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THE LEGAL FRAMEWORK OF THE SPACELAB/ SPACE SHUTTLE PROGRAMS IN COMPARISON WITH THE APOLLO/SOYUZ TEST PROGRAM

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The first international space rendezvous and the handshake between cosmonaut Leonov and astronaut Stafford on July 17, 1975, before the eyes of millions of television viewers will go down in the history of space travel as an event of prime importance. This joint venture between the United States and the USSR marks the end of a long competition that started 18 years ago with the first steps towards the conquest of space. It opened, we hope, an era of cooperation between the two great space powers. The joint Apollo/Soyuz flight also opened the way to other manned flight programs developed by several countries in cooperation. It will lead, no doubt, in the very long term, to the realization of a dream cherished by scientists and writers: the space station.

The exceptional nature of the Apollo/Soyuz rendezvous is not due to the simple fact that it was the fruit of international cooperation because the developments that it has led to are now legion, whether we are thinking in terms of materials or experiments. Nor is it due to the fact that such cooperation brought together former rivals, for apart from the political value to each of the two countries concerned, this rendezvous will not, for the moment at least, be followed by other similar enterprises. Nor again is it because this rendezvous in fact represents the peak of two independently conducted programs, one of which, at least, will have no follow-up.

What is striking about the success of the Apollo/Soyuz rendezvous is primarily the demonstration of the fact that it is possible for States to embark on an equal footing on a space enterprise with a view to achieving a common goal by individual methods.

Those countries of Western Europe which for almost 15 years have been engaged in scientific and technical cooperation in space and which have managed to overcome many difficulties can fully appreciate this aspect of things. Above all, this can but encourage them to develop their mutual cooperation at a time when they are developing a space laboratory program in conjunction with the United States Space Shuttle program, which, like the Apollo/Soyuz flight, falls into the category of manned flights.

It appears opportune, therefore, to examine this venture from the legal angle. Firstly, the conditions under which the joint experiment Apollo/Soyuz flight was carried out and, secondly, the framework relevant to the European space laboratory program (Spacelab) and its relations with the American Space Shuttle program. A comparison between the two enterprises will enable us to identify the resemblances and, above all, the differences. As a conclusion we shall then be able to see how the two examples enable us to prepare at this stage the rules that will need to be defined when the era of manned international orbital stations arrives.

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I. THE LEGAL REGIMES

A study of the respective legal regimes of the Apollo/Soyuz test program and the Spacelab/Space Shuttle program brings out the contrast between the general and deliberately limited nature of one regime and the detailed provisions of the other.

A. Apollo/Soyuz

The legal basis of the Apollo/Soyuz program is found in the space agreement signed in Moscow by President Nixon and Mr. Kosygin on May 24, 1972, the exact title of which is "Agreement between the United States of America and the Union of Soviet Socialist Republics concerning Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes."[1] In its preamble, this agreement itself refers to another agreement on "Exchanges and Cooperation in Scientific, Technical, Educational, Cultural and Other Fields," signed on April 11, 1972, which formed part of a series of measures designed to give concrete form to the desire for detente on the part of the two then Heads of State.

The Agreement of May 24, 1972, had itself stemmed from discussions starting in 1969 between NASA and the USSR Academy of Sciences on the possibility of cooperation in space science and applications. Hence this agreement, after asserting the parties' desire to cooperate in this field, first makes reference to the General Agreement of April 11, 1972, mentioned above, and then to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies,[2] as well as the Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space.[3]

The Agreement of May 24, 1972, then lisls three particular opportunities for cooperation: space meteorology (Arts. 1 and 2), the space rendezvous (Art. 3), and international space law (Art. 4); at the same time, it provides an opportunity for other joint action (Art. 5).

As regards the space rendezvous, the text of Article 3 states that

> The Parties have agreed to carry out projects for developing compatible rendezvous and docking systems of United States and Soviet spacecraft and stations in order to enhance the safety of manned flight in space and to provide the opportunity for conducting joint scientific experiments in the future.

[1] T.I.A.S. No. 7347. For texts, see also U.S. Senate Comm. on Aeronautical and Space Sciences, Hearings on Space Agreements with the Soviet Union, 92d Cong. 2d. Sess. 41-2 (Comm. Print, June 23, 1972); 2 J. Space L. 136-138 (1974).

[2] 18 U.S.T. 2410, T.I.A.S. No. 6347 (hereinafter referred to as the "Outer Space Treaty").

[3] 19 U.S.T. 7570, T.I.A.S. No. 6599 (hereinafter referred to as the "Rescue and Return Agreement").

The general aim of the cooperation is therefore to contribute, on the one hand, to the safety of manned flights in space—hence the reference in the agreement to the recovery of astronauts—and, on the other hand, to conduct certain subsequent scientific experiments—a reference to future space stations.

Moving on to the actual implementation of the project, Article 3 continues:

> It is planned that the first experimental flight to test the systems be conducted during 1975, envisaging the docking of the United States Apollo-type spacecraft and the Soviet Soyuz-type spacecraft with the visits of astronauts in each other's spacecraft.

As regards the implementation of this project, Article 3 lays down that it will be carried out "on the basis of principles and procedures which will be developed in accordance with the Summary of Results of the Meeting Between Representatives of the U.S. National Aeronautics and Space Administration and the U.S.S.R. Academy of Sciences..."

Because this document—which is merely a Summary of Results of a Meeting[4]—is mentioned in the agreement, it assumes the legal value of a protocol implementing the latter. It refers to four documents prepared by the United States:

Proposed organizational plan for the Apollo/Soyuz Test Mission,

Apollo/Soyuz Test Mission considerations (brief summary of above plan),

A project technical proposal document,

A project schedule document.

These documents were accepted as the basis for the development of documents prepared jointly at later meetings.

The Summary of Results specifically lists some of the principles on which both sides were able to agree, namely:

(a) For the preparatory (pre-launch) period—

1. Regular and direct contact will be provided through communication links and visits as required;

[4]For Summary of Results of a Meeting Between Representatives of the U.S. National Aeronautics and space Administration (NASA) and the U.S.S.R. Academy of Sciences (the Academy) on the Question of Developing Compatible Systems for the Rendezvous and Docking of Manned Spacecraft and Space Stations of the U.S.A. and the U.S.S.R., dated April 6, 1972, see U.S. Senate Comm. on Aeronautical and Space Sciences, Hearing on Space Agreements with the Soviet Union, 92d Cong., 2d Sess. 58-60 (Comm. Print, June 23, 1972); for text, see also 2 J. Space L. 133-6 (1976).

2. A complete project schedule will be developed and commitments will be made on both sides to meet the schedule;

3. Arrangements will be made for necessary contact and understanding between the specialists;

4. A comprehensive test, qualification and simulation program will be developed;

5. A sufficient level of familiarization and training with the other country's vehicle must be defined and provided for safety-in-flight assurance;

6. Prior agreement on the technical aspects of the mission;

7. Participation of responsible persons in the flight operations.

(b) For the mission operation—

1. Flight control will be carried out by each country for its spacecraft, with sufficient communication channels to ensure proper coordination;

2. Decisions concerning questions affecting joint elements of the flight program will be made after consultation with the control center of the other country;

3. Joint elements of the flight will be conducted according to coordinated and approved mission documentation, including contingency plans;

4. In the conduct of the flight, pre-planned exchanges of technical information will be performed on a scheduled basis;

5. The host country control center or host country spacecraft commander will have primary responsibility for deciding the appropriate pre-planned contingency course of action;

6. In situations requiring immediate response or when out of contact with ground personnel, the decision will be taken by the commander of the host ship according to the pre-planned contingency course of action;

7. Any television downlink will be immediately transmitted to the other country's control center. The capability to listen to the voice communications between the vehicles and the ground will be available to the other country's control center on a pre-planned basis and, upon joint consent, as further required or deemed desirable;

8. Both sides will continue to consider techniques for providing mutual information to the two control centers—including the exchange of representatives;

9. The two flight crews should be trained in the other country's language well enough to understand it and act in response as appropriate to establish voice communications regarding normal and contingency courses of action;

10. A public information plan will be developed which takes into account the obligations and practices of both sides.

It was on the basis of these principles that the United States and the U.S.S.R. prepared and carried out the space rendezvous in July 1975. As can be seen, the legal basis of the program—*i.e.* Article 3 of the Agreement of May 24, 1972 and the Summary of Results of a Meeting on April 6, 1972—was more a declaration of intent, accompanied by a definition of the procedures to be followed, then a precise statement of mutual rights and obligations. However, it does not appear that this was prejudicial to the preparation and execution of the program, which was preceded by a long and detailed period of technical work. It will be noted that in accordance with Article 3 of the agreement, the 1975 test rendezvous was, in principle, the first of a series. However, no subsequent project has for the moment been announced. Moreover, the United States has decided to end the Apollo program, whereas the U.S.S.R. is continuing its Soyuz program. Thus, any other U.S.—Soviet rendezvous program would need to be covered by a new agreement, or at lease a possible extension to the Agreement of July 24, 1972, with the reservation that the latter expiring at the end of five years would then be extended. These two possibilities are expressly provided for in Articles 5 and 6 of the agreement itself.

B. **Spacelab/Space Shuttle**

The decision by the European countries to develop Spacelab, which is one of the elements in the American Space Shuttle Program, results from lengthy discussions going back to the time when the United States was studying the definition and content of the post-Apollo program.

The idea of associating other countries was favorably received by both the U.S. Government and N.A.S.A. and in 1969 the latter officially proposed to the European countries then grouped under the European Space Conference that they should cooperate with the United States in the development of the new space transport system which was envisaged.

After a long period of joint studies, and after the European countries had overcome their own political and institutional problems[5] the European Space Conference decided on December 20, 1972, to accept the United States' offer of participation in the post-

[5]See Bourély, Le Nouveau Programme Spatial Européen, 28 Revue Francaise de Droit Aérien 11 (1974).

Apollo program and to entrust this action to the European Space Research Organization (ESRO), which subsequently was re-named the European Space Agency (ESA).[6]

The legal edifice set up on that occasion is somewhat complex as a result of the situation prevailing on the European side. ESRO, the organization that the countries had set up to conduct space activities on their behalf, had a program confined to scientific research only, and it was necessary for the Members States desirous of participating in other programs to conclude amongst themselves in each case a special agreement giving the Organization responsibility for its execution. For the same reason, ESRO was unable to conclude on its own, in such a case, an agreement with non-member States.[7]

Consequently, the Spacelab/Space Shuttle program gave rise to three separate agreements.[8]

(1) an Arrangement between certain Member States of the Agency and the Agency,[9]

(2) an Agreement between the Government of the United States and certain Member Governments of the Agency,[10]

(3) a Memorandum of Understanding between N.A.S.A. and the Agency.[11]

1.

The Arrangement between certain Member States of the Agency and the Agency

[6]ESRO, which was set up by a Convention signed in Paris on June 14, 1962, is composed of the ten following countries: Belgium, Denmark, Federal Republic of Germany, France, Italy, Netherlands, Spain, Sweden, Switzerland, and United Kingdom of Great Britain and Northern Ireland. Following the signature in Paris on May 30, 1975 of the Convention establishing a European Space Agency (ESA), ESRO constitutes the "de facto" prefiguration of this Agency and pursues its activities under the name of ESA.

[7]When the convention establishing ESA is in force, the legal situation will be simplified by the fact that it will be possible for member States to agree, within the framework of the Agency itself, to have optional programs carried out by the Agency. See M. Bourély; The Legal Framework of European Cooperation in the Execution of Space Application Programs, Proc. 18th Colloquium on the Law of Outer Space 58 (1976).

[8]The various agreements relating to Spacelab refer to ESRO but, for the purpose of this discussion we shall refer to it by its new name.

[9]The Arrangement of February 15, 1973 between certain Member States of the Agency and the Agency concerning the Execution of the Spacelab Program was signed by nine of the ten Member States. Sweden was not a signatory, but Austria, which is not a Member State of the Agency has subsequently acceded to the Arrangement.

[10]For texts, see U.S. Senate Comm. on Aeronautical and Space Sciences, Hearings on Space Missions, Payloads, and Traffic for the Space Shuttle Era, pt. 1, 93d Cong., 1st Sess. 121-134 (Oct. 30, 1973); 2 J. Space L. 53 (1974).

[11]For text, see 2 J. Space L. 40 (1974).

concerning the execution of the Spacelab program is the first text in chronological order.

In accordance with Article 1 of the Arrangement, "the participants...shall undertake in close cooperation with the United States authorities a program having as its objective the definition, design, development and construction of the Spacelab as a technically integrated part of the United States shuttle and orbital system and Europe's contribution to the post-Apollo program with which it is to be used."

The objectives and elements of the program form the subject of Annex A. The objectives are described as follows:

The Spacelab program includes the definition, design, development and construction of mannable pressurized laboratory modules and unpressurized instrument platforms (pallets) suitable for conducting research and application activities on shuttle sortie missions. The laboratory module and the pallet, either separately or together, will be transported to and from earth orbit in the shuttle payload bay and will be attached to and supported by the shuttle orbiter stage throughout the mission. The laboratory module will be characterized by a pressurized (shirt-sleeve) environment, a versatile capability for accommodating laboratory and observatory equipment at minimum cost to users, rapid access for users, and minimum interference with shuttle orbiter ground turnaround operations. The pallet, supporting telescopes, antennas, and other instruments and equipment requiring direct space exposure, will normally be attached to the laboratory module with its experiments remotely operated from the laboratory module, but can also be attached directly to the shuttle orbiter and operated from the orbiter cabin. Additional descriptive material of the concept will be included in the Preliminary Project Plan drawn up jointly with N.A.S.A.

In view of the fact that the project definition phase had been started before the signature of the Arrangement, Annex A stipulates that the program itself will include the continuation of this phase up to the selection of the prime contractor[12], then a design, development and construction phase terminating with the delivery to N.A.S.A. of a Spacelab flight unit, Spacelab functional mock-up and two series of Spacelab ground support equipment, possibly together with the necessary spares and relevant documentation.

Finally, Annex A includes a timetable showing the first Spacelab flight to be planned for 1980.

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[12]The main contract was awarded on June 5, 1974 to a European consortium led by VFW Fokker/ERNO, in which the distribution of tasks was as follows:

SPACELAB INDUSTRIAL CONTRACTOR TEAM: Under ESA management and technical direction, prime contractor: VFW Fokker/ERNO (Germany) project management, system engineering, integration and testing. Co-contractors: AERITALIA (Italy) module structure and therman control MATRA (France) command and data management, AEG TELEFUNKEN (Germany) electrical power distribution DORNIER (Germany) environmental control, HSD (U.K.) pallet structure, BELL (Belgium) electrical ground support equipment, INTA (Spain) mechanical ground support equipment, FOKKER-VFE (NL) airlock, SABCA(Belgium) utility bridge, KAM SAX (Denmark) computer software.

As regards the financial provisions, Article 5 contains an estimate of an envelope of 308 million accounting units (AU) at mid-1973 prices.[13] Details of the cost of the program are given in Annex B, which also contains the scale of contributions for the beginning of the program.[14] It is understood (Arts. 5 and 6 of the Arrangement) that this envelope and scale may be revised before the end of the definition phase.[15]

In accordance with the general principles adopted for the execution of the Agency's optional programs, a Program Board consisting of representatives of the participants is established under Article 4 of the Arrangement with responsibility for all decisions relating to the Spacelab program.

In addition, under Article 3.3 of the Arrangement it is stated that the Agency shall set up a structure for cooperation and coordination with N.A.S.A. in order to ensure close integration of the spacelab project with the other elements of the shuttle and orbital system—particularly with the development of the space shuttle. In addition, European scientific and technical users will be associated with the work of the Agency and N.A.S.A.

No useful purpose is served by analyzing the remaining provisions of the Arrangement, which are mainly concerned with the rights and obligations of the participants with respect to intellectual property rights and access to technical information (Art. 7), the placing of the contracts (Art. 8), and the compensation for damage (Art. 11). On the other hand, mention may be made of Article 9.1, according to which the Agency, "acting on behalf of the participants, shall be the owner of the Spacelab elements developed under the program, as well as of the facilities and equipment acquired for its execution."

For all the other matters connected with relationships with the United States

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[13]Mid-1975: 1 AU = U.S. $1.27.

[14]The scale is as follows:

States	Scale of contributions
Federal Republic of Germany	52.55
Belgium	4.20
Spain	2.80
France	10.00
Netherlands	2.00
United Kingdom	6.30
Switzerland	1.00
Italy and Other States	21.15
Total	100.00

[15]The Austrian contribution amounts to 0.8%. The envelope and scale of contributions were not revised at the time of moving through the subsequent phases.

Government and N.A.S.A., the Arrangement refers to the two other agreements concluded with them.

2.

The Agreement between the Government of the United States of America and certain Governments, Members of the Agency, for a Cooperative Program Concerning the Development, Procurement and Use of a Space Laboratory in conjunction with the Space Shuttle System was signed on August 14, 1973.[16] Its preamble refers to the fact that the countries involved were already engaged in considerable cooperation in the space field and to their desire to extend and expand such cooperation. The Agreement falls within the framework of the United States post-Apollo program and refers specifically to the development by the European partners of a space laboratory (SL) essential for the full exploitation of the space shuttle potential.

Article 1 of the Agreement describes as follows its purposes and objectives:

"The Government of the United States of America and the European partners shall engage in a cooperative program concerning an integrated space transportation and orbital system to provide for

1. design, development, manufacture and delivery of the first flight unit of the SL as an element to be integrated with the space shuttle;

2. the use of the space shuttle and SL systems for peaceful purposes;

3. the production and procurement of additional SLs;

4. appropriate exchanges and interaction in the development and use of the space shuttle and SL systems;

5. consideration of the timely expansion and extension of this cooperation as their mutual interest warrants."

Article 2 gives as follows the general description of the Space Shuttle and SL Programs:

"A. The Space Shuttle Program refers essentially to the defination, design and development of a space shuttle which will: serve in missions to deliver payloads to earth orbit; maintain station on orbit for mission durations in the order of 7 days or more; provide safety monitoring and control of the payload element throughout missions; and provide seating and complete habitability for crews, including free movement between the shuttle and SL.

[16]The European States that are parties to the Agreement are the same as those which signed the Arrangement, see note 9 above. For text of the Agreement, see note 10 above.

B. The SL Program provides for the definition, design, development and procurement of mannable laboratory modules and unpressurized instrument platforms (pallets) attached to and integral with the shuttle and suitable for conducting research and applications activities on the shuttle sortie missions."

After stating in Article 3 that N.A.S.A. and E.S.R.O. (now called the Agency) are respectively designated by the Parties to implement the cooperative program, the Agreement defines the respective obligations of the Parties.

The obligations of the European partners are set out as follows in Article 4:

"As their part of the cooperative program, the European Partners shall have among their obligations the following:

1. to design, develop, manufacture and deliver an SL and associated equipment according to mutually agreed specifications and time schedule;

2. to establish the necessary means and infrastructure in Europe in order to ensure the possibility of the procurement at reasonable prices by the government of the United States of America of additional such SLs, components and spares as the Government of the United States of America may need;

3. to ensure the availability of a sustaining engineering capability for the SL to meet the mission operating requirements of the Government of the United States of America; and

4. to provide for the necessary contingency arrangements to enable the production in the United States of SLs, components and spares in the event that the European Partners fail to complete the first SL or to produce subsequent SLs for procurement by the Government of the United States of America in accordance with agreed specifications and schedules at reasonable prices."

The obligations of the United States Government are set out as follows in Article 5:

"As its part of the cooperative program the Government of the United States of America shall have among its obligations the following:

1. to provide relevant information and advice;

2. to provide, subject to its availability and applicable United States laws and regulations, such assistance and for export of such technology, including know-how and hardware, as may be mutually agreed is required for the

development and manufacture of the SL;

3. to procure only from the European Partners such additional SLs, components and spares as substantially duplicate the design and capabilities of the first SL, as are needed by the Government of the United States of America, including needs arising from its international programs, and as are available in accordance with agreed schedules and at reasonable prices;

4. to refrain from separate and independent development of any SL substantially duplicating the design and capabilities of the first SL unless the European Partners fail to produce such SLs, components and spares in accordance with agreed specifications and schedules and at reasonable prices;

5. to use the first SL developed in Europe as an element integrated with the Space Shuttle system for the peaceful expoloration and use of outer space;

6. to keep the European Partners informed of its plans for future use of the Space Shuttle system, and, in particular, of future concepts which may lead to modifications of the present SL concept, with a view to expanding and extending this cooperation beyond the present Agreement."

In accordance with Article 8 the principle for financing the cooperative program is for the United States to bear the costs of their respective participation in the cooperative program under this Agreement without seeking to recover government research and development costs incurred in the development of items procured from the other party.

In Article 6, the Agreement determines the rules governing access to technology and information. These are based on the notion of exchange but are confined to what is needed in order to accomplish the cooperative program. Articles 9 and 10 deal with mutual consultation and planning between the Parties and the movement of persons and materials. Finally, Article 11 defines the principles governing liability.

The most characteristic article in the Agreement is Article 7 on the use of the space shuttle and SL—which comprises a "general" part and a part dealing specifically with the use of the first SL.

Generally speaking, the basic principle is that the Government of the United States of America "shall make the Space Shuttle available for SL missions (experiments and applications) on either a cooperative or cost reimbursal basis" (Art. 7A). As for the SLs developed under the cooperative program, the European partners will be able to use them in preference to third countries in the case of cost reimbursement, or after agreement with the United States when use takes place under the cooperative program (Art. 7B). The commercial use of space shuttles and SLs will be on a nondiscriminatory

basis, after an exchange of views between the Parties on the standards and conditions applicable (Art. 7C).

It is also stipulated that the Government of the United States will provide SL flight crew opportunities to nationals of the European partners in conncection with their space missions involving an SL (Art. 7F).

The results of N.A.S.A. and E.S.A. experiments on cooperative SL missions shall be made freely available to the Parties, subject to any proprietary rights and to the usual priorities which will be granted for the purpose of advance exploitation and publication of the data obtained (Art. 7F).

The special rules applicable to the first SL are as follows:

(a) "In order to assure the integrity of operation and management by the Government of the United States of America of the Space Shuttle system, this Government shall have full control over the first SL unit, after its delivery to the Government of the United States of America, including the right to make final determination as to its use for peaceful purposes. The Government of the United States of America may make any modifications to the first SL unit it desires. However, in the case of intended major modifications, the European Partners will be given advance notification to permit the opportunity for them to express their views and to provide modification kits." (Art. 7D).

(b) "With regard to the first flight of the first SL unit, the system test objectives will be the responsibility of the Government of the United States of America. The experimental objectives of this first flight will be jointly planned on a cooperative basis. Thereafter, the cooperative use of this first SL unit by the European Partners and ESRO will be encouraged throughout its useful life, although not to the exclusion of cost reimbursable use by them. The Government of the United States of America will otherwise have unrestricted use of the first SL unit free of cost." (Art. 7E)

(c) "It is contemplated that a European crew member will be included in the flight crew of the first SL flight." (Art. 7F)

As can be seen the legal status of the first SL is fairly complex. First, the first SL, in accordance with Article 9 of the Arrangement between the participating European States, is the property of the Agency, but it is delivered to the Government of the United States, which will have full control of it and may, in addition, make any modificiations to it (Art. 7D of the Agreement). Furthermore the departure from the general principle laid down in paragraph A of Article 11 of the Agreement, according to which both Parties shall have full responsibility for damage to their nationals and their property, is provided for in the case of the first SL in paragraph D of the same Article 11.

This text provides that the Government of the United States "shall be responsible for damage to such first SL after its acceptance by the Government of the United States of America, which will not be liable for damage occurring in connection with a space shuttle launch, flight or descent."

Furthermore, the first SL will be used in principle, but not necessarily, "in cooperation" (*i.e.* without cost) for the European users in accordance with the objectives determined jointly with the Government of the United States. On the other hand, the latter will have unrestricted use of the first SL unit free of cost. However, the results of experiments will be made freely available to both Parties.

