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PUBLIC realization that the Space Age was at hand came with the launching of Sputnik on October 4, 1957. A second and much larger Soviet earth satellite, containing a dog, was launched on November 3, 1957. This startling emergence of Soviet space science and technology had grave implications for the security of the free world, because it demonstrated that the U.S.S.R. possessed much of the technology required to explore and control space. Moreover, through the Sputnik launchings, the Soviet Union revealed a capacity to launch intercontinental ballistic missiles. Future methods of maintaining peace or waging war would be greatly altered by man's newly found ability to make use of space.

Repercussions from these significant events were felt immediately throughout the free world. In the United States Senate, the Preparedness Investigating Subcommittee of the Armed Services Committee moved swiftly to start hearings in November 1957. The Subcommittee's "Inquiry Into Satellite and Missile Programs" continued through the rest of that year during which it heard testimony from leaders in Government, science, education, and industry concerning existing and future national defense. By January 1958 the Subcommittee had concluded that although the satellite was not yet a weapon, the Soviet Union by leading the world into outer space had made it necessary for the United States to put forth a tremendous effort to insure its own preeminence in defense and space. Recognizing that its jurisdictional responsibilities were limited to defense, the Subcommittee pointed out the necessity for others to explore whatever needed to be done to involve the total effort of the Nation. The Subcommittee agreed that ". . . the same forces, the same knowledge and the same technology which are producing ballistic missiles can also produce instruments of peace and universal cooperation." [1]

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[1] *Hearings on Inquiry into Satellite and Missile Programs before a Subcomm. on Preparedness Investigating of the Senate Armed Services Comm.*, 85th Cong., 1st & 2d Sess., pt. 3, at 2429 (1958).

I. Organization of Space Activities

Thus arose the first policy question of the Space Age: how to organize and administer our activities on earth so that we could carry on an effective space program. Little more than thirteen years have passed since that dramatic event in October 1957. Looking back to the period of inception, it is unlikely that anyone could have then foreseen the complexity and scope of legal and policy problems which would emerge with man's venture into the new environment of outer space.

A. *The United States—The Formation of NASA*

The initial problems requiring solution were those in the field of government organization. Immediate needs included the establishment of legislative jurisdiction, policies governing all aspects of space exploration, executive-legislative relations, civilian-military coordination, and the organization and administration of international activities.

In the hearings held before the Senate Preparedness Investigating Subcommittee it became evident that the comprehensive nature of space activities cut across the jurisdictional lines of several standing committees of the House and Senate. Moreover, a different group of the substantive committee could be involved with each differing piece of space exploration legislation, including the necessary processes of the Committees on Appropriations.

As an interim measure, the Senate established a Special Committee on Space and Astronautics on February 6, 1958 consisting of fifteen appointed members most of whom were either chairmen or ranking members of the standing committees which had a logical interest in space exploration: Appropriations, Foreign Relations, Armed Services, Interstate and Foreign Commerce, Government Operations and the Joint Committee on Atomic Energy.

Evidencing the importance that Congress attached to space exploration was the election of Senate Majority Leader Lyndon B. Johnson as Committee Chairman and the former President Pro Tempore of the Senate, Styles Bridges, as the ranking minority committee member. The House of Representatives similarly created the Select Committee on Astronautics and Space Exploration on March 5, 1958, with thirteen members whose permanent committee assignments also largely reflected the possible extension of their interests to space and space-related subjects. Significantly, the Chairman was John W. McCormack, the Majority

Leader, and the Ranking Republican was Joseph W. Martin, Jr., the Minority Leader.

The establishment of permanent organizations in the Congress for handling legislative space matters was a task for internal consideration rather than one whose solution could reasonably be sought through the process of public hearings. The Senate special committee analyzed the advantages and disadvantages of four alternative methods of committee organization and jurisdiction: (1) separate standing committees in the Senate and House; (2) division of jurisdiction among existing standing committees; (3) assignment of jurisdiction to the Joint Committee on Atomic Energy; and (4) creation of a Joint Committee on Aeronautics and Space.

