Zablocki:

—The economic and social impact of the transfer of technology on the recipient countries;

—Impact on the economies of the recipient countries of restrictions on the transfer of dual purpose technologies (technologies with civilian and military applications);

—Impact of the restriction on the transfer of dual-purpose technologies on the military capabilities of potential adversaries;

—Effect of the transfer of technology on the U.S. economy and on U.S. international competitiveness; and

—Advantages and disadvantages of U.S. participation in international scientific and technological activities.[10]

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[10] Agenda, p. III.

There is little indication in the report of broad governmental participation in a comprehensive study of the issue as required by the act.

On the whole, the study gives the impression that the President and his administration are satisfied that transfers of U.S. technology abroad are adequately controlled, that such transfers do not pose enough of a risk to U.S. national interests to warrant going beyond what is now being done, and that no new legislation or congressional attention is needed. This optimistic assessment is substantially different from the congressional perception of risks and problems which led to the call for an executive study and report.

As the executive report did not respond in a comprehensive manner to many of the questions raised by Congress and did not provide extensive analysis and criticism of existing institutions and procedures, it follows that Congress might have to turn to methods other than required reports with detailed guidance or to sources other than the executive if it wishes to obtain critical, probing analysis and a review of possible alternatives regarding the transfer of technology.

It is possible that a reporting requirement with less specific questions might elicit a more unified and general response by the executive, but there is little in the executive report here under review to suggest that its response would be of any greater analytical depth.

Oversight hearings on the subjects mandated by section 24 of the International Security Assistance Act of 1977 might be targeted to correct omissions and provide data and insights not included in the report. Provided that additional information is available within the executive agencies and the private sector, such hearings might evoke some of the information and analysis required to evaluate current policies and procedures.

Since many trends in science and technology are documented and the leadtimes in the applications of technologies are sufficiently large, international technology transfer policies may be an area suitable for foresight hearings. In these hearings congressional committees could identify important current trends and develop forecasts of the future. These forecasts may then be used to evaluate alternative policies as well as identify new areas for policy development. Such hearings might, for example, explore the interaction with current policies and regulations of the applications of new or emerging technologies. With this orientation toward the future, the specific issues noted in section 24 of the International Security Assistance Act of 1977 might be addressed.[11]

Finally, ongoing Presidential studies that address technology transfer may yield useful information on the issues that were raised by section 24 of the International Security Assistance Act of 1977 but were not dealt with at length in the executive report. The results of those studies might be made public, or at least provided to the Congress when they have been completed.

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[11] For background on foresight hearings, see: "Foresight in the 95th Congress—First Session," Renfro, William L., Cynthia E. Huston, and Keith A. Bea. Congressional Research Service Report 78–18 SP. Jan. 19, 1978, 24 pp.

APPENDIX

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APPENDIX