Chapter 5
U.S. Policy Issues

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On October 30, 1984, President Reagan signed a Joint Resolution of Congress (S. J. Res. 236) in support of renewing cooperation in space with the U.S.S.R. Introduced by Senator Matsunaga and initially cosponsored by Senators Mathias and pen,' the resolution, now Public Law No. 98-562, states that "the President should: 1) endeavor, at the earliest practicable date, to renew the 1972/77 agreement between the United States and the Soviet Union on space cooperation for peaceful purposes; 2) continue energetically to gain Soviet agreement to the recent U.S. proposal for a joint simulated space rescue mission; and 3) seek to initiate talks with the Government of the Soviet Union, and with other governments interested in space activities, to explore further opportunities for cooperative East-West ventures in space. "[2]

This Public Law is one of a number of overtures made by both this Administration and Congress towards cooperation with the U.S.S.R. A speech delivered by President Reagan in June 1984 announced a renewed U.S. effort to revive or strengthen economic, cultural, and consular as well as scientific contact with the U. S. S. R., and called for efforts to renew U.S.-Soviet cooperation in areas other than space—for example, in the areas of environmental protection, fishing, housing, health, agriculture, and in discussions of maritime problems and joint oceanographic research.[3] An amendment sponsored by Senator Nunn to the Department of Defense Authorization Act of 1985 (signed into law on October 19, 1984, as Public Law 98-525), calls for expanding confidence-building measures between the United States and the U. S. S. R., including the establishment of nuclear risk reduction centers in Washington and Moscow linked with modern communications. And as of May 1985, the 99th Congress has before it several bills directed towards increasing U.S.-Soviet cooperation in space as well as in other areas. In February 1985, for example, Senator Matsunaga introduced S. Res. 46 calling for coordinating already scheduled Soviet and U.S. missions to Mars (for 1988 and 1990, respectively), and for examining ways to coordinate future Mars-related activities, Bills are presently pending in both the House and the Senate (sponsored by Congressman Huckaby in the House and Senator Proxmire in the Senate) calling for a joint U.S.-Soviet study of the long-term climatic effects of nuclear war. A House resolution sponsored by Congresswoman Schneider calls for an exchange of travel between leaders of the United States and the U.S.S.R. And a joint resolution of both houses, sponsored by Senator Warner and cosponsored by Senator Nunn, authorizes the Secretary of Defense to provide equipment and services necessary for an improved U. S .-Soviet "Hot Line. "

Public Law **98-562** marks the outcome of several years of debate on the merits and demerits of cooperation with the U.S.S.R. in other areas as well as in space. As it is primarily a statement of intent rather than a plan for resuming cooperation, however, the law has not resolved the policy issues surrounding its implementation. Instead, it has raised more questions, which must now become the subject of intense scrutiny.

The purpose of this chapter is neither to determine whether cooperation should be pursued, nor to prescribe optimal methods for crafting an agreement to achieve any particular set of goals. Instead, it is intended only to sketch out the broad issues surrounding the implementation of U. S.-Soviet cooperation in space, and to clarify the different viewpoints as a basis for discussing guidelines and specific policy approaches in the future.

'After the resolution was introduced in February 1984, an additional 13 senators became cosponsors: Senators Cranston, Hart, Inouye, Tsongas, Levin, Kennedy, Bingaman, Stafford, Leahy, Bumpers, and Hatfield. The House version of the resolution was introduced i n March 1984 by Representative Mel Levine with 75 cosponsors.

'For a copy ot the tull text, see app. B.

'See President Reaganrs speech, "Conference on U.S.-Soviet Exchanges, " White House, June 27, 1984, and proceedings of the Conference on U.S,-Soviet Exchange, Kennan Institute of Advanced Russian Studies, The Wilson Center, June 1984. See also President Reagan's "Address Before the 39th Session of the General Assembly, " United Nations, Sept. 24, 1984, in i+'eekl~' *Compi~ation of Presicientia] Documents,* Sept. 24, 1984, especially pp. 1357-1359.

Photo credit' National Aeronautics and Space Administration

The issue of U.S.-Soviet cooperation in space has been a subject of congressional hearings since the beginning of the Space Age in the 1950s. Here Astronaut Thomas P. Stafford, Commander for ASTP, addresses the Members of the Senate Space Committee during the 1973 hearings on the NASA budget. Seated at the table are; left to right; Astronaut Charles Conrad, Jr., James C. Fletcher, George M. Low, and Astronaut Stafford

Chapter 3 lists several potential areas and levels for cooperation, primarily from a scientific point of view. But as in France, the issue of U.S.-Soviet space cooperation is not only—or even primarily—a scientific one. These scientific considerations must be considered along with political messages the United States may or may not want to send, and the potential technological benefits and losses such cooperation might entail. After a brief background discussion of the policy questions as a whole, this chapter examines the scientific, foreign policy, and national security issues surrounding U.S.-Soviet cooperation in space, Soviet perceptions and behavior, and key challenges which will face U.S. planners in shaping any future U. S.-Soviet cooperation in space.

BACKGROUND

The signing of Public Law **98-562 and the debate concerning renewed U.S.-Soviet cooperation in space is occurring against a background of strained, unpredictable, and ambiguous relations between the two superpowers. Increased tension** since the detente of the **1970s reflects** such factors as: the imposition of martial law in Poland; the shooting-down of KAL **007; the continued Soviet presence** in Afghanistan; the slaying of an American officer in East Germany in March 1985; the internal exile and uncertain condition of Soviet Nobel laureate Andrei Sakharov; the Soviet Union's continued persecution of dissidents at home; expressed Soviet concern over "aggressive" "imperialist" policies of the Reagan Administration in Nicaragua and elsewhere; and a continued military buildup in both countries. The beginning of 1985 produced accusations by the Reagan Administration of Soviet violations of almost every arms control treaty signed in the past quarter century,[4] and hostile invective on the part of Soviet officials towards the United States, especially concerning the U.S. "Strategic Defense Initiative. " On the other hand, this hostile atmosphere has been imbued with cautious optimism by the resumption of the stalled U.S.-Soviet negotiations on arms reductions, the first high-level Soviet-American trade and economic talks in 5 years, and explicit U.S. overtures for renewing overall U.S.-Soviet cooperation.

The debate is also occurring at a time when U.S.-Soviet scientific and technical cooperation and the various uses of space are raising more complex and contentious issues in their own right.

'For a detailed listing of these accusations of Soviet treaty violations see ***A Quarter Century of Soviet Compliance Practices Under Arms Control Commitments: 1958-1983*** (Washington, DC: General Advisory Committee on Arms Control and Disarmament, October 1984). These accusations remain controversial.

The U.S. scientific community has shown renewed interest in international scientific and technical cooperation in the 1980s, in areas outside of space research per se. "The constraints on domestic resources and growing scientific excellence abroad suggest strongly the need for the United States to enter into cooperative arrangements with other technically advanced nations. "5 This increased interest in international cooperation, however, has been countered by opposing, and sometimes irreconcilable factors, including two key concerns: 1) science and technology have become increasingly important instruments of foreign policy, so that foreign policy interests have led to the reshaping, termination, and/or curtailing of scientific and technical cooperation; and 2) growing sensitivity of technology transfer questions has led to greater concern over the potential dissemination of "militarily sensitive" hardware or information through cooperative projects in the 1980s. '

Controversy in international and bilateral forums over both civilian and military space activities have also made *space* a particularly sensitive arena in which to encourage cooperative activity. In both the United States and the U. S. S. R., the high budgets directed towards uses of space essential to military programs—for satellite reconnaissance, communications, predicting weather, verification of arms control, and even for protection of these satellites—underline that space is, and will remain, an area of sensitive militarily related activities. Each country has consistently accused the other of pursuing policies which will "militarize" *or* "weaponize" space to an unacceptably dangerous level. U.S. press and government reports are filled with information regarding a possible "massive" Soviet buildup of militarily oriented space systems, including space weapons and an already operational ASAT capability,[7] Only tacitly admitting that they have a military space program of their own,[8] Soviet officials have decried the U.S. Strategic Defense Initiative (SDI) and have consistently stated that the U.S. SDI will be a serious, if not insurmountable, obstacle to any major U, S.-Soviet cooperation in space.[9] In civilian areas of space as well, international disputes over such issues as controlling radio frequency and orbital slot allocations have highlighted how difficult it can be to reach agreement even with our allies. Space by nature is an environment which extends beyond any one country's borders, making disputes likely.

Given all of these conflicts, the question of what type of bilateral U.S.-Soviet space cooperation should be pursued has created a good deal of controversy. Some believe that the United States should pursue a large-scale joint mission largely insulated from the ups and downs of U.S.-Soviet relations and world politics. Others support pursuing space cooperation only on a very low and strictly scientific level, if at all. And others hold different views, including pursuing scientifically valuable cooperation (such as joint data exchange and analysis, or hosted experiments on one another's spacecraft) that is insulated from the ups and downs of world politics; pursuing cooperation on any level, but linking it to politics, so that such cooperation would be turned on and off in protest to any egregious Soviet behavior; or pur-

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'Mitchell B.Wallerstein, "U.S. Participation in International S&T Cooperation: A Framework for Analysis, " ***Scientific and Technological Cooperation Among Industrialized Countries,*** Mitchell B. Wallerstein (cd,) (Washington, DC: National Academy Press, 1984), p. 6.

[6]For detailed discussions of the growing debate on S&T cooperation generally, see two recent reports by the National Academy of Sciences and National Research Council: Scientific *Communication and National Security* (Washington, DC: National Academy Press, 1982), commonly known as the "Corson Report" after its panel chairman, Dale Corson; and Wallerstein, op. cit.

'See, for example, "Soviets Develop Heavy Boosters Amid Massive Military Space Buildup, " *Aviation Week and Space Technology,* CCXXII, No. 11 (Mar. 18, 1985), pp. 120-121; Soviet ***Military Space*** *Doctrine* (Washington, DC: Defense Intelligence Agency, 1984), p. 31; and annual issues of the U.S. Department of Defense, ***Soviet Military Power,*** 4th ed. (Washington, DC: U.S. Government printing Office, 1985).

[8]For a discussion of Soviet positions on the "roil i tarization " of space, see "Appendix A: The 'Militarization' Issue at Unispace '82, in *Unispace '82: A Context for International Cooperation and Competition—A Technical Memorandum* (Washington, DC: U.S. Government Printing Office, OTA-TM-ISC-26, March 1983), For a discussion of evidence that the Soviets have a "Star Wars" program of their own, see "Soviet Directed Energy Weapons— Perspectives on Strategic Defense" (Washington, DC: Central Intelligence Agency, March 1985).

[9]See, for example, "U.S.-Soviet Mission in Space is Sough t," *New York Times,* Jan. 8, 1985; Walter Pincus, "Soviet Scholar Warns Against Space Arms, " ***Washington Post,*** Jan. 13, 1984; and interviews conducted by OTA in Moscow, June-July 1984. See also V.S, Avduievskii, "Space Should Be Peaceful, " in Russian in *Zemliai Vselennaia, No. 5* (September-October 1984), pp. 6-11, translated in Foreign Broadcast Information Service (FBIS), ***U.S.S.R. Daily Report,*** May 6, 1985, pp. 94-100; and "Academician on Cooperation, " TASS in English, Moscow, May 20, 1985, reprinted in FBIS, ***U.S.S.R.*** *National Affairs,* May 22, 1985, p. U3.

suing a series of relatively low-level cooperative efforts of gradually increasing complexity, to lead to larger joint projects and commitment in the future.

A related issue concerns the renewal of an intergovernmental bilateral agreement for cooperation in space, regardless of the level of cooperation. Soviet leaders have made it clear that cooperation in space on any level is exceedingly difficult without an overarching agreement which would provide a formal framework for cooperation. But the signing of an agreement itself would be a major event in U.S.-Soviet relations overall, even if it were to call for only low levels of exchange.

