

legally binding instrument, would probably cause further delays in the adoption of this document.

Nevertheless, if everything goes well, the present momentum in the elaboration of the NPS principles is maintained, and the remaining issues are successfully resolved, this new contribution to the progressive development of space law by the United Nations might be completed soon.

THE MOON AND MARS MISSIONS: CAN INTERNATIONAL LAW MEET THE CHALLENGE?+

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Introduction

A massive reevaluation is presently being made respecting the Moon and Mars Missions, both manned and unmanned. Since successful long-term human exploitation of celestial bodies requires advanced space stations, any plans dealing with the latter will materially impact on the former. The practical problems confronting the future of space stations, the shuttle, an aerospace plane, and the contemplated human presence on celestial bodies vastly exceed possibly relevant and unresolved legal issues.

Illustrative of divergent outlooks concerning a greater human presence in space are the January 1990 Report of the International Academy of Astronautics (IAA) Ad Hoc Committee, "Return to the Moon,"¹ the December 1990 conclusions of the Advisory Committee on the Future of the United States Space Program,² and the March 1991 position of the Space Studies Board of the National Research Council of the National Academy of Sciences.³ Of the eighty members of the IAA who responded to the Committee questionnaire, one-half agreed that an international institution "should plan and take steps towards realization of an International Lunar Base in the period from 1991 to 1995 with the International Space Year 1992 as a median."⁴ The respondents declared that a primary objective should be the establishment of a human settlement on the Moon so that human activities would be expanded in the solar system. Of the eighty respondents forty-five percent suggested that the first priority should be the establishment of a suitable infrastructure, followed by thirty-two percent favoring lunar sciences, and twenty-three percent supporting lunar manufacturing. When queried as to subjects on

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¹ 12 IAA Newsletter, p. 1 (Spring 1990). See also "The Case for an International Lunar Base," *1st Cosmic Study of the International Academy of Astronautics* (Paris, 1991).

² 54 Fed. Contracts Rep. 857 (Dec. 17, 1990); *Executive Summary*, 7 SPACEPOLY 173 (1991).

³ L.A. Times, March 21, 1991, at A20, col. 1.

⁴ *Supra* note 1

which the Academy should focus its future Cosmic Planning Studies, twelve of the eighty identified manned Mars exploration, while ten favored unmanned Mars exploration.⁵

On the other hand, the December 1990 U.S. Advisory Committee Report on the future of the United States space program placed emphasis on existing deficiencies and on practical obstacles facing much less visionary space activities.⁶ In questioning the future of the Shuttle Program, the Committee, which was chaired by Norman Augustine, Chairman and Chief Executive Officer of the Martin Marietta Corporation, concluded that NASA should focus on a program of heavy-lift rockets for space science missions. It accorded lower priorities to "space stations, aerospace planes, [and] manned missions to the planets"⁷

In February 1991 following the Augustine Report, President Bush issued a White House policy directive which, while seeking to encourage private firms to engage in commercial space activities without the governmental constraints of the past, determined that unmanned space objects would be accorded priority over manned launches.⁸ In keeping with this approach the proposed NASA FY92 budget calls for \$175 million dollars, to be matched equally by the Air Force, for the joint development of a new unmanned heavy lift-launch vehicle.⁹ It would be designed to place 150,000 pounds into low Earth orbit.

At about the time of the Augustine Report in December 1990, the United States and the Soviet Union, following ministerial talks between Secretary of State Baker and Foreign Minister Shevardnadze concluded that a permanent presence on the Moon might be a common objective of the two countries.¹⁰ However, their time frame was the 21st century.¹¹

The Augustine Report did not call for the elimination of space stations, as such, but rather, contemplated a much simplified version. Its suggested focus was to be on life sciences research.¹² While these events were unfolding, Congress cut six billion dollars from the station's budget

5 *Supra* note 1.

6 *Supra* note 2.

7 *Supra* note 2.