3.

The Memorandum of Understanding between N.A.S.A. and E.S.R.O. (ESA) for a Cooperative Program Concerning Development, Procurement and Use of the Space Laboratory in Conjunction with the Space System is provided for under Aticle 3B of the Agreement between the Government of the United States of America and the European partners and appears as the logical third element in the legal structure. It is in fact chronologically the second because it was signed on the same day (August 14, 1973) as the Agreement itself, but before it. This allows Article 3C of the Agreement to "confirm" the Memorandum whose subsidiary nature in relation to the Agreement is thus established.

Under Article I of the Memorandum the purpose of the document is to provide for the implementation of a cooperative program in which ESA undertakes to design, develop, manufacture and deliver the first flight unit of an SL and other materials for integration with the Space Shuttle.

The memorandum sets out in detail the provisions for E.S.A. access for use of the SL and for the procurement by N.A.S.A. of additional SLs. It finally establishes the cooperative structure between N.A.S.A. and E.S.A. for dealing with all questions concerning the interface between the Shuttle and SL programs and concerning the missions to be defined.

Consequently Article II of the Memorandum contains a general description of the SL program, its interface with the Space Shuttle, and its uses. Articles III and IV deal with the scheduling and the program plans (phases, completion schedules, overall plan). Article V describes in detail the respective responsibilities of the Agency and N.A.S.A. and Article VII states that each Party will bear the full cost of discharging their respective responsibilities. Article IX provides N.A.S.A. with guarantees in the event of the Agency's being unable to fulfil its commitments, granting it the right to demand changes affecting the interfaces or operational interactions between the shuttle and the SL.

Article X contains the detailed measures for the application of the principles contained in the Agreement for access to technology. Article XI reproduces textually the terms of the Agreement concerning access to and use of SL in the shuttle flights and also provides that N.A.S.A. and the Agency will jointly establish procedures enabling the Europans to make inputs relevant to the SL design and use.

Article XII establishes the principle, as regards public information, that each Party is free to release information regarding its own efforts, but undertakes to coordinate in advance any public information activities which relate to the other Party's responsibilities or performance. Finally Article XIII deals with patents and proprietary information.

Particular attention should be called to Article VI which deals with the structures for coordinating the work between the two Parties. Each of the Parties shall designate an SL program head and project manager. The two program heads shall be co-chairmen of a joint SL working group (JSLWG) which will be the principal mechanism for the exchange of information on the status of both the shuttle and the SL, for monitoring interface items and deciding on any action to be taken in the event of one of the programs encountering difficulties which may affect the other (Art. VI. 1, 2, 3).

In addition, representatives of each Party will assist in the work of the Committee of the other party (Art. VI. 4). Finally, progress reviews will be effected jointly and periodically (Art. VI. 5).

More detailed reference should also be made to Article VIII on N.A.S.A. procurement of SL. The first principle (Art. VIII. 1) is that, subsequent to the delivery by E.S.A of the first SL unit and the other associated items, N.A.S.A. will procure from E.S.A. items of this type which it may require, provided that they meet the agreed specifications and are available at agreed reasonable prices. It is on the basis of this text and in the light of the long lead time required for fabrication that N.A.S.A. has already notified E.S.A. of its intention to procure a second SL unit.

The second principle contained in Article VIII is N.A.S.A.'s commitment (Art. VIII. 2) (in pursuance of the principle laid down in Art. 6. 4 of the Agreement) to refrain from separate and independent development of any SL substantially duplicating the design and the capabilities of the first SL unless E.S.A. fails to fulfill its commitments. In order to meet any of its own SL requirements which could not be met by the SL developed by the Agency, N.A.S.A. will have the right either to make the necessary modifications to the European SL or to manufacture or procure another SL meeting its requirements. However, in that case, N.A.S.A. will inform the Agency (Art. VIII. 3) so as to provide E.S.A. with the opportunity of helping. It should be added that these provisions, which appear in the Memorandum but not in the Agreement, are only applicable to N.A.S.A. itself. They do not apply to other United States Government bodies such as the Defense Department.

4.

Before completing the study of the text relating to the Spacelab Program it should be mentioned that this program will involve on the European side the conclusion of supplementary Agreements between the Agency and certain of its Member States and will give rise to a number of decisions by the Council of the Agency or by the Spacelab Program Board. The following problems need to be resolved:

(a) Definition of the structure under which the European users can make their proposals for the first Spacelab payload and arrangements for the choice to be made in Europe before discussion with N.A.S.A. under terms agreed between the latter and the Agency;

(b) Setting up of an E.S.A. team responsible for the preparation, coordination, integration and technical management of the European part of the Spacelab payloads and the assurance of the interfaces with N.A.S.A. (SPICE Group);[17]

(c) Organization of the production of the second Spacelab that N.A.S.A. wishes to procure.

In brief, the study of the texts which have just been analyzed shows that, broadly speaking, the SL program is cooperative and integrated, that the arrangements for its implementation are set out in detail in the legal agreements concluded between the authorities responsible for carrying it out, and that it leaves every opportunity open for the future.

We shall now compare the two programs which we have studied separately in an attempt to discover the similarities and differences.

II. COMPARISON BETWEEN THE TWO PROGRAMS

From the legal angle—the purpose of our study—comparison between the Apollo/Soyuz test program and the Spacelab/Space Shuttle program leads to the conclusion that while similar forms are used the fundamental concepts are in reality quite different. This allows for the making of a better assessment of the features of the Spacelab/Shuttle program.

A. Similarities

1. There is no doubt that the governments involved in the two programs wanted their respective desires, namely to enter into an enterprise of international cooperation in the

[17] "SPICE" stands for Spacelab Payload Integration and Coordination in Europe.

space field, to materialize in the usual form, *i.e.* by the conclusion of international agreements.

It is also obvious that, since in both cases a high degree of technology is involved, the governments, in order to implement their decision to cooperate, had to rely on bodies that they expressly entrusted with this mission and which will therefore come directly face to face.

The two programs are therefore governed by agreements at several levels:

On the political level, an agreement is concluded between the governments concerned. In the case of the US-Soviet program this Agreement is bilateral, whereas in the case of the US-Europe program it is multilateral.

On the technical level, agreements are concluded between the executing bodies. In the case of the US-Europe program a formal agreement was concluded between N.A.S.A. and E.S.R.O./E.S.A., whereas in the case of the US-Soviet program this agreement was in the shape of a summary of conclusions of a joint meeting between the representatives of N.A.S.A. and the U.S.S.R. Academy of Sciences—a document which in itself had no legal force but acquired it as a result of the reference made to it in the intergovernmental agreement.

It should be noted that the arrangements for cooperation between the technical bodies are left vague and have been left to the bodies themselves who have worked them out in terms of the joint decisions taken during the preparation of the experiment, thus providing a great deal of flexibility. In contrast, in the case of the U.S.-Europe program, these arrangements have been specifically provided for in advance and to a fairly deep and detailed level.

2. One consequence of using an intergovernmental agreement for the two programs is that they fall within the framework of international law and especially the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies,[18] as well as the Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space.[19]

As we have seen above, the U.S.-Soviet Agreement even makes express reference to these two instruments, which is not the case with the U.S.-Europe Agreement. However, it goes without saying that these texts are applicable to the whole of the activities covered by the two programs, just as the Convention on International Liability

[18]See Outer Space Treaty, *supra* n. 2.

[19]See Rescue and Return Agreement, *supra* n. 3.

for Damage Caused by Objects in Space[20] and the Convention on the Registration of Objects Launched into Outer Space,[21] or any other subsequent agreement of the same type.

B. Differences

As far as substance is concerned, the legal framework set up by each of the two agreements reveals very considerable differences between the two programs.

1. Nature of the cooperation

By its very essence, cooperation consists of a contribution by each party to a joint effort. Admittedly, the contributions need not be equal nor even of the same nature or the same form: nevertheless the control of the joint endeavor should be provided jointly.

In the Apollo/Soyuz test program the Americans and Soviets are on a completely equal footing; each party is responsibile for its own participation. All general decisions need to be taken jointly or in accordance with a procedure agreed jointly in which there is perfect symmetry between the rights and obligations of each party.[22] The Spacelab/Space Shuttle program is of a totally different nature. Admittedly it is a cooperative effort between Europe and the United States but within the framework of an "integrated space transportation and orbital system"[23] and the SL program aims at the development of equipment "attached to, and integral with, the shuttle."[24] Consequently, and as we have seen in the analysis of the texts, the Americans, having overall responsibility for the system, also control it as regards the development of the SL itself[25] and as regards its use in relation with the space shuttle.[26] The terms used in these texts leave no doubt on this matter: "in order to assure the integrity of operation and management of the space shuttle" (Art. 7D of the Agreement), "with regards to the first flight of the first SL unit, the system test objectives will be the responsibility of the Government of the United States of America" (Art. 7E of the Agreement).

2. Purpose of cooperation

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[20]24 U.S.T. 2389; T.I.A.S. No. 7762. For text, see also 1 J. Space L. 86 (1973).

[21]For texts, see U.N.G.A. Res. 3235 (XXIX), Annex; 3 J. Space L. 100-105 (1975).

[22]See the rules relating to cooperation in the Summary of Results of the N.A.S.A.-U.S.S.R. Academy of Sciences Meeting, *supra* n. 4.

[23]See Agreement, *supra* n. 10, Article 1.

[24]*Id.* Article 2B.

[25]See Memorandum of Understanding, *supra* n. 11, Art. 5.

[26]See Agreement, *supra* n. 10 Art. 7D. and E.

Another difference lies in the very purpose of the two cooperative agreements under consideration.

In the U.S.-Soviet Agreement, the space rendezvous is one of the three objectives (Art. 3), the two others being, first the study of various space sciences—meteorology, environment, exploration of near-earth space, space biology and medicine—(Arts. 1 and 2), and secondly the development of space law.

In the U.S.-Europe Agreement, on the other hand, the Spacelab/Space Shuttle program is considered as an objective in itself. This obviously does not exclude other areas of cooperation between the United States and Europe[27] but simply signifies that the Agreement is of a specific nature whereas the U.S.-Soviet Agreement is on a higher political level as it forms in some respect an open-ended agreement.

3. **Duration of the programs**

The duration of the programs is more strictly limited in the U.S.-Soviet Agreement than in the U.S.-Europe Agreement.

In the first case, and although Article 3 of the Agreement envisages rendezvous and docking systems in a general manner, only the first of these rendezvous is specifically referred to both in respect of dates (1975) and the type of the space vehicles concerned (Apollo/Soyuz).

In the second case, however, although the purpose of the Agreement refers to the "first SL flight unit," the extension of the Agreement is already provided for both as regards "the production and procurement of additional SLs" (Art. 1. 3) and for "consideration of the timely expansion and extension of this cooperation as their mutual interest warrants" (Art. 1. 5).

4. **Funding**

The very nature of the Apollo/Soyuz Program implies that each party should bear the costs incurred for its execution and this explains no doubt why the U.S.-Soviet agreements do not even mention financial questions.

The same principle is explicitly laid down in Article 8 of the Agreement as regards the Spacelab/Space Shuttle Program. In addition there is a mutual commitment not to seek to recover the "government research and development costs incurred in the development of items procured from the other in connection with this cooperative program" (Art. 8B). The explanation for this clause, which is somewhat unusual in an agreement of this kind, is the need for ESA to procure directly from the United States

[27]For example, scientific research and the Aerosat Program which form the subject of special agreements.

certain existing equipment in order to avoid developing it again in Europe.[28] The Europeans have been unable to obtain any compensation for this unfavorable element as they had hoped to do by receiving preferential treatment in connection with reimbursable launch services supplied by the American launch sites. Article 8C of the Agreement simply says that in such a case the prices requested of the European partners and ESA "will be charged on the same basis as comparable non-Government United States domestic users."

5. **Exchange of technology**

A final area of difference concerns the exchange of technologies. This matter is not mentioned in the U.S.-Soviet Agreement nor in the Summary of Results of the joint meeting between the representatives of N.A.S.A. and the Soviet Academy of Sciences, except as regards the mutual exchange of general information of a purely technical nature required for the proper execution of the program.

On the other hand, Article 6 of the U.S.-Europe Agreement and Article X of the Memorandum of Understanding between N.A.S.A. and E.S.R.O (ESA) contain detailed provisions, the main features of which are as follows:

Recognition of the right of each of the parties to have access to the technology—including the know-how—of the other party; Limitation of this principle to the technology "directly necessary for the execution of the SL Program" (Art. 6D); Non-infringement of the proprietary rights of third parties (Art. 6F), which leads to the possibility of the Europeans having to pay fees (Art. 6H); Possibility of replacing access to technology "by making hardware available rather than know-how" (Art. 6B); To offset this and in view of the fact that the previous clause will be detrimental to the Europeans, there is a commitment by the U.S. Government "to give full recognition to advantages offered in Europe in cost, quality or availability" when procuring "components and services related to the development of the Shuttle" (Art. 6. 1).

C. **Assessment of the Spacelab/Shuttle Program**

From the above considerations it is possible to make a reasoned assessment of the advantages and disadvantages of the agreements relating to the Spacelab/Shuttle in comparison with those organizing the Apollo/Soyuz Program.

1. The main advantage of the U.S.-Europe agreements is that they cover, in detail, both at the political level (agreement between governments) and at the technical level (Memorandum of Understanding), fundamental matters relating to the proper execution of the program, namely: a clear and precise definition of the responsibilities

[28]At the beginning of the program, the value of materials to be procured in the United States was estimated at 10% of the value of the program.

of the parties, a definition of the ownership of materials, matters relating to intellectual property, financial arrangements, compensation for damage and the sharing of data—all of which are matters that are not dealt with in a practical fashion in the U.S.-Soviet agreements and which have been settled by informal agreements reached on a day-to-day basis between the Apollo-Soyuz program chiefs.

2. On the other hand, the U.S.-Europe agreements introduce cooperation for the integration of a European element, the SL, into an American space transport system, which implies the subordination of Europe to the United States. This aspect does not appear in the U.S.-Soviet agreements, which relate to an Apollo/Soyuz Program that is to be carried out on a basis of complete equality.

3. It must finally be added that the U.S.-Europe agreements, although limited to the specific case and limited to the development of the first SL flight model, fall within a more general framework, *i.e.* the use of the Space Shuttle system. In themselves, they contain the possibility of extension to the SL operations and to the production of later SLs, even if nothing is yet decided in this connection. This is not so with the U.S.-Soviet agreement, whose area is explicitly restricted to the rendezvous and docking system, which, whilst a matter of obvious importance, is not likely, in itself, to lead to an extension of cooperation into other activities, such as the construction or exploitation of the space stations.

III. CONCLUSION

In concluding this comparison between the programs, which are undoubtedly similar but show fundamental basic differences, it would appear that the Spacelab/Space Shuttle Program has a double advantage over the Apollo/Soyuz Program:

First, the Spacelab/Space Shuttle Program is, for the Europeans, a program in itself which can be extended (development of other SL models and extension to the development of independent space laboratories).

Secondly, the Spacelab/Space Shuttle Program falls within the more general and longer-term Space Shuttle Program which itself may be open to other forms of international cooperation.[29]

This is not true of the rendezvous and docking program. It seems unlikely that in the near future, at international level, this program will go beyond the initial and single Apollo/Soyuz rendezvous[30] which obviously does not exclude the continuation of U.S.-

[29]According to certain rumors, the Soviets considered the possibility of being associated with the Space Shuttle Program.

[30]A rendezvous between Soyuz cabins took place in November 1975. NASA nevertheless submitted to Congress in November 1975 a proposal concerning another rendezvous which would cost 655 million U.S. dollars but whose chances of success are slim.

Soviet space cooperation in other areas.[31]

Having said this, the Spacelab/Space Shuttle Program has the disadvantage for Europeans of not being executed on a basis of complete equality with their partner and thus places them in an unfavorable position with regard to responsibilities, funding, access to technology and the right of use.

We may hope, however, that if this Program, as is desirable, is extended in the long term, the Europeans will, through their experience, become more "equal" partners of the Americans.

Will these possible extensions go in the direction of the development of space stations? Such an idea, which has long been a notion of science fiction, is undoubtedly within the possibilities of the space powers and would constitute for them a privileged area of international cooperation. It is clear that it could only come into being if it was demonstrated that its scientific and practical interest would justify the considerable expenditure involved.

For the legal expert, it would raise many interesting problems which, for once, might be settled before the law was overtaken by a *fait accompli*.[32] Although very limited in their purpose and their field of application, the Apollo/Soyuz and the Spacelab/Space Shuttle agreements have nevertheless established principles which cannot be disregarded when the time comes to draw up the laws relating to orbital stations.

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[31]Another NASA proposal to Congress concerns the insertion of a Soviet payload in a Saturn V firing, which would cost 770 million U.S. dollars. This project also seems unlikely to come to fruition.

[32]Since the present article is not designed to deal with the legal status of space stations, the reader is referred to the considerable literature on the subject, particularly in connection with the Colloquia of the International Institute of Space Law. See, in particular, the following reports:

Pikus, Space Stations: The Technical Basis of Legal Problems, Proc. 17th Coloquium on the Law of Outer Space 298 (1975); Stoebner, Stations Spatiales Presentes et Futures: Technique et Droit, *id.* at 304; Sarkar, Scientific and Technological Aspects of Space Stations: Present and Future, *id.* at 346; Gorove, Legal Aspects of Space Stations, *id.* at 208; von Preuschen, International Cooperation in the Use of Space Laboratories, *id.* at 233. Christol: Space Stations, Present and Future, *id.* at 364; Kopal, Fundamental Legal Problems of Establishing and Activities of Space Stations, *id.* at 379; Doyle and Lewis, Reaching the Space Station: The Transportation System and the Law, *id.* at 393. See also Haakma, Some Legal Aspects space Lab and Future Space Laboratories launched by a Space Shuttle, Proc. 18th Colloquium on the Law of Outer Space 90 (1976); Diederiks-Verschoor, Some Observations on the European Cooperation Regarding the Space Shuttle Project, *id.* at 85.

REMOTE SENSING AND STATE SOVEREIGNTY

*Dr. D. M. Polter**

At its 29th session in 1974, the General Assembly of the United Nations recommended that the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space consider, with high priority, the "legal implications of remote sensing of the earth from space, taking into account the various views of States expressed on the subject, including proposals for draft international instruments".[1] Although the matter had been put on previous agendas of the Committee on the Peaceful Uses of Outer Space[2] and its sub-bodies and had, to some extent, been dealt with earlier,[3] this was the first time that the legal aspects of remote sensing were accorded "high priority".[4] The Legal Subcommittee considered the matter during its 14th session, which took place in New York from February 10 to March 7, 1975. Some of the results of the Subcommittee's work are contained in its Report to the Committee on the Peaceful Uses of Outer Space.[5] This Report points to several areas of general agreement, namely:

(a) that remote sensing activities by means of space technology should be conducted for the benefit and in the interest of all mankind; this new technology would be of particular significance to developing countries in their plans and programmes for national development;

(b) that remote sensing activities by means of space technology should be conducted in accordance with international law including the United Nations Charter and the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies;

(c) that the maximum benefits to all countries could be obtained by

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[1]U.N. Doc. A/RES/3234/29 (1974).

[2]The Committee was appointed in 1958, in the first instance as an Ad Hoc Committee. In 1973, the number of members was increased from 28 to 37. The previous members—Egypt, Albania, Argentina, Australia, Belgium, Brazil, Bulgaria, Chad, France, India, Iran, Italy, Japan, Canada, the Lebanon, Morocco, Mexico, Mongolia, Austria, Poland, Rumania, Sweden, Sierra Leone, the Soviet Union, Czechoslovakia, Hungary, the United Kingdom and the United States—have been joined by the Federal Republic of Germany, the German Democratic Republic, Chile, Indonesia, Kenya, Nigeria, Pakistan, the Sudan and Venezuela.

[3]Report of the Working Group on Remote Sensing, U.N. Doc. A/AC.105/125 (1975).

[4]The two other matters of "high priority" in 1974 were the draft treaty relating to the Moon and the principles governing the uses by States of artificial earth satellites for direct television broadcasting. *Cf.* U.N. Doc. A/RES/3234(XXIX).

[5]U.N. Doc. A/AC.105/147 (1975).

international co-operation at all levels, particularly on a regional basis;

(d) that States undertaking programmes for remote sensing activities by means of space technology should encourage international participation;

(e) that in remote sensing activities by means of space technology measures should be taken to promote efforts for the protection of the natural environment of the earth.

In addition, the Report lists the following questions on which common agreement has not been reached:

> Whether a future international instrument on remote sensing should deal with remote sensing of the natural resources of the earth or with the whole natural environment of the earth; whether sovereign rights of States over their natural resources apply also to information on those resources; whether consent of the sensed State should be required and, if so, whether the consent should not be considered within the broader context of international co-operation and participation; whether a distinction should be made between the question of access to information on resources within national jurisdiction and on resources outside national jurisdiction; whether the access by the sensed States, the sensing State and third parties respectively to information or data should be unlimited or subject to certain conditions and, in the event of the latter, whether it might be possible to draw on analogies with the existing practice of some States whereby they protect the confidentiality of certain kinds of information concerning their natural resources, and formulate simular guidelines in regard to data collected by means of remote sensing on an international level; whether there should be parallel consideration of the legal and organizational aspects of remote sensing; whether certain organizational and technical solutions might not help resolve some legal problems.

The list reflects the variety of views held by delegations; it does not give an account of the underlying legal and political concepts that form the basis for the differences of opinion. On the legal level, the differences seem to stem mainly from a widely different understanding of the principle of state sovereignty. This paper therefore aims to shed some light on the principle itself and its relationship to remote sensing activities.

Before embarking upon a legal discussion, however, it is felt that a few remarks concerning the technical, scientific and organizational aspects of remote sensing are required to put the legal considerations into proper perspective.

I. TECHNICAL AND ORGANIZATIONAL ASPECTS OF REMOTE SENSING

Remote sensing technology can, and eventually will, be applied to a broad variety of fields such as meteorology, geology and earth resources, hydrology and irrigation, agriculture, forestry and fishery. To give but a few examples, the information gained through remote sensing could advance weather forecasting, facilitate the protection of our environment, help resolve water management problems, particularly in developing countries, and enable better crop yield estimates with a view to improving world-wide food dissemination. United States experiments undertaken through satellites ERTS—1 AND ERTS-B—recently renamed Landsat 1 and Landsat 2—have already confirmed many of the high expectations attached to this new technology. The U.S. experiments are carried out with participation from more than forty states—a number that continues to increase.[6]

1. The physical basis of remote sensing

Technically, remote sensing is based on the fact that every object with a temperature above absolute zero (-273° C) radiates and/or reflects electromagnetic energy at specific distinctive wavelengths. The spectral data are collected by active or passive sensors; active sensors generate radiation and measure the return signal after interaction with the object of interest; passive sensors rely solely on object-generated/reflected radiation. By analyzing the collected data it is possible to distinguish the objects and furnish information on their physical properties.

Remote sensing instruments may be mounted on various platforms such as, unmanned and manned spacecraft, aircraft, balloons and sounding rockets. In the Legal Subcommittee, considerations have been limited to remote sensing of the earth by means of observation from space platforms.

2. Configuration of a remote sensing system

Operational space platforms for remote sensing will most probably be satellites[7] with either sun-synchronous or geo-synchronous orbits. The sun-synchronous orbit provides global coverage under permanently corresponding illumination conditions. The geo-synchronous orbit is particularly suitable for continuous monitoring of phenomena on a regional scale, but also lends itself to global monitoring if the space segment of the system consists of at least 3 satellites—the minimum required for world-

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[6]See U.N. Doc. A/AC.105/150 (1975). See also Hearings on S. 573 Before the Comm. on Aeronatucial and Space Scien., 94th Cong. 1st Sess., pt. 3, at 103-186.