Each of the viewpoints on how to cooperate involves a combination of scientific, foreign policy, and national security concerns. Each also involves subjective judgments about broader issues of world tensions, Soviet objectives and the course of U.S.-Soviet relations. U.S. planners and the public have demonstrated a multiplicity of views concerning the goals of U.S.-Soviet space cooperation, and it is unlikely that U.S. policy as a whole will pursue a consistent, unified set of objectives. But the objectives the policy reflects, and the way inconsistencies among them are reconciled, will shape any U.S.-Soviet space cooperation in the future—or determine whether such cooperation will be possible.

SCIENTIFIC AND PRACTICAL ISSUES

One key issue in U.S.-Soviet cooperation in space is whether it is valuable to the United States—either from the standpoint of gaining access to data and information, or from a cost-savings perspective—and whether these benefits offset the costs. Does cooperation with the U.S.S.R, in space research and applications open more research opportunities than we would be able to gain from our programs alone? Can it provide opportunities for cost-savings through reduced duplications of missions and/or shared costs of cooperative missions? And do the Soviets gain far in excess of what the United States does?

The scientific issues in U.S.-Soviet space cooperation are discussed extensively in chapter 3, based on the proceedings of a workshop held at OTA in May **1984 on U.S.-Soviet cooperation in** the space sciences. The workshop and the record of past experience suggest that scientific gains can indeed be substantial from cooperation with the U.S.S.R. in many areas of space research.[10] In brief, OTA'S workshop suggested that:

- Past U.S.-Soviet cooperation in the space life sciences area has been substantive and valuable, especially in: 1) the exchange of flight experimental data regarding human response to spaceflight conditions; 2) joint ground-based simulations of spaceflight conditions; and 3) animal (biological) research.
- While somewhat more problematic, cooperation in planetary science has also been valuable, especially in the exchange of data in lunar studies, the exploration of Venus, and solar terrestrial physics.
- The success or failure of U.S.-Soviet cooperation in the space sciences may depend on such factors as: 1) a focus on well-defined and specific scientific objectives; 2) selection of areas of complementary capability; 3) the selection of projects where the required instrumentation is generally not of a type raising technology transfer concerns.
- The future offers numerous possibilities for U.S.-Soviet cooperation in space which should be scientifically valuable in areas including: "global habitability;" exobiology; the joint demonstration and testing of advanced life support systems; integration of Soviet data into the International Solar-Terrestrial Physics Program (now being developed); joint missions in very long baseline interferometry (VLBI); and cooperative ventures in the planetary field relating to the Moon, Venus, Mars, the comets and outer planet exploration.

[10] "U.S.-Soviet Space Cooperation, " proceedings of workshop held at OTA on May 8, 1984, staff paper compiled by the staff of the Science, Transportation, and Innovation Program, OTA.

These and other views underlying the potential scientific gains of U.S.-Soviet cooperation in space were reiterated in subsequent Congressional testimony.[11] In the space sciences, cooperative activity in planetary research and the life sciences has provided U.S. space scientists with long-duration flight opportunities for experiments, and with data and information unavailable elsewhere; National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and other agencies and individuals continue to seek cooperative activities on the basis of scientific merit alone.

At the level of applications, the experience of cooperation in search and rescue operations has also been beneficial. As described in appendix C, during the course of the approximately 3 years since the first launch in the COSPAS/SARSAT system, close to 400 lives have been saved, and efforts are now being made to standardize emergency locator beacons. The signing of an agreement in October 1984 to extend the program through 1990 indicates that all four parties to the search and rescue agreement consider it beneficial.

In balancing scientific and practical gains against potential losses, however, U.S.-Soviet space cooperation is more controversial. Arguments against renewing space cooperation with the U.S.S.R. based on its scientific and technical aspects alone are threefold. One is the belief that the United States is so far ahead of Soviet efforts that the U.S. space program as a whole has little to gain from renewed cooperation. * A second belief is that—while cooperation may provide benefits in specific areas of space research—whatever the U.S. might gain from such cooperative efforts is hardly worth the enormous amount of time, money, energy, and frustration involved in acquiring it, and that cooperation might draw funds away from other, more scientifically important projects.

A third argument against cooperation is that what we learn may be out of balance with what Soviet scientists gain, and, therefore, it may be in our best interests to severely restrict space cooperation. Scientifically and technically, some believe, cooperation provides a greater boost to the Soviet space program overall than to our own; thus, Soviet scientists may learn more about the U.S. space program from interaction with U.S. scientists than the reverse, and may gain access to potentially sensitive technology or technical know-how in the process. They also argue that in light of the U.S. technological edge, the Soviets should not be "subsidized" to improve their space program and related military capabilities at the United States' expense.

[11] See, for example, statement of Thomas M. Donahue, Chairman, Space Science Board, National Research Council, in *East-West Cooperation in Outer Space, Hearings Before the Senate Committee on Foreign Relations of the 98th Congress on S.J.Res. 236* (Washington, DC: U.S. Government Printing Office, Sept. 13, 1984).

*OTA's studies on *Cooperation and Competition in Space* and *Civilian Space Stations* do not support this conclusion.

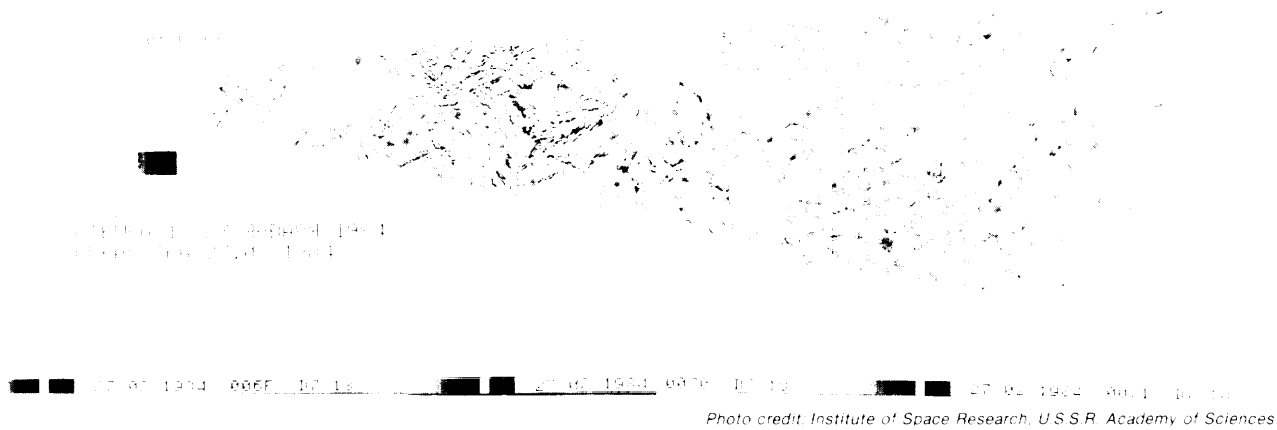

Photo credit: Institute of Space Research, U.S.S.R. Academy of Sciences

Despite the lapsing of the intergovernmental agreement, some exchange of data and information continues today. This Soviet photo of Venus, taken from Venera 16, was shared with OTA during a recent visit with members of the Soviet Academy of Sciences

Supporters of cooperation for scientific reasons, however, believe that U.S.-Soviet space cooperation is important not only in specific areas of space research and applications, but in enhancing our insight into the Soviet space program and scientific knowledge generally. Because of the high level of secrecy in the U. S. S. R., cooperation provides the United States greater access to information not only in one specific area of space research, but in the Soviet space program as a whole. Because of the poor mechanisms for communication among people and institutes within the U. S. S. R., cooperation provides the United States a fuller picture of what Soviet scientists and researchers are working on—often a fuller picture than Soviet scientists themselves have. And since certain aspects of the Soviet space program have been different from those in the United States, cooperation also provides U.S. scientists with the opportunity to learn from different technological roots. Soviet scientists have different experiences to share and a range of scientific experience that the United States does not have, and from which the United States can draw valuable information. In economic terms, U.S.-Soviet space cooperation is viewed as an opportunity for significant cost savings (although there is no assurance that a joint project would be less costly to the United States than a separately funded project) and perhaps as a catalyst for the United States to initiate certain projects or programs which would not otherwise be undertaken. Indeed, several scientists have commented that such cooperation is also beneficial because it works to garner more funding and public support and interest for particular programs.

In terms of the balance of what American and Soviet scientists may gain from such cooperation, proponents of space cooperation assert that the question should not be phrased in terms of "who gets more, " but rather "who gets more of whatever they wouldn't have gotten otherwise. " Since so much more information about U.S. space programs than about Soviet space programs is available in the open literature, Soviet planners are assumed to have ready access to enormous amounts of information whether or not cooperation takes place. Yet scientific and technical cooperation is one of the few mechanisms available for the United States to assess what the U.S.S.R. is doing in certain areas.[12] In this sense, many observers argue, the United States may actually "gain more" than the U.S.S.R. A State Department study submitted to the Senate Foreign Relations Committee in 1982 described space cooperation as one of four agreements where the United States was seen as benefiting more than the U. S. S.R.[13]

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What emerges from these arguments is twofold: It is clear that scientific and practical benefit can be gained from U.S.-Soviet cooperation in space. But the degree to which the "gains" may be offset by scientific or technical "losses" is still a matter of debate. The possibility of scientific and technical "losses" is not necessarily a factor of the type or level of the project. Depending on the nature of the project, a low-level effort (on joint data analysis, for example) could present greater risks than a larger effort carefully crafted to minimize them. A key challenge, therefore, will be to select areas for cooperation that prove beneficial from a scientific and/or practical point of view, but minimize the risks of transferring sensitive information or technology to the U.S.S.R. Specific scientific issues are discussed in chapter 3. Technology transfer issues are discussed below.

[12]It has been estimated that about 90 percent of the science and technology information the United States receives from the Soviets occurs via official exchange agreements. See Genevieve Knezo, "American-Soviet Science and Technology Agreements, " ***East-West Technology Transfer: A Congressional Dialog With the Reagan Administration,*** prepared for the use of the Joint Economic Committee, Congress of the United States (Washington, DC: U.S. Government Printing Office, 1984), pp. 117-120.

[13]See U.S. Department of State, "Report to Congress: Scientific Exchange Activities With the Soviet Union, Fiscal Year 1981 and Fiscal Year 1982, " Department of State Authorization Act, Sec. 126 (a) and (b).

FOREIGN POLICY ISSUES

The issue of U.S.-Soviet space cooperation is fundamentally one of foreign policy. Administration statements and annual reports of the President to Congress illustrate how extensively scientific and technical cooperation as a whole has come to be viewed as a component of U.S. foreign policy. [14] High visibility and drama make this especially true in the space arena. [15] Congress has consistently viewed U.S.-Soviet cooperation in space as a means for improving relations in general and for enhancing U.S. prestige. The primary objective of present U.S. overtures for a joint U.S.-Soviet space rescue mission is explicitly one of foreign policy: to act as a focal point for renewed dialog and cooperation between the two superpowers. Issues of foreign policy have been the motivation sustaining space cooperation with the U.S.S.R. —and also the chief impediment to its successful implementation. It was for foreign policy reasons that cooperation in space with the U.S.S.R. was begun, and for foreign policy reasons—to express U.S. abhorrence of the declaration of martial law in Poland—that the space cooperative agreement was allowed to lapse in 1982.

Controversy arises, however, in determining precisely what our foreign policy objectives are, and on the appropriateness of using cooperation in space to meet political goals at the expense of scientific or technical objectives. Foreign policy concerns related to U.S.-Soviet cooperation in space embrace many different elements. Some of these objectives are mutually contradictory; others are contentious in themselves. These objectives include using cooperation in space as a mechanism to: reduce tensions between the two countries; reverse a perceived trend towards the "weaponization" of outer space; send positive

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symbolic messages to the rest of the world; alter Soviet behavior in a way which would be favorable for U.S. or Western interests; manifest displeasure with any reprehensible Soviet behavior; and keep lines of communication open with the U.S.S.R. even—or perhaps especially—when relations are strained.