There was a measure of support in the Congress for the creation of a Joint Committee on Aeronautics and Space in the bill whose provisions would ultimately be enacted into law. In reporting the legislation to the House on the creation of the National Aeronautics and Space Administration, the House Select Committee on Astronautics and Space Exploration recommended a joint congressional committee. However, the idea was abandoned by the House in favor of amending its rules to provide for a separate Committee on Science and Astronautics. The Senate version of the space legislation provided for a Joint Committee on Aeronautics and Space, but when the matter was considered by the conference committee the Senate acceded to the expressed preference of the House for separate standing committees.

Most of the major components of our basic United States governmental policy on space activities are set forth in the National Aeronautics and Space Act of 1958.[2] Declaring that the policy of the United States is that space activities should be devoted to peaceful purposes for the benefit of all mankind, and that our welfare and security require an adequate program and leadership,[3] the law provided for the establishment of the National Aeronautics and Space Administration (NASA).[4] Building its organization upon the nucleus of the National Advisory Committee for Aeronautics (NACA) and acquiring certain functions from the Department of Defense, NASA was given authority to "plan, direct and conduct aeronautical and space activities" [5] with the exception of

[2] 42 U.S.C. §§ 2451-2476 (1964).
[3] *Id.* at § 2451.
[4] *Id.* at § 2472.
[5] *Id.* at § 2473.

those primarily concerned with defense. The Department of Defense was given responsibility over "activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States. . . ." [6] Both agencies were provided authority to engage in research and development in these areas.

The initial draft legislation toward the organization of the United States aeronautical and space program was introduced in the Senate on April 4, 1958 as a bill, S. 3609,[7] and was referred to a special committee which held hearings in May of that year. No differences of opinion developed among committee members over three of the main proposals: (1) a civilian space agency should be established; (2) the National Advisory Committee for Aeronautics (NACA) should be the nucleus of the new agency; and (3) the Department of Defense should be responsible for space programs essential to national defense.

Implicit in the original draft legislation, however, was a different assumption concerning the nature of the problem to be solved from that which was in the act as finally passed by the Congress. The assumption underlying the original version of S. 3609 was that a total U.S. space program could result from dividing projects among agencies and declaring that they should voluntarily cooperate. However, no provision was made for overall coordination. There was an impression, it should be noted, that the Director of the new space agency would have considerable authority over the U.S. civilian space program. For example, he would be given an advisory rather than an executive board within his own organization, and furthermore he would not have to share authority and responsibility with others as in a commission-type structure. Nevertheless, it was not clear how the overlap between the new civilian agency (which eventually became NASA) and the Department of Defense would be handled. Neither was it apparent how other agencies with space-related programs would be coordinated; for example, the Atomic Energy Committee (nuclear rockets), the Department of State (international agreements), the Department of Commerce (meteorology), and others.

Since coordination of any large undertaking requires some organizational arrangement for centralized guidance, the legislation which ulti-

[6] *Id.* at § 2451.

[7] S. 3609, 85th Cong., 1st Sess. (1958).

mately passed the Senate[8] contained a provision for a National Aeronautics and Space Policy Board over which the President would preside. During the conference on the different space bills which passed the Senate and House, the Senate concept that interagency coordination should be at a high level led to final agreement on the establishment of the National Aeronautics and Space Council. Another contribution of the Senate to the National Aeronautics and Space Act of 1958 was the establishment of recognition that a section providing for international cooperation was needed. In its declaration of policy and purpose, the original bill defined one of its objectives as "cooperation by the United States with other nations and groups of nations in work done pursuant to this act and in the peaceful application of the results thereof," [9] but there was no subsequent implementing section in the bill. A section on International Cooperation was written into the bill and became part of the NASA act authorizing the new agency to engage in a program of international space cooperation under the foreign policy guidance of the President.[10]

In the November 1958 elections, the Democratic party won substantial majorities in the House and Senate. Anxious allies of the United States considered the possibility of an impasse between the President and the Congress in the conduct of U.S. foreign policy. This was largely dispelled, however, when Secretary of State Dulles, on behalf of President Dwight D. Eisenhower, extended an invitation to the Senate Majority Leader, Lyndon B. Johnson, to represent the United States in the United Nations, which was then considering the establishment of an ad hoc Committee on the Peaceful Uses of Outer Space. Senator Johnson allayed any fears that partisan politics might affect the participation of the United States in the space program:

> . . . I am here to express to you the essential unity of the American people in their support of the goals of the resolution offered now in their name. This resolution is presented, as our system requires, by the representative of the executive branch of our Government. I speak here today at its request.