8 L.A. Times, Feb. 10, 1991 at A29 col. 5, 134 Av. WK. & SPACE TECH. 17 (No 7, Feb. 18, 1991).

9 29 AEROSPACE AMERICA 1 (March 1991).

10 U.S. Foreign Broadcast Information Service, Daily Report, Soviet Union, SOV-90-238, Dec. 11, 1990, p. 12; *Id.*, SOV-90-239, Dec. 12, 1990, p. 7.

11 Earlier, in April 1988, the two countries had arrived at an "Agreement for Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes." This called for a common approach to solar system exploration.

12 *Supra* note 2.

over the next five years.¹³ The FY 91 appropriations bill also directed that the station be built one stage at a time rather than all at once.¹⁴

These criticisms led NASA to a reevaluation of the space station. In 1990 it proposed a more modest project that would be reduced in terms of the size, in number of its personnel, and in the scope of its scientific inquiry.¹⁵ The March 1991 findings of the Space Studies Board reported that NASA's new design could not be justified on the basis of scientific accomplishments. The Board concluded that "neither the quantity nor the quality of the research that can be conducted on the proposed station merits the projected investment."¹⁶ This would mean, if the station were not to become a reality, that research would not go forward in scientific areas related to long-term human exploration or habitation of space nor could there be research pertaining to the weight-free conditions which must be resolved if there is to be a greater commercial use of space.

In March 1991, following a review of the conclusions of the Space Studies Board, the National Space Council announced plans to go forward with the revised space station. The treaty partners, according to NASA, have expressed their willingness to participate in the revised and more modest program.¹⁷

Since any hope of success for missions to the Moon and Mars must depend on adequate shuttle and space station operations, and since both of them have been questioned on financial and scientific grounds, it is probable that the proposed revised program must be employed if the basic project is to be implemented. One suggestion has been that scientific efforts should be continued in the area of microgravity automatic research.

¹³ This reduced NASA's forecast from \$21.5 billion to a proposal of \$15.754 billion for FY 92. Even so, this was an increase of almost \$1.9 billion over the preceding year. Of the total \$2.028 billion was identified for Space Station Freedom. J. Padrón, *NASA Seeks Modest Budget Increase*, 29 AEROSPACE AMERICA 16 (No. 4, April 1991).

¹⁴ Lerner, *Space Station Changes its Course*, 29 AEROSPACE AMERICA 12 (No. 1, Jan. 1991). The 1991 contrast with President Reagan's assessment in 1985 is seen in his words: "When it becomes operational in the early to mid-1990s, the space station will be a catalyst for expanding the peaceful uses of space for scientific, industrial, and commercial gain. The station will serve as a laboratory for materials processing and industrial and scientific research; as a permanent observatory for astronomy and Earth observation; as a storage and supply depot; and as a base from which to service other satellites or satellite clusters that will form the World's first space-based industrialized park." II Pub. PAPERS OF THE PRESIDENT OF THE UNITED STATES: RONALD REAGAN 93 (1988). Background is provided by the OFFICE OF TECHNOLOGY ASSESSMENT, *ACCESS TO SPACE: THE FUTURE OF U.S. TRANSPORTATION SYSTEMS* (1990); D.P. GUMP, *SPACE ENTERPRISE BEYOND NASA* (1990).

¹⁵ L.A. Times, March 21, 1991, at A1, col. 4.

¹⁶ L.A. Times, March 16, 1991, at A28, col. 2.

¹⁷ L.A. Times, March 21, 1991, at A20, col. 2.

where human crews are not required. However, the new plans call for a four person crew.¹⁸

Because of the linkage between shuttle, space station, and proposed missions to the Moon and Mars, the foregoing facts will materially affect plans for the 1983 Space Exploration Initiative (SEI) with its focus on Moon and Mars research.¹⁹ Further, since members of the European Space Agency, Canada, and Japan have already committed themselves to supply components for the originally proposed station, there will be new and important legal and political matters to be considered. Since all parties have invested heavily in the original design of the space station there will be a reluctance to cancel the project entirely.