Reduce Tensions

The driving force behind efforts to renew U. S.-Soviet cooperation in space—and the area of most controversy—is the belief that space cooperation can reduce tensions between the two superpowers and contribute to world peace. With a fundamentally adversarial relationship, few expect that U.S.-Soviet conflicts can somehow be "solved." But the spirit of Public Law **98-562 is the belief that space cooperation can reduce the danger of superpower confrontation, perhaps eventually allowing each country to divert some of its resources from military to civilian purposes. This belief was expressed in the resolution's original title: "A Joint Resolution Relating to Cooperative East-West Ventures** in Space as an Alternative to a Space Arms Race. " The belief that cooperation

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[14] See, for example, the annual "Title V" reports entitled Science, *Technology, and* ***American Diplomacy,*** submitted to Congress by the President Pursuant to Sec. 503(b) of Title V of Public Law 95-426, the Foreign Relations Authorization Act for Fiscal Year 1979, which requires the President to provide annual reports to Congress on the U, S. Government's international activities in the fields of science and technology.

[15] See, for example, Harr, R, Marshall, Jr., *U.S.* ***Space Programs: Cooperation and Competition From Europe,*** Current Policy No. 695 (Washington, DC: U.S. Department of State, May 1985), esp. pp. 2 and 5.

can reduce tensions has been buttressed by the reports of several visitors to the U. S. S. R,, including that of a delegation of eight senators, led by Senator Pen, to the Soviet Union in September 1983. These senators recommended that:

> scientific and technical agreements which have been allowed to languish or expire should eventually be returned to a full level of cooperative activity. It is not only self-defeating, but a failure of world responsibility to forego the humanitarian and ecological achievements that can emanate from such superpower cooperation. [16]

Proponents of this view see significant benefits in encouraging greater dialog and understanding between the two superpowers, perhaps creating a "web" of interactions—as stressed during the period of detente—which could make U.S.-Soviet relations more stable and interdependent.

Others have taken this issue further. In the press and in congressional testimony, some have asserted that such cooperation can offset the momentum of "Star Wars, " whose attraction, they believe, lies largely in the exciting, futuristic, and technologically challenging image it presents of man's future in space, as well as in the high level of funding and number of people employed. Some view a large-scale, equally spectacular and challenging cooperative U.S.-Soviet effort in space as providing an alternative means for utilizing the high levels of funding and manpower which the SDI requires. 17

From a directly opposing vantage point are arguments that such beliefs may not only be misleading, but counterproductive. Some observers are deeply skeptical of efforts to reduce tensions with the U. S. S. R., as they believe that any apparent reduction in tension will be illusory. They believe it is unlikely that cooperation in space—on any level—will lead to any genuine concessions by or permanent changes in the U.S.S.R. And in the absence of such changes, they are wary that such efforts might lead the United States to "lower its own guard," creating an atmosphere which would allow the Soviets to gain greater access to U.S. technology and concessions on other fronts. In addition, some studies on U.S.-Soviet cooperation in space imply that even if successfully completed, greater understanding and mutual accord may not be automatic outgrowths of such cooperative efforts.[18] Observers from this vantage point tend to be skeptical that real benefits grew out of the detente of the 1970s, and believe that efforts to renew cooperation in space will ultimately represent another instance where expectations for reducing tensions may be raised high and once again not fulfilled.[19]

A third viewpoint is that cooperation in space will have little effect on overall U.S.-Soviet relations in any arena, so that these objectives in themselves do not comprise an adequate rationale for pursuing cooperation. According to this view, U.S.-Soviet cooperative efforts have fluctuated greatly over the past two decades, along with expectations, but we have not seen any fundamental change in the U.S.-Soviet relationship. They believe that there is nothing to suggest that cooperative activities in space on any level will have an impact on the overall U.S.-Soviet relationship, or on space-related military developments in either country in the future.

There is little agreement on how the lessons of past cooperation can be applied to the future. A

[16] See *Dangerous Stalemate: **Superpower Relations in Autumn 1983,*** A Report of a Delegation of Eight Senators to the Soviet Union, to the United States Senate, September 1983 (Washington, DC: U.S. Government Printing Office, 1983), p. 3. The eight Senators were Senators Pen (Delegation Chairman), Long, Bumpers, Leahy, Metzenbaum, Riegle, Sarbanes, and Sasser.

[17] See, for example, Daniel Deudney, "Forging Missiles Into Spaceships, " ***World Policy Journal,*** spring 1985, pp. 271-303, and prepared Statement of Dr. Carol S. Rosin, "East-West Cooperation in Outer Space, " *Hearings Before the **Senate** Committee on Foreign Relations of the 98th Congress on S.J. Res. 236* (Washington, DC: U.S. Government Printing Office, September 1984), pp. 43-50.

[18] For example, one study on the benefits and dilemmas of an international space station notes that because of cultural differences between Soviet and American citizens, certain types of cooperation in space could be strangled by a whole array of unanticipated and complex sociocultural problems. See B. J. Bluth, "The Benefits and Dilemmas of an International Space Station," *Acta Astronautica,* II, No. 2 (1984), pp. 149-153. Another study conducted some years earlier suggested that "there is no ground for the common assumption that the promotion of international understanding automatically promotes international good will," and that it is misleading to think that "face-to-face meetings and personal associations between people from different countries are the most obvious way to engender sympathy and mutual accord" (Charles Frankel, *The Neglected Aspect of Foreign Affairs: American Educational and Cultural Policy Abroad* [Washington, DC: The Brookings Institution, 1965], quoted in Bluth, "The Benefits and Dilemmas of an International Space Station," p. 152.)

[19] Some of these views are discussed in Richard Pipes, "Can the Soviet Union Reform," *Foreign Affairs,* LXIII, No. 1, fall 1984, pp. 47-62.

reduction in tension and in the military buildup of both sides was one of the hopes behind the initiation of space cooperation in the 1960s and 1970s and the Apollo-Soyuz mission in 1976.[20] Yet the decade of the **1970s was characterized not only by U.S.-Soviet space cooperation, but by Soviet belligerence abroad and severe U.S.-Soviet strains** in other areas. And during the same decade, both countries were still placing a great deal of strategic and tactical importance on military space systems, and exhibited significant growth in militarily related space capabilities. The mid-1970s saw not only the launching of the joint U.S.-Soviet Apollo-Soyuz mission, but also the beginning of the Soviets' second phase of testing of their antisatellite weapons and the development of Soviet nuclear-reactor powered radar ocean reconnaissance satellites (RORSATS); and the number of Soviet space launches which were exclusively militar, or joint military~'civilian missions remained high.[21] In the United States as well, there was little linkage between a large-scale cooperative effort with the U.S.S.R. in space and U.S. military space programs. Military space programs in both countries have gained their own technological momentum. But there is little agreement on whether U.S.-Soviet relations might have been worse without such cooperation, or, alternatively, whether the United States may have become too conciliatory during past cooperative efforts. There is also little agreement on whether the future might provide a more or less promising context for cooperation than the past.

Two questions lie at the heart of these debates. The first concerns how foreign policy and space cooperation affect each other. Deep conflicts of interest form the foundation of U.S.-Soviet relations; it is a subjective judgment as to whether space cooperation can significantly change that level of conflict, and lead each superpower to redefine its relation to the other. Foreign policy has generally affected the direction of U.S.-Soviet cooperation, in space as elsewhere. Cooperation in space has usually been an outgrowth of good relations. There is little evidence, however, that space cooperation can lead to detente, or can improve overall U.S.-Soviet relations in any substantial way,

A second question is whether space cooperation may be viewed in either/or terms. At the time of the Apollo-Soyuz Test Project, for example, it was assumed that space would become either more internationalized, or an arena of greater competition and eventual conflict .22 History has proved otherwise: countries can and do cooperate and compete simultaneously. Thus, while

[20] See, for example, lack Manno, *Arming the' Heavens (New* York: Dodd, Mead, 1984). At the time of ASTP, he notes, it was hoped that "Soviet-Amerl(an cooperation in space might just be the first steptowardinternational cooperation on earth" (Manno, p. 1 36). A *New York Times* editorial also expressed the hope that "Soviet American detente is only the beginning toward more broadly based cooperation in space efforts involving the personnel and talents of every nation for the benefit of all human ity. "Meeting in Space, ' *New York Times*, June *15*, 1975, p. *32*.

Photo credit: U.S. Department of Defense

While the United States and U.S.S.R, both share stated policies that space should be a peaceful domain, military uses of space also absorb high budgets in both countries. The above artist's conception depicts a Soviet Operational Antisatellite Interceptor

[21] See Marcia Smith, "Overview of Unmanned Space Programs: *1957 -83," Soviet Space programs: 1976-80, Part 3, Unmanned Space Activities,* prepared for the use of U, S. Congress, Senate, Committee on Commerce, Science, and Transportation (Washington, DC: U S. Government Printing Office, May 1985), pp. 761-766; and *Soviet Military* ***Space Doctrine,*** op cit. RORSATs are the only Soviet military space system for which there is no U. S, equivalent.

For a discussion of the heavy military orientation of the present Soviet space program, see, for example, Craig Covault, "Spaceplane Called a Weapons Platform, " *Aviation Week* ***and Space*** *Technology,* CXXI, No. 4 (July *23, 1984),* pp. 70, 75; Craig Covault, "U.S.S.R'S Reusable Orbiter Nears Approach, Landing Tests, " *Aviation Week and Space Technology,* CXXI, No. 23 (Dee, 3, 1984), pp. 18-19; and *Soviet Military Space* Doctrine, o,. cit.

"See for example, Jack Manno, *Arming the Heavens*, op. cit., p. 136.

cooperation may provide an alternative vision of the future or a more positive backdrop for negotiations—in arms control, space weapons, or other areas—it may represent only a complement to efforts to improve relations generally.

Symbolism

Symbolic value has always been a principal characteristic of the U.S. and Soviet space programs. Both countries have used their space programs to increase national prestige, project national influence, display technological leadership, and enhance the image of each country's respective governmental system—the United States, through emphasizing the openness of democratic systems; the U. S. S. R., by linking its space achievements with the superiority of the socialist system over capitalism. The U.S.S.R. has dispatched cosmonauts to other countries to link their celebrity with particular political ideas and policy lines, or with historic Communist traditions; and both countries have invited foreign "visitors" to fly on their spacecraft to strengthen international ties.[23] The idea of U.S.-Soviet cooperation in space has also played a symbolic role to offset any aggressive image of either superpower, and to demonstrate each country's goals of using space for peaceful scientific purposes.

The symbolic value of any prospective U.S.-Soviet cooperative mission today would be equally central. Renewed U.S.-Soviet space cooperation on any level would send to the world a symbolic message of the willingness of the two countries to attempt to work together to reduce tensions or achieve common goals. Even on lower levels of cooperation, joint efforts can carry with them positive symbolic benefits and significant psychological value. The concept of "peace" in space is especially appealing to those who view peaceful use as an alternative to, rather than a spin-off from, the military use of space.