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[8] The House bill was passed in lieu of the Senate bill. *See generally* 2 U.S. CODE CONG. & ADMIN. NEWS 3160 (1958).

[9] This language was retained in the legislation that was finally enacted. National Aeronautics and Space Act, 42 U.S.C. § 2451 (1964).

[10] *Id.* at § 2475.

> The executive position in the United States is held by the Republican Party through the mandate of the people. I am here as a member of one house of the legislative branch, in which the majority position is held, also at the mandate of the people, by the Democratic Party, of which I am a member.
>
> These are distinctions. They are not, on this resolution, differences. On the goal of dedicating outer space to peaceful purposes for the benefit of all mankind there are no differences within our Government, between our parties, or among our people. The executive and the legislative branches of our Government are together. . . .[11]

Thus, the United States space program, from its earliest days, was cast in a bipartisan, if not a nonpartisan, mold.

B. *The United Nations–International Agreements on Space*

Policy objectives of the United Nations for international space activities began to take shape as part of the comprehensive negotiations on disarmament. The United States, in January 1957, almost nine months before an earth satellite was first orbited, indicated its readiness to participate in "fair, balanced, reliable systems" for controlling outer space vehicles in order to devote their use exclusively to peaceful, scientific purposes. However, in March 1958, the Soviet Union voted against a resolution proposed to the United Nations that the use of cosmic space for military purposes be banned, that foreign military bases be eliminated, and that an agency for international cooperation be established by the United Nations to study space policy. In September 1958, the United States requested the General Assembly to consider a program for international cooperation in outer space and to declare itself on "the separability of the question of the peaceful uses of outer space from that of disarmament." This policy determination was deemed desirable so that the lack of agreement on an effective system of inspection and control of armaments need not delay progress in establishing agreement on space exploration.

Both President Eisenhower and President Kennedy supported international control of space activities through the United Nations. On September 22, 1960, President Eisenhower in an address to the United Nations, proposed that:

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[11] Address by Senator Lyndon B. Johnson, United Nations Political and Security Committee, Nov. 17, 1958.

> (1) We agree that celestial bodies are not subject to national appropriation by any claims of sovereignty.
>
> (2) We agree that the nations of the world shall not engage in warlike activities on these bodies.
>
> (3) We agree, subject to appropriate verification, that no nation will put into orbit or station in outer space weapons of mass destruction. All launchings of space craft should be verified in advance by the United Nations.
>
> (4) We press forward with a program of international cooperation for constructive peaceful uses of outer space under the United Nations. Better weather forecasting, improved world-wide communications, and more effective exploration not only of outer space but of our own earth—these are but a few of the benefits of such cooperation. . . .

Similarly, in his State of the Union message of January 30, 1961, President Kennedy stated:

> . . . [T]his Administration intends to explore promptly all possible areas of cooperation with the Soviet Union and other nations to invoke the wonders of science instead of its terrors. Specifically, I now invite all nations—including the Soviet Union—to join with us in developing a weather prediction program, in a new communications satellite program, and in preparation for probing the distant planets of Mars and Venus, probes which may some day unlock the deepest secrets of the universe.[12]

Specific results of the United States' efforts are seen in two space treaties negotiated in the United Nations: The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies,[13] (Outer Space Treaty) which entered into force on October 10, 1967; and The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space,[14] (Treaty on the Rescue of Astronauts) entered into force on December 3, 1968.

The Outer Space Treaty consists of a preamble and seventeen articles. Some objectives of the Treaty are implicit in its provisions which offer solutions for anticipated problems: (1) International law and the United

12 107 CONG. REC. 1363 (1961).