[7]A space laboratory as *e.g.* the SPACELAB currently developed by the European Space Research Organization's successor, the European Space Agency (ESA), may be used for remote sensing experiments, but because of technical and financial reasons is not expected to be employed for operational remote sensing activities.

wide coverage from that orbit.[8]

Studies submitted by the Federal Republic of Germany to the United Nations show that a complete remote sensing system might consist of (a) an orbiting satellite, (b) an earth station for mission control, (c) terrestrial data collection platforms and earth stations, at least one per region, (d) data processing and dissemination centers, at least one per region, (e) aircraft and ground truth observation programs and (f) an international center for data storage and data dissemination.[9]

3. Organization of remote sensing activities

Organizationally, such a system would be a combined centralized/decentralized one and, from a political standpoint, it would be based on international cooperation.[10] The forms and subjects of international cooperation will develop on the basis of already existing and, perhaps, new approaches; they will be decisively influenced by technological capability and demand for information, and, as soon as the activities have entered the operational phase, probably also by prices. Furthermore, it is quite obvious that forms of organization and the legal basis of remote sensing activities are interdependent. Since, however, none of the system configurations has been sufficiently shaped up to now, any discussion on them would be founded on little more than speculation. It may be assumed, though, that the legal questions touched upon in our further considerations are basically the same with regard to any specific system configuration.

II. PROPOSALS SUBMITTED TO THE LEGAL SUBCOMMITTEE

At its thirteenth session in 1974, the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space had before it the texts of the following documents:[11]

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[8]The first Global Atmospheric Research Program Experiment which will be conducted under the auspices of a specialized agency of the United Nations, the World Meteorological Organization, in the late seventies will use five geostationary weather satellites. See Hearings on S. 573, Before the Comm. on Aeronautical and Space Sciences, 94th Cong. 1st Sess. pt. 1, at 3-17, 466-468.

[9]The studies deal with agriculture, hydrology and air pollution respectively; they carry no U.N. reference numbers. *Cf.* also U.N. Document A/AC.105/140 which contains a Report by the Secretariat on implementation requirements for an international center for storage and dissemination of remote sensing data.

[10]See also U.N. Doc. A/AC.105/150, para. 28 (1975) in which the Subcommittee expresses the view that with regard to the ground segment, a regional international and national approach would be preferable, whereas for the space segment attention should also be given to the possibility of international financing and management.

[11]The 5 proposals are reproduced in Annex IV of the Legal Subcommittee's Report on its thirteenth session (A/AC.105/133).

—a proposal by Argentina on a draft international agreement on activities carried out through remote sensing satellite surveys of earth resources;[12]

—a proposal by Brazil on draft basic articles for a treaty on remote sensing of natural resources by satellites;[13]

—a proposal by France on draft principles governing remote sensing of earth resources from outer space;[14]

—a proposal by the USSR on model draft principles governing the use of space technology by States for the study of earth resources;[15]

—a working paper, submitted jointly by France and the USSR on draft principles governing the activities of States in the field of remote sensing of earth resources by means of space technology.[16]

At the fourteenth session of the Legal Subcommittee in 1975, the proposals by Argentina and Brazil listed above were replaced by a joint proposal on draft basic articles for a treaty on remote sensing of natural resources by means of space technology[17] introduced at the twenty-ninth session of the General Assembly for consideration by the Legal Subcommittee. During the fourteenth session of the Legal Subcommittee, the joint proposal was co-sponsored by Chile, Mexico and Venezuela. This so-called Latin American proposal, the Franco-Soviet working paper mentioned above and a working paper by the United States, introduced at the 1975 session of the Subcommittee, on the development of guidelines on remote sensing of the natural environment of the earth from outer space[18] formed the textual and also, largely, the conceptual basis for the deliberations in the Legal Subcommittee.

1. Differences in the three drafts

A first, very obvious, difference between the three drafts is the proposed degree of legal commitment. The proposals made by the Latin-American countries are the strictest, aiming at an agreement. The "principles" proposed by France and the Soviet Union need not necessarily have a legally binding effect; they may, however, become legally binding without any difficulty and it seems as if they are intended to. The

[12]U.N. Doc. A/AC.105/C.2/L.73 (1974).

[13]U.N. Doc. A/AC.105/122 (1974).

[14]U.N. doc. A/AC.105/1.69 (1974).

[15]U.N. Doc. A/AC.105/C.2/L.88 (1974).

[16]U.N. Doc. A/AC.105/C.2/L.99 (1974).

[17]U.N. Doc. A/C.1/1047 (1975).

[18]U.N. Doc. A/AC.105/C.2/L.103 (1975).

American "guidelines" may be understood as a rather informal code for desirable international behavior; of course, they could also become binding international law by means of agreements or by usage, without difficulty.

The "natural resources" are the subject of the drafts proposed by the Latin-American countries, and by France and the Soviet Union respectively; the U.S. draft includes the entire "human environment". None of the above drafts explains, however, the meaning of the corresponding terms. The United Nations once defined "natural resources" as being "all those elements of the physical environment which are actually or potentially useful to the human beings who live upon this planet".[19] This definition of "natural resources" may, to a large extent, correspond to the meaning of "human environment"; the two terms are, however, not identical, *i.e.* the latter includes air and water pollution, while the first does not. It cannot be seen whether the first two of the above-mentioned drafts are based on the comprehensive U.N. definition of "natural resources", or on a more restrictive interpretation of the term. Future discussions in the Legal Subcommittee should clarify this issue.

The most important differences with regard to content refer to the regulations governing the right of disposition on those data gained by means of remote sensing. Of all the proposed regulations, we shall limit our discussion to those concerning the principal relationship between the sensing State and the sensed State and the data collected. The nucleus of the different conceptions seems to be contained in the following paragraphs:

(a) Latin-American Draft:

> States parties shall refrain from undertaking activities of remote sensing of natural resources belonging to another State party, including the resources located in maritime areas under national jurisdiction, without the consent of the latter.[20]
>
> States parties obtaining information relating to the natural resources of another State party through remote sensing shall neither devulge such information nor transmit or transfer it in any manner to a third State, international organization or private entity, without the express authorization of the party to which the natural resources belong, nor can they utilize the information thus obtained to the detriment of the latter.[21]

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[19]Science and Technology for Development. Report on the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas, vol. 2, at 9 (1963).

[20]Latin-American Draft, Art. V. It is stated correspondingly under Article VI that: "States parties will take all measures authorized by international law to protect their territory and maritime areas under their jurisdiction from remote sensing activities for which they had denied their consent."

[21]*Id.*, Article IX; under Article X, third parties are refused permission to accept information which has been obtained without authorization.

(b) Franco-Soviet Draft:

> Such use[22] shall, in particular, respect the principle of sovereignty of States and especially the right of peoples and States to exercise permanent sovereignty over their wealth and resources as a basic element of their right to self-determination as well as their unalienable right to dispose of their natural resources and of information concerning those resources.[23]

(c) U.S. Draft:

> States receiving data directly from satellites designed for remote sensing of the natural environment of the earth shall make those data available to interested States, international organizations, individuals, scientific communities and others on an equitable, timely and non-discriminatory basis.[24]

2. **The sensing State's sovereignty versus the sensed State's sovereignty**

With regard to the aspect we are presently discussing, the wording of these regulations is quite clear. The proposals made by the Latin-American countries and by France and the Soviet Union start from the assumption that generally only the *sensed* State may dispose of the information concerning it. According to the U.S. proposal, the *sensing* State is, however, principally free to utilize all gained information. Thus the regulations proposed by the Latin-American countries and by France and the Soviet Union on the one hand, and the U.S. regulations on the other hand, are almost diametrically opposed in their approach to solving the question of a State's right with regard to remote sensing data.

In an attempt to explain this opposition—at least as far as its legal aspects are concerned—reference will be made, first of all, to some statements delivered during the debate on remote sensing in the 14th session of the Legal Subcommittee.

Besides numerous political, economic and technical arguments for and against free data collection and dissemination, the legal aspects were only referred to in a

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[22]Relates to the use of outer space mentioned in Principle 1 of the Draft.

[23]Draft Principle 2, Correspondingly, Draft Principle 5(b) says that a State which obtains information concerning the natural resources of another State as a result of remote sensing activities shall not be entitled to make it public without the clearly expressed consent of the State to which the natural resources belong or to use it in any other manner to the detriment of such State. It adds that documentation resulting from remote sensing activities may not be communicated to third parties, whether Governments, international organizations or private persons, without the consent of the State whose territory is affected.

[24]Draft Principle 5. In Draft Principle 6, the Draft goes one step further by stating that States receiving data directly from such remote sensing satellites shall ensure in particular that data of a sensed area within the territory of any other State are available to the sensed State as soon as they are available to any other than the sensing States.

strikingly small measure.[25] The restrictive positions are most clearly expressed in the following remarks made by the Soviet delegation: "...the interests of States whose natural resources might be subject to remote sensing must be protected, ... the legal regulation of the problems must not go beyond the framework of existing international law, notably the principle of *unconditional respect of state sovereignty, including the right to dispose of natural resources and information about them.*"[26] This understanding of the legal problem is explained somewhat in a statement delivered on behalf of Argentina, according to which the principles of sovereign equality of States and self-determination of peoples embrace not only the right to internal sovereignty and independence, but also "the economic aspect of the freedom to use and distribute their wealth, whereby peoples might exercise their legitimate and exclusive sovereign rights over their own natural resources".[27]

The opposite conception, which starts from the assumption that data collection and dissemination must not be restricted according to applicable international law, is equally succinctly stated in the remark of the British representative to the effect that "international law as it currently stood did not impose any regulation or inhibition on a survey of the earth and its environment, including its natural resources, which was carried out from beyond the limits of national sovereignty and therefore from outer space".[28] After pointing out that no authority for any restriction could be found in the Outer Space Treaty, in any other relevant international agreement, or in any of the applicable rules of customary international law, the British representative went on to say that: "Furthermore, it served no real purpose to invoke concepts of traditional international law such as the sovereignty of States over their territory, the equality of States, or the permanent sovereignty of States over their natural resources."[29] Such was his delegation's position with regard to both the collection and the dissemination of information. To this may be added the statement made on behalf of the Federal Repurblic of Germany, according to which the German delegation does not consider "... the concept of sovereignty as such to be a sufficient reason for withholding from anyone information about the physical conditions under which he lived and upon which he depended".[30]

The remarks quoted do not really explain the almost completely opposing conceptions. It must be stressed in this connection that the freedom of countries to dispose of their own natural resources is not under discussion; this freedom is

[25] *Cf.* U.N. Doc. A/AC.105/C.2/SR.226-245 (1975).

[26] *Id.* (Emphasis added). In this connection, the French representative pointed out that the Franco-Soviet draft could, admittedly, be improved, but that it contains "nothing alarming."

[27] *Id.*

[28] *Id.*

[29] *Id.*

[30] *Id.*

undisputed. Moreover, the advocates of the restrictive conceptions are not so much concerned with preventing possible abuses of free data collection and dissemination. This objective only plays a minor role with some of them. What is really at stake is the *right of disposal* of information concerning natural resources, with widely divergent interpretations of state sovereignty at the center of controversy.

III. SOVEREIGNTY, REMOTE SENSING DATA AND INTERNATIONAL LAW

In international law state sovereignty means, above all, that individual States are principally free to act at their discretion, unless internatinal law provides for restrictions. With respect to information, this means that—provided no restrictions are imposed by international law—every State may freely dispose of that information which is subject to its jurisdiction; a power limited territorially and with regard to the persons subject to it. This implies that within the confines of its power, a country is free in its treatment of information, and that it may keep it to itself or give it to anybody who is prepared to take it. This would furthermore signify that a country cannot dispose of information not falling within its jurisdiction, and that this information would be subject to the country under the jurisdiction of which it falls. Thus the question arises whether there are provisions in international law imposing a specific form of conduct on countries, in particular with respect to information on natural resources.

Up to now, general international law does not contain any provisions on information on natural resources. We have also not been informed on any agreements or on any usage—possibly based on *opinio juris*—to the effect that a country, the resources of which constitute the subject of any piece of information, has supreme power with regard to the handling of all such information. Therefore, we have to ask more generally for provisions which might be releveant for data collection and dissemination; furthermore, we have to examine whether information on natural resources is directly subject to the provisions of internationlal law on natural resources, or whether those provisions apply to them *mutatis mutandis*.

1. The Outer Space Treaty

Article I, paragraph 2 of the Outer Space Treaty of 1967[31] provides that all States are free to use outer space in accordance with international law. In the preamble, the parties to the Treaty point out that it is desirable to continue the use of outer space for peaceful purposes. According to Article III, the States pursue their activities "in the interest of maintaining international peace and security and promoting international cooperation and understanding". Article XI, which is important for the discussion of our problem, reads: "In order to promote international cooperation in the peaceful

[31]Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T.2410, T.I.A.S. No. 6347, 610 U.N.T.S.205.

exploration and the use of outer space, *States Parties to the Treaty* conducting activities in outer space, including the moon and other celestial bodies, *agree to inform the Secretary General of the United Nations* as well as *the public* and the *international scientific community, to the greatest extent feasible and practicable,* of the nature, conduct, locations and *results* of such activities. On receiving the said *information,* the Secretary General of the United Nations should be prepared to *disseminate it* immediately and effectively."[32] The above provisions thus not only permit data collection, they also call for dissemination of the information gained. They apply to the activities of States Parties to the Treaty in the exploration and use of outer space.[33]

The U.S. concept is obviously in accordance with the sense and purpose of the above provisions. The proposals made by the Latin-American countries and by France and the Soviet Union respectively would be contradictory to them unless an interpretation of the wording: "to the greatest extent feasible and practicable" would show that the proposed restricted data dissemination is the broadest dissemination feasible and practicable.[34] We shall, however, not try to interpret the technical, financial and organizational constraints contained in that phrase, but limit ourselves to the legal constraints of future remote sensing regulations.

2. The relation of resources to their data

The regulation quoted from the Franco-Soviet Draft and various statements which served to explain the restrictive concepts seem to be founded on the idea that the States' right of disposal of resources includes the information concerning these resources, or that this information has to be dealt with analogously. Such an idea might either be based on the assumption that "sovereignty with regard to resources" is at least partly dentical with "sovereignty with regard to information" or that the latter can be derived from the first. Both ideas cannot be justified by the facts. Natural resources and data, *i.e.* information, belong to different and separate planes of existence and, in corresponding to reality, the law makes them subject to different rules. It would be quite absurd if the law were to try to ignore such ontological differences. This absurdity becomes obvious if one imagines that purchase regulations might also be applied to information on the purchase, or that the criminal law inflicting a penalty on murder might also directly, or by analogy, be applied to information on such an offense. Presumably no one would attempt to deal with data on sausages and cheese in the way he would deal with these commodities themselves, and eat them. The series of examples

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[32]Art. XI. (Emphasis added).

[33]*Id.*

[34]In view of wording of Article XI, it appears difficult to follow the opinion that the expression "to the greatest extent feasible and practicable" refers to information regarding the nature, conduct, locations and results of space activities, but not the sharing of the results. *Cf.* Marcoff, 10 Diritto Aereo 289-283 (1970). Furthermore, such an interpretation would not seem to lead to any different results in practice. Gorove, Earth Resources Survey Satellites and the Outer Space Treaty, 1 J. Space L. 80, 85 (1973) concludes that dissemination seems mandatory within the general conditions set forth in the treaty.

could be continued along these lines.[35] They illustrate that neither an identical nor an analogous treatment of resources and data concerning them is apt to delineate the admissible or the appropriate extent of data dissemination.

In addition to provisions regulating the rights and obligations of countries in respect of their relationship to one another, provisions regulating the relationship between the State and individual could also help to determine the content of the general freedom of the States with regard to data collection and dissemination. This would be the case if the individual has a right to demand that the State had to do, or not do, certain things concerning data collection and dissemination.

3. The situation of the individual with regard to data

According to Article 19 of the Universal Declaration of Human Rights adopted in 1948,[36] everyone has the right to freedom of opinion and expression. This right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers. Article 27, para. 1 says that everyone has the right freely to share in scientific advancement and its benefits.[37] However, the two provisions which imply that States are bound to make available the data at their disposal, have no legally binding effect inasmuch as the famous resolution adopted on December 10, 1948 does not formally commit States.[38] The freedom of information incorporated in the two articles mentioned has not become part of general international law. There exists neither an international custom that could be taken as evidence of a general practice accepted as law, nor could it be contended that the freedom of information is one of the general principles of law recognized by civilized nations.[39] Nonetheless, the articles will become, to a considerable extent, part of international law, with the entry into force of the International Covenant on Economic Social and Cultural Rights and of the International Covenant on Civil and Political Rights.[40] With regard to our subject, the

[35]Of course, links exist between facts and the information concerning them. For this reason, under a uniform legal system a link will, if need be, exist also between the legal provisions governing a given subject and a legal provision regarding relevant information—but not, however, identity or analogy, because both aspects concerned are neither identical nor do they correspond from the ontological point of view. *Cf.* Gorove, *supra* note 34, at 85, who concludes that there is no indication that any sovereign rights might be violated and who furthermore is of the opinion that the eventual utilization of earth resources data collected through satellite observation does not appear to be such an act that may give rise to a legitimate claim for damages under the provisions of the Treaty or the Liability Convention.

[36]U.N.Y.B. on Human Rights at 459 (1948).

[37]In this connection, attention is drawn to Article 2, paras. 1 and 2 of Article 26, and Article 28.

[38]U.N. Res. 216/A(III) of December 10, 1948.

[39]The scope of application of Article 10 of the European Convention on Human Rights is limited to a few Western European Countries, and no similar provisions seem to exist elsewhere.

[40]Both Agreements shall take effect 3 months after deposit of the 35th instrument of ratification. In mid-1975, only 31 and 30, respectively, of such instruments had been deposited. U.N.Y.B. on Human Rights 469-479 (1948). 20 U.N.Y.B. 423-32 (1966).

following provisions of the International Covenant on Economic, Social and Cultural Rights seem to merit attention:

> The States Parties of the present Covenant, recognizing the fundamental right of everyone to be free from hunger, shall take, individually and through international cooperation, the measures, including specific programmes, which are needed: To improve methods of production, conservation and distribution of food by making full use of technical and scientific knowledge, by disseminating knowledge of the principles of nutrition and by developing or reforming agrarian systems in such a way as to achieve the most efficient development and utilization of natural resources.[41]

> The States Parties to the present Covenant recognize the right of everyone to enjoy the benefits of scientific progress and its applications.[42]

Para. 2 of Article 19 of the International Convenant on Civil and Political Rights[43] may also be of direct relevance to us as indicated by the following text:

> Everyone shall have the right to freedom of expression; this right shall include freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or in print, in the form of art, or through any other media of his choice. This is made subject to certain restrictions as are contained in para. 3, if such restrictions are provided by law and are necessary:
>
> (a) for respect of the rights or reputations of others;
>
> (b) for the protection of national security or of public order (ordre public), or of public health or morals.

The provisions quoted above show that the individual will have the right to receive and disseminate information gained through remote sensing, once the covenants have entered into force. This right corresponds with the regulations of Article XI of the Outer Space Treaty, according to which States are obliged to make the information available to the individual. This partly answers the question whether there are provisions in international law imposing a specific conduct on States. Our problem has, however, not yet been solved, for these provisions only provide a certain

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[41]Art. 11, para. 2(a) of the Covenant. For text, see U.N.Y.B. on Human Rights 469-479 (1948).

[42]Art. 15, para. 1(b).

[43]For text, see 20 U.N.Y.B. 423-32 (1966).

scope, a scope that cannot be narrowed further by legal considerations.[44] The U.S. proposal seems to fall within the limits set by this scope, and although the restrictive regulations in the proposals made by the Latin-American countries and by France and the Soviet Union seem rather precarious, they could, perhaps, be interpreted to comply with the above provisions and the Outer Space Treaty. Any definite answer to this and the above question would have to take into account the important technical, financial and organizational constraints that are contained in the phrase "to the greatest extent feasible and practicable". This will become possible as soon as these aspects of remote sensing will have taken on somewhat sharper contours and can be identified more clearly.

IV. A STATE'S ATTITUDE TOWARDS INFORMATION

One is tempted to discontinue the examination of the legal aspects at this point and to relegate the above described contradiction to the arena of political controversy, in the broadest sense, within the United Nations. Those participating there in the discussion will probably arrive at a text, maybe even generally accepted,[45] that will eventually become legally binding. Our understanding of the legal aspects of the situation can, however, be deepened to some extent and directed at a study of the underlying issues of the theory of State. In doing this, an attempt shall be made at presenting some elements in state sovereignty from which basic differences result in the attitude adopted toward the handling of information. In this connection, a philosophical approach is pursued which makes man the focus of studies of the State and of national order.[46]

1. The concept of sovereign national will

"Sovereignty" is not a specific legal term. At one end of the scale it is associated with notions of divine omnipotence. At the other, it is a political catchword. State sovereignty can be understood as a permanent rule organized on the basis of legal

[44]The interface between the rights of the individual and the State's position becomes apparent in Article 25 of the International Covenant on Economic, Social and Cultural Rights and in Article 47 of the International Covenant on Civil and Political Rights. The text of both these articles reads as follows: "Nothing in the present Covenant shall be interpreted as impairing the inherent right of all peoples to enjoy and utilize fully and freely their natural wealth and resources."

[45]The Outer Space Committee and its subordinate bodies pursue an expedient and rather special course with regard to procedure: they pass their resolutions solely on the basis of general agreement (principle of the unanimous vote). The result is not only a comparatively unpolemical style of procedure, indeed, account is thus taken of the fact that international law must be accepted by all those bound by it in order to become both valid and effective.

[46]This could be defined as an anthropological approach. The findings thereby gained can perhaps also be arrived at on the basis of other legal philosophical theories, but not, I believe, from thought propositions based on the assumed existence of a closed legal system, such as the doctrine of natural law or even legal positivism. *Cf.* Kaufmann, Durch Naturrecht und Rechtspositivismus zur juristischen Hermeneutik, 30 Juristenzeitung 337 (1975), which presents a survey of the more recent trends of thought in legal philosophy.

principles and exercised over a specific territory, characterized outwardly by a certain degree of effective independence and inwardly by effective rule.[47] As has been defined in echo of Jean Bodin (1530-1596), the sovereign is not subject to any superior state or other authority. The will of the sovereign constitutes the supreme authority.

The development of the concept of sovereignty, which can generally be said to have started approximately at the end of the Middle Ages, cannot be traced here. It is equally not possible to give adequate consideration to the extensive and far-reaching discussion concerning the theory of State sovereignty. For the permitted scope of this paper, the following theses should suffice as premises:

(a) The community of nations at the present time does not constitute a *civitas maxima,* but merely a society of States. Under this system, state sovereignty is neither eliminated nor derived from international law.[48]

(b) It is not possible to establish a theoretical and general definition, not specifically linked to any particular epoch, of the content of sovereign will. It is regarded as a peculiarity of a supreme authority and such an authority is basically free to design a system of national order at its own discretion. The content is decided upon in the respective actual historical situation and is decisively influenced by the latter.

(c) The sovereign national will is directed at implementing what it deems just and proper. In the process, the determination of what is right is in principle effected either within the confines of a preconceived system of values, or within the framework of a basically open system where what is right has to be defined constantly anew.

A more precise explanation of the last-mentioned thesis and its consequences for the position of the individual within the framework of law is required. Each national system claims to be the right one. The State's right to enforce the implementation of its specific legal system is justified by the rightness of the system concerned. The wide variety of normative systems distinguishes between two basic types: those based on preconceived systems of values and those based on open systems of values. "Preconceived systems of values" are understood as those which are constantly held up to the individual as being right. In contrast, "open systems of values" are those

[47]For information on the stage reached in the current discussion, see W. von Simson, Die Souveranität im rechtlichen Verständnis der Gegenwart 19-24 (Berlin, 1965).

[48]As to the idea of a universal hierarchy, von Simson points out that, throughout the world, political demands confront each other on all sides and that there is no compulsory system which can provide a binding solution for all parties concerned in respect of values and that not even the necessary common pre-legal foundation exists for a universal legal system. *Id.* at 81.

which are permanently open for revision.[49] The correct clothing of such systems is a task assigned to those governed by them.