From the foregoing it can be concluded that existing science and technology cannot efficiently and effectively provide an operational basis for successful space station operations. It should be added that demands remain strong in the United States to allocate federal funds to bail out its savings and loan institutions, for social security and medicare reform, to meet military costs occasioned by the Iraq invasion of Kuwait, and to confront legitimate concerns respecting America's educational productivity, deteriorating infrastructures, and the societal needs of the underclasses. While these illustrations apply principally in the United States, constraints of a similar kind and magnitude exist in many other advanced countries.

The contrast between the 1983 call for the Space Exploration Initiative and the 1990 IAA position on manned Moon and Mars facilities, compared with the current outlooks reflected in the White House, in Congress, in the Augustine Report, and in the findings of the Space Science Board, could not be starker. There is a present need to sort out the policy considerations which are generally supportive of this exploratory phase of the space program from financial and scientific capabilities. A less ambitious program seems to be forecast.

In light of these and other practical limitations, it is more than ever timely to examine the prospects for future space developments. As scientists and budgetary experts begin to think small, this may reduce the previously existing crisis mentality of some lawyers.

Let us suppose, that the foregoing scenario can be normalized so as to allow, over time, based in no small part on successes achieved in extended unmanned space operations, for human presences on space stations, on the Moon, and on Mars. The policy considerations favoring an immediate focus on unmanned activities would have general application to manned activities.

There are two primary considerations. First, there is the benefit to be derived from the acquisition of both scientific and material resources.

¹⁸ L.A. Times, March 21, 1991, at A20, col. 2.

¹⁹ Logsdon, *America's Future in Space*, Part 1, 5 SPACE POL'Y 267 (1989); Part 2, 6 SPACE POL'Y 182 (1990); Part 3, 7 SPACE POL'Y 90 (1991); Lerner, *Space Station Changes its Course*, 29 AEROSPACE AMERICA 12 (No. 1, Jan. 1991).

Secondly, there is the real but less tangible benefit to be derived from efforts leading to successful international cooperation, *per se*.

As to resources, these can also be efficiently used and conservation measures can be implemented. Multiple broadcast facilities, for example, can be placed on a single orbiting space object, thereby reducing the number of objects in orbital positions. Through the operation of a limited number of versatile multinational space stations, where unique national contributions can be stressed, it would be possible to reduce the number of objects in orbit and thus contribute to the prevention of collisions and the avoidance of potential contamination and debris. Where there has been a pooling of operational resources there can be a more broadly based sharing in the resulting benefits. If the cooperative base can be extended very widely, thereby making use of the unique contributions of the developing as well as advanced countries, new opportunities would be presented for the wider sharing of the space-derived benefits. In working out such arrangements, it would of course be necessary to arrive at clearcut understandings respecting such controversial matters as the multinational transfer of technology. Issues as to what may be allowed to be transferred, what could be retransferred or disclosed to a third party, and the conditions for compensation would have to be resolved. Special as well as general interests would have to be considered within the larger framework of cooperation. Such relations could lead to cooperative effects in other similar or dissimilar areas.

Legal Problems

This inquiry confronts the interrelated subjects of "challenge" and "international law." They need to be addressed in the context previously identified. Fortunately, as challenges mount law can accommodate to them.

Existing law, consisting of general principles, and more specific rules, is in place, although in some areas somewhat abstract and untested. There are practical reasons why greater precision and creative new approaches should accompany each other into the future. Outlooks of immediacy will influence the process which will include both international agreements and supplemental national legislation. Over time international customary law will become applicable.

Although much productive scholarly and practical attention has been given to the present subject, there are modifying perceptions and unresolved matters which require a thoughtful review.

It becomes necessary to inquire if present prospects for a more modest space station program would reduce the legal complexities associated with it. In responding to an orbiting station (however constituted) or to a station situated on a celestial body, either manned or unmanned, and if manned, composed of either national or international crews, one can ask if this presents problems that have not previously been considered. Are the legal issues now and in the future the same as in the past, except for more realistic structures, and when new missions or a series of new missions are taken into account?