13 [1967] 3 U.S.T. 2410.

14 [1968] 6 U.S.T. 7570.

Nations Charter govern space activities; (2) Nations are guided by the principles of cooperation and mutual assistance, avoiding harmful contamination and adverse environmental changes, consulting as necessary if such problems arise; (3) Nations may be given opportunity by other States to observe flights of their space objects; (4) Comprehensive information on space activities shall be provided so that it may be disseminated promptly and effectively by the United Nations Secretary General in the interest of international peaceful space cooperation; (5) Installations and equipment on the Moon and other celestial bodies are open to representatives of other nations on a reciprocal basis, provided interference with normal operations is avoided. The Treaty provisions are made applicable to international intergovernmental organizations, and if problems arise they are to be resolved by treaty member states, by the organization, or by one or more of its members.

The general guiding principle that astronauts shall be regarded as "envoys of mankind," receiving all possible assistance in case of accident, distress, or emergency landing, including return to the State which registered the spacecraft is set forth in Article V of the Outer Space Treaty. The Treaty on the Rescue of Astronauts further develops the duties attendant to this undertaking, making specific arrangements for notification of the launching authority and the Secretary General of the United Nations for search and rescue operations, and for safe and prompt return. Article VIII of the Outer Space Treaty provides that the launching authority retains ownership of objects sent into outer space, and should they fall to earth they shall be returned after identifying data has been supplied. Under Article VII, the launching State is internationally liable for damage.

II. Unresolved International Legal Problems

The two space accords discussed above were significant steps toward providing guidance in the solution of possible international problems arising from the use and exploration of the space environment. Nevertheless, two principal subjects relating to international space law have not yet been resolved. These concern (1) the legal differentiation between airspace and outer space and (2) international rules and procedures concerning the liability for damages caused by space objects to ensure prompt and equitable treatment for victims of such damage.

A. Defining Outer Space

Implicit in the Treaty on Outer Space is the provision that outer space and celestial bodies are to be free for exploration by all States. Since airspace by existing law and custom is subject to national sovereignty, many international lawyers were concerned that it would be difficult to prevent claims of sovereignty over outer space unless a definite boundary line between airspace and outer space were determined. Numerous ideas were advanced[15] but resulted only in the determination that there was no legal, scientific and technical basis for determining an exact delineation between airspace and outer space.

The American Bar Foundation made a tabulation of early proposals for "altitude boundaries" between airspace and outer space to illustrate differences of opinion.[16] Among the proposals suggested were setting the limit of airspace at fifty-two miles because this was considered the limit of atmospheric lift; at sixty miles because this was considered the point at which the earth's gravitational effect disappears; and at two to three hundred miles as an analogy to the three-mile limit at sea.

It became apparent in considering this problem that some suggested legal definitions would have made a specific satellite in an elliptical orbit fall within "sovereign" limits at perigee only to escape from such "sovereign" conditions at apogee. In this connection it should be noted that the United States Explorer 6 had a perigee of 157 miles and an apogee of 26,366 miles.

The difficulty of delimiting airspace from outer space is complicated further by the rapid development of technology both in aeronautics and astronautics. The progress of technology has steadily increased the upper boundaries at which aircraft can operate. Also, there is currently under study a new type of spacecraft—the space shuttle—which would have

[15] For discussions of proposals for delimiting airspace and outer space, *see* A. HALEY, SPACE LAW AND GOVERNMENT 75-135 (1963); C. JENKS, SPACE LAW 98-101, 106, 111, 122, 134-35, 139, 155, 157, 159 (1965); M. McDOUGAL, H. LASSWELL & I. VLASIC, LAW AND PUBLIC ORDER IN SPACE 323-59 (1963); Christol, *The International Law of Outer Space*, in INTERNATIONAL LAW STUDIES 1962, at 185, 187-88, 191, 239-53, 261 (1966); L. LIPSON & N. KATZENBACH, THE LAW OF OUTER SPACE, REPORT ON THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BY THE AMERICAN BAR FOUNDATION 785-805 (1960), in LEGAL PROBLEMS OF SPACE EXPLORATION, A SYMPOSIUM, S. DOC. NO. 26, 87th Cong., 1st Sess. 1392 (1961) [hereinafter cited as AMERICAN BAR FOUNDATION REPORT]. This symposium includes a number of papers by individual authors who discuss problems of drawing a boundary between airspace and outer space. *See also* Doyle, *When a Lid on National Sovereignty?*, in ASTRONAUTICS & AERONAUTICS 94-95 (Oct. 1967).