2. **From preconceived toward open systems of values**

The kingdoms of Western Europe in the Middle Ages provide an illustration from the past for preconceived systems of values. Their political foundation was the firm belief in a predetermined system of absolute rule. This system, embracing both this world and the world to come, was determined by theological principles. Its organization as far as this world was concerned was established by uniform principles drawn up by both secular and spiritual leaders.[50] History can provide no example of a system organized solely on the lines of the second basic type as described above. Ryffel speaks of a society offering possibilities for development on a democratic basis, a society in which the opportunity for each and every man to develop his abilities and to advance is available on a basis of equality for all and this becomes reality for each individual.[51] Politically, such a society is characterized by the fact that the individual participates in the task of shaping the state system himself in a responsible manner.

Starting from the philosophical idea, rooted in anthropology, that man is intended to do that which he deems right and proper, the transition which can be observed in history from a preconceived system of values to an open system of values can be understood as a development in which man gradually casts off the shackles of blind resignation to his fate in order to shape the order of things himself in accordance with his own views. The changing role of the individual in the various social systems throughout history, from archaic systems to modern democracy, reflects this development, the trend of which—seen in its entirety—appears to be determined. Admittedly, historical reality reminds us that this is not a historical process cutting clear across time and space. It would appear that individual persons, peoples and specific social systems are mere contingencies in this overall process. For the particular established system there is no guarantee for its continued development along the path

[49]This difference is shown in sharp setting in R. Ryffel, Grundprobleme der Rechts—und Staatsphilosophie 93, 338 *et seq.*, 458 *et seq.* (1969).

[50]This dissolution of this rounded concept of the medieval world began in the second half of the 11th Century with the investitures controversy—a struggle for power between the papacy and the monarchy over the investiture of bishops and abbots, which developed into a basic controversy concerning the relations between spiritual and temporal power.

[51]*Supra*, note 49. Some present-day democracies which contain a number of elements characteristic of the second type, seem to present advanced transitional stages between the two primary forms.

delineated.[52] On the contrary, it is apparently constantly exposed to the danger of relapsing into a state thought to be left behind long ago, of crumbling into a state of anarchy or of disintegrating because too large a proportion of the population is still not equipped to cope with the tasks assigned to it.

A study of history also reminds us that our contemporaneity calculated in years and days is an artificiality which all too easily hides the fact that systems existing side by side can represent vastly different stages of development and, in fact, often do. It can be said of many present-day systems—perhaps of all of them—that a start has been made with the gradual detaching of the individual from the bonds of preconceived systems of order. This process is taking place in remarkably gradual stages. The latter are characterized by the way in which what is decisively right from the national order—the content of the sovereign will—is established both in theory and in practice. To the extent to which actions are based on rules believed to be unquestionably right, the process of detachment has not taken place; that much the individual is still merely the subject of a predetermined fate as described above.

3. The role of information in diverse systems

In view of the discussed considerations, the basically varying importance of information may be easily recognized. Information is not essential for the individual governed by a preconceived system of values. He who possesses unquestionable truth does not necessarily need to know more. Information is merely incidental. On the other hand, within the framework of an open system of values it is essential to inform the individual since he can only arrange his actual existence in an appropriate manner on the basis of information. In order to realize his opportunity for development and advancement it is necessary to give him access to as much information as possible.

This contradiction provides the more deepseated reason for the differing concept of state sovereignty and information. It becomes apparent when one puts the mode of behavior of the State in relation to the position of the individual within the structure of the State. Of course, the few lines which have been drawn in an attempt to sketch the background provided by the theory of State for the attitudes taken towards remote sensing activities constitute only a few main contours. At least with regard to the evaluation of the attitudes adopted by the State as described above, supplementary remarks appear essential.

The foregoing discussion is based on the unspoken opinion that the development from a preconceived system of values to that of an open system is to be regarded as a positive step in the right direction. For this reason, the more progressive attitudes

[52]This observation appears to be in line with the findings of the theory of evolution with regard to both man and populations. More recent genetically oriented considerations tend to continue to stress the role played by chance. *Cf.* Thoday, Non-Darwinian "Evolution" and Biological Progress, 255 Nature 675 *et seq.* (1975), which would further explain the remarkably slow tempo of development and emphasize the accident of our own individual role.

postulating freedom of information appear worthy of attention whereas the less progressive restrictive attitudes are shown in an unfavorable light. One would get the same picture with completely reversed premises if one were to regard this development as negative, instead of positive. However, seen from the aspect of our anthropological approach only the first-mentioned evaluation appears to be justifiable. On the other hand, seen from the basis of doctrines postulating absolute truths,[53] the second evaluation would have to be regarded as valid.

On the United Nations level, the various theoretical foundations of the diverging attitudes taken are unimportant to the extent that none of them can claim to be generally valid.[54] The members of the United Nations are faced with the difficult task of finding provisions acceptable to all without jeopardizing the manifold benefits mankind could derive from remote sensing.[55] The difficulty of this task is enhanced by the incorporation of those factors not discussed which likewise exercise some influence on the final attitude adopted by the individual States. Particular attention should be drawn to technical constraints, the economic relevancy of data, the financial aspects of systems utilization and the necessity of international cooperation. By including both these and other factors, the importance of the fundamental set of problems described above is relativized. At the same time, however, the complex interdependence of the various points of view complicates the necessary reduction of subjects to clear statements of the problems at stake. The latter might increase the danger of precipitate answers.

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[53]For instance, this seems to apply to Marxist ideology which—like Christianity—is based on a doctrine which declares its statements to be generally valid truths, principles independent of time and space. In this connection, Istvan Kovacs says of the development of socialist constitutions: "... from the first day of their appearance, the socialist constitutions ... embody not only the institutions of the state, but also those of society, and not only social relationships governed by law, but also extensive spheres of legally not controlled social relationships ... in the consecutive stages of socialist constitutional evolution, the sphere of social relationships covered by the constitution tends to expand...". I. Kovács, New Elements in the Evolution of Socialist Constitution 71 (Budapest, 1968). According to this thesis, state and society would gradually merge to become a unity which totally encompasses the individual.

[54]It should be recalled, however, that the Outer Space Committee and its sub-bodies are bound by articles 13, 55 and 56 of the U.N. Charter. When drafting the remote sensing principles, they will therefore have to seek regulations that help promote, in the words of article 55, "(a) higher standards of living, full employment, and conditions of economic and social progress and development; (b) solutions of international economic, social, health, and related problems; and international cultural and educational cooperation; and (c) universal respect for, and observance of, human rights and fundamental freedoms for all without distinction as to race, sex, language, or religion".

[55]According to the recommendations by the Committee on the Peaceful uses of Outer Space that need be confirmed by the General Assembly, the Legal Subcommittee at its next session, in 1976, will have to "continue its detailed legal consideration of remote sensing from space of the earth ... with a view to identifying further common elements among the views of States" and "proceed to the drafting of principles in regard to those particular areas of the subject where common elements in the views of States are identified." See The Draft Report of the Committee on the Peaceful Uses of Outer Space on the Work of its Eighteenth Session, U.N. Doc. A/AC.105/L.85/Add.4, (1975).

ECOSPACE AND SOME OF ITS LEGAL IMPLICATIONS***

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A. INTRODUCTION

Ecospace—the economics of outer space—is a controlling factor in the future use of outer space for peaceful purposes for all people. The 1975 Presidential Program of the American Bar Association in Montreal, Canada contained a discussion by a group of distinguished Soviet and United States panelists, including an American astronaut and a Soviet cosmonaut. They reached informal consensus on four matters: (1) an extension of the 1972 U.S.-U.S.S.R. Agreement on Cooperation in Space;[1] (2) the desirability of further joint space programs in the interest of world peace; (3) the desirability of joint space and multilateral space cost sharing; and (4) the desirability of full publicity to bring outer space national benefits to governments, industry, and the individual.

The United States has spent over $80 billion on its combined civilian and military space programs and over half a million people will have been employed directly in American space endeavors.[2] No corresponding data are available from the Soviet Union because of their policies of secrecy in this regard. Nevertheless, experts who have considered the available physical evidence of space activity conclude that in real terms the Soviets have committed a similar amount of resources.[3] The ability of the two leading space powers[4] to continue their space activity depends on the availability of existing resources: finances, manpower, laboratories, factories, launch sites, tracking facilities, and launch vehicles. The critics of expenditures for the space program consistently argue that such resources—especially the billions of dollars and the

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[1]Agreement on Cooperation in Space, May 24, 1972, [1972] 23(1) U.S.T. 867; T.I.A.S. No. 7347. Reproduced in 1 J. Space Law 95 (1973).

[2]Sheldon, United States and Soviet Progress in Space: Summary Data Through 1974 and a Forward Look 1 (Congr. Res. Serv., Library of Congress, 1975).

[3]Hesman, Arms, Men and Military Budgets, 19 Sea Power 154 (May, 1976).

[4]Other nations who have demonstrated earth orbital launch capability include Australia, France, India, Italy, Japan, People's Republic of China, and the United Kingdom. Interview with Dr. Charles S. Sheldon II, Chief, Science Policy Research Division, Library of Congress, August, 1975.

manpower—should be directed to solving man's more immediate and Earthbound problems.[5]

Neither these criticisms nor the glowing incantations on how the conquest of space will benefit mankind show an accurate picture. The space programs of neither the U.S. nor the U.S.S.R. have been "bargains". But a careful and thoughtful look at the goals set, achieved and the benefits derived reveals that they have been the wisest investments these countries have made.

This study purports to set forth some of the intangible benefits of the space program. However, it should be remembered that the intangibles are equally important. Such factors as national pride, international good will, and a nations prestige cannot be measured in dollars and cents, but are invaluable assets. Finally, through the space programs, man has come to realize both the frailty of his own Earth system and the unlimited ability he has, when coupled with the will, to deal with its problems.

B. COST OF THE SPACE PROGRAM

The $80 billion spent thus far by the United States needs to be put into perspective. It is the total amount spent from the beginning of the space program in 1959 by the several governmental agencies involved, such as the National Aeronautics and Space Administration (NASA), the Department of Defense, the Atomic Energy Commission, the Weather Bureau and the National Science Foundation. These expenditures reached a peak of $7.7 billion in 1966,[6] and in 1975 were about $5 billion with $3.2 billion for N.A.S.A. alone.[7] At the peak, the United States was spending close to one percent of the gross national product.[8] Today it is spending *under* 1/2 of one percent.[9] The Soviet Union does not publish space budget data. Because they fly a greater weight of hardware, it is assumed that their program is at least of the same magnitude as that of the United States at its former peak, and may be larger. Their gross national product is thought to be about half that of the United States and therefore they probably spend about two percent of their gross national product on space programs.[10]

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[5]Remarks by Capt. Alan Bean, U.S. Astronaut during the U.S.-U.S.S.R. Aerospace Panel, A.B.A. Presidential Program. A.B.A. Annual Meeting, Aug. 11, 1976 (Montreal, Canada).

[6]Figures taken from U.S. Dept. of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1974 at 224 (94th ed.); Sheldon, United States and Soviet Progress in Space: Summary Data Through 1974 and a Forward Look, *supra* note 2; and interview with Dr. Charles S. Sheldon II, *supra* note 4.

[7]The 1976 N.A.S.A. Budget is for $3.539 million. This is a $300 million increase from 1975, but the effective increase is only about $100 million, or just about 3 percent. This figure should be compared to the current much higher inflation rate. 6 N.A.S.A. Activities 3-4 (Feb. 1975).

[8]*Supra* note 5.

[9]*Id.*

[10]*Supra* note 3.

The manpower commitment has been equally great. In the United States, the NASA program alone at its peak employed about 400,000 people, but now has dropped to about 150,000.[11] This figure does not include the indirect beneficiaries of the space program from the multiplier effect of these expenditures, nor does this figure emphasize the dependence of some regions upon space expenditures. The Soviet Union does not disclose how many people are employed in their space programs. The productivity of this work force in comparison with that of the United States is not known, either. One would like to think that U.S. productivity is higher, but some Soviet attitudes to space development may be simpler than the American approach which incorporates very extensive testing and duplicative facilities in industry.[12] The Soviet work force may be close to 600,000 people because their effort today seems to be at least equal to the U.S. 1966 peak.[13] In short, the Soviet space program is picking up at an accelerating rate just when inflation, Government cutbacks and public apathy are curtailing the American program.[14]

Having lost the "race" to the moon, the most immediate national project for the Soviet Union seems to be the development of a long-term laboratory in earth orbit, lofted into space in sections and assembled there as a permanent space station.[15] The Soviets are expected to move to fill the void left in the wake of the U.S. Apollo programs by developing their own space shuttle. It is their practice to make up in volume what they may lack in American-type precision. In 1974 alone, the U.S.S.R. launched 91 objects, or nearly four times as many as the United States and they have already learned how to loft some communications satellites into orbit eight at a time.[16]

To date the United States has made only 770 successful launches compared to the Soviet Union's 934.[17] Five separate programs (Mercury, Gemini, Apollo, Skylab and Apollo/Soyuz Test Project) totalling 31 missions sent 44 U.S.astronauts to log a total of 22,468 hours in space.[18] More importantly, not one American astronaut was

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[11]Remarks by Capt Alan Bean, *Supra* note 5; E. Finch. The United Nations and Earth Resources Satellites, 7 Int'l Lawyer 158-164.

[12]*Id.*

[13]*Id.*

[14]"U.S. Astronauts Report Soviet Program on Rise," N.Y. Times, May 15, 1975, at 86.

[15]Success and experience in long-term space laboratories would give the Soviets the expertise to send a manned mission to Mars. It is also suggested that the Soviets may attempt to beat the U.S. by putting instruments on Mars capable of detecting life, see " 'Race to Mars'—Soviets May Beat U.S.," The Christian Science Monitor, Aug. 19, 1975, at 1.

[16]"End of Apollo Opens Way for the Shuttle," N.Y. Times, July 25, 1975 at 8.

[17]U.S. Bureau of the Census, *supra* note 6; Information provided by Dr. Charles S. Sheldon II, *supra* note 4.

[18]"Manned Space Flight—The First Decade", N.A.S.A. Facts (1973). In terms of manned spaceflight the costs and goals attained may be broken down by program. *See generally,* Canby, Skylab: Outpost of the Frontier of Space, 146 National Geographic 441 (1974); Bergman, A Look Behind the U.S.—Soviet Space Flight, Family Weekly 5 (June 22, 1975; see also *supra* note 16.

lost or injured during a space flight or upon its completion.[19]

C. CORNUCOPIA FROM THE SPACE PROGRAM

The space program has paid for its cost many times over by the scientific perspective it provides—first from the deep insights into the Earth gained from studying other planets, and second from the new knowledge acquired about Earth by looking at it from space.[20]

1. Earth Surveying

In terms of benefits from Earth surveying space activities, the *Landsat* satellites[21] are the outstanding performers. The Soviets calculate their benefits in the range of 5 billion rubles a year in agriculture, geology, geography, and oceanography.[22] A recent report by the U.N. Secretariat listed specific monetary benefits from the earth surveying programs in more than 20 countries.[23]

Of 85 applications studied in the American report for remote sensing information 43 are considered to have valid benefit estimates totalling about $1.4 billion in gross annual benefits. These include: $12.5 million for mapping relative to mineral exploration; $20 million for estimates of crop vigor and yield; $125 million for expediting exploration of petroleum; $326.8 million for improved forecasts of irrigation water availability benefits; $382.9 million for improved timeliness and accuracy of world wheat production forecast benefits.[24]

In addition, requests for *Landsat* information have generated a revenue of their own. The response has been nothing short of phenomenal. The National Aeronautics and Space Administration reports $2 to $2.5 million a year in sales of Earth survey information. This figure has been doubling annually since *Landsat-1* was launched in 1972 and is expected to increase.[25]

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[19]The Soviets lost four cosmonauts on Soyuz I and VI, and U.S. Astronauts Grissom, White and Chaffee were lost in the launch pad fire of Apollo I in 1967.

[20]"Lots of Space Mysteries Still Left to Explore," U.S. News and World Report, May 19, 1975, at 69.

[21]Landsat-1 (formerly ERTS-A) was launched in 1972 and is still in operation, Landsat-2 was launched in 1975, and Landsat-C is scheduled for launch in 1976.

[22]12 Astronautics & Aeronautics 67 (Dec. 1974).

[23]"Summary of Studies on Cost Effectiveness in Remote Sensing," Report by the Secretariat, U.N. Doc. A/AC.105/139, at 11-16 (1975).

[24]*Id.* at 16.

[25]*See* Bylinsky, ERTS Puts the Whole Earth Under a Microscope, 91-1 *Fortune* 117, 130 (Feb. 1975). As a result of sales and activity in earth survey information new publications have appeared (*e.g.* Remote Sensing of Environment, an interdisciplinary journal) and proceedings from annual international symposia on remote sensing have been published (*e.g.* Proceedings on Remote Sensing Symposia, Environmental Research Institute of Michigan).

In the decade ahead, resources issues will have increasing social and economic importance. The danger of famines, depletion of minerals and other natural resources, and permanent changes in the ecology face all nations. Resource decisions need early accurate inventories and projections. In many instances, the real economic problem does not arise in production, but in distribution to those in need. If American plans for *Landsat-C* are cancelled for budgetary reasons, then other governments or the private sector must step in to guarantee a continuity of Landsat-type data. Only a commitment to long-term continuity of service will attract investors and allow realization of the full potential of remote sensing.[26]

2. **Communications and Meteorology**

Communications satellites already have more than repaid the cost of their development and launching and, in fact, became commercially profitable within their first decade of operation.[27] This technology application is most obvious to TV viewers. In 1960, one could not send live TV across the Atlantic; by 1965, it became possible but expensive. By 1969, as a result of the space program, the quality has been improved and the cost reduced to one-fifth of the 1965 rate.[28] At present, communications satellites are used largely for transoceanic traffic, providing economical links across the Atlantic, Pacific and Indian Oceans. Before satellites, a West Coast-to-Japan cable circuit cost $15,000 per month; today, the Communications Satellite Corporation (Comsat) offers the same service at a charge of $4,000 per month.[29] In addition, satellites which directly broadcast television to community receivers are demonstrating their potential for delivering educational, medical and other services to remote and hitherto unreachable populations. This could be a tool of immense importance to developing countries seeking to raise the literacy of their people on a mass scale.[30]

It is becoming apparent that satellites will soon handle domestic communications as well as transoceanic traffic. In 1960, there were fewer than 75 million phones in America. There are now about 120 million. In 1960, Americans made about 18 billion calls, this year, about 200 billion.[31] The point is fast approaching where cables will not be able to handle the entire communications load of this country. Our domestic

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[26]"Remote Sensing: A good Business Proposition?," 13 Astronautics and Aeronautics 5 (July/Aug., 1975).

[27]"Space Benefits," N.A.S.A. Facts—(1974).

[28]*Id.*

[29]*Id.*

[29]*Id.*

[30]See generally, The Aspen Institute Program on Communications and Society and the Office of External Research of the Dept. of State, Control of the Direct Boradcast Satellite: Values in Conflict (1974).

[31]"Space Benefits," *supra* note 27.

satellite systems should soon offer a whole range of services including low-cost message, data, and television transmission from coast-to-coast and anywhere in between.[32]

Weather satellites, too, yielded almost immediate practical returns from the investment in space research and now provide constant daily information to the National Weather Service, National Oceanic and Atmospheric Administration. The continued improvement in techniques of interpreting data and the improvements in the satellite itself offer the possibility of accurate weather forecasting over vast regions. Space observation of weather patterns on a global scale offers the only hope of understanding weather movement, global temperature, and global wind patterns, which is necessary for long-range forecasts.

An accurate five-day forecast of weather conditions over the United States can provide an estimated annual savings of $6.75 billion when applied to agriculture, lumbering, transportation, retail marketing, and water-resources management. This savings alone would be more than the cost of the U.S. space program in any single year.[33] Accurate long-range forecasts could lead to savings of at least: $70 million annually from flood and storm damage; $1 billion a year to the construction industry; $500 million a year to fuel and electric power industries; $500 million a year to fruit and vegetable producers; $450 million annually to livestock producers.[34] The Soviet Union, usually the most conservative in putting a value to space technology, calculates benefits in the range of 100 billion rubles a year from applying space-based meteorology and communications.[35]

3. Technology Utilization

Space technology has a multiplier effect in the economy on individuals and industries that can adapt it for their own problems and uses. The list of benefits from technology generated by the space program is a long one.[36] Space flight technology

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[32]Western Union has already launched a satellite for U.S. domestic service. Others are planned by COMSAT by contract with RCA, American Satellite, and AT&T (statement from office of Telecommunications Policy, Sept. 1975).

[33]"Space Benefits," *supra* note 27.

[34]"Space Benefits," *supra* note 27.

[35]13 Astronautics & Aeronautics 67 (July/Aug. 1975). This issue contains a summary of the 26th International Astronautical Federation Conference.

[36]*See* Staff of Senate Comm. on Aeronautical and Space Sciences, 93d Cong., 1st Sess., Toward a Better Tomorrow With Aeronautical and Space Technology (Comm. Print, 1973); Staff of House Comm. on Science and Astronautics, 93d Cong., 2d Sess., For the Benefit of all Mankind: The Practical Returns From Space Investment (Comm. Print, 1974); Staff of Senate Comm. on Aeronautical & Space Sciences, Space Benefits— The Secondary Application of Aerospace Technology in Other Sections of the Economy, 94th Cong., 1st Sess., (Comm. Print, 1975); N.A.S.A., Technology Utilization Program Report 1974 (N.A.S.A. Publ. SP-5120: 1975). *See generally* 5-6 N.A.S.A. Activities (April 1972-Aug. 1975). For the importance of manned missions in space, see 13 Astronautics and Aeronautics 65 (July/Aug. 1975).

has been used for such diverse purposes as law enforcement equipment systems, pollution control, air transportation, maritime port planning, personal rapid transit, solar energy conservation in housing, and management of natural resources.[37] From this geometric explosion of technology another industry has been spawned—technology utilization.

Technology utilization is the deliberate, structured and planned system for adapting and applying N.A.S.A. technology to industrial, medical, and social problems. Its successful application to such varied and significant public problems as cataract surgery, burn diagnosis and treatment, fire fighting safety, and low-cost household wiring again demonstrates that productivity and quality of life improvements are dividends of the national aerospace investment. In 1974, 4,200 industrial firms throughout the country spent nearly one million dollars for access to space-generated technology through the regionally located Industrial Applications Centers. These users are industries which do not want to "reinvent the wheel" when NASA may have already done so. Over 6,000 technical innovations from the space program are now available for use.[38]

For industry and the individual, this program means access to a data base of more than 3.5 million items, not only generated by N.A.S.A. but from all over the world. One such facility at the University of Connecticut—the New England Research Application Center (N.E.R.A.C.)— has over 3.5 million items and is growing at the rate of about 100,000 pieces of data a month. In 1975 N.E.R.A.C. received about 3,000 requests from about 200 different companies and is growing at the rate of 10 percent a quarter. For as little as $1,700 a company may request the answer to any number of questions if asked one at a time. The answers usually come within five days, 85 percent are processed within ten.[39] With the commitment and efficiency that took man to the moon and satellites to the end of the galaxy, N.A.S.A. technology has been made available to fulfill public and private needs.[40]

4. The Rule of Law in Space

From the birth of N.A.S.A. in October, 1958, the space program of the United States has been dedicated to the concept that space would be the common heritage of mankind and used for peaceful pruposes.[41] Incorporating these and similar ideas put

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[37]The Aerospace Corporation (Annual Report, 1974), at 9-24.

[38]N.A.S.A., Technology Utilization Program Report 1974 (N.A.S.A. Publ. SP-5120: 1975, at i. 1-4). Another organization which attempts to speed the movement of new ideas and processes from the laboratory to the market place is the M.I.T. Development Foundation, Inc. "M.I.T's. Hothouse for New Ventures," N.Y. Times, Aug. 24, 1975, sec. 3 at 5.