While the symbolic value of renewed U.S.-Soviet space cooperation could be positive, however, some U.S. observers point to more negative messages. They believe that if cooperation were to break down, the positive symbolic benefits would be negated, and the United States might appear more belligerent than before. They also believe that U.S.-Soviet space cooperation on any level appears to cast the two superpowers as equals, a status which they feel the Soviets would abuse; the more visible the level of cooperation, the more negative the symbolic message. The launch of the Apollo-Soyuz Test Project is cited as a case in point. Despite the fact that U.S. reports described

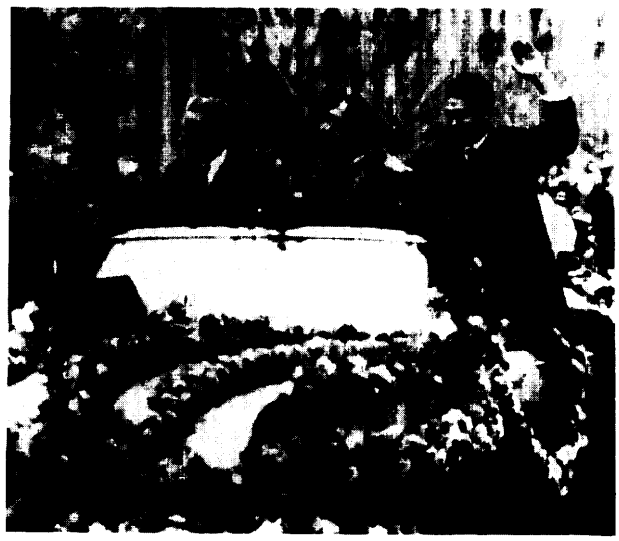

Photo credit: National Aeronautics and Space Administration

Cosmonauts receive grand reception in Moscow

Photo credit: National Aeronautics and Space Administration

U.S. exhibits model of Explorer I following successful flight

[23] James E. Oberg, "Window for Space Detente, " ***Aerospace America,*** XXII, No. 11 (November 1984), pp. 86-87; exerpted from *The New* ***Race for Space*** (Harrisburg, PA: Stackpole Books, 1984), and Harry R. Marshall, Jr., ***U.S. Space Programs, Cooperation and Competition From Europe.***

the Soyuz spacecraft as technically primitive, Soviet media nonetheless reported that U.S. specialists spoke of "the high technical qualities of the Soyuz. " The Soviet press consistently implied that the U.S.S.R. led the United States in space flight, attributing its lead to Marxist ideology .24 Along with strong, positive, symbolic messages, then, renewed U.S.-Soviet cooperation could give Soviet planners another opportunity to assert technical parity with the United States.

The potential positive and negative symbolic messages from U.S.-Soviet cooperation in space would increase with the size, scale, and visibility of the cooperative effort. On a low-level of exchange, both the risks and benefits are small, As the level of exchange, and thus the potential risks and benefits increase, however, the cooperation becomes more controversial. While some emphasize that a joint "spectacular" would provide substantial symbolic benefit for the United States, others emphasize that the risks are also great: should the project "fail," or should the United States find it in its interest to withdraw, the losses to U.S. prestige could be damaging.

"Linkage"

Another foreign policy issue associated with U.S.-Soviet cooperation in space is the question of "linking" such cooperation to other aspects of Soviet behavior. For example, some observers question the wisdom of having allowed U. S.-Soviet space cooperation to lapse in **1982** in response to an unrelated event, the declaration of martial law in Poland. Others argue that that was an appropriate action and, further, that such cooperation should not be reinstituted before the Soviets demonstrate a willingness to make concessions on other fronts—in policies regarding emigration abroad, human rights at home, or concessions in arms control negotiations.

The use of scientific and technical (S&T) cooperation as a lever for altering Soviet behavior has become the subject of debate similar to that of U,S,-Soviet trade. The theory and practice of trade leverage are discussed in detail in previous OTA reports .25 The conclusions of these reports is that trade leverage can work only under very limited conditions, and that past experiences have demonstrated its weakness when used against the Soviet Union. Assessments of the potential impact of S&T cooperation in altering Soviet behavior have been no more positive, A recent study by the National Academy of Sciences states:

> While there is little doubt that S&T agreements have helped on some occasions to move relations onto a more positive basis, and on others to signal United States displeasure regarding certain behavior, there would appear to be little conclusive evidence that the signing or termination of an agreement has been very influential in persuading another nation to pursue or desist from a particular policy position .2"

The effect may be further diluted as, based on past behavior, the Soviets generally expect the United States to seek renewed cooperation after a relatively short amount of time.

The real question is whether S&T cooperation, including space cooperation, is an appropriate mechanism for showing displeasure with Soviet actions, regardless of whether it alters Soviet behavior. One set of opinions argues that in the absence of other foreign policy levers, S&T cooperation is one of the most effective means for protesting egregious Soviet actions and demonstrating U.S. resolve. According to this view, when a superpower does something which the other views as fundamentally "'abhorrent or inimical to our interests, "[27] there is pressure to respond. In these cases, "Soviet activity sometimes demands responses stronger than rhetoric but more prudent than military action, "[28] In the absence of other measures, canceling an ongoing cooperative program has been viewed as an appropriate response; the financial costs are hard to identify and in any case are deferred, the effect

[24] See issues of *Pravda* before and during the ASTP, especially from July 13. 17, and 21, 1975,

[25] *Technology and East- West Trade* (Washington, DC: LT. S, Government Printing Office, OTA-ISC-1 01, November 1979); *Technology and Soviet Energy A vailability* (Wash i ngton, DC: U.S Government Printing Office, OTA-ISC-153, November 1981), and ***Technology'*** and *East- West Trade: An Update* (Washington, DC U S. Government Printing Office, OTA-ISC-209, May 1983).

[26] Wallerstein, op. cit , p. 19.

[27] See George P. Shultz, "New Realities and New Ways of Thinking," *Foreign Affairs*, LXIII, No. 4 (spring 1985), p. 707

[28] William Root, Trade Controls That Work, " *Foreign Policy*, No. 59 (fall 1984), pp. 61-80.

is immediate, and the intended moral message is sent. Moreover, proponents of this view argue that "business as usual" in S&T exchange would be immoral under these circumstances anyway. As stated in the President's Title V report to Congress, 1984:

> Science and technology exchanges between the United States and the Soviet Union . . . are of critical concern to this Administration. We must respond adequately to Soviet actions adverse to our own interests and contrary to the basic principles of civilized behavior within the community of nations. For example, during 1983 the United States, among other actions, stopped discussions on extension of a Transportation S&T Agreement with the Soviets as a result of their deliberate destruction of Korean Airlines flight 007.[29]

Few people argue that the threat to cancel, or actual cancellation of a cooperative program in space, would really affect Soviet behavior on a matter of substance. The idea is to protest, not to deter.

Opponents of this view assert that little is accomplished by terminating S&T cooperation as a mechanism of protest, while the benefits from cooperation are diluted or lost. Canceling cooperative efforts already underway entails some human and dollar costs, and may give the United States a reputation as an unreliable partner. And some observers argue that more can be achieved through cooperation than without it. In the words of one historian of science involved in cooperative projects with the U. S. S. R.:

> Personal links to Soviet scientists lead Americans to learn more about who is being arrested or persecuted and to more readily react against it than in the past . . . Almost all Soviet scientists have favored the improvement of communication, and the dissidents in particular have stressed that their security is greater because of their links to the West , . . It seems clear that the worst fate for unorthodox Soviet scientists would be to lose their contacts with the West. [30]

Proponents of this view argue that S&T cooperation comprises a relatively minor tool in foreign policy, and that terminating scientific and technical cooperation is no more an effective means of showing displeasure than other symbolic gestures (such as speeches of condemnation at international forums, or termination of cultural visits) which carry fewer negative and long-lasting consequences.

The difficulty in reconciling these viewpoints has consistently been expressed by the Reagan Administration in annual reports to Congress:

> We must respond adequately to Soviet actions adverse to our own interests and contrary to the basic principles of civilized behavior within the community of nations . . . At the same time, we do not want to jeopardize joint S&T efforts which may be of substantial benefit. We will continue to observe Soviet behavior carefully and to adjust our S&T cooperative agreements accordingly.

The effect of not reconciling these issues, however, was perhaps best expressed in the congressional testimony of James Morrison, Deputy Director of International Affairs, NASA, who suggested guidelines for future U.S.-Soviet cooperative efforts in space. Noting that any such guidelines must be applied in a political context, but also stressing the costs of terminating cooperative efforts once they are underway, Morrison stated:

> Obviously, guidelines such as these will be applied in a political context, because of the high visibility of this type of cooperation. Nevertheless, there should be an appreciation that if a major project should be interrupted while in progress, it is likely that the human and dollar resources would have been utilized better in other space endeavors, i.e., once undertaken, there are good reasons why a project should be allowed to proceed to completion, barring some major disruption in relations between the two countries.

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[29] U.S. Congress, House Committee on Foreign Affairs and Committee on Science and Technology, *Science, Technology, and American Diplomacy 1984*, 5th Ann ua 1 Report Submitted to the Congress by the President Pursuant to Section 503(b) of Title V of Public Law 45-420. (Washington, DC: U.S. Government Printing Office, 1984), p. 3.

[30] Loren R. Graham, "How Valuable Are Scientific Exchanges With the Soviet Union?" *Science*, CCII, No. 4366 (Oct 27, 1978), p. 387

[31] *Science, Technology, and American Diplomacy 1984*, op. cit pp *3-4*. See also Shultz, op. c it., for a discussion of the Is\ Lie'\ complexities in a broader context: "Whether important negotiations sought to be interrupted after some Soviet outrage will always be a complex calculation "

"Statement of James R. Morrison, Deputy Director, International Affairs Division, National Aeronautics and Space Administration before the U.S. Senate Committee on Foreign Relations, Sept. 13, 1984, p. 8.

Maintaining Channels of Communication

Perhaps the simplest foreign policy objective of renewed U.S.-Soviet cooperation in space is to keep channels of communication open, even—or especially—during times of increased tensions. At a time when overall U.S.-Soviet relations are poor, some believe that cooperation on any level can provide an important conduit for communication. Aside from its value as a way of learning about the U. S. S. R., cooperation provides a mechanism for making U.S. views more widely known in the U.S.S.R. While acting as a kind of barometer for U.S.-Soviet relations generally, it maintains a continuing dialog on a governmental level when other avenues may not be as active. And some level of cooperation also keeps alive the possibility of expanded cooperation in the future.

These objectives, however, run counter to the policy of linkage described above. The tension between the two objectives is illustrated by the Reagan Administration's stated emphasis on "maintaining the framework" of the agreements "so that beneficial exchanges can be expanded if the political situation improves" while at the same time choosing to severely reduce S&T exchange with the U.S.S.R. and allow the space, science and technology, and energy agreements to lapse.[33] The 1984 Presidential report to Congress also underlined the importance of keeping lines of communication open, but stressed the need to respond to "Soviet actions adverse to our own interests. "

Photo credit National Aeronautics and Space Administration

East-West Cooperative Effort—Soviet Cosmonaut Filipchenko and U.S. Astronaut Slayton on the banks of the Little Blanco River in central Texas as a break from training for ASTP

A key question, then, is whether the option for renewing cooperative activities can in fact be exercised once an agreement has been abrogated or allowed to lapse. Past experience suggests another basic asymmetry: it is easier to kill cooperation than to restart it. Several observers-from NASA and elsewhere—have commented that it is difficult, once ties are broken, to keep them in a state where they can be repaired.

It is difficult to assess the degree to which the framework of U.S.-Soviet space cooperation has been maintained since **1982.** The institutional apparatus remains in place and has not been dismantled, and one could argue that the low level of cooperation which continues to occur has left a door open. But events themselves have changed and complicated the context in which cooperation occurs. Administration statements in 1984 suggest some questions as to whether the framework for renewed space cooperation is still viable. [34]

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Foreign policy objectives form the foundation for decisions on U.S.-Soviet space cooperation. One main challenge is to define more precisely and soberly what U.S. foreign policy objectives from space cooperation actually are, address internal inconsistencies among them, and establish criteria to evaluate the ways in which coopera-

[33] See U.S. Congress, House Committee on Foreign Affairs and Committee on Science and Technology, Science, *Technology, and American Diplomacy 1981*, 2nd Annual Report Submitted to the Congress by the President Pursuant to Section 503(b) of Title V of Public Law *94-426* (Washington, DC: U.S. Government Printing Office, 1981), p. 180. "Despite the sharp curtailment in exchange activity, the framework of the agreements is being maintained so that beneficial exchanges can be expanded it the political situation improves. "

[34] See Science, Technology, and *American Diplomacy 1984*, op. cit., pp. 33-34; and "Committee Questions and Administration Responses, " *East- West Technology Transfer: A Congressional Dialog With the Reagan Administration*, op. cit., p. 29.

tion in space maybe helpful in achieving broader foreign policy goals.[35]

A second major foreign policy challenge concerns the relationship of foreign policy to scientific and technical objectives in cases where pursuing the former may be detrimental to the latter. The issue of "how to effectively integrate science and technology concerns into the overall development of American foreign policy'"[36] has become a fundamental issue in all aspects of international scientific and technical cooperation. The history of U.S.-Soviet cooperation suggests this will remain a central issue in any future cooperative endeavors in space.