[16] *See* AMERICAN BAR FOUNDATION REPORT, note 15 *supra*.

maneuverability in airspace similar to existing aircraft while having the characteristics of a spacecraft for operation in outer space.

It is interesting to note that to date no nation has protested the flight of space vehicles over its territory. Whether the status quo will continue as new and advanced technological applications in space are born remains a matter of conjecture. In the meantime the United Nations Committee on Peaceful Uses of Outer Space is continuing its study of the problem.

B. Liability for Outer Space Activities

Although the Outer Space Treaty contains a provision making any State party to the Treaty internationally liable for damage to another State as a result of its outer space activities, it was generally recognized by the member nations of the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space, and by the General Assembly that a separate convention on liability would be required to obtain international agreement.

Throughout the development of the law applicable to activities in outer space, no one has seriously challenged the need to establish criteria for determining liability and procedures for assuring compensation in the event of damage caused by the launching of a space object. Through the system of domestic law, individual nations are able to establish appropriate rules for compensating their own nationals who are affected by space accidents. However, the international consequence of outer space activities becomes more complex because the movement of objects in outer space is not constrained by national boundaries, and the return to a designated location cannot always be effected.

As a result of intensive negotiations held within the Legal Subcommittee, most of the substantive issues regarding liability for damages have been resolved. However, there remain two procedural issues which prevent complete agreement: (1) whether a claimant State which finds that its negotiations for compensation with the launching State cannot be resolved may take the matter to arbitration before an impartial tribunal; and (2) whether there should be a limitation on the liability of a launching State for damage resulting from a single accident. The United States has supported third-party arbitration and has proposed an amount of $500 million as a reasonable limitation of liability. It is generally believed

that if agreement can be obtained on these two issues all other topics relative to liability in outer space will be readily resolved.[17]

III. New Problems From Space Age Technology

Rapidly developing space age technology has provided man with the challenge of developing new modes and institutions to handle accompanying problems. A few examples are illustrative of the impact of space technology upon man's daily activities.

A. Communications

In less than a decade since NASA launched its first application satellite, space age technology has been responsible for significant expansion and improvement in the area of communications systems. The Communications Satellite Act of 1962[18] has the expressed purpose of serving the communications needs of the United States and other countries, and thereby promoting the causes of world peace and understanding.[19] The Act also created the Communications Satellite Corporation (COMSAT),[20] a United States commercial system, to carry out the objectives of the Act.

In August 1964, representatives of the United States Department of State and COMSAT entered into agreements with governments and telecommunications officials of ten other nations to organize what eventually became the International Telecommunications Satellite Consortium—called "Intelsat."

By common agreement among the members of Intelsat, the COMSAT Corporation manages the international consortium. Intelsat membership has grown from an original eleven nations to more than seventy.

Since the launch of COMSAT's first communications satellite, Early Bird, in 1965, communications satellites have made a major impact on global communications. The satellite has provided a needed supplement to existing cable, radio and microwave links, and provided their equivalent where they do not exist. At present, communications satellites are

[17] For a full discussion on establishing liability in outer space *see* Statement by Paul G. Dembling, former General Counsel of the National Aeronautics and Space Administration, before Colloquium on Space Law, International Institute of Space Law, October, 1970.

[18] 47 U.S.C. §§ 701-744 (1964).

[19] *Id.* at § 701.