[39]Interview with Dr. Daniel U. Wide, Director of N.E.R.A.C., Aug. 1975.

[40]See N.A.S.A., *supra* note 38 at iii.

[41]National Aeronautics and Space Act, Sec. 102, 42 USC 2451 (1974), 72 Stat 426.

forth by the Soviet Union,[42] a United Nations General Assembly resolution was passed which recognized outer space, its peaceful uses and exploration to be the common interest of "mankind" with benefits for states "irrespective of the stage of their economic or scientific development"[43] The resolution which seeks to avoid obstructing national rivalries, emphasizes "international cooperation for peaceful purposes."[44] There was to be a mutual exchange and dissemination of information on outer space research and these basic tenets became "the principles of outer space." The 1967 Outer Space Treaty, now adhered to by more than 70 nations incorporates these tenets and adds the denial of national sovereignty in outer space and the freedom peacefully to use, explore, and investigate there for all states.[45] Variations and elaborations on these principles are found in each subsequent space treaty: 1968 Agreement on the Rescue and Return of Astronauts,[46] 1972 Liability convention[47] and the 1975 Registration Convention.[48]

Today the United Nations including the General Assembly, the Secretariat, the specialized agencies, and especially the Committee on the Peaceful Uses of Outer Space (hereinafter Outer Space Committee), continues to promote the rule of law in outer space and to study the technical and legal problems likely to arise in space exploration.[49] The Outer Space Committee, at the conclusion of its 18th Session in June 1975, noted its future work to be such matters as the draft of a Moon treaty, remote sensing of the Earth from space, and direct broadcasting by satellite.[50]

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[42]See generally, A Piradov (ed.), International Space Law (Moscow, 1974); V. Vereschchetin, Space, Cooperation, Law (Moscow, 1974; N.A.S.A. Translation); S. Lay and H. Taubenfeld, The Law Relating to Activities of Man in Space (1970; J. Fawcett, International Law and the Uses of Outer Space (1968); Dembling and Arons, The Evolution of the Outer Space Treaty, 33 J. Air L. & Comm. 419 (1967).

[43]G. A. Res. 1721, 17 U.N. G.A.O.R. Supp. 17 at 6, U.N. Doc. A/5026 (1962).

[44]*Id.*

[45]Treaty on Principles Governing the Activities of State in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, [1967] 18 (3) U.S.T. 2410;T.I.A.S. No. 6347.

[46]Agreement on the Rescue of Astronauts, The Return of Astronauts, and the Return of Objects Launched Into Outer Space (1968), 18 (3) U.S.T. 2410, T.I.A.S. No. 6599.

[47]Convention on International Liability for Damage Caused by Space Objects, [1973] 24(2) U.S.T. 2389; T.I.A.S. No. 7762.

[48]Convention on Registration of Objects Launched Into Outer Space, U.N. Doc.A/RES/3235/XXIX (Nov. 26, 1974), reproduced in 3 J. Space L. 99 (1975).

[49]The technical, economic and social implications of space endeavors and technology utilization are usually studied by the Scientific and Technical Subcommittee of the Outer Space Committee, the Secretariat, and the U.N. expert in charge of space applications. The legal aspects of space utilization are usually studied by the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space.

[50]Report of the Committee on the Peaceful Uses of Outer Space, 13 U.N. G.A.O.R. Supp. 20, U.N. Doc. A/10020, at 4-6 (1975).

Reflecting a recognition of the fact that Space Shuttle craft will mean permanent lunar missions and space stations, the Legal Subcommittee of the Outer space Committee must resolve questions of the Moon's natural resources, the scope of a Moon treaty and the information to be furnished on missions to the Moon. Remote sensing of the Earth from space poses several legal puzzles as to national sovereignty.[51] A consenus has been reached that their solution will depend on the answer to the fundamental question of whether a state has sovereign rights over the dissemination and use of information pertaining to its natural resources.[52] Similarly, principles to govern direct broadcast satellites will turn on considerations of whether a state has sovereign rights to control absolutely the flow of information into its territory.[53] As the quantity of space activity increases, a consensus must be reached on matters relating to the definition and delimitation of outer space and outer space activities.

The Outer Space Committee and the United Nations will continue to provide the most optimal forum for airing exploration of space. The precedent is commendable—no satellite has been destroyed in space by other than the launching state. As long as the mission is for peaceful purposes, it is now recognized that any interference would violate principles of international law and treaty obligations.

5. International Cooperation and Exchange of Information

Until the successful "handshake in space" during the Apollo/Soyuz Test Project (A.S.T.P.), international cooperation in space had been a more subtle legacy of our space program. Starting with the International Geophysical Year in 1958 to the 1974-75 Global Atmospheric Research Program,[54] the United States has joined other nations in a solid history of effective and productive international cooperation in space sciences. In addition, N.A.S.A. has current international cooperative programs with West

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[51]*See,* Background Paper by the Secretary-General Assessing United Nations Documents and Other Pertinent Data Related to the Subject of Remote Sensing of the Earth by Satellites, U.N. Doc. A/AC.105/118 (1973); Finch, The United Nations and Earth Resources Satellites, 7 Int'l. Lawyer 158 (1973); Dalfen, The International Legislative Process: Direct Boradcasting and Remote Earth Sensing by Satellite Compared, 10 Can. Y. B. Int'l L. 186 (1972); Packard, International Legal and Political Aspects of Earth Reources Surveying by Satellite, American Institute of Aeronautics and Astronautics Paper No. 70-331 (1970).

[52]Moore, Earth Resource Satellites, A Puzzle for the United Nations, 16 Harv. Int'l. L. J. 649 (1975).

[53]See Aspen Institute, *supra* note 30. Am. Soc. of Int'l Law, Direct Broadcasting from Satellites: Policies and Problems, Studies in Transnational Legal Policy No. 7 (1975); and Gotlieb, Dalten, and Katz, The Transfer of Information by Communications and Computer Systems: Issues and Approaches to Guiding Principles, 68 Am. J. Int'l L. 227 (1974).

[54]Scheel, GATE: Doing Something about the Weather, *Sea Power* 25 (March 1975).

Germany, Japan and the Soviet Union.[55] For global problems, it is obvious that only systematic, organized global efforts can hope to discover solutions.

N.A.S.A. continues its policy of launching, on a reimbursable basis, payloads for industry and other nations.[56] In 1974, the majority (9) of the payloads launched by N.A.S.A. were international in character. They were launched jointly with, or for, the United Kingdom, France, Germany, and the Netherlands. The only *caveat* is that the purpose of the mission must be in line with the Outer Space Treaty.[57] The Landsat program involves participation of more than 35 countries and various international organizations, educational institutions and private industry.[58] Our manned flights, from Gemini to Skylab and A.S.T.P., performed experiments the results of which were used by international principal investigators. This practice will continue in connection with the Space Shuttle and appropriate invitations to governments, international organizations, agencies and individuals to propose experiments for particiation in life sciences investigations have already been issued.[59]

The United States has been committed from the start of its space efforts to the free release of all scientific and technical results from its missions, as well as open coverage of all N.A.S.A. launches.[60] Now, in the second decade of space exploration, these principles have guided all of N.A.S.A.'s programs and have influenced other space powers.

The national policy on remotely sensed information was announced before the U.N. General Assembly in 1969. *Landsat* and the Earth Resources Experimental Package (E.R.E.P.), which flew on Skylab, were "dedicated to produce information not only for the United States, but also for the world."[61] The United States would "share both the adventures and the benefits of space....the effort marked by the same spirit of fraternal cooperation that has so long been the hallmark of the internatinal community of

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[55]See Robinson, N.A.S.A.'s Bilateral and Multilateral Agreement—A Comprehensive Program for International Cooperation in Space Research, 36 J. Air L. & Comm. 729 (1970), containing a fairly detailed discussion of the effectiveness of N.A.S.A.'s past bilateral and multilateral cooperative undertakings. N.A.S.A.'s current international efforts are summarized in N.A.S.A., Aeronautics and Space Report of the President: 1974 Activities 7-40, 79-83 (N.A.S.A., 1975).

[56]Remarks by Capt. Alan Bean, U.S. Astronaut, *supra* note 5.

[57]*Cf. supra* note 41.

[58]Finch, The United Nations and Earth Resources Satellites, 7 Int'l. Lawyer 158-164 (1973); NASA, ERTS (NASA publ., 1972).

[59]Interview with Dr. Charles Sheldon and Mr. Stephen Doyle, NASA Headquarters, Wash., D.C., Aug. 1975.

[60]J. Barbour, Footprints on the Moon 42 (1969), (quoting President Kennedy); *See also* National Aeronautics and Space Act, *supra* note 41, § 102(c).

[61]President Nixon's address before the U.N. General Assembly, "Strengthening the Total Fabric of Peace," 61 Dept. State Bull. 297-301 (Oct 6, 1969).

science."[62] America has more than fulfilled this promise—selling all remote sensed data at minimal cost; offering the services of specialists to aid in their interpretation; hosting panels, workshops and instructional seminars; providing the Outer Space Committee with copies of *Landsat* raw data; and supporting efforts to establish an international regional data storage and dissemination center for the informatin from receiving stations here and in Canada, Brazil, Italy, and Iran.[63]

The United States took the initiative in developing international agreements on space and space law.[64] Bilateral agreements with Mexico, Brazil, and Canada set ground rules for the cooperative efforts in research and utilization of data from earth resources surveys by aircraft and spacecraft.[65] A 1971 U.S.-U.S.S.R. Agreement on Space Cooperation between N.A.S.A. and the Soviet Academy of Sciences set up schedules for the exchange of scientific data and for cooperation in the study and coordination of experiments.[66] The 1972 memorandum of understanding set in motion the joint space effort that culminated in Apollo/Soyuz.[67] It is this 1972 memorandum that should be extended as noted above. Formal extensions would enable outer space international law and science to advance together. The United States also has completed an agreement with the member governments of the European Space Research Organization (E.S.R.O.),[68] and N.A.S.A. has signed a memorandum of understanding with E.S.R.O., now the European space Agency (E.S.A), for a cooperative program concerning the development, procurement and use of the space laboratory to be flown by Space Shuttle.[69] To this end, E.S.A. has already committed more than $400 million.[70] Canada is also participating by developing and manufacturing the remote manipulator system, or "mechanical arm", at a cost of about $30 million.[71]

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[62]*Id.*

[63]*Id.*

[64]*Id.*

[65]*But see,* A Piradov (ed.) International Space Law (Moscow, 1974), setting forth the proposition that the Soviet Union acted alone.

[66]*See* Earth Resources Agreement with Brazil, Sept. 10, 1968, [1968] 19(5) U.S.T. 6066, T.I.A.S. No. 6569; Earth Resources Agreement with Mexico, Dec. 20, 1968, [1968] 19 (6) U.S.T. 7809, T.I.A.S. No. 6613; Letter plus annex from Marcel Cadieux (Ambassador of Canada) to the U.S. Secretary of State, May 14, 1971.

[67]Agreement on Cooperation in Space, *supra* note 1.

[68]Agreement Between the Government of the United States and Certain Governments, Members of the European Space Research Organization, reproduced in 2 J. Space L. 53 (1974).

[69]Memorandum of Understanding Between N.A.S.A. and E.S.R.O., Hearings before the Committee on Aeronautical and Space Sciences of the U.S. Senate on Space Missions, Payloads and Traffic for the Space Shuttle Era, 93d Cong. 1st Sess., pt. 1 at 121-134 (Oct. 30, 1973), reproduced in 2 J. Space L. 40 (1974).

[70]Interview with Dr. Charles S. Sheldon III and Mr. Stephen Doyle, N.A.S.A. Headquarters, Washington, D.C. (Sept. 1975).

[71]Interview, *supra* note 59.

With Apollo/Soyuz, the U.S.S.R. allowed foreign media representatives to view a launching for the first time. Before that only American astronauts and technicians were allowed to visit their space operation headquarters and become familiar with the Soyuz spacecraft.[72] In addition to being a necessary element for the success and safety of the Apollo/Soyuz mission, these precedents provide a foundation for continued exchanges and a more open policy by the Soviet Union toward the rest of the world concerning its space activities.

After the successful conclusion of the Apollo/Soyuz linkup, it is hoped that the flow of information—scientific, technical, economic—will be more balanced. The pattern of bilateral and multilateral agreements have successfully promoted cooperation in outer space, and has kept it open for peaceful uses. Similar cooperation in other areas would certainly aid in relieving tensions in the world and facilitate the quest for solutions to national as well as global problems.[73]

D. THE CHALLENGE OF THE FUTURE

A four-year pause in manned space flights has begun. Operating within a fixed budget of slightly more than $3 billion a year, N.A.S.A. will continue during this period a large program of launching unmanned communications and scientific satellites into orbit around the Earth and sending vehicles toward Mars, Venus, Jupiter, and Saturn. For the first time a N.A.S.A. budget has no new project starts.[74] In terms of immediate impact, the significance of this fact is alarming. For the future it will mean an eventual "drying up" of the expertise, manpower and equipment that should have been committed five or ten years earlier. The technology now being utilized so successfully did not grow in a vacuum but from clearly defined national goals. A new commitment and new goal definitions will be mandatory for the already extensive benefits to accrue and continue to increase in the future.

Rising costs have affected other space programs as well. International cooperation with a sharing of equipment and knowledge is the necessary key to future exploration.[75] The catalogue of possible subjects for joint, international endeavors includes an International Solar System Decade, energy from space, space manufacturing, Earth resources, direct broadcast satellites, space shuttles and space stations, space colonization, voyages outside the planetary system, scientific experiments that can only be done in space, and space medicine.[76] In the spirit of the Outer Space Treaty, any

[72]J. Bergman, A Look Behind the U.S.-Soviet Space Flight, Family Weekly, June 33, 1975 at 5; U.S. Newsmen Visit Soviet Space Center, N. Y. Times, May 14, 1975, at 8.

[73]Waldheim, Space Can Unite Nations, 13 Astronautics and Aeronautics 21 (Sept. 1975).

[74]"U.S. Aide Forecasts Huge Rise in Solar Panel Energy", N.Y. Times, April 30, 1976, Sec. D, p. 17. See also Hessman, *supra* note 3.

[75]Statement of the Soviet space expert Viktor Bayov, N.Y. Times, July 20, 1975, at 48.

[76]12 Astronautics and Aeronautics 69 (Dec. 1975).

combined missions would reflect a truly international effort to explore space and celestial bodies for peaceful purposes and man's benefit. Rising costs make it mandatory that the billions in expense be shared not only by the major space powers but also by other states.

1. The Space Transportation System

N.A.S.A., of course, has not abandoned manned space flight. The Space Shuttle era will begin approximately 20 years after our first venture into space, the launching of Explorer I on January 31, 1958. Since that date, unmanned satellites have probed the near and distant reaches of space, and manned systems have been used to explore the lunar surface. In order to serve the future needs of space science and its applications, technological and operational experiences underlying these accomplishments are being applied to the development of the Space Shuttle.[77] This vehicle is the basic element in a space transportation system which includes a sortie lab and space tug and will open a new era of routine operations in space.[78]

The first American satellite, *Explorer I,* cost more than $100,000 a pound to place in orbit.[79] When the largest present launch vehicle (*Saturn V*) is used, the cost is less than $1,000 a pound.[80] By avoiding the cost of a launch vehicle and recovery at sea, Space Shuttle should reduce space flight costs to about one-tenth of the presnt level.[81] It is estimated that by using the Shuttle the cost of placing a payload in near earth orbit could be as little as $1 per pound, and of placing a payload on the moon could be as little as $5 per pound.[82]

2. Space Contamination and Pollution

It is anticipated that, in the future, contamination, both forward and back, will pose a problem for manned and unmanned space flights.[83] Forward contamination

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[77]End of Apollo Opens Way for Shuttle, N.Y. Times, July 25, 1975, at 8; M. Mallzivo, Space Shuttle: The New Baseline, 12 Astronautics and Aeronautics 62 (Jan. 1974); N.A.S.A., Environmental Statement for the Space Shuttle Program (N.A.S.A. publ., 1972); Space Benefits, *supra* note 27; Interview with NASA Information Officer, NASA Headquarters, Wash., D.C., Aug. 1975.

[78]*Id.* For example, the Large Space Telescope (LST) scheduled to be lifted into orbit by the Space Shuttle in the early 1980's is intended greatly to extend the range of man's vision into the universe. *See* 7 Industrial Research 18 (Aug. 1975); American Insitute of Aeronautics and Astronautics, Large Space Telescope (AIAA publ., 1975).

[79]Space Benefits *supra* note 27.

[80]*Id.*

[81]*Id.*

[82]See Sheldon note 3 *supra.*

[83]Robinson, Earth Exposure to Martian Matter: Back Contamination Procedures and International Quarantine Regulations, Proc. 18th Colloquium on the Law of Outer Space 134 (1976).

could be carried to a planet. Billions of bacteria were deposited on the Moon from manned exploration. Fortunately, the Moon's surface—exposed to extreme heat and cold and hard radiation—is self-sterilizing. But Mars is not. If there is life on Mars, then manned exploration there might produce some problems for the Martians,[84] and if there are Martian micro-organisms, for the astronauts and for us on their return.[85] The attempt to protect the Earth from contact with lunar samples failed repeatedly because of laxity in the enforcement of quarantine procedures.[86] If the Moon had harbored virulent micro-organisms, it is believed there might have been a plague on Earth. With a planet such as Mars, the danger is greater.[87]

If sufficient concern and attention are not given at the outset to all aspects of reducing the risk of back contamination in the Mars surface sample return mission, establishment of technologically viable, politically sensitive, and legally responsible back contamination programs will suffer.[88] The possibility of introducing to Earth's biosphere an alien life form or toxic substance, either of which might cause an insidious low-grade infection or a catastrophic biological accident, is a serious risk that must be addressed responsibly not only by scientists but also by lawyers.

The simple economics of the Mars surface sample return mission make international cooperation and involvement essential. It is infinitely easier to obtain governmental and citizen support if these costly undertakings are shared internationally, and there already exists a broad international scientific interest in Mars surface samples.[89] Precisely what constitutes an acceptable level of risk of biological, vector or toxic contamination in returning Martian surface samples to Earth will involve weighing the views of persons from disciplines, including scientists, engineers, public health officials, legislators, economists, lawyers and general public opinion.

The large number of flights scheduled for an operational Space Shuttle may result in environmental problems of its own. The amount of nitrogen oxide and sulfur oxide released from supersonic transport flights, subsonic planes, and space launchings presents serious possibilities for reducing the ozone layer around the Earth, thereby letting in harmful ultraviolet light and changing climatic conditions.[90] Traced by

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[84]*Cf.* H. Wells, The War of the Worlds (1848), describing a fictional invasion of the earth that was stopped when earth bacteria infected Martian invaders; *cf.* also M. Clichton, The Andromeda Strain (1969), depicting a fictional epidemic caused by alien bacteria brought to earth on unmanned space probe.

[85]Robinson, *supra* note 83.

[86]*Id.*

[87]*Id.*

[88]Two methods for returning Martian surface samples are described in Robinson, *supra* note 83.

[89]*Id.*

[90]National Academy of Sciences, Environmental Impact of Stratosphere Flight 8 (1975); 107 Science News 220 (1975).

sounding rockets, these noxious gases stay mostly in the upper atmosphere, where they may stagnate for three years while diffusing laterally all around the world. The problem is obviously global, requiring international regulation on airflight, fuel, and aircraft engines.[91]

3. Solar Power Satellites

Current estimates are that in the year 2000 this country alone will need at least 85,000 megawatts per year of new generator capacity.[92] One of the newest methods being considered for meeting this rising demand is to collect solar energy and relay it to Earth for conversion into electricity.

The basic idea is a large array, either of solar cells or of turbogenerators, located in geosynchronous orbit, about 25,000 miles high, always over a fixed point on the surface of the Earth. There, solar energy would be available more than 99 percent of the time. Solar energy is converted into microwave power, and transmitted from a phased-array antenna, of about 1,000 meters diameter, driven by a large number of small amplifying tubes. At a fixed receiving antenna on the ground about 90 percent of the beam power is contained within a width of about seven kilometers. An overall transmission efficiency of about 56 percent has been demonstrated in tests. The target figure is from 63 to 70 percent which seems close to realization. The cost estimated for a first satellite power station is about $9.37 billion.[93]

Increased utilization of the radio frequency presents the problem of user conflict with navigation, communications, and meteorological satellites.[94] Careful study will have to be made to (1) insure the integrity of the other systems using the geostationary orbit; (2) investigate the environmental and economic impact of such systems; and (3) provide equal access by the less-technologically advanced nations to this energy source. At the same time, the energy needs of Earth will be growing and the need for a "clean" alternative energy source must be met.[95]

4. Space Manufacturing Research

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[91] *Id.* at 88-90.

[92] O'Neill, Summary of Session on Application and Developments, Space Manufacturing Facilities Conference, Princeton University, May 7-9, 1975.

[93] Arthur D. Little, Inc. would use solar cells while Boeing Aerospace Co., as an alternate would use turbogenerators. Dr. O'Neill's summary includes a comparison and criticism of both concepts and their respective costs. O'Neill, *supra* note 92.

[94] The International Telecommunications Union World Administrative Radio Conference in 1977 (WARC-ST) will be considering allocation of the 11.7-12.2 GHZ band and weighing the competing users, present and future.

[95] A phased development program for a satellite solar power station (SSPS) started in 1975 could not result in an operational system until 1977. A flight experiment will be done by 1985, with a prototype by 1992. Arthur D. Little, Inc., Press Release (1975).

Project Skylab marked the highlight and completion of the first chapter in the history of materials processing under weightlessness. It demonstrated dramatically that elimination of gravity may lead to different and often superior products, as well as to many operations virtually impossible on the surface of the Earth.[96]

Crystals grow larger and purer under zero gravity. Such crystals could make feasible substantial reductions in the size of the components in computers, television sets, and other electronic devices and great improvement in memory capacity. Glass may be produced essentially perfect, without scratches or flaws, thereby solving the problem of tension failure.[97] In the energy-rich environment of outer space, an energy- intensive process such as electrolysis is an economically viable way for obtaining aluminum from the lunar rock plagioclase. The same is true for reducing ilmenite (lunar rock) to titanium and oxygen.[98]

Studies have identified about 50 different research and development topics including, *inter alia,* metals and alloys, composite materials, semiconductor crystals, glasses, and biological substances.[99] The new techniques learned may also find application on Earth as the rich ores that need only simple processes run out. Taking advantage of the unique qualities of the space environment to produce materials which might be more economical to process in space or impossible to produce on Earth will present fascinating new problems for lawyers. Such areas as contracts, licensing agreements, labor law, or, more broadly, the policy decisions on private and public funding of space enterprises will need close examination.[100]

5. Habitats in Space

The dream of 10,000 people working and living in outer space now has firm financial and technical foundations. In recent seminars on the feasibility of space stations it was concluded that space colonies have a future and could be operating by early in the twenty-first century.[101] Reports have been made on specific topics such as

[96]*Cf.* NASA, Aeronautics and Space Report of the President: 1974 Activities, at 4 (NASA publ., 1975); Stuhliner, Materials Processing in Space: A Look Towards the Future, 13 Astronautics and Aeronautics 20 (May, 1975); Bredt and Montgomery, Materials Processing in Space: New Challenge for Industry, 13 Astronautics and Aeronautics 22 (May, 1975).

[97]Hibbs, Summary of Presentations, Space Manufacturing Facilities Conference, Princeton Univ., May 7-9, 1975.

[98]*Ibid.*

[99]Stuhliner, *supra* note 96 at 20.

[100]Robinson, Legal Problems of Sustaining Manned Space-Flights, Space Stations and Lunar Communities Through Private Initiative and Non-Public Funding, 7 Int'l Lawyer 455 (1973).