In assessing this situation it must be acknowledged that considerable literature exists.²⁰ A review of such materials, when examined in the light of changed circumstances, can be helpful in providing guidance for the future. Moreover, some of the thought which had previously been addressed to longer-term perspectives, although having lost part of its immediate relevance, will still be of use in the future. Future legal norms will obviously be based on past achievements.

It is evident that there is an abundance of existing law applicable to space activity taking the form of space stations, either orbiting or situated on a celestial body. However, it must be kept in mind that rapid progress in space technology may produce uncertainties augmented by "a number of abstract, imprecise, insufficient and sometimes contradictory legal rules which are likely to be subject to genuinely differing legal interpretations."²¹ Even so, the five UN-based international space agreements and the law of the International Telecommunication Union (ITU)

²⁰ There has been a large number of articles on the legal aspects of the Moon and Mars missions in the Proceedings of the annual Colloquia on the Law of Outer Space. They include with the authors' names in parenthesis: 17 PROC. COLLOQ. L. OUTER SPACE (1975), (Christol, Doyle, Lewis, Kopal, Pikus, Sarkar, and Stoebner); 22 *id.* (1980), (Bourély, Christol, Dupas, and Nauges); 25 *id.* (1983), (Böckstiegel, DeSaussure and Haanappel, Fekete, Kamenetskaya, Rosenfield, Sloup, and Stewart); 27 *id.* (1985), (Böckstiegel, Bourély, DeSaussure, Estradé, Fasan, Goldman, Gorbil, Gorove, Kamenetskaya, Leaphart, Lederer, Marcoff, Nemes, Sloup, Toth, and Vassilevskaya); 28 *id.* (1986), (E. Galloway, and Ruder); 31 *id.* (1989), (Clayton, Diederiks-Verschoor, Schwetje, and Wirin); 32 *id.* (1990), (Sloup, Spradling, Zwaan and de Vries). Reference to additional sources can be found in the following publications: Bourély, *The Legal Hazards of Transatlantic Cooperation in Space*, 6 SPACE POL'Y 323 (1990); Christol, *Space Stations: A Lawyer's Point of View*, 4 INDIAN J. INT'L L. 488 (1964); DeSaussure, *The Impact of Manned Stations on the Law of Outer Space*, 21 SAN DIEGO L. REV. 985, (1984); Fasan, *Celestial Bodies and the Exploitative Use of Outer Space*, 12 ANNALS AIR & SPACE L. 227 (1987); Gore, *Outer Space, the Global Environment, and International Law into the Next Century*, 57 TENN. L. REV. 329 (1990); Lodico, *A Basis for Jurisdiction on the Space Station*, N.Y. INT'L L. REV. 4 (1989-90); Lessard, *Un pas géant pour l'humanité: aspects juridiques d'un accord pour l'établissement d'une base lunaire*, 14 ANNALS AIR & SPACE L. 377 (1989); March, *Authority of the Space Station Commander: The Need for Delegation*, 6 GLENDALE L. REV. 73, (1984); Matte, *L'ère des stations spatiales: Coopération internationale et implications juridiques*, 13 ANNALS AIR & SPACE L. 279 (1988); McCord, *Responding to the Space Station Agreement: The Extension of U.S. Law into Space*, 77 GEO. L. J. 1938 (1989); Reynolds, *Space Law in the 1990's: An Agenda for Research*, 31 JURIMETRICS J. 1 (1990). See also the Annual Reports of COPUOS and its two Subcommittees; SPACE STATIONS: LEGAL ASPECTS OF SCIENTIFIC AND COMMERCIAL USE IN A FRAMEWORK OF TRANSATLANTIC COOPERATION, 5 STUDIES IN AIR AND SPACE LAW (K.-H. Böckstiegel ed. 1985) NATIONAL COMMISSION ON SPACE, PIONEERING THE SPACE FRONTIER (1986); OFFICE OF TECHNOLOGY ASSESSMENT, SPACE STATIONS AND THE LAW: SELECTED LEGAL ISSUES (1986); A.J. YOUNG, LAW AND POLICY IN THE SPACE STATIONS ERA (1989).