[35]The difficulties of spelling out specific foreign policy objectives, and of then establishing criteria to evaluate the effects of S&T cooperation on foreign policy, are highlighted in the Title V Report for 1984 and the subsequent critique by the Congressional Research Service. See G. J. Knezo, "Congressional Research Service Critique of the 1984 Title V Report, " ***Science, Technology, and American Diplomacy*** *1984*, op. cit., pp. 165-167.

[36] ***Science, Technology, and American Diplomacy*** *1984*, op. ***cit.,*** p. ***6.***

MILITARY TECHNOLOGY ISSUES

A final set of issues concerns the extent to which the U.S.S.R. may gain access to militarily sensitive technology and technical know-how through U.S.-Soviet space cooperation, and thus the extent to which cooperation should be controlled or limited. These "technology transfer" concerns are part of a much larger debate concerning all commercial and cooperative relations with the U.S.S.R. At the heart of the debate is the trade-off between two important national interests: the importance of minimizing the use of American scientific and technological expertise in the build-up of Soviet military strength; and the importance of maintaining and promoting open communication in science and technology, both within the borders of the United States and across international boundaries. The highly technical and sensitive nature of space research and technology makes the question of renewed or expanded U. S.-Soviet cooperation in space especially controversial .[37]

Few would argue against caution in U.S.-Soviet cooperation in space. Rather, the main areas of contention are the limits and mechanisms of control, i.e., determining what should be controlled, when, by whom, under what circumstances, how it should be controlled, and finally, how the effects of controls can be evaluated .38

Some observers argue in favor of severe restrictions on all levels of cooperative space activity with the U.S.S.R. The underlying assumptions of this view are that the U. S. S. R., while extremely strong militarily, is making important military gains through the acquisition of Western technology; that cooperation is an important mechanism through which these gains occur;[39] that space is a particularly sensitive area of S&T cooperation; and hence, that renewed cooperation will doubtlessly enhance Soviet capabilities to gain even more militarily sensitive technology and know-how from the West. Reports on Soviet acquisition of Western technology have singled out space as a key "target" of Soviet acquisition efforts in

[37]For a brief discussion of the problems associated with transferring potentially sensitive space technolog, even to U.S. allies, see Stuart Auerbach, "Great Britain Joins U.S. in Space Station Effort, " ***Washington Post,*** Jan. 18, 1985, and William Drozdiak, "Bonn Joins in U.S. Led Space Base, " ***Washington*** *Post,* Jan. *17, 1985.*

[38]For a *discussion* of *these* issues especially as related to commercial exports, see OTA's ***Technology and East-West Trade: An Update,*** op. cit.; and Panel on East-West Technology Transfer, Science and Technology Committee, "Securing Technological Advantage: Export Controls in an Era of Strategic and Economic Competition," Center for Strategic and International Studies, Georgetown University, September 1984. For a discussion of these issues as related to the exchange of scientific information, see the forthcoming OTA technical memorandum, *The Regulatory Environment for Science,* anticipated publication date October 1985.

[39]According to several observers, this has tended to be a working assumption of the Reagan Administration—i.e., that "non-trade transfers—espionage, people-related, scientific communications—have played a significant role in the qualitative improvement in the Soviet military arsenal." See John P. Hardt and Donna L. Gold, "Background Facts About East-West Trade," *East-West Technology Transfer: A Congressional Dialog with the Reagan Administration,* p. 76. See also *Report of the Defense Science Board Task Force on University Responsiveness to National Security Requirements,* January 1982, p. 4-7 as cited in Harold Relyea, "Controls and Scientific Communication," *East-West Technology Transfer: A Congressional Dialog With the Reagan Administration,* op. cit., p. 110, and remarks of Richard Perle, Undersecretary of Defense for International Security Policy, at the National Press Club, "Roundtable on National Security and Scientific Inquiry," May 3, 1985.

the West, especially in this country. [40] These observers fear that cooperation may only facilitate an extensive Soviet effort to obtain space-related technology and technical know-how, and will contribute to sophisticated Soviet military capabilities. They believe the dangers are greatest in large-scale cooperative projects, but that even lower levels of cooperation—data exchange, joint data analysis, coordination of missions, etc.—may result in transfer of sensitive technical information.

Other observers—while recognizing the enormous Soviet military strength and significant advances the U.S.S.R. has made in the military uses of space—believe that space cooperation, like other areas of scientific and technical cooperation, is a relatively ineffective way for the Soviets to gain access to Western technology and know-how; [41] that little militarily sensitive technology has been transferred through past cooperative projects; that other Western countries with sophisticated space programs of their own are cooperating with the U.S. S. R., providing the Soviets with much of the same technology and know-how; and that controls are difficult to enforce without sacrificing the free interchange of ideas which is at the heart of scientific and technological progress in this country. Consequently, they believe the imposition of increasingly stringent controls will unnecessarily offset the real scientific, economic, humanitarian, and potential foreign policy gains which can follow from cooperation with the U.S.S.R. "A national strategy of 'security by secrecy, ' " the Corson panel concluded regarding international scientific and technical cooperation generally, "would weaken American technological capabilities, because there is no practical way to restrict international scientific communication without disrupting domestic scientific communication. "[42] These observers believe that technology transfer concerns may be especially exaggerated with regard to lower levels of cooperation, where Soviet access to data, equipment, and information can be carefully monitored. But they believe that even large-scale projects could be crafted to make technology transfer a minor concern as well.

Photo credit National Aeronautics and Space Administration

Visiting Soviet aerospace engineers discuss a docking mechanism with a member of the ASTP space team in Houston, Texas

[40] See, for example, ***Assessing the Effect of Technology Transfer on U.S.-Western Security*** (Washington, DC: Office of the Undersecretary of Defense for Policy, Department of Defense, February 1985), which cites the expansion of the Soviet space program as one of six major goals in present and future Soviet weapons programs (pp. 1-4),

[41] The report prepared by the National Academy of Sciences under the chairmanship of Dale Corson, and OTA's *Update* on East West trade reach two conclusions regarding scientific and technical cooperation generally. First, it has not been demonstrated that the potential security danger to the United States of exchange programs outweighs the benefits of maintaining open channels of communications with the U.S.S.R. Second, it is generally believed that such passive mechanisms of technology transfer are less likely to result in Soviet ability to absorb, diffuse, and improve on technological acquisitions than are more active commercial channels. No study, however, has been prepared specifically on U.S.-Soviet cooperation in space. See ***Scientific Communication and National Security***, op. cit.; and ***Technology and East- West Trade: An Update,*** op. cit,

[42] See *Scientific Communication and National Security*, op. cit., and Mitchell Wallerstein, "Scientific Communication and National Security in 1984," *Science*, CCIV (May 4, 1984), pp. 460-66.

The debate concerning the potential transfer of militarily **sensitive technology and technological know-how so far has not been a highly visible issue in U.S.-Soviet space cooperation, because so little interchange** has been occurring, because cooperation has been on a very low level, and because technology transfer concerns have led to significant internal review and self-censorship on the part of individual scientists and government agencies prior to formal review. Since the expiration of the cooperative agreement in 1982, there have been few cooperative space proposals submitted for review, as official State Department policy is to complete ongoing projects but not initiate new ones. As illustrated in chapter **3, most instances of U.S.-Soviet space cooperation to date have consisted of exchanges of scientific data gathered through experiments by one country or through separate but related missions. Any expansion of U.S.-Soviet cooperation in space will inevitably lead to greater controversy, and technology transfer issues may be the most difficult issues to resolve.**

In space, as in many other areas of U.S.-Soviet interchange, three issues are central to the technology transfer debates: determining how "military sensitivity" should be defined in the first place; assigning jurisdiction among people and agencies for making and implementing decisions; and determining the ways sensitive technology may or may not be used in any given cooperative exercise.

Defining Military Sensitivity

The nature of scientific or technical cooperation means that some technology transfer will always be involved in bilateral S&T exchange. But defining what precisely may be "militarily sensitive" has proved to be an exceedingly ambiguous exercise. As shown in the box, a number of regulatory mechanisms have been established to control the transfer of militarily sensitive technology or information abroad. These mechanisms and lists which specify what is "militarily critical, " especially in the category of "dual use" technology, have themselves become the subject of enormous controversy.

Two sets of regulations govern the assessment of what may be militarily sensitive in any space activity: one for equipment which has been specially designed or modified for use in space, the other for that with potential "dual use"—i.e., civilian and military—applications. The Munitions List, incorporated into the *International Traffic in Arms Regulations* (ITAR) which control the export of military systems, defines all space technology* as an "implement of war." Unlike commercial exports to the U.S.S.R., therefore, space equipment is assumed to be militarily sensitive until it is shown not to be. The ITAR list includes all "military and space electronics,"** "all aircraft, spacecraft and associated equipment,"*** "fire control, range finder, optical and guidance and control equipment, spacecraft guidance, control and stabilization systems, astro compasses and star trackers," and other categories.

From the standpoint of data and information, the ITAR list also restricts the transfer of technical data related to space technology and know-how, including an extensive and sometimes vaguely worded list of all technical data and information related to articles on the Munitions List. As defined in the ITAR, technical data include both classified data and unclassified information "directly related to the design, engineering, development, production, processing, manufacture,

*Defined as equipment that has no terrestrial use or which has been specially designed or modified for use in space.

**This category includes such items as: a) space electronics, including both electronic equipment specifically designed or modified for spacecraft and spaceflight, and electronic equipment specifically designed or modified for use with nonmilitary communications satellites; b) very high speed integrated circuit semiconductor devices that are specially designed for military applications; and c) "components, parts, accessories, attachments, and associated equipment specifically designed for use or currently used with equipment listed in other parts of this category, except for such items as are normal commercial use."

***Including: 1) spacecraft, including manned and unmanned, active and passive satellites; 2) nonmilitary communications satellites (except for ground stations and equipment for them); 3) spacecraft engines specifically designed or modified for use with the spacecraft; 4) airborne equipment (e.g., refueling equipment) specifically designed for use with the spacecraft; 5) launching and recovery equipment if specifically designed for use with the spacecraft specified above; 6) power supplies and energy sources specifically designed for spacecraft; 7) components, parts, etc. (including ground support equipment specifically designed or modified for all the articles specified above).

Technology Transfer Controls

Three main pieces of legislation have marked the Federal Government's efforts to slow, if not prevent the loss of militarily sensitive technology and information since the 1940s. First, the *Atomic Energy Act* of 1954, as amended by the 1978 *Nuclear Nonproliferation Act,* establishes procedures for the export of nuclear facilities, equipment, materials and technology, and deals with criteria for controlling U.S. nuclear exports domestically and abroad. Second, the *Export Administration Act* (EAA) of 1979 is intended to limit the release of a much wider range of products, processes, and technical data to potentially adversary nations. Implemented through the *Export Administration Regulations* (EAR), and through a comprehensive list of products and processes known as the *Commodity Control List* (CCL), the EAA remains the principal legislative instrument for controlling the flow of sensitive technology and technical data across borders. The EAA also mandates that a "Militarily Critical Technologies List" (MCTL) be drawn up by DOD, to assist in identifying items which maybe of significant value to potential adversaries and should be controlled. Since its expiration in 1983, however, the EAA has continued to be administered through a Presidential Executive Order, and the MCTL remains controversial.

Finally, the *Arms Export Control Act* of 1976 is implemented by the Department of State through the *International Traffic in Arms Regulations* (ITAR). These regulations control the export of military systems and information on the basis of the *Munitions Control List* (MCL) maintained by the Department of State in conjunction with the Department of Defense (DOD). A revised ITAR was formally released in January 1985. All of these regulations govern not only the export of goods or technical data from the United States abroad, but also the access of foreign nationals to such materials and information within the United States. A multinational committee to control the movement of militarily sensitive goods at the international level, the Coordinating Committee for multinational export controls (CoCom), was also established by informal agreement in 1949, and meets periodically in Paris.