[101]This idea is based on fabricating totally manmade communities or facilities in stable orbit in earth-moon space. It differs from prior conceptions of "space colonization," *i.e.* the idea of colonizing the Moon or Mars or some other planet. *See generally,* "Princeton Gathering Makes Detailed Assessment of Problems in Establishing a Colony of 10,000 in Space. N.Y. Times, May 12, 1975 at 54; "Space Colonies Getting to be Serious Dreams," N.Y. Times, June 1, 1975, Sec. 4, at 9; "Plan Space Colonies for Next Century," Industrial Research 30-38 (Aug. 1975); "Scientists Consider Space Living Plans," The Christian Science Monitor, Aug. 5, 1975, at 6.

location of the orbiting colonies, materials to be used in their construction, basic supplies of raw materials for the orbiting colonies, means of producing food for their thousands of inhabitants, and legal and social structures for the colonies. Solar heat is to be the main power source for these space structures. According to one scheme, a major project of the first group of settlers would be to construct a vast solar energy satellite that would convert solar heat to electricity and then to microwaves, which would then be beamed down to Earth for reconversion to electric power. Revenue from this activity would finance expansion of the colony. Lunar raw materials would make the construction economically feasible and in view of this the terms of a new Moon treaty take on added significance.[102]

Legal and social regimes would have to be created for this unique command-control situation without depriving the inhabitants of basic rights and freedoms. The question of granting governmental or ultimately statehood status to these colonies is to be seriously considered. International law will have to restructure its Earth-bound criteria when applying the rule of law in space.

E. CONCLUSION

When President Kennedy called for a manned lunar landing and safe return by the end of the decade, he characterized the effort as a leading accomplishment in space achievement which may hold the key to our future on Earth. His words have proved to be most prophetic.

Space programs have produced talented men and women everywhere with technical inventiveness and capacity to deal with global problems. Such knowledge and ingenuity can vastly improve and enhance the condition of all humanity. To continue this impetus, the economics of space demand international cooperation as envisioned in the 1972 U.S.-U.S.S.R. Space Cooperation Agreement. Space activity eventually may pay for itself. Until then, the investment and cooperation by nations of the world hold the future for man's continued peaceful existence on his own planet and his successful exploration of new frontiers.

President Ford and Chairman Brezhnev have both come out strongly for the advancement of outer space for the benefit of all mankind. Now the nations of the world are on the threshold of increasing opportunities to restore the Earth and its environment for the increasing population on this planet. This era has become known as the Space Age—it can become a "Golden Age" bridging the twentieth and twenty-first centuries.

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[102]For details, see *supra* note 101.

INTER-GOVERNMENTAL MARITIME CONSULTATIVE ORGANIZATION: INTERNATIONAL CONFERENCE ON THE ESTABLISHMENT OF AN INTERNATIONAL MARITIME SATELLITE SYSTEM*

SESSIONAL ACT of the SECOND SESSION OF THE INTERNATIONAL CONFERENCE ON THE ESTABLISHMENT OF AN INTERNATIONAL MARITIME SATELLITE SYSTEM, 9 to 28 February 1976

Historical Background

1. The Assembly of the Inter-Governmental Maritime Consultative Organization, by Resolution A.305(VIII) of 23 November 1973, decided to convene an international conference to decide on the principle of setting up an international maritime satellite system and, if it accepted this principle, to conclude agreements to give effect to this decision.

The first session of the Conference

2. Pursuant to this decision, the International Conference on the Establishment of an International Maritime Satellite System convened for its first session in London on 23 April 1975. This session concluded its work on 9 May 1975.

3. The activities and understandings of this session were recorded in the Sessional Act (MARSAT/CONF/10) adopted by the Conference at the concluding plenary meeting of the session. The Conference resolved to reconvene in a second session to take place in London from 9 to 27 February 1976, and invited the Inter-Governmental Maritime Consultative Organization to make arrangements for the convening of the second session accordingly.

4. For the direction of its future work the Conference established an Inter-Sessional Working Group to prepare for the second session of the Conference. The Working Group held three sessions under the Chairmanship of Mr. P. G. Damle (India).

The second session of the Conference

5. In response to the decision of the first session of the Conference the Inter-Governmental Maritime Consultative organization made arrangements for the second session of the Conference.

*Taken from I.M.C.O. Doc. MARSAT/CONF/27 (Feb. 28, 1976).

6. The second session was held in London from 9 to 28 February 1976.
7. The following States were represented at the second session by delegations:

Algeria
Argentina
Australia
Belgium
Brazil
Bulgaria
Byelorussian Soviet Socialist Republic
Canada
Chile
Cuba
Denmark
Egypt
Finland
France
German Democratic Republic
Germany, Federal Republic of
Ghana
Greece
Hungary
India
Indonesia
Iran
Iraq
Italy
Japan
Jordan
Kuwait
Liberia
Netherlands
New Zealand
Norway
Peru
Poland
Singapore
Spain
Sweden
Switzerland
Thailand
Turkey
Ukrainian Soviet Socialist Republic
Union of Soviet Socialist Republics
United Kingdom of Great Britain and Northern Ireland

United Republic of Cameroon
United States of America

8. The following States were represented by observers at the second session:

Czechoslovakia
Romania
Uruguay

9. The following organizations in the United Nations system sent representatives to the second session:

United Nations
International Telecommunication Union

10. The following inter-governmental organizations sent observers to the second session:
Council of Euorpe
European Space Agency
International Telecommunications Satellite Organization

11. The following non-governmental organizations also sent observers to the second session:

International Chamber of Shipping
International Electrotechnical Commission
International Confederation of Free Trade Unions
International Association of Lighthouse Authorities
International Radio-Maritime Committee
International Law Association
European Industrial Space Study Group
Oil Companies International Marine Forms
Engineering Committee on Oceanic Resources
EUROSAT S.A.
International Association of Institutes of Navigation
International Federation of Shipmasters' Association
Oil Industry International Exploration and Production Forum

12. Mr. R. M. Billington of the delegation of the United Kingdom of Great Britain and Northern Ireland who was elected President of the Conference of the first session presided at the second session. The following were the Vice-Presidents for the second session:

Mr. P. G. Damle (India)
Mr. B. T. Collins (Liberia)

Captain R. Vargas Fuller (Peru)
Mr. A. S. Kolesnitchenko (USSR)
Mr. W. K. Miller (United States)

Captain R. Vargas Fuller (Peru) and Mr. W. K. Miller (United States) were elected at the second session to replace Lt. Cdr. R. A. Forsyth and Mr. R. J. Waldmann respectively, who did not take part at that session.

13. The following Committees established by the Conference at the first session operated at the second session with officers as indicated:

Steering Committee—Chairman: Mr. R. M. Billington (United Kingdom), President of the Conference

Committee I—Chairman: Mr. J. S. Stanford (Canada); Vice-Chairman: Mr. B. Todorov (Bulgaria)

Committee II—Chairman: Ambassador J. Jaenicke (Federal Republic of Germany); Vice-Chairman: Mr. C. Vahtrick (Australia)

Credentials Committee—Chairman: Commander R. M. Bledel (Argentina)

Drafting Committee—Chairman: Ambassador F. Seyersted (Norway)

14. The Secretariat of the Conference consisted of the following officers:

Secretary-General, Mr. C. P. Srivastava, Secretary-General of the Organization

Deputy Secretary-General: Mr. J. Queguiner, Deputy Secretary-General of the Organization

Executive Secretary: Captain A. Saveliec, Secretary, Maritime Safety Committee

Deputy Executive Secretary: Captain Z. N. Sdougos, Director, Marine Safety Division

Work of the second session

15. At the second session the Conference based its work on the following documentation elaborated by the Inter-Sessional Working Group on the basis of the draft of the Panel of Experts and the documentation of the first session of the Conference. This was submitted in document MARSAT/CONF/13 and included:

—A draft text of the Convention on the International Maritime Satellite Organization (INMARSAT)

—A draft text of the Operating Agreement on the International Maritime Satellite Organization (INMARSAT)

—A draft Protocol on Privileges and Immunities of the International Maritime Satellite Organization

—Draft Procedures for the Settlement of Disputes referred to in Article 36 of the Convention and Article XII of the Operating Agreement

—A Report on Investment Shares and Captial Ceiling.

Results of the Conference

16. The Conference approved the complete texts of:

—all the Articles of the Convention on the International Maritime Satellite Organization (INMARSAT) and its annex with the exception of paragraph (3) of Article 14, paragraph (5) of Article 32 and Article 36; and

—all the Articles of the Operating Agreement of the International Maritime Satellite Organization (INMARSAT) and its Annex.

The texts of Articles of the Convention on the International Maritime Satellite organization and its Annex, and of the Operating Agreement on the International Maritime Satellite Organization and its Annex approved by the Conference are recorded in the reports of the Committees and in the records and documentation of the plenary session.

17. The Conference also adopted a number of Resolutions and Recommendations which are annexed to this Sessional Act, as follows:

Resolution 1—Headquarters of the International Maritime Satellite Organization (INMARSAT)

Resolution 2—Establishment of a Preparatory Committee

Recommendation 1—Recommendation on World-Wide Minimum Technical and Operational Equipment Standards as a Basis for Specifications for Ship Earth Stations

Recommendation 2—Recommendation on the Need to Establish World-Wide Technical and Operating Standards to Facilitate Communication Between Ships and Subscribers on Shore

Recommendation 3—Recommendation on the Use of Ship Earth Stations

Operating in the Bands 1535-1542.5 and 1636.5-1644 MHz Within Harbour Limits and Other Waters Under National Jursidiction

Recommendation 4—Study on the Use by INMARSAT of Multi-Purpose Satellites.

18. The Conference did not reach agreement on the texts of paragraph (3) of Article 14, paragraph (5) of Article 32 and Article 36 of the Convention on the International Maritime Satellite Organization (INMARSAT). The Conference therefore resolved to adjourn and to reconvene in a third session to take place in London from 1 to 3 September 1976. To this effect it adopted Resolution 3 which comprises Attachment 1 to this Sessional Act.

19. The third session of the International Conference on the Establishment of an International Maritime Satellite System will be charged solely with considering the texts of paragraph (3) of Article 14, paragraph (5) of Article 32 and Article 36 and making any consequential amendments, with any adjustments necessary to timing, with a view to the final adoption of the Convention on the International Maritime Satellite Organization (INMARSAT) and the Operating Agreement of the International Maritime Satellite Organization.

Adoption of this Sessional Act

20. The texts of this Sessional Act adopted by the Conference at the concluding plenary meeting of its second sesesion shall, with its attached Resolutions and Recommendations, be communicated by the Secretary-General to the Governments of States invited to the Conference.

ADOPTED by the International Conference on the Establishment of an International Maritime Satellite System this twenty-eight day of February one thousand nine hundred and seventy-six.

ANNEX I

RESOLUTION 1

HEADQUARTERS OF THE INTERNATIONAL MARITIME SATELLITE ORGANIZATION (INMARSAT)

THE CONFERENCE,

NOTING the invitation of the Government of the United Kingdom to establish the Headquarters of the INMARSAT Organization in London,

RECOGNIZING the importance for the Organization of maintaining close contact with the maritime community and other international maritime organizations and of being located in a world centre of communications,

RECOGNIZING FURTHER the desirability and utility of assistance from the Inter-Governmental Maritime Consultative Organization in the preparatory administrative work before the formal establishment of the Organization,

RESOLVES to accept the invitation of the Government of the United Kingdom and to authorize the Preparatory Committee to conduct preliminary discussions with it in order to prepare a draft Headquarters Agreement for consideration by the Organization.

RESOLUTION 2

ESTABLISHMENT OF A PREPARATORY COMMITTEE

THE CONFERENCE,

DESIRING to expedite the effective functioning of the International Maritime Satellite Organization (INMARSAT) once it is established,

CONSIDERING the consequential need for certain preparatory studies and actions to take place between the close of the conference and the coming into force of the instruments establishing INMARSAT,

HAVING EXAMINED proposals on this matter,

RESOLVES:

(a) To establish a Preparatory Committee, the membership, terms of reference, procedures and financial arrangements of which are set out in the Annex to this Resolution.

(b) To request the Secretary-General of the Inter-Governmental Maritime Consultative Organization (IMCO):

(i) To communicate this resolution to the participants of the Conference.

(ii) To convene the first session of the Preparatory Committee at the Headquarters of IMCO when at least fourteen States or their designated entities among those entitled to participate pursuant to paragraph 1 of the Annex, have notified the Secretary-General of IMCO pursuant to paragraph 2 of the Annex, that they wish to participate in the Preparatory Committee.

(iii) To make the necessary administrative, financial and secretarial arrangements for the Preparatory Committee.

INVITES States and/or their designated entities to participate in the work of the Preparatory Committee and to undertake the obligations thereof by notifying the Secretary-General of IMCO to that effect.

ANNEX

Membership

1. Participation in the Preparatory Committee is open to representatives of governments which have signed the INMARSAT Convention and the Operating Agreement and of designated entities which have signed the Operating Agreement; or to representatives of governments and to representatives of designated entities of those governments which have indicated their intention to initiate domestic procedures which would permit membership in INMARSAT.

2. Membership in the Preparatory Committee and sharing of the costs of the Preparatory Committee shall be on the basis of a declaration to be submitted to the Secretary-General of IMCO. There shall be a single declaration which may be submitted by the State, by its designated entity, or by both jointly. Each State and/or its designated entity shall be considered as one member with one vote and shall incur one share of the costs of the Preparatory Committee. In the case of participation by a state and its designated entity, the declaration shall specify who shall be responsible for payment of the share of the costs.

3. A member of the Preparatory Committee may at any time withdraw its declaration by providing written notification to this effect to the Secretary-General of IMCO. A withdrawing member shall be responsible for its share of all costs including current commitments, up to the date of receipt of the notification by the Secretary-General.

Existence of the Preparatory Committee

4. The first session of the Preparatory Committee shall be held at the Headquarters of IMCO from 11 to 17 January 1977, provided that by 1 December 1976 at least fourteen States or designated entities have submitted the declaration referred to in paragraph 2. If fourteen such declarations have not been submitted by 1 December 1976, the first session shall be held as soon as possible after that condition has been met.

5. The Preparatory Committee shall continue in existence until the INMARSAT Convention and Operating Agreement enter into force and thereafter until the first session of the Assembly or Council, whichever is earlier, or as the case may be, until the first date on which in accordance with Article 33(2) of the Convention the Convention can no longer enter into force. Thereupon any outstanding liabilities shall be settled. Liabilities in excess of the available funds shall be met by the members of

the Preparatory Committee on the basis of equal allotments. The balance of funds after settlement of any outstanding liabilities shall be returned to the members of the Preparatory Committee in proportion to their contributions.

Work Programme

6. The work of the Preparatory Committee shall be of an exclusively preparatory nature, not intended to bind INMARSAT. Accordingly, the tasks of the Preparatory Committee shall be as follows:

(1) Study of performance standards of land and ship earth stations, including ship earth station reliability, operational procedures, and interconnection with public telecommunications networks, taking into account the Panel of Experts' Report, studies of CCIR and CCITT, the experience obtained from the operation of existing systems, systems under development and other relevant studies.

(2) Study of the Organization's space segment facilities options, including:

(a) Studies of services which in view of Article 3 of the Convention might be offered by the Organization and an assessment of the potential market, for consideration by the Council and, if appropriate, subsequently by the Assembly, identifying distress and safety communications and radiodetermination for early consideration, taking into account the Panel of Expert's Report and other relevant studies.

(b) Technical and operational considerations of parameters for draft specifications of an INMARSAT space segment.

(c) Evaluation of traffic and economic forecasts.

(d) Such other studies as might be considered necessary.

(3) Identification of tasks which might be assigned to a management services contractor or contractors and subsequently the study of the possibility of obtaining such contractor(s).

(4) With respect to the Director General and the Directorate:

(a) The preparation of a proposal concerning their tasks and responsibilities.

(b) Study of their relationship with any management services contractor or other contractors.

(5) Preparation of a draft organizational structure of the Directorate.

(6) Initiation of contacts with the host country prior to Council negotiations of a Headquarters Agreement.

(7) Study of possible premises for the Organization.

(8) Preparation of draft financial and staff regulations, taking into account, if possible, the regulations of similar organizations, for consideration by the Director General and subsequently by the Council.

(9) Preparation of draft rules of Procedure of the Assembly and the Council, including rules for the election of officers.

(10) Any other tasks that may be necessary.

7. The results of the work should be submitted to the following Organs:

(a) To the Assembly: tasks (4) and

(b) To the Council: tasks (1) to (9) of paragraph 6.

(c) To the Director General: task (8) of paragraph 6.

(d) As appropriate: task (10) of paragraph 6.

8. In addition, the Preparatory Committee shall not later than the end of 1978 prepare, for distribution to all States that were invited to the Conference an interim report relating to the tasks listed in paragraph 6(2).

Financing of the Preparatory Committee

9. The expenses of the Preparatory Committee shall be met by contributions from participating members on the basis of equal allotments. The Preparatory Committee may invite the Council of INMARSAT at its first meeting to reimburse all or part of its expenses.

10. The Secretary-General of IMCO shall be authorized to incur the necessary obligations for convening the first meeting of the Preparatory Committee and providing secretariat services for the Committee and to call in contributions from the participating members to meet the expenditure incurred. Thereafter, the Secretary- General of IMCO may incur such obligations as the Preparatory Committee authorizes him to incur; such expenses shall be met by contributions from the members of the Preparatory Committee.

11. Expenditure shall be kept to a minimum and shall not exceed 500,000 U.S. dollars per annum, unless the Committee decides otherwise with a two-thirds majority of the members present and voting. An annual budget for the expenditure shall be adopted by the Preparatory Committee. The total expenditure over the lifetime of the Preparatory Committee shall not exceed 2 million U.S. dollars, unless unanimously agreed otherwise.

12. The Preparatory Committee shall not have the authority to commit the INMARSAT Organization to expenditure.

13. Members on the Preparatory Committee or on any Panels it establishes shall bear the costs of their attendance at meetings of the Committee and its Panels.

14. In the interest of minimizing the costs of the Preparatory Committee, members are encouraged to second staff, contribute facilities and conduct studies singly or jointly without costs to the Committee.

Conduct of business

15. The Preparatory Committee shall elect its own officers, meet as often as necessary, and may establish a technical panel, especially in view of task (1) given in paragraph 6 and any other subsidiary bodies it deems necessary.

16. The Committee shall conduct its business in a manner consistent with this Resolution.

17. The Committee shall adopt its own Rules of Procedure, including provisions concerning meetings in open and closed sessions.

18. For reasons of economy the Preparatory Committee shall conduct its business and issue documents in the English and French languages only.

Voting Procedure

19. The representative(s) of a government and/or the representative(s) of its designated entity shall together have one vote in the Preparatory Committee.

20. The committee shall endeavour to take decisions unanimously. If unanimous agreement cannot be reached, decisions on the tasks referred to in paragraph 6 shall be taken as follows:

(a) tasks (1) to (5) by a two-thirds majority of the representatives present and voting;

(b) tasks (6) to (9) by a simple majority of the representataives present and voting.

Minority views should be reported in the interest of providing the widest possible information.

Secretariat

21. Unless the Preparatory Committee decides otherwise, accommodation facilities and secretarial services shall be provided by IMCO within the budgetary limits referred to in paragraph 11.

ANNEX II

RECOMMENDATION 1

RECOMMENDATION ON WORLD-WIDE MINIMUM TECHNICAL AND OPERATIONAL EQUIPMENT STANDARDS AS A BASIS FOR SPECULATIONS FOR SHIP EARTH STATIONS

THE CONFERENCE,

RECOGNIZING that one of the functions of the Council, in accordance with Article 15(c) of the INMARSAT Convention, is to adopt criteria and procedures for the approval of earth stations on ships for access to the space segment and that, for ships, the criteria should be in sufficient detail for use by national licensing authorities, at their discretion, for type-approval of earth stations on ships,

FURTHER RECOGNIZING that world-wide harmonization of specifications offers significant economic, operational, administrative and technical advantages,

RECOMMENDS that all Parties to the Convention should, through appropriate international fora including the Organization, take all necessary steps to establish agreed world-wide minimum technical and operational equipment standards as a basis for specifications for ship earth stations to operate with the INMARSAT system.

RECOMMENDATION 2

RECOMMENDATION ON THE NEED TO ESTABLISH WORLD-WIDE TECHNICAL AND OPERATING STANDARDS TO FACILITATE COMMUNICATION BETWEEN SHIPS AND SUBSCRIBERS ON SHORE

THE CONFERENCE,

RECOGNIZING that in the preamble to the INMARSAT Convention attention is drawn to the principle adopted by the United Nations that communication by means of

satellites should be available to the nations of the world on a global and non-discriminatory basis,

RECOGNIZING that Article 7 requires that the INMARSAT space segment shall be open for use by ships of all nations on conditions to be determined by the Council, which shall not discriminate among ships on the basis of nationality,

FURTHER RECOGNIZING that the Convention must essentially, and by definition, relate to the space segment,

RECOMMENDATION 4

STUDY ON THE USE BY INMARSAT OF MULTI-PURPOSE SATELLITES

THE CONFERENCE,

RECOMMENDS that arrangements should be made to undertake at an early date the study, without prejudice to programmes in planning, of the institutional, financial, technical and operating consequences of the use by INMARSAT of multi-purpose satellites providing both a maritime mobile and an aeronautical mobile capability. In connexion therewith, the advice, participation and co-operation of the appropriate aeronautical authorities should be sought.

RECOMMENDS that all Parties to the Convention should, through appropriate international fora including the Organization, and taking into account relevant Resolutions, Recommendations and procedures established by the Organs of the International Telecommunication Union, take all necessary steps to establish world-wide technical and operating standards to enable effective, non-discriminatory communications to be established between ships' earth stations, land earth stations and subscribers on shore.

RECOMMENDATION 3

RECOMMENDATION ON THE USE OF SHIP EARTH STATIONS OPERATING IN THE BANDS 1535-1542.5 AND 1636.5-1644 MHz WITHIN HARBOUR LIMITS AND OTHER WATERS UNDER NATIONAL JURISDICTION

THE CONFERENCE,

WHILST RECOGNIZING that each country must retain whatever safeguards it considers necessary for the protection of its own communication services,

CONSIDERING:

(a) that objections to transmission by ships in harbours and other waters under national jurisdiction may not apply in the case of the band of 1636.5-1644 MHz allocated to the maritime mobile-satellite service;

(b) that the use of ship earth stations within harbour limits and other waters under national jurisdiction would facilitate improvements in ship management efficiency and ship-shore communications generally; and

(c) that if ship earth stations were permitted to operate in harbours and other waters under national jurisdiction, it would provide powerful encouragement for the fitting of such equipment; moreover this would improve ship safety,

RECOMMENDS that all countries should be invited to consider permitting ship earth stations to operate in the bands 1535-1542.5 and 1636.5-1644 MHz within harbour limits and other waters under national jurisdiction, and

INVITES the International Telecommunication Union to bring this Recommendation to the attention of its Members for their consideration.

ATTACHMENT 1

RESOLUTION 3

CONVENING OF THE THIRD SESSION OF THE CONFERENCE

THE CONFERENCE,

HAVING CONSIDERED the work accomplished at its second session and in particular the approval of the Articles of the CONVENTION ON THE INTERNATIONAL MARITIME SATELLITE ORGANIZATION (INMARSAT) and its Annex, and the Articles of the OPERATING AGREEMENT ON THE INTERNATIONAL MARITIME SATELLITE ORGANIZATION and its Annex, as indicated in the summary records of the Plenary, the reports of the Committees and the Sessional Act,

NOTING that agreement has not been reached at the present session on the texts of paragraph (3) of Article 14, paragraph (5) of Article 32 and Article 36, of the CONVENTION ON THE INTERNATIONAL MARITIME SATELLITE ORGANIZATION (INMARSAT),

RESOLVES

(a) to convene the third session of the Conference in London from 1 to 3 September 1976 for the sole purpose of considering the texts of paragraph (3) of Article 14, paragraph (5) of Article 32 and Article 36, with a view to the final adoption of the CONVENTION ON THE INTERNATIONAL MARITIME SATELLITE ORGANIZATION (INMARSAT) and its Annex, and the OPERATING AGREEMENT ON THE INTERNATIONAL MARITIME SATELLITE ORGANIZATION and its Annex;

(b) to invite the Inter-Governmental Maritime Consultative Organization to make arrangements for the convening of the third session accordingly.