²¹ Nauges, *Legal Aspects of Large Systems in Space: Problems and Prospects*, 25 PROC. COLLOQ. L. OUTER SPACE 269 (1980).

provide a sound and essential basis for understanding rights and duties relating to space stations and missions to the Moon and to Mars.

On the other hand the 1988 quadripartite international agreements between the United States, the members of ESA, Japan, Canada, relating to the construction of the International Space Station have produced some very serious legal problems.²² In the light of the U.S. constitutional principles funding problems, caused by the U.S. Congress and the limited authority of NASA, the treaty partners of the United States have considered that the United States has not fully implemented its promises. This has been summed up by M. Bourély, who has concluded that "the agreements concerning cooperation in space activities between Europe and the USA are not satisfactory."²³ If the basic project is to succeed, fundamental changes will have to be undertaken.²⁴

Since the utility of law can be measured in large part by its certainty there is always a possibility that a formal international agreement could address one or more of the problems likely to arise on board manned space stations. As early as 1979 Bourély called for a United Nations initiative leading to an agreement "laying down rules for manned international spaceflights applicable to all states."²⁵

Before examining those situations where new formal agreements would provide rules and procedures governing space-station operations, it will be necessary to refer to the existing principles and rules which beneficially serve the mutual interests of States, international intergovernmental organizations, and private firms in this field of endeavor. It is not surprising in the light of the very rapid evolution of space law, both international and municipal, that there are a myriad of current and relevant legal prescriptions.

In urging the applicability of existing international space law to long-distance and long-duration space exploration, use, and exploitation, commentators have referred to both general and more specific principles and rules. For example, Marcoff has referred to the "general interests"

²² For a text of the *Agreement on Cooperation in the Detailed Design, Development, Operation, and Utilization of the Permanently Manned Civil Space Station*, signed on September 29, 1988, see III UNITED STATES SPACE LAW - NATIONAL AND INTERNATIONAL REGULATION, sec. 22 (S. Gorove ed. 1989).

²³ Bourély, *The Legal Hazards of Transatlantic Cooperation in Space*, 6 SPACE POL'Y 331 (1990); Compare, Barnes, *Treaties Are Not the Answer*, 7 SPACE POL'Y 167 (1991); Schwetje, *The Legal Regime of the U.S. Space Station*, 31 PROC. COLLOQ. L. OUTER SPACE 179 (1989).

²⁴ Logsdon, *International Cooperation in the Space Station Programme*, 7 SPACE POL'Y 35 (1991).

²⁵ Bourély, *Towards a Convention on the Legal Status of Manned International Space Flights*, 22 PROC. COLLOQ. L. OUTER SPACE 59 (1980).

provision in Article 1 of the 1967 treaty.²⁶ He recognized that this principle "keeps its full binding force under present international law. It applies integrally to the issues of the international legal status of all space objects, including all kinds of permanent space stations, interplanetary platforms and large space structures for industrial and commercial use."²⁷

Other scholars have been more content to list those more specific and well-established principles and rules which they consider applicable to such activities. One of the more comprehensive listings has been compiled by Rudev. He refers to the areas where a space object may lawfully orbit, the relevance of the peaceful purposes principle, the *res communis* principle, disaster assistance and rescue operations, quarantine, manufacture, intellectual property, noninterference with communications, solar power, jurisdictional matters, including the right of one country to have access to a foreign space object or space station in either normal or emergency situations, and the utilization of transportation systems.²⁸