In the 1980s, a number of regulations and directives have also been instituted specifically to control the flow of data and other scientific and technical information beyond U.S. borders. Executive *Order* 12356, signed by President Reagan in April 1982, introduced greater stringency into the government classification procedure, including the introduction of policies which expand the number of categories of potentially classifiable information, allow for imposing restrictions where reasonable doubt exists, and allow for reclassifying information previously made public. *National Security Decision Directive 84 (NSDD 84), a* Presidential order announced in 1983, requires, among other things, that government employees and contractors sign lifetime nondisclosure agreements with prepublication review clauses as a condition for access to certain categories of information. Although exceedingly controversial and not yet issued as official policy, as of June 1985 the directive appeared to constitute unofficial policy for the control of classified information in many areas. The 1984 Defense *Authorization Act* assigns the Secretary of Defense greater authority to withhold certain kinds of unclassified technical data in the possession or under the control of DOD. And additional proposals have been circulated within DOD to seek broader authority to protect sensitive technical data produced by other Federal agencies (including NASA) by facilitating their transfer to DOD control. Further actions have also been taken on the issuance of visas, other kinds of prepublication reviews, etc.

The increasing number of controls placed on scientific and technical interchange has triggered a great deal of controversy among those who believe that increased communication in science and technology can and should be promoted without compromising U.S. national security interests. The essentially sensitive and strategic nature of both countries' space programs suggest this will be a serious concern in determining potential areas for joint U.S.-Soviet projects in space.

operation, overhaul, repair, maintenance, or reconstruction of defense articles, including blueprints, computer software, drawings, etc." and "any information which advances the state of the art of articles on the Munitions List."* Other areas, such as training for Soviet scientists and/or cosmonauts in the use of space equipment, also require careful consideration.

Equipment and information which is not specifically "space technology" but has been specially modified for use in space is often considered equally sensitive, falling into a "gray" area which may be subject to review according to the Commodity Control List under the *Export Administration Regulations* (EAR) which govern commercial exports. This category includes ground-based equipment involved in space cooperation, as well as any equipment used in space, and technical data that can be "used, or adapted for use, in the design, production, manufacture, utilization, or reconstruction of articles or materials."[43] In many cooperative ventures, this potential "dual use" area—such as computers or certain types of information—may be deemed more sensitive or controversial than specifically "space-related" technology itself. But it has become increasingly difficult to distinguish dual-use from single-use technology.[44]

In addition, a number of other regulations and directives govern the transfer of space-related information to foreign nationals. On December 24, 1984, NASA issued such a "NASA Management Instruction" to control the availability of NASA developed or supported scientific and technical information. The Instruction, The *NASA Scientific and Technical Document Availability Authorization*, provides discretionary authority for the Administrator of NASA to protect certain unclassified data and information, parallel to authorities granted the Secretary of Defense in the 1984 Defense Authorization Act. The Instruction "establishes policies, procedures, and responsibilities for the authorization process to assure the appropriate distribution, bibliographic processing and announcement of availability of NASA sponsored or authorized information, "[45] to be implemented in accordance with existing Management Instructions concerning the production and distribution of information. It is intended to be "responsive to administration directives to develop plans and procedures to help stem the flow of advanced Western space technology to the Soviet Union and other countries. "[46]

The exceedingly broad and comprehensive range of definitions of what may be proprietary and/or militarily sensitive technology or information has become quite controversial, often leaving wide room for interpretation in any given assessment. Efforts to make more precise definitions have been reflected in such exercises as the design of a Militarily Critical Technologies List (MCTL) by the Department of Defense to assist in identifying items which may be of significant value to potential adversaries and which should be controlled. But the MCTL has been criticized on several counts—many believe it is too long, overly broad and comprehensive, and that it lacks sufficient clarity and specificity to be usefully applied[47]—and remains controversial today. More

*Information considered to be in the "public domain," however (i.e., published and generally available to the public), is not controlled. See Part 120.21 of the ITAR regulations, which also defines technical data as classified information directly related to defense articles and services and information covered by an invention secrecy order.

[43]The data may take a tangible form, such as in models, prototypes, blueprints, or operating manuals, or an intangible form, such as in the case of technical data. See "NASA Management Instruction," NMI 2230.1B, Dec. 24, 1984.

[44]"There are almost no militarily significant technologies which do not also have important peaceful uses. Indeed, in the highly industrialized modern world, while arms and ammunition can still be identified, the distinction between implements of war and peaceful goods as well as the technologies for their manufacture has become so blurred that whether an item is a sword or a plowshare depends today not so much on how it is made but on how and by whom it is used . . . So common is this dual-use characteristic that it is almost impossible to draw up a list of items, whether goods or technology, whose embargo will inhibit weapons development without including some items whose embargo will also inhibit the peaceful trade activities . . ." Maurice Mountain, *Issues in East-West Commercial Relations*, a compendium of papers submitted to the Joint Economic Committee, Congress of the United States (Washington, DC: U.S. Government Printing Office, 1979), p. 30, as cited in *East-West Technology Transfer: A Congressional Dialog with the Reagan Administration*, op. cit., p. 83.

[45]"NASA Management Instruction, " op. cit., p.1.

[46]Ibid.

[47]For example, a 1982 report by the National Academy of Sciences and the National Research Council recommended "a drastic streamlining of the MCTL by reducing its overall size to concentrate on technologies that are truly critical to national security, " In, *Scientific Communication and National Security,* op. cit., p. 67. The MCTL was mandated by the Export Administration Act of 1979. For a description of the MCTL and the controversy surrounding it, see *Technology and East- West Trade: An Update,* op. cit. The MCTL was declassified in 1984.

than 2 years of efforts to renew the Export *Administration* Act—with no agreement thus far in Congress and no coordinated Administration position—highlight the lack of consensus on how technology exports should be controlled. This same lack of consensus is reflected in international cooperative programs.

Evaluating technology transfer from past cooperative efforts *in space* is also controversial. Experts differ over the significance of technology or technical know-how that may have been transferred during past cooperative projects, perhaps especially during the Apollo-Soyuz Test Project. Some observers believe that despite the low level of interchange, the Soviets gained access to valuable command and control information and U.S. management techniques, such as experimental data relay systems (employed for the safety of the astronauts), and insight into U.S. management of highly complex systems. Others believe that the Soviets gained little from Apollo-Soyuz that could have been detrimental to U.S. interests. A 1980 report by the Congressional Research Service, for example, states that there was "no evidence to date of any harmful effects from any technological giveaway to either side from these joint space efforts. "[48]

The central role of the technology transfer issue in U.S. cooperation today with Western European allies on the space station shows how difficult an issue it could become if space cooperation with the U.S.S.R. were to be expanded. The secretary of the backbench parliamentary space technology committee of the British House of Commons, Spencer Batiste, stated in February 1985 that the European Space Agency (ESA) views the Pentagon's fear of technology "leaks" to the Soviet bloc as one of the biggest problems in joint U.S.-ESA work on the space station project." According to Batiste, strict U.S. export controls greatly restrict the transfer of American know-how to its partners in the project, and could greatly hamper European and Japanese collaboration in the project. According to press reports,

Photo *credit U S Department of Defense*

The extent to which space cooperation may enhance Soviet military programs in space is the subject of debate and presently, stringent control. The above represents an artist's concept of a possible Soviet space complex with significant military applications

a recent internal West German government report suggests that U.S. restrictions on space-related as well as other high technology areas comprise "one of the prickliest thorns in transatlantic relations at the moment. "[50] The paper reportedly documents two instances of a German company being denied access to important U.S. space findings, and suggests that the whole idea of cooperation can work only if the United States eases its restrictions. And recent disputes in the U.K. over the possibility of using the Soviet Proton rocket as a satellite launch vehicle for INMARSAT–an international organization that operates communications links between ships—have highlighted the sensitivity in the West towards allowing Soviet engineers to work closely with Western engineers involved in other militarily-sensitive projects sharpening the definition of what may be militarily sensitive in space without stifling scientific inquiry will be a major challenge if U. S.-Soviet bilateral space cooperation is expanded.

[48]CRS Report to the United States Senate Committee on Foreign Relations, GPO Report 87-389 (Washington, DC: Government Printing Office, 1980).

"See Christian Tyler, "U.S. Warned on Hi-Tech Controls, " Fi*nancial Times,* Feb. 15, 1985, p. 5.

[50]See Peter Gumbel, "Europeans See Space Project With U.S. as Way to Bolster Political Ties and Share Technology," *Wall Street Journal,* Dec. 7, 1985, p. 33.

[51]See, for example, Peter Marsh, "Marconi Ends Soviet Satellite Deal After Warning," *Financial Times,* Feb. 17, 1985, p. 1.

Delineating Responsibilities

Because of the murkiness of the definition of sensitive space hardware and information, deciding the level of control for a particular item or body of information is a question of judgment.

A second key issue, therefore, concerns not only the criteria for determining what may be militarily critical, but who should make these judgment calls for instituting and implementing technology transfer controls. This question has proved to be a very difficult one throughout the area of export control, one which Congress has yet to fully resolve. At a May 1985 Roundtable on National Security and Scientific Inquiry at the National Press Club, Assistant Secretary of Defense Richard Perle suggested that much of the criticism concerning technology transfer has little to do with the principle of export controls, or with the substance of those controls, but with the "scandalously inept administration of those controls that has been characteristic of a succession of administrations." Hearings conducted between 1982 and 1984 **by** Senator Nunn, Ranking Minority Member of the Permanent Subcommittee on Investigations, Senate Committee on Governmental Affairs, and general debates over renewing the Export Administration Act of 1979, highlighted the intra- and inter-agency jurisdictional disputes over responsibility for making technology transfer determinations in various areas of commercial exports, and the particular difficulties involved in instituting and implementing a set of controls in the area of commercial exports to the U. S. S.R.[52] Similar disagreements have occurred between government agencies and the scientific and technical communities.

It is likely that expanded U.S.-Soviet cooperation in space would create similar conflicts, As space activities are usually multidisciplinary, U. S.-Soviet space cooperation inevitably creates coordination problems for various offices within the Department of State, within and among other agencies, and individual experts. The process for evaluating projects is often an informal one. Project proposals are evaluated to assess the degree to which they may involve the transfer of equipment, production/operational know-how, and/or sensitive technical data or information, first within the sponsoring agency, * and then in formal or informal interagency meetings. Knowing the unease surrounding the subject, both scientists and individual agencies engage in a considerable degree of self-censorship before the interagency review process begins .53 Objections to the transfer of particular pieces of equipment or areas of technology are sometimes resolved by downgrading the equipment's technical specifications or by substituting different equipment. This informal process largely reflects the personalities involved.

Recent experience in exceedingly low-level space cooperation with the U.S.S.R. and the U.S. space program itself highlights the importance of clarifying procedures and responsibilities should U. S.-Soviet space cooperation be expanded. For example, all of the participants in the VEGA mission with whom OTA spoke underlined the enormous problems they had working through the "maze" of people and conflicting agencies responsible for evaluating their proposed activities—despite the fact that all of their proposals carried few possibilities for technology transfer and all were ultimately accepted, The overlap between military and civilian space activities, and between NASA and DOD responsibilities, has begun to fuel greater tension among the defense and scientific communities.[54] And serious concern **has** been expressed on the part of the scientific community over the extent to which DOD has exercised seem-

[52] See U.S. Congress, Senate Permanent Subcommittee on Investigations, ***Transfer of Technology*** (Washington, DC: U.S. Government Printing Office, 1984).

*The overwhelming proportion of U.S.-Soviet cooperation in space occurs through NASA. Other cooperative efforts occur, however, with the participation of other U.S. Government agencies and individuals, such as the National Oceanic and Atmospheric Administration, the Department of Agriculture, the National Science Foundation, the National Academy of Sciences (through their interacademy exchange program), and other agencies, universities, and on an individual basis depending upon the nature of the cooperation. NASA is the implementing agency for the intergovernmental bilateral agreement for cooperation in space.