[20] *Id.* at §§ 731-35.

largely used for transoceanic traffic, providing economical links across the Atlantic, Pacific and Indian Oceans. Before communications satellites were available, a West Coast-to-Japan cable circuit cost $15,000 per month; COMSAT was able to offer this service at a monthly charge of $4,000. Reduced costs are stimulating new uses for telecommunications in such enterprises as banks, stock exchanges, hotel reservations, cable television, hospitals and computer centers.

A new type of communications satellite, the broadcast satellite, has recently been developed by NASA. This type of communications satellite system can broadcast from a satellite directly into a home radio or television receiver. The ordinary home television set can receive such broadcasts today by merely adding a larger antenna and some additional electronics. In the future, these additions may be unnecessary.

One of the reasons for the intense interest in the broadcast satellite system is that it can provide direct television coverage where none now exists without the necessity of developing a conventional television distribution system. In the underdeveloped parts of the world, for example, governments can, by use of the broadcast satellite, provide instruction to their people in such matters as population control, agriculture, child care and food preparation.

In September 1969, the United States signed an agreement with India which will permit the Indian government to use our Applications Technology Satellite F (ATS-F) in a trial program of this kind. Under this agreement, NASA will make the ATS-F satellite available to India for up to six hours a day for one year and will provide technical advice and guidance. India will be responsible for developing the instructional television programs; transmitting the programs from an earth station to the satellite; and providing approximately 5,000 village television sets. Some 2,000 of the television sets will be designed to receive signals directly from the spacecraft, and the remainder of the sets will receive the signals via ground relay stations. India will also be responsible for obtaining necessary international frequency clearances and evaluating the results of the experiment which then will be made available to all nations. India will assume all costs associated with the ground segment programming, training and analysis. The tangible cost to the United States in permitting India to use the satellite is minimal. This program will be the first large-scale test program using the broadcast satellite technique.

Should the Indian experience prove to be a success both technically and economically, future requests for broadcast satellites could raise serious political questions. For example, the word "education" can have varying meanings depending upon the political orientation in any given State. In other words, where does education end and propaganda begin? Moreover, in the extreme, the broadcast satellite lends itself to thought control. Similarly, the success of the broadcast satellite experiment could raise major economic questions in highly developed industrial States. In the event of such success, existing methods of television and radio broadcasting could suffer severe economic disruption. The problem of regulatory procedures would unquestionably be raised. Consequently, the day is not far off when the nations involved must give careful study to the political and economic impact of broadcast satellites.

B. Earth Resources Satellite

One of the important new space developments of considerable economic potential is the Earth Resources Satellite program (ERTS). Results obtained from multispectral photographs and sensor data in early manned Apollo flights and specially fitted aircraft demonstrated that it is possible to photograph the earth's surface on a repetitive basis from an orbiting satellite and thereby acquire significant environmental information that may be employed in a number of disciplines. For example, ERTS data may prove to be valuable in the monitoring and management of agricultural crops, including the identification and control of diseased crops; in the surveillance and management of water resources; in programs of pollution control; in identification of new fishing grounds; and in the location of oil and other mineral deposits. Although these and other potential benefits from space photography have not yet been fully assessed, the developmental work already accomplished indicates that the initial demonstration satellites to be orbited in 1972 and 1973 will confirm the expectations of the ERTS program.

Should the ERTS program prove technologically successful, there may be a number of legal, political and economic problems which will need resolution. The ability to obtain important economic information from ERTS satellites may raise a question of the proprietary rights among individual countries. Some progress in this area has already been made. In 1968, NASA entered into agreements with Brazil and Mexico for instrumented aircraft flights over those countries to test the Earth Re-

sources sensing equipment. These programs have proved successful in demonstrating the economic value of the ERTS program while alleviating possible fears that the satellite would be used as a "spy in the sky."

Another matter of possible concern, should the ERTS program prove successful, is the manner in which accumulated information would be made available. Should information of economic importance be made available at all? (ERTS is capable of discovering new mineral deposits.) What safeguards are needed to prevent one enterprise from gaining unfair advantage as a result of deliberate or inadvertent disclosure of information? (This suggests a method similar to that used by the Department of Agriculture to provide information to the public on crop production.) Should a national monopoly be permitted on information of international concern? (The identification of new fishing grounds has economic implications for more than one country.)