OPERATING AGREEMENT ON THE INTERNATIONAL MARITIME SATELLITE ORGANIZATION (INMARSAT)*

The Signatories to this Operating Agreement:

CONSIDERING that the States Parties to the Convention on the International Maritime Satellite Organization (INMARSAT) have undertaken therein to sign, or to designate a competent entity to sign, this Operating Ageement,

AGREE AS FOLLOWS:

Article I

Definitions

(1) For the purposes of this Agreement:

(a) "Convention" means the Convention on the International Maritime Satellite Organization (INMARSAT) including its Annex.

(b) "Organization" means the International Maritime Satellite Organization (INMARSAT) established by the Convention.

(c) "Amortization" includes depreciation; it does not include compensation for use of capital

(2) The definitions in Article 1 of the Convention shall apply to this Agreement.

*Taken from I.M.C.O. Doc. MARSAT/CONF/29 (Feb. 28, 1976). Text approved by the Conference.

Article II

Rights and Obligations of Signatories

(1) Each Signatory acquires the rights provided for Signatories in the Convention and this Agreement and undertakes to fulfil the obligations placed upon it by these two instruments.

(2) Each Signatory shall act consistently with all provisions of the Convention and this Agreement.

Article III

Capital Contributions

(1) In proportion to its investment share, each Signatory shall make contributions to the capital requirements of the Organization and shall receive capital repayment and compensation for use of capital, as determined by the Council in accordance with the Convention and this Agreement.

(2) Capital requirements shall include:

(a) All direct and indirect costs of the design, development, acquisition, construction and establishment of the INMARSAT space segment, of the acquisition of contractual rights by means of lease, and of other property of the Organization.

(b) Funds required for operating, maintenance and administration costs of the Organization pending availability of revenues to meet such costs, and pursuant to Article VIII(3).

(c) Payments by Signatories pursuant to Article XI.

(3) Interest at a rate to be determined by the Council shall be added to any amount unpaid after the scheduled date for payment determined by the Council.

(4) If, during the period up to the first determination of investment shares on the basis of utilization pursuant to Article V, the total amount of capital contributions which Signatories are required to pay in any financial year exceeds fifty percent of the capital ceiling established by or pursuant to Article IV, the Council shall consider the adoption of other arrangements, including temporary debt financing, to permit those Signatories who so desire to pay the additional contributions in subsequent years by instalments. The Council shall determine the rate of interest to apply in such cases, reflecting the additional costs to the Organization.

Article IV

Capital Ceiling

The sum of the net capital contributions of Signatories and of the outstanding contractual capital commitments of the Organization shall be subject to a ceiling. This sum shall consist of the cumulative capital contributions made by Signatories pursuant to Article III, less the cumulative capital repaid to them pursuant to this Agreement, plus the outstanding amount of contractual capital commitments of the Organization. The initial capital ceiling shall be 200 million U.S. dollars. The Council shall have authority to adjust the capital ceiling.

Article V

Investment Shares

(1) Investment shares of Signatories shall be determined on the basis of utilization of the INMARSAT space segment. Each Signatory shall have an investment share equal to its percentage of all utilization of the INMARSAT space segment by all Signatories. Utilization of the INMARSAT space segment shall be measured in terms of the charges levied by the Organization for use of the INMARSAT space segment pursuant to Article 19 of the Convention and Article VIII of this Agreement.

(2) For the purpose of determining investment shares, utilization in both directions shall be divided into two equal parts, a ship part and a land part. The part associated with the ship where the traffic originates or terminates shall be attributed to the Signatory of the Party under whose authority the ship is operating. The part associated with the land territory where the traffic originates or terminates shall be attributed to the Signatory of the Party in whose territory the traffic originates or terminates. However, where, for any Signatory, the ratio of the ship part to the land part exceeds 20:1, that Signatory shall, upon application to the Council, be attributed a utilization equivalent to twice the land part or an investment share of 0.1 percent, whichever is higher. Structures operating in the marine environment, for which access to the INMARSAT space segment has been permitted by the Council, shall be considered as ships for the purpose of this paragraph.

(3) Prior to determination of investment shares on the basis of utilization pursuant to paragraphs (1), (2) and (4), the investment share of each Signatory shall be established in accordance with the Annex to this Agreement.

(4) The first determination of investment shares based on utilization pursuant to paragraphs (1) and (2) shall be made not less than two nor more than three years from the commencement of operational use of the INMARSAT space segment in the Atlantic, Pacific and Indian Ocean areas, the specific date of determination to be

decided by the Council. For the purposes of this first determination, utilization shall be measured over the one year period prior to such determination.

(5) Subsequent to the first determination on the basis of utilization, investment shares shall be redetermined to be effective:

(a) Upon one-year intervals after the first determination of investment shares on the basis of utilization, based on the utilization of all Signatories during the previous year.

(b) Upon the date of entry into force of this Agreement for a new Signatory.

(c) Upon the effective date of withdrawal or termination of membership of a Signatory.

(6) The investment share of a Signatory which becomes a Signatory after the first determination of investment shares on the basis of utilization, shall be determined by the Council.

(7) To the extent that an investment share is determined pursuant to paragraphs (5) (b) or (c) or paragraph (8), the investment shares of all other Signatories shall be adjusted in the proportion that their respective investment shares, held prior to this adjustment, bear to each other. On the withdrawal or termination of membership of a Signatory, investment shares of 0.05 percent determined in accordance with paragraph (8) shall not be increased.

(8) Notwithstanding any provisions of this Article, no Signatory shall have an investment share of less than 0.05 percent of the total investment shares.

(9) In any new determination of investment shares the share of any Signatory shall not be increased in one step by more than 50 percent of its initial share, or decreased by more than 50 percent of its current share.

(10) Any unallocated investment shares, after application of paragraphs (2) and (9) shall be made available and apportioned by the Council among Signatories wishing to increase their investment shares. Such additional allocation shall not increase any share by more than 50 percent of a Signatory's current investment share.

(11) Any residual unallocated investment shares, after application of paragraph (10), shall be distributed among the Signatories in proportion to the investment shares which would otherwise have applied after any new determination, subject to paragraphs (8) and (9).

(12) Upon application from a Signatory, the Council may allocate to it an investment share reduced from its share determined pursuant to paragraphs (1) to (7)

and (9) to (11), if the reduction is entirely taken up by the voluntary acceptance by other Signatories of increased investment shares. The Council shall adopt procedures for the equitable distribution of the released share or shares among Signatories wishing to increase their shares.

Article VI

Financial Adjustments between Signatories

(1) At each determination of investment shares after the initial determination upon entry into force of this Agreement, financial adjustments between Signatories shall be carried out through the Organization on the basis of a valuation effected pursuant to paragraph (2). The amounts of these financial adjustments shall be determined with respect to each Signatory by applying to the valuation the difference, if any, between the new investment share of each Signatory and its investment share prior to the determination.

(2) The valuation shall be effected as follows:

(a) Deduct from the original acquisition cost of all property as recorded in the Organization's accounts as at the date of the adjustment, including all capitalized return and capitalized expenses, the sum of:

(i) The accumulated amortization as recorded in the Organization's accounts as at the date of adjustment.

(ii) Loans and other accounts payable by the Organization as at the date of adjustment.

(b) Adjust the results obtained pursuant to sub-paragraph (a) by adding or deducting a further amount representing any deficiency or excess, respectively, in the payment by the Organization of compensation for use of capital from the entry into force of this Agreement to the effective date of valuation relative to the cumulative amount due pursuant to this Agreement at the rate or rates of compensation for use of capital in effect during the periods in which the relevant rates were applicable, as established by the Council pursuant to Article VIII. For the purpose of assessing the amount representing any deficiency or excess in payment, compensation due shall be calculated on a monthly basis and relate to the net amount of the elements described in sub-paragraph (a).

(3) Payments due from and to Signatories pursuant to this Article shall be effected by a date decided by the Council. Interest at a rate to be determined by the Council shall be added to any amount unpaid after that date.

Article VII

Payment of Utilization Charges

(1) Utilization charges established pursuant to Article 19 of the Convention shall be payable by Signatories or authorized telecommunications entities in accordance with arrangements adopted by the Council. These arrangements shall follow as closely as practicable recognized international telecommunications accounting procedures.

(2) Unless otherwise decided by the Council, Signatories and authorized telecommunications entities shall be responsible for the provision of information to the Organization to enable the Organization to determine all utilization of the INMARSAT space segment and to determine investment shares. The Council shall adopt procedures for submission of the information to the Organization.

(3) The Council shall institute any appropriate sanctions in cases where payments of utilization charges have been in default for four months or longer after the due date.

(4) Interest at a rate to be determined by the Council shall be added to any amount unpaid after the scheduled date for payment determined by the Council.

Article VIII

Revenues

(1) The revenues earned by the Organization shall normally be applied, to the extent that such revenues allow, in the following order of priority, unless the Council decides otherwise:

(a) To meet operating, maintenance and administrative costs.

(b) To provide such operating funds as the Council may determine to be necessary.

(c) To pay to Signatories, in proportion to their respective investment shares, sums representing a repayment of capital in the amount of the provisions for amortization established by the Council and recorded in the accounts of the Organization.

(d) To pay to a Signatory which has withdrawn from the Organization or whose membership has been terminated, such sums as may be due to it pursuant to Article XIII.

(e) To pay to Signatories, cumulatively in proportion to their respective investment shares, the available balance towards compensation for use of capital.

(2) In the determination of the rate of compensation for the use of capital of Signatories, the Council shall include an allowance for the risks associated with investment in INMARSAT and, taking into account such allowance, shall fix the rate as close as possible to the cost of money in the world markets.

(3) To the extent that the revenues earned by the Organization are insufficient to meet operating, maintenance and administrative costs of the Organization, the Council may decide to meet the deficiency by using operating funds of the Organization, by overdraft arrangements, by raising a loan, by requiring Signatories to make capital contributions in proportion to their respective current investment shares or by any combination of such measures.

Article IX

Settlement of Accounts

(1) Settlement of accounts between Signatories and the Organization in respect of financial transactions pursuant to Articles III, VI, VII and VIII shall be arranged in such a manner that funds transferred between Signatories and the Organization, as well as funds at the Organization's disposal in excess of the operating funds determined by the Council to be necessary, shall be kept at the lowest practicable level.

(2) All payments between the Signatories and the Organization pursuant to this Agreement shall be effected in any freely convertible currency acceptable to the creditor.

Article X

Debt Financing

(1) The Organization may, upon decision by the Council, enter into overdraft arrangements for the purpose of meeting financial deficiencies pending receipt of adequate revenues or capital contributions.

(2) In exceptional circumstances the Organization may raise loans upon decision by the Council for the purpose of financing any activity undertaken by the Organization in accordance with Article 3 of the Convention or for meeting any liability incurred by it. The outstanding amounts of such loans shall be considered as contractual capital commitments for the purpose of Article IV.

Article XI

Liability

(1) If the Organization is required by a binding decision rendered by a competent tribunal or as a result of a settlement agreed to or concurred in by the Council, to pay any claim, including any costs or expenses associated therewith, which arises out of any act or obligation of the Organization carried out or incurred in pursuance of the Convention or this Agreement, the Signatories shall, to the extent that the claim is not satisfied by indemnification, insurance or other financial arrangements, pay to the Organization the amount unsatisfied on the claim in proportion to their respective investment shares as at the date when the liability arose, notwithstanding any ceiling established by or pursuant to Article IV.

(2) If a Signatory, in its capacity as such, is required by a binding decision rendered by a competent tribunal or as a result of a settlement agreed to or concurred in by the Council, to pay any claim, including any costs or expenses associated therewith, which arises out of any act or obligation of the Organization carried out or incurred in pursuance of the Convention or this Agreement, the Organization shall reimburse the Signatory to the extent the Signatory has paid the claim.

(3) If such a claim is asserted against a Signatory, that Signatory, as a condition of payment by the Organization, shall without delay notify the Organization of the claim, and shall afford it the opportunity to advise on or to conduct the defence or other disposition of the claim and, to the extent permitted by the law of the jurisdiction in which the claim is brought, to become a party to the proceeding either with the Signatory or in substitution for it.

(4) If the Organization is required to reimburse a Signatory under the Article, the Signatories shall, to the extent that the reimbursement is not satisfied by indemnification, insurance or other financial arrangements, pay to the Organization the unsatisfied amount of the claimed reimbursement in proportion to their respective investment shares as at the date when the liability arose, notwithstanding any ceiling established by or pursuant to Article IV.

Article XII

Exoneration from Liability arising from the Provision of Telecommunications Services

Neither the Organization, nor any Signatory in its capacity as such, nor any officer or employee of any of them, nor any member of the board of directors of any Signatory, nor any representative to any organ of the Organization acting in the performance of their functions, shall be liable to any Signatory or to the Organization

for loss or damage sustained by reason of any unavailability, delay or faultiness of telecommunications services provided or to be provided pursuant to the Convention or this Agreement.

Article XIII

Settlement upon Withdrawal or Termination

(1) Within three months after the effective date of withdrawal or termination of the membership of a Signatory pursuant to Articles 29 or 30 of the Convention, the Council shall notify the Signatory of the evaluation by the Council of its financial status in relation to the Organization as of the effective date of its withdrawal or termination and of the proposed terms of settlement pursuant to paragraph (3). The notification shall include a statement of:

(a) The amount payable by the Organization to the Signatory, calculated by multiplying its investment share, as at the effective date of withdrawal or termination, by the amount established from a valuation effected pursuant to Article VI as at that date.

(b) Any amount to be paid by the Signatory to the Organization representing its share of capital contributions for contractual commitments specifically authorized prior to the receipt of notice of decision to withdraw or, as the case may be, prior to the effective date of termination, together with the proposed schedule for payment.

(c) Any other amounts due from the Signatory to the Organization as at the effective date of withdrawal or termination.

(2) In its evaluation pursuant to paragraph (1), the Council may decide to relieve the Signatory in whole or in part of its responsibility for contributing its share of the capital contributions for contractual commitments specifically authorized and liabilities arising from acts or omissions prior to the receipt of notice of decision to withdraw or, as the case may be, the effective date of termination.

(3) Subject to payment by the Signatory of any amounts due from it under sub-paragraphs (1) (b) and (c), the Organization, taking into account Article VIII, shall repay to the Signatory the amounts referred to in sub-paragraphs (1) (a) and (b) over a period consistent with the period over which the remaining Signatories will be repaid their contributions, or sooner if the Council so decides. The Council shall determine the rate of interest to be paid to or by the Signatory in respect of any amounts which may, from time to time, be outstanding for settlement.

(4) Unless the Council decides otherwise, a settlement pursuant to this Article shall not relieve the Signatory of its obligations to contribute its share of the non-contractual liabilities arising from acts or omissions of the Organization prior to the date of receipt of notice of decision to withdraw or, as the case may be, prior to the effective date of termination.

(5) The Signatory shall not lose any rights acquired by it, in its capacity as such, which would otherwise continue after the effective date of withdrawal or termination, and for which it has not been compensated by the settlement pursuant to this Article.

Article XIV

Earth Station Approval

(1) In order to utilize the INMARSAT space segment, all earth stations shall require approval by the Organization in accordance with criteria and procedures established by the Council pursuant to Article 15(c) of the Convention.

(2) Any application for such approval shall be submitted to the Organization by the Signatory of the Party in whose territory the earth station on land is or will be located, or by the Party or the Signatory of the Party under whose authority the earth station on a ship or on a structure operating in the marine environment is licensed or, with respect to earth stations located in a territory or on a ship or on a structure operating in the marine environment not under the jurisdiction of a Party, by an authorized telecommunications entity.

(3) Each applicant referred to in paragraph (2) shall, with respect to earth stations for which it has submitted an application, be responsible to the Organization for compliance of such stations with the procedures and standards specified by the Organization, unless, in the case of a Signatory which has submitted an application, its designating Party assumes this responsibility.

Article XV

Utilization of the INMARSAT Space Segment

(1) Any application for utilization of the INMARSAT space segment shall be submitted to the Organization by a Signatory or, in the case of a territory not under the jurisdiction of a Party, by an authorized telecommunications entity.

(2) Utilization shall be authorized by the Organization in accordance with criteria and procedures established by the Council pursuant to Article 15(c) of the Convention.

(3) Each Signatory or authorized telecommunications entity for which utilization of the INMARSAT space segment has been authorized shall be responsible for compliance with all conditions established by the Organization with respect to such utilization unless, in the case of a Signatory which has submitted an application, its designating Party assumes the responsibility for authorizations made with respect to all or some of the earth stations not owned or operated by that Signatory.

Article XVI

Settlement of Disputes

(1) Disputes arising from Signatories, or between Signatories and the Organization, relating to rights and obligations under the Convention or this Agreement, should be settled by negotiation between the parties to the dispute. If within one year of the time any party to the dispute has requested settlement a settlement has not been reached, and if a particular procedure for settling disputes has not been agreed between the parties to the dispute, the dispute shall be submitted to arbitration in accordance with the Annex to Convention at the request of any party to the dispute.

(2) Unless otherwise mutually agreed, disputes arising between the Organization and one or more Signatories under agreements concluded between them shall be submitted to arbitration in accordance with the Annex to the Convention at the request of one of the parties to the dispute within a period of one year from the time that settlement was requested by any party to the dispute.

(3) A Signatory which ceases to be Signatory shall remain bound by this Article in respect of disputes relating to rights and obligations arising from its having been a Signatory of this Agreement.

Article XVII

Entry into Force

(1) This Agreement shall enter into force for a Signatory on the date on which the Convention enters into force for the respective Party in accordance with Article 33 of the Convention.

(2) This Agreement shall continue in force for as long as the Convention is in force.

Article XVIII

Amendments

(1) Amendments to this Agreement may be proposed by any Party or Signatory. Proposed amendments shall be submitted to the Directorate, which shall inform the other Parties and Signatories. Three months' notice is required before consideration of an amendment by the Council. During this period the Directorate shall solicit and circulate the views of all Signatories. The Council shall consider amendments within six months from circulation. The Assembly shall consider the amendment not earlier than six months after the approval by the Council. This period may in any particular case be reduced by the Assembly by a substantive decision.

(2) If confirmed by the Assembly after approval by the Council, the amendment shall enter into force one hundred and twenty days after the Depositary has received notice of its approval by two-thirds of these Signatories which at the time of confirmation by the Assembly were Signatories and then held at least two-thirds of the total investment shares. Notification of approval of an amendment shall be transmitted to the Depositary only by the Party concerned and the transmission shall signify the acceptance by the Party of the amendment. Upon entry into force, the amendment shall become binding upon all Signatories, including those which have not accepted it.

Article XIX

Depositary

(1) The Depositary of this Agreement shall be the Secretary-General of the Inter- Governmental Maritime Consultative Organization.

(2) The Depositary shall promptly inform all signatory and acceding States and all Signatories of:

(a) Any signature of this Agreement.

(b) The entry into force of this Agreement.

(c) The adoption of any amendment to this Agreement and its entry into force.

(d) Any notification of withdrawal.

(e) Any suspension or termination.

(f) Other notifications and communications relating to this Agreement.

(3) Upon entry into force of this Agreement the Depositary shall transmit a certified copy to the Secretariat of the United Nations for registration and publication in accordance with Article 102 of the Charter of the United Nations.

In witness whereof the undersigned, duly authorized, have signed this Agreement.

Done at _____ on the _____ day of _____ 19_____ in the _____ languages, all the texts being equally authentic, in a single original which shall be deposited with the Depositary, who shall send a certified copy to the Government of each of the States which were invited to attend the International Conference on the Establishment of an International Maritime Satellite System, to the Government of any other State which signs or accedes to the convention and to each Signatory.

ANNEX

INVESTMENT SHARES PRIOR TO THE FIRST DETERMINATION ON THE BASIS OF UTILIZATION

(a) The initial investment shares of the signatories of the States listed below shall be as follows:

UNITED STATES	17.00
UNITED KINGDOM	12.00
USSR, Byelorussian SSR and Ukrainian SSR	11.00
NORWAY	9.50
JAPAN	8.45
ITALY	4.37
FRANCE	3.50
GERMANY, FEDERAL REPUBLIC OF	3.50
GREECE	3.50
NETHERLANDS	3.50
CANADA	3.20
SPAIN	2.50
SWEDEN	2.30
DENMARK	2.10
AUSTRALIA	2.00
INDIA	2.00
BRAZIL	1.50
POLAND	1.48
ARGENTINA	0.75
BELGIUM	0.75

FINLAND	0.75
GERMAN DEMOCRATIC REPUBLIC	0.74
SINGAPORE	0.62
NEW ZEALAND	0.44
BULGARIA	0.33
CUBA	0.33
INDONESIA	0.33
IRAN	0.33
CHILE	0.25
PERU	0.25
SWITZERLAND	0.25
LIBERIA	0.10
ALGERIA	0.05
EGYPT	0.05
GHANA	0.05
IRAQ	0.05
KUWAIT	0.05
THAILAND	0.05
TURKEY	0.05
UNITED REPUBLIC OF CAMEROON	0.05
Total:	100.02

(b) Any signatory to the Operating Agreement designated by a State listed above may, prior to the entry into force of the Convention and the Operating Agreement, accept an initial investment share higher than that listed in paragraph (a) if:

(i) other signatories accept a correspondingly lower initial investment share; or

(ii) the Convention and the Operating Agreement have not entered into force twenty-four months after they were opened for signature.

The signatories concerned shall inform the Depositary, who shall prepare and distribute a revised initial investment shares to all States included in the list of initial investment shares.

(c). A signatory of a State not listed in paragraph (a), on signing the Operating Agreement prior to its entry into force, shall declare to the Depositary its initial investment share, which shall correspond to its projected proportionate utilization of the INMARSAT space segment. The Depositary shall add the new signatory and its initial investment share to the list of initial investment shares in paragraph (a). The revised list shall be sent to all States included in the list. The initial investment share of the new signatory shall be subject subsequently to approval or adjustment by the

Council. If the Council adjusts the share, it shall adjust proportionately the initial investment shares of all Signatories and, subsequently, the investment shares of all Signatories.

(d) Upon entry into force of the Operating Agreement, the investment shares of Signatories shall be determined by adjusting the initial investment shares of Signatories proportionately so that the sum of all investment shares amounts to 100 percent.

(e) The initial investment share of any Signatory which is not included in the list in paragraph (a) and which signs the Operating Agreement after its entry into force, and for any Signatory included in the list of initial investment shares for which the Operating Agreement has not entered into force thirty-six months after it was opened for signature, shall be determined by the Council and shall be included in a revised list of initial investment shares of all Signatories.

(f) When a new Party enters the Organization or when a party withdraws from the Organization or its membership is terminated, the investment shares of all Signatories shall be determined by adjusting proportionately the initial investment shares of all Signatories so that the sum of all investment shares amounts to 100 percent.

(g) Investment shares of 0.05 percent determined in accordance with paragraph (8) of Article V of the Operating Agreement, shall not be increased pursuant to paragraphs (c), (d), (e) and (f) of this Annex.

1. *Roundtable on Space Law Developments, International Space Hall of Fame Dedication Conference, Alamogordo, New Mexico, October 5-9, 1976.*

During the Dedication Conference of the International Space Hall of Fame in Alamogordo, New Mexico, October 5-9, 1976, a Roundtable on Space Law Developments was organized by Professor Stephen Gorove of the University of Mississippi Law Center. Dr. Diederiks-Verschoor, President of the International Institute of Space Law, served as invited chairperson and Professor Carl G. Christol of the University of Southern California as moderator.