[53] See, for example, Robert L. Park, "Intimidation Leads to Self-Censorship in Science," *Bulletin of Atomic* ***Scientists,*** XLI, No. 3, March 1985. and OTA interviews.

[54] For example, see Craig Covault, "Shuttle Earth Imagery Spurs Censorship Debate," ***Aviation Week and Space Technology,*** CXXII, ***No. 17*** (Oct. 22, 1984), pp. 18-21. The literature on space cooperation has been weak in addressing the extent to which U.S. military capabilities and responsibilities have been associated with NASA.

ingly unilateral control on the communication of certain types of scientific information. Many U.S. participants in past space cooperation with the U.S.S.R. have noted that proposals for larger efforts would have met with possibly "insurmountable" resistance from some parties in charge of evaluating technology transfer concerns. This *suggests* that if space cooperation were to occur on a larger or more substantive scale, these disputes might only be magnified.

Utilization of Sensitive Technology

A third issue involves determining how sensitive technology or information can actually be used in cooperative projects with the U.S.S.R. Some have argued, for example, that at certain times it may be in the U.S. interest to allow some potentially sensitive technical know-how to be utilized. They believe that the U.S.S.R. has limited capability for absorbing Western technology and gaining production know-how, and they believe that the United States may acquire valuable information in return .55 Others argue that however limited they may be, we cannot afford to underestimate Soviet capabilities in absorbing technical information, copying U.S. technology, and incorporating particular items of technology into their military effort even without the ability to reproduce them. [56]

Similarly, there are major differences of opinion on the issue of how well sensitive technology necessary for particular missions can be "protected. " As discussed in chapter 4, United States and French planners differ regarding how effectively "black boxes" or other types of packaging may protect potentially sensitive instrumentation or devices. On a more individual basis, there is also disagreement over whether briefing the Western participants prior to international symposia or other cooperative efforts is an effective mechanism for reducing the transfer of sensitive know-how to the Soviet bloc. These, too, will be important considerations should U.S.-Soviet space cooperation be significantly expanded,

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In the area of national security concerns, three issues will remain central should U. S .-Soviet cooperation in space be greatly expanded. First, it will not be possible to gloss over concerns about the potential transfer of militarily sensitive technology or technical know-how. Such concerns will remain central and controversial on any level of cooperative activity, so that U.S. policymakers will have to address the trade-off between the potential scientific and/or foreign policy gains that may be attained from U. S .-Soviet space cooperation, and the questions that such an interchange might pose for national security. Any project proposal will require intense scrutiny and review, and will undoubtedly generate controversy.

Second, any large-scale U.S.-Soviet cooperative space project could provoke reevaluation of the ideological thrust behind the present U.S. trend towards increased controls over exports and the flow of information, technical data, and ideas, The Reagan Administration has imposed more controls over international interchange in science and technology than its predecessors. The spirit of openness and cooperation in which a joint proj-

Photo credlt OTA **.Naff**

OTA staff member meets with leading Soviet officials and Academicians in Moscow during research for this study

[5] The degree to which the U.S.S.R, can successfully assimilate Western technology has been the subject of widespread debate See 1. Hardt and D. Gold, "The Eastern Economies, " *East- West Technology Transfer: A Congressional Dialog With the Reagan Administration* op cit , p. 8 3 .

[56] See, for example, Office of the Undersecretary of Defense for Policy, *Assessing the Effect of Technology' Transfer on Western Security -.4 Defense Perspective,* (Washington, DC: U .S. Department of Defense, February 1985); and *Soviet Acquisition of Western Technology* (Washington, DC: Central Intelligence Agency, April *1982),*

ect **with the U.S.S.R. might be undertaken could lead to calls for a re-evaluation of the line between what is considered militarily sensitive and what is made widely available. It could also make it more difficult to pressure U.S. allies** to be more stringent in the area of export controls if U. S.-Soviet cooperation is so prominent.

Finally, the mechanics of dealing with technology transfer decisions will have to be addressed. This might require a more effective delineation of responsibilities among individuals and agencies for determining and implementing controls, utilizing personnel with sound knowledge in both technical and foreign policy areas to conduct such deliberations. It might also involve a more in-depth assessment of possible technology transfer through past cooperative projects in space, the criteria used to assess such technology transfer, and a clearer evaluation of the ways in which technology can be protected or used to U.S. advantage,

THE SOVIET APPROACH

Cooperation with the U.S.S.R. in any endeavor is a two-sided affair, and U.S. planners cannot unilaterally make decisions concerning the amount, type, and scope of cooperation which should take place. Although Soviet designs and objectives are themselves a matter of widespread controversy in the West, OTA'S interviews in the United States and in Moscow suggest that Soviet perspectives on prospects for U.S.-Soviet cooperation in space are generally quite different from our own.[57]

Soviet official policy has always expressed, and continues to express, a commitment to cooperation in space:

> The potential value of I Soviet-American cooperation in space] seems very significant on the economic, scientific and technical plane, since the U.S. and U.S.S.R. space programs are mutually complementary in many of their parameters. The significance of this cooperation would also be great on the political psychological plane—from the point of improving the entire atmosphere of Soviet-American relations and ensuring trust between the people and leaders of the two great powers .58

While there are certainly differences among Soviet scientists and planners, Soviet scientists have shown great interest in expanding cooperative efforts with the United States, pooling knowledge and sharing in outer space discovery. Like their political counterparts, they emphasize that the goals of such cooperative efforts are not only, or even mainly, scientific, but rather are to enhance prospects for "peaceful coexistence" on Earth and to keep outer space as a peaceful domain.

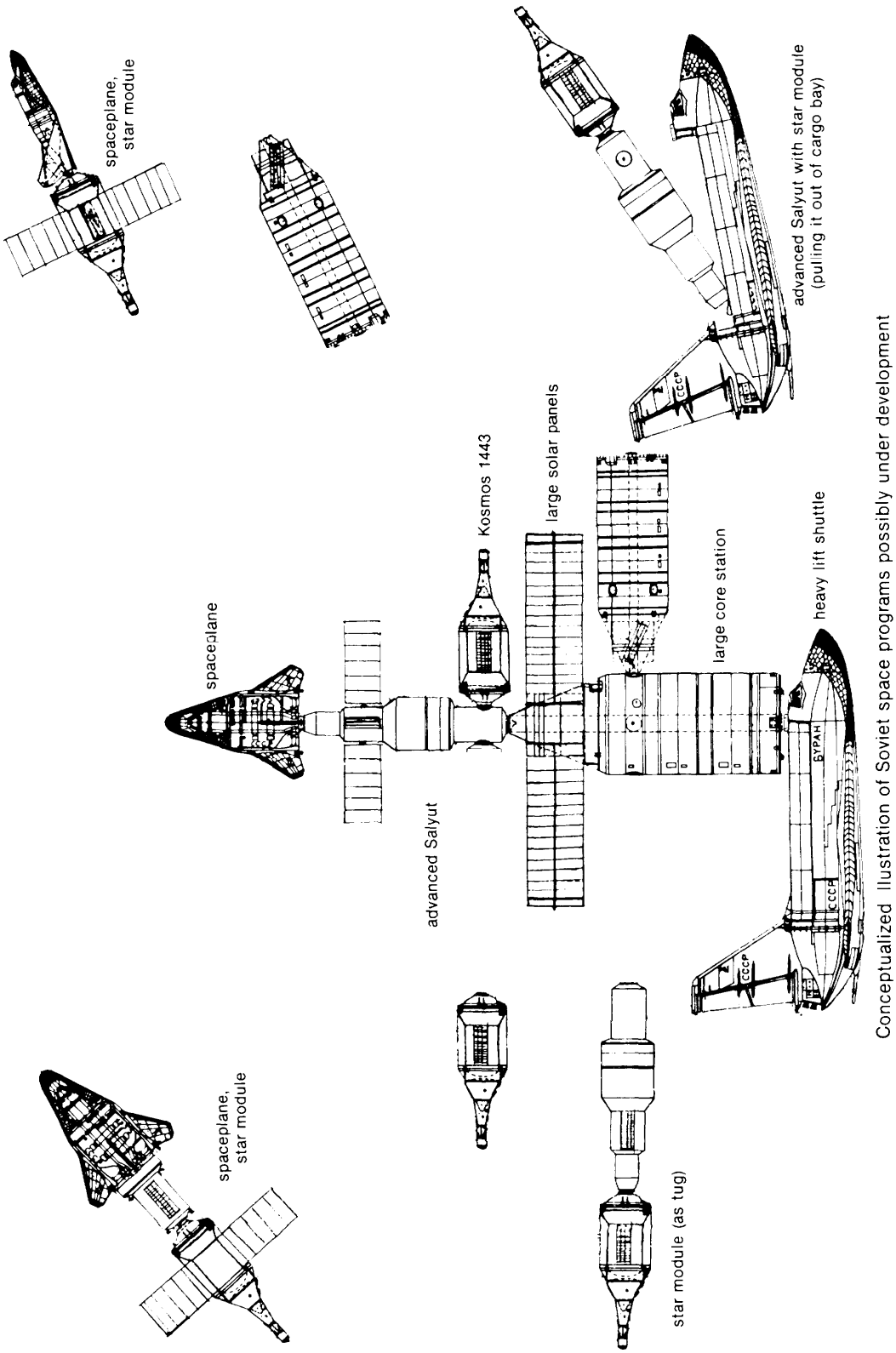
The issue of space cooperation, however, is an integral part of Soviet foreign policy, and its objectives extend beyond a desire for peace to competition as well.

> International cooperation in the study of space is inextricably linked with the foreign policy of governments, and it depends on the general state of political relations between them , . .[59]

The Soviet view of U.S.-Soviet relations is overshadowed by a basic competitiveness not only between two space or military programs, but between two political and social systems. Marxist-Leninist doctrine—the ideological foundation of the U.S.S.R.—expresses an irreconcilable conflict of interest between the Socialist and non-Socialist worlds; today, the Soviet concept of "peaceful coexistence" represents more of a continuing struggle than a state of equilibrium, as it is generally defined in the West. [bo]

Thus, Soviet political leaders have consistently used their space program not only to enhance cooperation, but to pursue other foreign policy objectives more competitive or confrontational in nature: using space as a propaganda tool to en-

[57] OTA interviews in Moscow, June-July 1984.
[58] A Kokoshin, "Space-Based Anti-Missile Defense: Illusions and Dangers, " *Moscow* News, No. 23 (1984), p. 5.
[59] S V Petrunin *Sovetsko-frantsuzskoe sotrudnichestvo v kosmose* (Moscow: "Znanie," 1980), p. 7.
[bo] "See Paul H. Nitze, "Living With the Soviets, " Foreign ***Affairs,*** LXIII, No. 2 (winter 1984), pp. 368-369.



Conceptualized Ilustration of Soviet space programs possibly under development

SOURCE: Charles P Vick. 1984.

hance national prestige and influence; weakening the prestige and influence of the United States by portraying it as a threat to international peace and security; belittling the impact of U.S. space accomplishments; and deflecting attention from the military character of the Soviet space program onto that of the United States.

Today, therefore, tensions in U.S.-Soviet relations are reflected in an official Soviet hard-line, albeit somewhat ambiguous, approach towards space cooperation with the United States. Soviet officials consistently stress the viewpoint that past U.S.-Soviet cooperation was beneficial, and lay the blame for its termination squarely on the shoulders of the United States; and yet they have not responded officially to any recent overtures to renew such cooperation. Despite publicity in the United States surrounding American experiments on VEGA, the Soviet press has either avoided mentioning or denied that there is any U.S. participation in this mission. " The Soviets have consistently decried the U.S. policy of "linking" the issue of cooperation to other political events; but they have also politicized the issue by emphasizing the severe, if not insurmountable constraints the U.S. Strategic Defense Initiative places on initiating or renewing U.S.-Soviet cooperation in space. Official Soviet policy on space cooperation tends to follow the overall state of U.S.-Soviet relations.