Other experts have noted the applicability of existing principles and rules dealing with individuals in space, safety considerations applicable to them, the avoidance of collisions, debris and pollution, the use of nuclear power sources, the protection to be accorded to a space object while in the orbit of its choice, the applicability of the Common Heritage of Mankind principle to the natural resources of the Moon and other celestial bodies, and the contrast between the *res communis* principle and that of the Common Heritage of Mankind. Other areas regarded to be applicable include registration problems, low-altitude orbits over foreign countries, conflict resolution including the availability of officially sanctioned fact-finding processes, problems arising from living and working in space, on-board discipline, torts, criminal conduct, intellectual property, contracts, choice of law issues, including determining the applicable law relating to civil law situations, the problem of identifying which country is the launching country, tax problems relating to imports and transfers between modules of different nationalities, and other relevant matters. Even this long, and incomplete identification of subjects, deemed relevant by earlier commentators,²⁹ indicates the nonseverability of the international and municipal ramifications of both space station activity as well as long distance and long duration space ventures. It also demonstrates that such activities and ventures, together with the application of law to them, possess a global quality.

²⁶ Marcoff, *The International Legal Status of Large Space Structures and the 'General Interests' Principle*, 27 PROC. COLLOQ. L. OUTER SPACE 264 (1985).

²⁷ *Id.*

²⁸ Rudev, *Manned Orbital Stations: Technico-Legal Aspects*, 28 PROC. COLLOQ. L. OUTER SPACE 281 (1986). He also refers to the possibility that, with the development of the capacity to acquire solar power, devices may become available to provide special illumination for agricultural crops being produced on Earth.

²⁹ For a list of the relevant literature, see *supra* note 20.

The relevance of the foregoing is seen in the terms of the multipartite agreement entitled "Agreement on Cooperation in the Detailed Design, Development, Operation, and Utilization of the Permanently Manned Civil Space Station" signed on September 29, 1988.³⁰ Standard subjects dealt with in the agreement, especially Articles 5 through 27, were registration, jurisdiction and control, restraint on transfers of ownership of equipment on a space station, user elements and resources derived from the infrastructure, cross-waiver of liability, third party liability, customs and immigration, exchanges of data and goods, treatment of data and goods in transit, choice of law for intellectual property (State of registry), criminal jurisdiction including a code of conduct, and dispute resolution. The agreement also stipulated when it would enter into force, methods for amendment, and the right of withdrawal.

Two subjects which have been widely considered were not dealt with, namely, taxation and tortious conduct. In the important matter of jurisdiction the concept of territoriality was accepted, namely, each contracting party, referred to in the agreement as a "partner," was granted control over the elements which it provided. To shore up this determination each country was authorized to register, pursuant to the UN Registration Convention, the elements provided by it.³¹

While the terms of the 1988 and 1989 agreements cannot be referred to as general international law because of their contractual nature and the limited number of partners, they suggest relevant norms which will be considered by all States engaging in extended space activities. Further, while they do not address themselves to all of the issues listed above, they do nonetheless, deal with those problems having key importance to long-distance and long-duration space activities. Additionally, the terms of these agreements fall within the legal prescriptions contained in the five basic UN international space agreements.

A substantial amount of law, both international and municipal, is presently available for application to space stations and missions to the Moon and Mars. Undoubtedly it will be desirable to concentrate existing law on such efforts by unifying and formalizing the most relevant principles and rules so that a clearly identifiable legal regime will serve as an encouragement to such activities. In order to further this goal, it will be advisable for governmental space lawyers to place high on their several agendas an exchange of ideas between their respective governments. In light of differing perceptions as to priorities and urgencies, an early establishment of common goals is essential.

³⁰ *Supra* note 22. The parties are the United States, Canada, Japan, and the members of the European Space Agency. This agreement was accompanied by Memorandums of Understanding between NASA and ESA, Sept. 29, 1988 and NASA and Canada and Japan, March 14, 1989. *Id.* at secs. 22(a),(b),(c).

³¹ Schwetje, *supra* note 23, at 182-188; Spradling, *National Security Uses of the International Space Station*, 32 PROC. COLLOQ. L. OUTER SPACE 410 (1990). See also, Shin, *Multinational Space Stations and Choice of Law*, 78 CAL. L. REV. at 1375 (1990).