While these policy questions do not require immediate solution, early consideration and discussion would nevertheless assure more complete understanding of the problem areas and the alternative solutions available.

C. Space Shuttle-Space Station

Looking to the next decade of space activity when exploitation must follow exploration, NASA is actively studying a reusable space vehicle—the Space Shuttle—which can economically transport men, payloads and supplies to and from orbit. This, in turn, would permit development of a large space station in earth orbit in which men would live and work in space. The space station conceivably could continue in a usable state in orbit for periods as long as ten years, being resupplied and restaffed by the space shuttle.

The development of the space shuttle represents a technical and managerial challenge more difficult than anything attempted heretofore in space technology. The fundamental characteristics of the space shuttle are an operational mode approaching an airliner-type operation for passengers and payload at significant reductions in cost and a capability of supporting a variety of missions, while providing a less severe payload environment. Current cost estimates for the development of a space shuttle and space station approximate ten billion dollars.

On March 7, 1970, President Nixon in a statement on the future of the space program remarked: "I believe that both the adventures and

the applications of space missions should be shared by all peoples. Our progress will be faster and other accomplishments will be greater if nations will join together in this effort, both in contributing the resources and in enjoying the benefits."

In furtherance of this presidential declaration, NASA in early 1970 took steps to encourage free world participation in the planning and development phase of post-Apollo transportation systems such as the space shuttle. The NASA administration made trips to Europe, Canada, Australia and Japan to inform the nations which are most active in space of the United States' plans for the next decade. Subsequently, international conferences were held in Washington, Paris and Bonn during which NASA officials reviewed and discussed more specifically its plans for post-Apollo programs.

Considerable interest in a cooperative venture on the development of the space shuttle was expressed by the Western European countries. As a consequence more detailed discussions were held between United States officials and European space organizations' representatives in 1970 and early 1971 to consider possible arrangements for cooperation.

The principal policy questions generated by these discussions with Western Europe are:

(1) What role will Europe play in the development of post-Apollo hardware? The United States has advanced the concept that the European nations have the option of deciding which developmental tasks they wish to undertake. There would be two provisos: (a) establishment of technical competence to do the job; (b) absorbtion of the developmental costs of the task selected. The United States would have overall management and decision authority with the exception of tasks undertaken by European nations. In the latter instance, decisions would be made jointly.

(2) How much detailed technology should be shared with Western Europe? The United States suggests that Western Europe be entitled to complete access to general, publishable information. Detailed access involving production know-how would be available to the Western Europeans on those tasks which they finance.

(3) What choices must the Europeans make if they are to participate in the space shuttle program? The Western European nations maintain that they cannot provide substantial funds for both their own programs and participation with the United States. If they choose partici-

pation with the United States they must correspondingly reduce their own programs. This would curtail the availability of launch vehicles and services for European missions. Accordingly, as a *quid pro quo*, they request the United States to provide launch vehicles and services for European missions during the seven or eight year period required to bring the space shuttle to fruition. The United States, recognizing the problem, has offered to provide launch vehicles and services at reimbursable cost, provided that the European nations participate substantially; in other words, to an extent of approximately one billion dollars or ten percent of the total cost. Moreover, the United States would require that the European missions be for peaceful purposes and consistent with outstanding treaties and international organizations such as Intelsat.

IV. Conclusion

In a little more than a decade, the United States has established a program of space exploration unequaled in its success by any other nation. Manned exploration of the moon, as a symbol of America's advanced space technology, has come to appear almost routine. Although a comprehensive assessment of the benefits from space exploration lies in the future, nevertheless, current scientific yields for the program are staggering in nature.

Having achieved our national goal of being first to the moon, the question of budgetary priority is being raised. The psychological blow delivered by Sputnik in 1957 should serve as a reminder that a lack of vigilance might create a future technological Pearl Harbor. Clearly, the United States requires a substantial space program to garner the benefits arising from aerospace activities.