The political dimensions of Soviet participation in space cooperation extend to implementing the agreements as well. Access to people and information in the U.S.S.R. is closely monitored and controlled by the government. This has resulted in a high level of secrecy surrounding many areas of research and other activities, a highly compartmentalized bureaucracy, and a high degree of control placed over its citizens and scientists in all of their interactions with foreigners.

All of these factors inevitably constrain the implementation of a U.S.-Soviet cooperative agreement in space. The high level of secrecy in the U.S.S.R. is compounded in space matters by military domination of Soviet space activities. The Soviet space program is run primarily by the military-the Air Force is responsible for cosmonaut training and vehicle recovery, the Strategic Rocket Force for conducting all space launches—and most of the known high officials in Soviet space organizations have strong military or defense industry backgrounds and exercise dual responsibilities in civilian and military space activities. The thoroughgoing compartmentalization of the Soviet bureaucracy, and the difficulties Soviet scientists face in meeting with foreigners—from being allowed to travel and mix at international scientific meetings, to gaining permission to mail technical letters and papers—also greatly constrain substantive interchange. At the same time, space cooperation is viewed (at least as much as it is in the United States) as an effective means for intelligence gathering and gaining insight into the U.S. space program and Western technology.

The experience of U.S. scientists involved in cooperation in space research has varied enormously. Some have registered surprise at the frankness and openness with which particular Soviet institutes and individuals have shared data and information. Others have complained that the Soviets bring little data or information to meetings and conferences, do not send their best scientists, do not provide their papers in advance, and often treat results as state secrets, making them available only to a select few. Sometimes the disparity in the success or failure of individual experiences has been affected by knowledge or lack of knowledge of the Russian language among U.S. scientists, sometimes by personal style. More often it has been affected by Soviet decisions or behavior patterns which extend beyond the cooperative arrangement itself to broader aspects of Soviet domestic or foreign policies.

In the U. S. S. R., then, the issue of U.S.-Soviet cooperation in space is tied up with both domestic and foreign policy concerns in ways often unfamiliar to the Western observer. In a society where ideas and contacts are tightly controlled, foreign cooperation always implies some loss of control, however limited, for the Soviet regime. For this reason the Soviets tend to set the criteria for judging the merits of cooperation very high.

*] See, forexample, the report of a Moscow television broadcast, "Obvious But Incredible, " by Professor S. P. Kapitsa on the VEGA probes, Jan. 12, 1985, translated in Foreign Broadcast Information Service, ***U.S.S.R.*** *Daily* ***Report,*** Jan. *16, 1985,* pp. U1-3; "Soviet Denies U.S. Participation in Soviet Halley Mission, " ***Soviet Aerospace,*** Jan. *7, 1985,* p. *8;* and ***Defense Daily,*** Jan. 8, 1985, p. 39.

Soviet planners seriously calculate the potential foreign policy and technological benefits and costs of any particular endeavor, and act accordingly.

Should U.S.-Soviet space cooperation be expanded or renewed, then, this will place upon U.S. planners a special burden of having to be alert to factors and attitudes affecting cooperation that are quite different from those of other foreign partners.

> . . . Soviet-American relations over the years have been plagued by the tendency, especially on the American side, of public and even official opinion and expectations to fluctuate between naive euphoria and angered disillusionment . . . We must understand realistically, what was done, what was not done . . .[62]

In pursuing renewed U.S.-Soviet cooperation in space, the United States will be dealing not only with an adversarial partner, but with one whose framework for judging the gains and costs of cooperation is quite different from our own. In the words of two participants in U.S.-Soviet cooperative efforts in space:

> When all is said and done, however, Soviet attitudes and performance, and, indeed, personal relationships with their representatives, all have come a long way since the early days of the International Geophysical Year . . . The prescription for the future can only be patience and persistence on both sides.[63]

> At the same time, we should not overlook the vast difficulties of space cooperation in the past, difficulties which must arise from the contrasting roles and duties of citizens in the U.S.S.R. compared to in the United States.[64]

More than in other cooperative ventures with foreign partners, U.S. policy makers will have to reconcile Soviet decisions and behavior with the United States' own objectives. And this will make it all the more important for U.S. planners to sort out precisely what U.S. objectives are. In the words of yet another observer, "Policy, like charity, begins at home."[65]

[62] See Foy D. Kohler, "An Overview of U.S.-Soviet Space Relations," in Dodd L. Harvey and Linda C. Ciccoritti, U.S.-Soviet *Cooperation in Space* (Miami: Center for Advanced International Studies, University of Miami, 1974), p. xv.

[63] Arnold W. Frutkin, *International Cooperation in Space* (Englewood Cliffs, NJ: Prentice-Hall, 1965), p. 120.

[64] From a letter to OTA from L.J. Lanzerotti, Nov. 5, 1984.

[65] James Cracraft, "U.S.-Soviet Relations," *Bulletin of the Atomic Scientists*, XLI, No. 1 (January 1984), p. 8.

SUMMARY AND CONCLUSIONS

In light of conflicting currents in U.S.-Soviet relations, balancing competing objectives and different perceptions of the U.S.S.R. will be a major challenge in determining the shape and magnitude of future U.S.-Soviet cooperation in space, Four issues are central:

- the scientific and practical benefits that can be gained from space cooperation,
- the potential transfer of militarily sensitive technology or know-how between the two countries,
- the effect of space cooperation on foreign policy, and
- perceptions about Soviet motivations and behavior and the course of U.S. Soviet relations overall.

From a scientific and practical point of view, past experience has shown that cooperation in space can lead to substantive gains in some areas of space research and applications, and can provide insight into the Soviet space program and Soviet society as a whole. As discussed in chapter 3, scientists in OTA'S workshop concluded that the scientific return from U.S. space exploration activities could be expanded significantly by cooperation with the Soviet Union. The scientists also suggested that cooperation be initiated with modest exchanges of solid scientific substance and that the possibility of a large-scale mission might be held out as a long-term goal, provided that it, too, offered solid scientific rewards.

Past experience also suggests that technology transfer will remain a major countervailing concern in any future space cooperation with the U.S.S.R. Should cooperation be renewed or expanded, the challenge facing U.S. planners will

be to minimize these concerns; but concerns will continue to arise regardless of the scale or level of cooperation. Most people agree that caution should be exercised against transferring militarily sensitive technology and know-how to the U.S.S.R. The difficulties will lie in determining what should be considered militarily sensitive, who should be authorized to make such decisions, and the extent to which potentially sensitive technology or know-how can be protected in any particular exercise.

Past experience, both in low level cooperation with the U.S.S.R. and more extensive cooperation with our allies, suggests that this will be a difficult and controversial challenge. The Soviets have no doubt been pursuing an aggressive campaign to acquire Western technology and know-how, particularly in the area of space systems and technology; severely limiting cooperation in space is one way of protecting Western security against such efforts. But Soviet scientists are also conducting innovative and high caliber work in certain areas of space research and applications. Overly stringent controls could threaten the free interchange of scientific and technical ideas and information in areas complementary to, but not always addressed in, the U.S. space program; and since the Soviets are already cooperating with other Western countries in space research and applications, the United States could find it increasingly difficult to control the flow of information to the U.S.S.R. without isolating itself from the rest of the world space community. A key challenge, then, will be to craft cooperative arrangements that diminish the possibility of aiding Soviet military capabilities but that keep space cooperation substantive and viable.

Perhaps the most difficult challenge will be to assess how space cooperation can be effectively used to support or further U.S. foreign policy objectives. Space cooperation, on both low and high levels, is inherently symbolic. The main areas of controversy concern whether space cooperation can alter Soviet behavior, and so ease U.S.-Soviet conflicts; and whether starting and/or stopping space cooperation is an appropriate political symbol to underscore other U.S. foreign policy objectives.

The extent to which space cooperation can *alter* Soviet behavior, and in that way reduce tension in U.S.-Soviet relations overall, is hard to predict. One viewpoint suggests that this is entirely plausible, and cooperation should be pursued toward this end. An opposing viewpoint suggests that there is no reason to believe the Soviets would alter their behavior as a result of U.S.-Soviet cooperation in space and that cooperation might even be dangerous: from this perspective, any reduction in tension would be superficial, and would only lead the United States to lower its guard against an adversary that uses cooperation solely for its own purposes. In between are a range of views, including the belief that a low level of interchange among scientists at a working level, removed from the realm of superpower politics, can be the most effective way for keeping channels of communication open and reducing tensions between the two countries in the long run. Another belief is that space cooperation has no fundamental positive or negative effect on U. S.-Soviet relations, and must be weighed simply on its own merit. Although there is no evidence from past experience that space cooperation can affect foreign policy in any far reaching way, many believe the future can be different.

Regardless of whether space cooperation can *alter* Soviet behavior, another question is whether it is smart to exploit its symbolic value to achieve other U.S. interests. Symbolic value has always been a key component in both the U.S. and Soviet space programs, on low as well as high levels of cooperation. The question of whether cooperation should be initiated or terminated primarily to pursue symbolic goals has generated a controversy of its own.

Creating a large-scale cooperative effort in space, for example, could bring positive benefit to the United States, by illustrating to other countries the U.S. desire to work with our adversaries to promote peace. But it could also bring risks: 1) it may provide the U.S.S.R. with a great deal of symbolic benefit by casting them as technological equals; and 2) should a large-scale joint project fail, the symbolic cost could be damaging to U.S. interests. The symbolic benefits and risks from U.S.-Soviet cooperation in space would increase with the size, scale, and visibility of any cooperative effort.

Similarly, severely *curbing* or *terminating* cooperation may be an appropriate symbolic measure to show displeasure with egregious Soviet behavior, but also carries risks. U.S.-Soviet cooperation in space inevitably occurs in the context of U.S.-Soviet relations overall, and the tendency of U.S. policy in the past has been to utilize space cooperation for foreign policy ends. The assumption has been that an abrupt reduction in space cooperation can be an effective means of *protesting* Soviet behavior: when the Soviets do something morally reprehensible at home or abroad, some believe the United States has a moral responsibility to respond and space cooperation is an effective way of doing so. But as this will generally result in scientific and practical losses, many have questioned this approach, preferring other methods of protest that show displeasure at less cost. They believe that curtailing or terminating space cooperation with the U.S.S.R, brings little benefit, and in fact may harm scientific inquiry and/or U.S.-Soviet relations overall. There is a notable lack of agreement on how past experience might clarify these debates, and the degree to which past experience may be useful in assessing potential future cooperation.

Underlying all of these viewpoints are different assumptions about Soviet objectives and behavior. The Soviet approach to cooperation has tended to mirror its overall approach to U. S.-Soviet relations, reflecting both an official commitment to cooperation in space, and a basic competition between the two superpowers. Soviet leaders have consistently used their space program not only to enhance cooperation, but also to pursue other foreign policy objectives more competitive and confrontational in nature (such as weakening the prestige and influence of the United States while enhancing that of the U. S. S. R., and developing a strong militarily related space capability of their own). This has led to vastly different interpretations of Soviet motivations and actions among U.S. observers, and different interpretations of the lessons of past U.S.-Soviet cooperation. A central U.S. foreign policy challenge, therefore, will be to assess how U.S. objectives may be attained independent of Soviet intentions.

Because of several factors then—the conflicts between the gains of cooperation and the risks of technology transfer; disagreement over the relative importance of scientific and practical benefits and foreign policy goals; and possible inconsistencies among foreign policy objectives—there will always be a multiplicity of views about East-West cooperation in space. The ways in which these viewpoints are reflected in policy will determine the size, shape, scope, and effectiveness of any potential space cooperation with the U.S.S.R.

It would clearly be useful to further examine the costs and benefits of past cooperation, as a basis for considering the establishment, cancellation or continuation of cooperative arrangements in the future. At the same time, however, it is important to recognize that views on how much cooperation to pursue will necessarily reflect judgments about broader issues of world tensions, Soviet objectives, and the overall course of U.S.-Soviet relations at least as much as they will reflect judgments about the costs and benefits of U.S.-Soviet space cooperation itself.