As this process goes forward the previously identified subjects will have to be considered. Additionally, it is suggested that attention be given to the following: (1) the acquisition of solar power, including safety considerations, for use on orbiting space stations, on fixed stations situated on a celestial body, and also its use for the illumination of the Earth; (2) the formation of rules making it clear that persons on space objects, including space stations, as well as on a celestial body, enjoy all of the rights and duties presently accorded to astronauts in international agreements and pursuant to national laws; (3) the identification of security zones around space objects; (4) the creation of rules designed to facilitate traffic control for space objects and for transportation systems going to and returning from such objects; (5) a further clarification of the circumstances under which nuclear power sources can be employed on space objects and on celestial bodies; (6) an understanding of the term "celestial body," and a determination of the legal regime or regimes applicable to such an entity; and (7) the creation of principles and rules establishing the rights and duties of launching States when they abandon inoperable space objects, including space stations in orbit or on celestial bodies.

Definitional problems may also arise in national statutes. For example, in the United States there has been some speculation as to whether the 1981 "Special Maritime and Territorial Jurisdiction"³² statute which extends federal criminal law to events on space vehicles also applies to multinational space stations. In planning for such litigation, it will be necessary to determine if federal criminal laws of general applicability on Earth will be well-suited to events occurring on space stations inhabited by individuals of varying nationalities.

As an appropriate legal regime emerges for space stations and missions to the Moon and Mars, there will be a blending of existing laws with those designed particularly for new explorations, exploitations, and uses. This law must meet the critical test of protecting those humans who engage in long-distance and long-duration pursuits, although there will be unmanned elements. When this effort is coupled with multinational participation it becomes evident that it is a complex matter. The complexity is enhanced by the fact that such endeavors will call into play the presence of international intergovernmental organizations and private firms. Especially in the area of liability for damage, the involvement of such participants augments the need for acceptable and understandable legal precepts.

The need to address the content of the applicable legal regime at an early moment is demonstrated by the long time consumed in the negotiation of the 1967-1979 UN space agreements, the more recent Inter-Solar Polar Mission ("Ulysses") agreements, the problems which have arisen respecting the space station, and the Moon-Mars missions.³³

³³ For texts of the U.N. space agreements, see *op. cit. supra* note 22.

It is the function of most international agreements to create and formulate commitments binding on the parties. However, few of these are self-executing. Frequently, a considerable time elapses between the initial agreement and its entry into force following ratification. Only following this event does it become incumbent on a party to enact implementing national legislation. Such statutes are the source for the rights and duties of those individuals who engage in space missions. These statutes are of critical importance to those engaged in manned space station activities.

Resulting from both the original hope that human benefits would result from space activities, and from highly pragmatic considerations, the exploration, exploitation, and use of space, the Moon, and celestial bodies and their natural resources has become a matter of global interest and concern. Globalization is a concept understood by both advanced and developing countries. These considerations led President Reagan in his speech of January 25, 1984, in calling for a "permanently manned space station" within a decade, to state that "We want our friends to help us meet these challenges and share in the benefits."³⁴

Sharing in the benefits will require the use of a governing structure. The nature of the structure will measurably affect the manner and extent to which sharing will take place.

Two quite different approaches are possible. One, referred to as the corporate model, allows participants to invest with the expectation that the most favorably situated countries will invest larger sums than the developing countries. Benefits will be distributed on the basis of investment. INTELSAT represents this model.

The second, or administrative, model consists of all interested countries each having an equal vote and without the restrictions on sharing contemplated in the corporate approach. INMARSAT follows this design. According to Marcoff its program has demonstrated that "cooperation on a global level, management and sharing of profits in accordance with the 'general interest' [Article 1 of the 1967 Principles Treaty] principle is feasible and can be beneficial to all countries."³⁵

In each situation the availability of benefits will depend on the management skills brought to the entire exploration, exploitation, and use process. Until recently, there has been a shortage of experienced managers able to relate effectively to the cooperative requirements of large scale space activities. If success is to come to space station and Moon and Mars activities, there will have to be much preparation of the needed multinational team.

Highly imaginative approaches will be essential in order to properly select from among existing legal principles and rules those to be applied to long-duration and long-distance human voyages into space and

³⁴ I PUBLIC PAPERS OF THE PRESIDENT OF THE UNITED STATES: RONALD REAGAN 90 (1986).

³⁵ *Supra*, note 26, at 268.

onto celestial bodies. These will have to be shaped to the present situation. In any event, they will be supplemented by new ones as the occasion requires. An early need to identify the most relevant principles and rules relating to the critical issue of jurisdiction falls within this area of creativity.

Access to a foreign spacecraft is a case in point. A space object may be somewhat likened to a human being. It can be alive and engaged in many productive activities "during [its] orbital life."³⁶ On the other hand, its orbital life, in the sense of the constructive activities it was designed to accomplish, may have become terminated by choice or by an accident. In either event, it is not performing its intended function. In these two opposing situations the State of registry may hold different opinions respecting access by a foreign government. Security concerns may exist. Perhaps the space object has reached such a nonfunctional condition that it may be perceived to be debris, even though it retains the same form that it possessed following a successful launch. May a country fearing that the object poses a serious threat to it take, on its independent initiative, protective measures? Or, if unilateral protective action can be justified, would this, nonetheless, depend on a prior agreement and advance notice? Existing space law does not specifically address itself to the rights of the State which seeks to protect itself from such hazards.³⁷

Security in a larger sense involves the various measures, including military activity, available to States to protect their territorial integrity and continued independence. In a smaller sense, it includes the protection of classified materials which compose elements of space stations. Clearances and procedures for obtaining access are essential elements for successful joint operations.

Conclusion

It is evident that there is an inextricable relationship between the use of the space shuttle, the aerospace plane, the space station, and an understanding of the Moon and Mars. These related matters present global issues. Success in dealing with them will require very serious and substantial commitments to international cooperation.

Even with a scaled-down approach to operational space stations, there will be ongoing involvements in science and technology, commercial undertakings, and the need for appropriate defense policies. Demilitarization of facilities and activities should be considered. It is expected that practical operations will enlist the combined efforts of

³⁶ Rudev, *supra*, note 28, at 283.

³⁷ Christol, *Environmental Aspects of Activities in Outer Space - Suggestions for Legal Measures and Instruments for Dealing with Debris*, in: 9 STUDIES IN AIR AND SPACE LAW 257 (K.H. Bøockstiegel ed. 1990). This refers to but one aspect of security against space hazards.

governments, international governmental organizations, and private firms. The latter may be called upon to play a larger role than in the past.

From the legal point of view the most critical issue will be to establish the appropriate areas of jurisdiction for the several actors. It is to be expected that such determinations will be the product of international agreements. Every effort should be made to use standardized terminology. Defined terms should be employed where practical. Once they are formulated, there will be a need for cooperating governments to adopt national legislation implementing the international norms. Uniformity in such prescriptions will be desirable although different national interests and values may treat such issues separately and differently. For example, different countries may hold unique views on patents, taxation, and what constitutes tortious conduct.

Critical matters, including that of jurisdiction, have been disposed of to a large extent in existing international legal norms. Reliance should be placed on the principles and rules set out in the five UN based space agreements, the ITU conventions, WARC agreements, and on the provisions of the 1988 quadripartite space station agreement.³⁸ These offer assurance that there are no intractable legal problems which would impede long-distance and long-duration space ventures, manned or unmanned.

Admittedly, because of the nature of the projected efforts, there may be special problems. To the extent that these can be imagined before the practical operations begin, they should be addressed and resolved. As experience is gained after the practical efforts have been initiated, there will be a need for modifications. Especially if Earth-bound laws are overly relied upon, there may be a need for appropriate corrections. In any event, as previously suggested, a major function of the law is to afford a high measure of certainty and stability.

Since there will be many national concerns as to the content of an acceptable legal regime, it is highly desirable that governments give early attention to the law and laws for a new era of outer space and celestial body activity. This is particularly required since it is a notorious fact that much time is required to obtain the necessary accommodations to perceived wants and needs.

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For texts of these agreements, see *op. cit. supra* note 22.