In the written exchange of communications which preceded the Conference, Professor Gorove presented a survey paper on "Developments in Space Law: An Impressive Record for the Hall of Fame". This served as a starting point for subsequent comments and responses among the organizing chairman and the invited commentators who included: Dr. I. H. Ph. Diederiks-Verschoor, Dr. Ernst Fasan, Edward R. Finch, Jr.; Professors Hamilton DeSaussure, L. S. F. Goldie, S. Houston Lay; Mrs. Eilene Galloway, Dr. István Herczeg and Brig. Gen. Martin Menter, USAF (ret.)

The survey paper of Professor Gorove and the exchanges of views were published in a book entitled "The Eagle Has Returned" which was edited by the Dedication Conference Committee Chairman and Program Director, Dr. Ernst A. Steinhoff and was published as vol. 43 of the Science and Technology Series under the auspices of the American Institute of Aeronautics and Astronautics.

The actual discussions at the Roundtable which were held on October 8, 1976 are expected to be published in a subsequent volume some time in 1977.

Among the many space pioneers who were inducted during the Dedication Conference into the Space Hall of Fame was Andrew G. Haley, the only space lawyer to receive such distinctive honor.

Stephen Gorove
Organizing Chairman,
Roundtable on Space Law
Developments, International
Space Hall of Fame Dedication
Conference

2. *XIXth Colloquium on the Law of Outer Space, Anaheim, California, October 10-16, 1976.*

During the 1976 Congress of the International Astronautical Federation in Anaheim, California (Oct. 10-16, 1976), fifty papers were presented in five sessions of the XIXth Colloquium on the Law of Outer Space of the International Institute of Space Law (IISL). The papers covered the following subjects: The Future of Space Law; Space Law and Energy; Relationship of Air and Space Law; and, Other Subjects. Chairpersons for the sessions were Katherine Drew Hallgarten, Esq., Professor S. Houston Lay, Professor Hamilton DeSaussure, and Professor Stephen Gorove. The large number of papers was matched by a large and enthusiastic group of participants, and observers, and by the high quality of the respective papers. These factors produced stimulating dialogues and discussions. The XIXth Colloquium will undoubtedly contribute to the further clarification of space policy and the formation over time of new and possibly modified conceptions as to the present and future direction of modern space law.

The papers and the observations and commentaries of the participants will be published in the annual Proceedings of the Colloquium. The Proceedings will appear under the editorial direction of Professor Mortimer Schwartz, University of California School of Law, Davis, California, and will be printed and distributed as in the past by Fred B. Rothman & Co., South Hackensack, N. J. 07605.

The participants did not limit themselves to narrow legal concepts. They acknowledged the relationship of law and policy and took into account economic, social, environmental, and security considerations, among others.

The different subjects appearing on the agenda stressed three factors. There was, first, a willingness to consider very general concepts, including both the traditional and the novel. Thus, attention focused on sovereignty, jursidiction, the Common Heritage of Mankind, and the real qualities of the present world community. At the same time, the central concerns of the less-developed countries and advanced countries were identified and distinguished.

Second, there was general agreement that the space lawyer is increasingly obliged to give attention to the manner in which space science and technology are being applied to human needs. Although there was no consensus that the time was ripe to effect a legal boundary between sovereign airspace and the non-sovereign space environment, yet it was acknolwedged that the advent of the space shuttle orbiter was possibly making this matter a more pressing one than in the past. Applications problems were also noticed in discussions focusing on the allocation of radio frequencies, sensing, and direct broadcasts by satellite.

Third, many of the participants indicated a growing concern for the effective management of the human and material resources employed or situated in the space environment. This called attention to the existence of such institutions as the United Nations, the European Space Agency, the uses of national activities and instrumentalities, and the prospect for the possible formation of a new international space organization or organizations.

On October 15 the members of the IISL agreed on the agenda[1] for the XXth Colloquium in Prague, September 26-October 1, 1977. It was also agreed to continue for another term the members of the board and officers whose terms had expired.

Owing to the need of President Isabella Diedericks-Verschoor to return to the Netherlands prior to the closing ceremony on October 16, the report of the IISL Colloquium to the International Astronautical Federation was made by the organizing chairman of the Colloquium.

Carl Q. Christol
Chairman of the Colloquium,
Prof. of International Law & Chairman,
Dept. of Pol. Science, University of
Southern California

3. *XXth Colloquium on the Law of Outer Space, Prague, Czechoslovakia, Sept. 26-Oct. 1, 1977.*

The following items have been placed on the agenda of the XXth Colloquium on the Law of Outer Space of the International Institute of Space Law to be held in Prague, Czechoslovakia, September 26- October 1, 1977:

I. Should there be a World International Space Agency?

II. Matters Relating to the Definition and/or Delimitation of Outer Space and Outer Space Activities;

III. Ways of Coordinating Space Science and Technology with Space Law;

IV. Various Subjects, such as:

1. Direct Broadcast Satellites,
2. Status of the Moon Treaty,[2]
3. Sovereignty and the Outer Space Treaties,
4. Solar Energy and Space Law,
5. Use of the Geostationary Orbit,
6. Analysis of the Concept of the "the Common Heritage of Mankind",
7. Settlement of Disputes Regarding Activities in Outer Space,
8. The Impact of Commercial Activities on Space Law,
9. Environmental Legal Problems of Space Activities,
10. Telecommunications with Reference to Space,

[1]The agenda is given under the next heading.

[2]Subjects on the agenda of the Legal Sub-Committee of the U.N. Committee on the Peaceful Uses of Outer Space. The Legal Subcommittee meets next on March 14, 1977 in New York City for four weeks.

11. Problems of Conflicting Uses of Space,
12. Other Subjects.

Remote Sensing of the Earth by Satellites will be the subject of a Round Table by the Scientific-Legal Liaison Committee of the International Academy of Astronautics, under the chairmanship of Dr. Vladimir Kopal of Czechoslovakia.

4. *AAS/AIAA Conference—Industrialization and Colonization of Space: The High Frontier, San Francisco Bay Area, Oct. 18, 20, 1977.*

The American Astronautical Society, in conjunction with the AIAA Technical Committee, announces a multi-dimensional conference on the industrialization and colonization of space. The conference will focus on commercial activities in space over the next ten years.

There will be technical sessions on Large Space Structures (manned and unmanned); Manufacturing for Profit; and Economical Transport Systems. Sessions are also planned to discuss Space Law; Space Community Planning; Psycho-Social Considerations for Space Communities; and Economic Realities of Space.

Papers in the field of Space Law may consider—but are not limited to—the following subject areas:

Property rights in space,
Freeports for commercial space use,
The status of privately owned space objects and colonies,
Legal ties of a space community to earth,
Internal legal options for space colonies,
The impact of existing and imminent treaties on commercial space operations,
The legal framework for intra-space cabotage,
Rights of multi-national corporations in space,
Rights and protection of information from space,
Rights of entrepreneurs in space commerce.

Abstracts of 200 to 500 words should be forwarded prior to 1 May 1977 to the Technical Program Chairman: Paul L. Siegler, President, EARTH/SPACE, Inc., 4151 Middlefield Road, Palo Alto, California 94303. Authors should receive notification by June 1, 1977, of acceptance of their papers.

5. *1976 Madrid Conference of the International Law Association: A Summary of the Discussion of Space Law*

The meeting to discuss the Report of the Space Law Committee took place on Tuesday morning 31st August and was presided by Professor Bos of the Netherlands.

In presenting his report, the Chairman of the Space Law Committee first referred to the three Addenda to the Report which were prepared after the Report had gone to print at the end of January. Since that time two important meetings of the U.N. Outer Space Committee had taken place (the 15th Session of the U.N. Legal Sub-Committee on Outer Space was held at Geneva from 3-28 May and the main Committee met in New York from 27 June-7 July) during which the subjects considered in the report came under further discussion. Addendum II contained a short survey of the views on remote sensing satellites expressed during these meetings. This addendum was circulated to the members of the Space Law Committee together with Addendum I containing the answers received on the Questionnaire on Remote Sensing Satellites included in the original Report.

In Addendum II reference was made to the five draft principles and the three "common elements" the U.N. Legal Sub-Committee had been able to complete.

Though the importance of this achievement should not be underrated, no agreement could be reached on the two crucial issues, relating *first* to the question whether or not prior consent was required for a launching state to conduct remote sensing activities over the territory of any other state and *second* whether the information obtained could be distributed to third parties without the consent of the sensed state. In Addendum II, the conflicting views on these two issues were set forth. It was submitted however that, though considerable difficulties had to be overcome in achieving a generally acceptable compromise, it was possible to discern remarkable examples of a rapidly increasing international cooperation in the field of remote sensing, which offered a proof that apart from the *need* of cooperation in this field, there was a beginning of an awareness of an *obligation* of cooperation. Referring to Addendum III containing a short survey of the debates on the problems arising from the use of direct broadcasting satellites held during the two meetings of the U.N. Outer Space Committee mentioned above, the Chairman expressed his regret that there had not been sufficient time for the Headquarters of the Association to circulate this Addendum to all the Branches.

As was mentioned in the Addendum, the last U.N. meetings revealed a continuation of the conflicts of views on how to strike a balance between, on the one hand, freedom of information and on the other, the need and moral obligation to act responsibly in order to prevent abuses of this freedom.

In view of the very limited time at the disposal of the Meeting and the great many aspects involved in the use of both remote sensing and direct broadcasting satellites, it

would be difficult to expect that the conference could arrive at a meaningful Resolution on both these problems. The Chairman expressed the hope however, that on the outstanding issues arising in the use of remote sensing satellites, the Meeting would be able to make a useful contribution to the study of how to arrive at certain guidelines to govern this use. It was decided to discuss the possibility of arriving at such guidelines on the basis of the questions submitted in the Report.

A. *Remote Sensing Satellites*

As to the questions of a substantive nature arising in this field:

1. The Meeting agreed that the rules to be devised should cover *all* data obtained by remote sensing both from environmental as well as from earth resources surveying.

2. The Meeting considered that the rules to be devised should cover only the earth segment and that an attempt to include *at this stage* the space segment would be premature.

3. The Meeting tended to support a system by which the data obtained by remote sensing should be disseminated internationally but, recognizing the specific interests of the sensed state, proposed the study of elaborating this system in such a way that a certain limited priority of access to processed data should be accorded to the sensed state.

As to the questions of a procedural nature:

1. The Meeting considered that efforts to arrive at an international convention should not be undertaken before a further indepth examination of the various technological and organizational problems of remote sensing had taken place. An understanding of these problems was generally believed to be an essential prerequisite to the elaboration of such a convention.

2. The Meeting expressed the opinion that the proposal, made by several delegates during the meetings of the U.N. Outer Space Committee to accept non-binding guidelines, would at this stage offer greater prospects of success than the laying down of binding rules.

B. *Direct Broadcasting Satellites*

Though the Meeting did not succeed in bridging the gap between the divergent interpretations of the fundamental principle of freedom of information, the exchanges of views on this subject proved to be fruitful.

Professor Bockstiegel (Federal Republic of Germany), noting the little progress that had been made by the U.N. Space Committee between the two schools of thought

referred to in the Report, stressed the responsibility of States to make sure that the immense potentialities of direct broadcasting satellites are not kept unused due to political reasons.

In so far as the situation "de lege lata" was concerned he agreed with the view expressed in the Report presented to the New Delhi Conference of the ILA, according to which the principle of the free use of space does not mean only the placing of geo-stationary satellites in orbit without doing anything with them; it only meant freely using them as long as no more specific rule of international law provided an exception to that positive rule in the Space Treaty. He considered the Helsinki Agreement as an objective of primary importance also in discussing the use of direct broadcasting satellites.

He saw as one of the advantages but also as one of the responsibilities of organizations like the I.L.A. that they were less bound by ties of strategy and interest from their Governments, and submitted for consideration by the Meeting the following suggestions by which a possible compromise might be achieved.

The meeting might start by confirming the principle of freedom of the use of outer space and of information. This freedom should however be subject to the following restrictions.

1. Non-intervention of the broadcasting state in the internal affairs of the receiving state.

2. Direct broadcasting by satellites should in general only take place after prior *notice* and, if desired, consultation with the receiving state.

3. With respect to a number of specific kinds of programmes to be listed, direct broadcasting would not be permitted unless prior consent of the receiving state had been obtained.

Professor Bockstiegel said he was fully aware of the formidable difficulties involved in agreeing on the kind of programmes for which prior consent would have to be obtained. The list to be drawn up might include some of the provisions laid down in Articles I, II and III of the Convention concerning the Utilization of Radio Diffusion in the Interest of Peace (23rd September 1936) to which reference was made in the Chairman's Report, and might also contain some of the kind of restrictions mentioned in the memorandum prepared by Professor G. P. Zhukov of the Soviet Union and distributed during the Conference. In this memorandum it was stated that the Soviet Union was seeking to ban programmes of direct satellite broadcasting which contained harmful and dangerous ideas, such as propaganda of war, militarism, nationalism and racial hatred and enmity among peoples, dissemination of immoral ideas, pornography and narcotics and also programmes undermining the bases of local civilizations, culture, home life, traditions and the language.

Mr. Subrata R. Chowdhury, considering the inclination of the Chairman's Report in this field to be rather pessimistic, expressed the view that once a broad consensus had been reached on programme content, the principle of consdent and of a free flow of information would not be difficult to reconcile. All states agreed that war propaganda, racial hatred and interference in internal affairs should be excluded. Similarly it was equally agreed that programmes ought to include matters relating to sports, education, social culture and economic development of mankind which were of particular importance to developing countries. Mr. Chowdhury, believing that the Space Law Committee meeting every two years could not keep pace with the rapid developments in the U.N. Forum, suggested that the Association should arrange for periodic meetings and prepare interim reports from time to time.

Professor G. Haraszti (Hungary) expressed the view that the free flow of information was not recognized by general international law and that a principle which would prohibit direct broadcasting by State A which could be received by State B, unless the prior consent of State B had been obtained, was fully consistent with the Outer Space Treaty. On reading the Report, he got the impression that it wrongly meant to convey that the majority of the members of the U.N. Space Law Committee took a stand in favour of a free and unlimited right of information, and that the principle of prior consent was defended only by socialist states and a number of representatives of developing countries. Dr. Sylvia Williams (Argentine) referred to the Argentine Draft on Direct Broadcasting presented to the U.N. Outer Space Committee, which envisaged the possibility for the receiving state of being able to ask the broadcasting state to suppress those parts of the programme affecting the national interests of the latter. This possibility arose *after* the programme had been broadcasted. She fully agreed with the need of participation between the broadcasting and receiving state.

In his reply, the Chairman first of all regretted that it was not possible to refer to the comments of those members who had not submitted them in writing to the Secretariat, as provided by the rules of the Association. He then referred to the erroneous impression which Professor Haraszti had received from reading the Report. During the discussions on the use of direct broadcasting satellites in the U.N. Outer Space Committee, only a limited number of the 37 members had expressed their views on the principle of prior consent. No mention was made in the Report—nor could such mention have been made as to vote was taken—regarding a majority for or against this principle.

What *had* been suggested in the Report was that, as the United States was among the countries which opposed the establishment of a system of prior consent, considering the principle of freedom of information to be a fundamental human right, and as no really viable legal regime in outer space could be established without the agreement of the two main Space Powers, namely the United States and the Soviet Union, the adoption of a system of prior consent appeared to be unlikely. Professor Haraszti had stated that, according to the Report, the opponents to the principle of prior consent were in favour of an *unlimited* right of information. This statement was not correct. The

Chairman referred to the last paragraph of page 4 of the Report which specifically mentioned that the opponents of a system of prior consent did not fail to recognize that the present limitations on the principle of freedom of information laid down in several international instruments did not sufficiently allay the fears of many countries of being subjected to unwanted broadcasts.

The suggestion that a system of prior consent was unlikely to be adopted was not—"pace" Mr. Chowdhury—inspired by pessimism but was based on the consideration that space law, like all other branches of international law, cannot gather strength by isolating itself from political realities. This did not mean that a compromise could not be found by which the principle of freedom of information and the principle of Sovereignty of States could be reconciled.

Among the possible approaches of arriving at such a compromise, the Chairman referred to Prof. Bockstiegel's proposal to study the possibility of drawing up a list of a number of items in programmes regarding which prior consent of the receiving state should be obtained. Another possible approach would be that envisaged in the Argentine Draft to the U.N. Outer Space Committee providing for the need of participation between the broadcasting and receiving state and for the ability of the receiving state to ask the broadcasting state to suppress those parts of the programmes affecting the national interests of the receiving state.

In connection with the study of these issues by the Space Law Committee, the Chairman referred to Mr. Chowdhury's remarks. Though he did not agree with the observation that the U.N. Forum always outpaced the work of the Committee—there were, on the contrary, several instances where the ILA had outpaced the U.N. vide f.i. the ILA Resolution adopted at the Buenos Aires Conference on the interpretation of the term "outer space" and which had been widely acclaimed throughout the world*—he fully agreed with Mr. Chowdhury's view on the importance of arranging periodic meetings of the Committee between the plenary conferences of the Association.

Unfortunately, up till now, the efforts to arrange for interim meetings had met with little success. It had proved very difficult—for various reasons including financial—to get a sufficient number of members together. He hoped however that it would be possible to convene a meeting of the Committee in the course of 1977, probably at the Headquarters of the ILA in London.

In his report to the closing meeting of the Madrid Conference on the results of the Space Law Meeting, the Chairman first drew the attention of the Conference to a factor

*The Resolution reads as follows: 'That the term "outer space" as used in the "Treaty of Principles governing the Activities of States in the Exploration of use of Outer Space, including the Moon and other Celestial Bodies' should be interpreted so as to include all space at and above the lowest petigee achieved by the 27th January 1967 when the Treaty was opened for signature, by any satellite put into orbit, without prejudice to the question whether it may or may not later be determined to include any part of space below such perigee.

which had an adverse effect on the law-creating processes in outer space. Outside the comparatively small circle of those directly concerned with the development of practical space applications, the world showed a widespread ignorance of the immense potentialities and benefits which *can* flow from these applications to the life of every human being on Earth. An encouraging factor was however, that in the meetings of the U.N. Committee concerned with the consideration of the political, legal and scientific implications of the conquest of space, the delegates of several countries had lately shown a greater awareness of the urgent need to start a public information campaign and bring the general public "au fait" of the revolutionary influence which the space applications at present being developed were going to exercise in the social, cultural and economic fields.

Because of the many political, social, cultural and financial aspects involved in the two space applications considered in the Report of the Space Law Committee, the complexities in arriving at a consensus on rules to govern these new technologies were obviously considerable, all the more so as one had to avoid crystallizing the law prematurely before enough was known of the facts to which it would apply.

It was satisfying that, in so far as the use of remote senisng satellites was concerned, the Meeting had been able to agree on a number of principles to govern this use (see above).

On the subject of direct broadcasting by satellites, the opinions expressed demonstrated the differences between the two schools of thought referred to in the Report of the Space Law Committee, the exchange of views had however been useful in clarifying the crucial issues in this field and had provided a fruitful basis for further study by the Committee. Finally, the Chairman drew the special attention of the Conference to one factor in space activities already mentioned at the beginning of this survey and which could be expected to exercise a profound influence not only on the development of space law but also indirectly on that of international law in general. In the last few years there had been very remarkable examples of a rapidly increasing international co-operation in space activities, in particular in the field of remote sensing by satellites. This offered a proof of a growing awareness of states that apart from the need for international co-operation there was an obligation to such co-operation.

Professor Dr. D. Goedhuis
Chairman, ILA Space
Law Committee

6. *Other Events*

An Aerospace Law Symposium was held in Washington, D.C. on September 15, 1976, as part of the National Convention of the Federal Bar Association. Chairing the program was Judge Harold Berger of Philadelphia. Participants in the program

included: Mrs. Eilene Galloway, Brig. Gen. Martin Menter, USAF (Ret.); Messrs. Edward R. Finch, Jr.; Lawrence R. Caruso; S. Neil Hosenball; Paul G. Dembling; and Mrs. Katherine Drew Hallgarten. In addition, Professor Stephen Gorove acted as symposium consultant. The topics covered included direct broadcasting and remote sensing satellites. The demarcation of outer space from airspace, ozone pollution, legal implications of the space shuttle, general treaty discussion and legal developments in respect to communications satellites systems.

The Space Law Committee of the International Law Association met during the 58th meeting of the Association in Madrid, Spain, August 29-Sept. 4, 1976. During the session, Professor D. Goedhuis of the Netherlands, Chairman of the Committee, presented his report.

The Peaceful Uses of Outer Space was the theme of a three-day conference organized by the Center for Peace Studies of the University of Akron, October 21-23, 1976. Featured speakers included Achmad Padang, Chief of Committee Services Reports and Research Section, Outer Space Affairs Division, United Nations; James V. Zimmerman, Applications Officer, Office of International Affairs (NASA): Arthur W. Johnson, Former Deputy Director National Environmental Satellite Service; Francis S. Urbany, Office of Telecommunications Policy, Executive Office of the President; Ronald S. Stowe, Assistant Legal Advisor, Office of United Nations Affairs, Department of State; Eilene Galloway, President, U.S. Membership, International Institute of Space Law; and Professor Stephen Gorove of the University of Mississippi Law Center.

7. *Brief News*

The European Space Agency has accepted Ireland into its membership...Japan plans to launch its first synchronous satellite in February 1977. The launch is considered a preliminary step toward the development of a Japanese communications satellite program...The Arab League has approved a plan to establish a satellite communications system within the next few years...The nineteenth meeting of the Committee on Space Research of the International Council of Scientific Unions was held in June 1976 in Philadelphia.

The Convention on Registration of Objects launched into Outer Space entered into force on September 15, 1976. The United States is a party to the Convention...Brazil has announced plans to have two commercial communications satellites in operation by mid-1979...On July 1, 1976, President Ford formally dedicated the National Air and Space Museum, a part of the Smithsonian complex...An agreement has been signed between the Austrian Space Agency and the French Centre National d'Etudes Spatiales (CNES), providing for cooperation between the two countries on such projects as the European Spacelab Program.

The third spacecraft to be launched in the Marisat maritime communications satellite series, Marisat-C, was placed into orbit on October 14, 1976. The vehicle will be a backup to the earlier spacecraft and also provide the Navy with increased UHF communications capacity...A group of about 10 Soviet space officials headed by Boris N. Petrov, Intercosmos Council Chairman for the Soviet Academy of Sciences, held discussions in Washington during the week of October 18, 1976, with NASA officials about future joint U.S./Soviet manned space missions...European Space Agency participation in the NASA large space telescope project was recently approved by the ESA science program committee.

8. *Report* to the Inter-American Bar Association, XIXth Conference, Cartagena, Columbia (Sept. 27-Oct. 3, 1975)—Important Developments in Terrestrial and Space Communications, 1973-75: Their Legal Significance.

In view of the central theme for the XIX Conference—"Juridical Aspects and Documents relating to Latin American Economic Integration, including those relating to the Andean Pact"—it is fitting that we commence our report to the XIX Conference of the Inter-American Bar Association (IABA) with a reference to the First Meeting of Andean Ministers of Communications which took place in May 1974 in Cali, Colombia. At that meeting 32 proposals designed to improve subregional communications systems were considered.[3] Those proposals had been drafted earlier by communications experts during a meeting held in Bogota, Columbia, in January 1974. Among the subjects considered which had potential legal significance are: formation of public telecommunications associations or entities on the subregional level, amateur radio operators' acting in Andean countries other than their own, and exchange of informative, cultural and educational radio and TV programs.

A Central American regional body which commenced operations under a treaty signed in Managua, Nicaragua on April 26, 1966 is COMTELCA (the Central American Technical Telecommunications Commission). COMTELCA is carrrying out the purpose of the treaty which is to set up a modern telecommunications network to interconnect countries in the region and link them to other countries throughout the world. In our report to the last IABA conference, mention was made of the entry into force on February 12, 1973 of the definitive arrangements for the International Telecommunications Satellite Organization (INTELSAT), the international organization which operates the global commercial communications system. As of the date of entry into force of the definitive arrangements, when the requisite number of countries—54—had ratified the arrangements, 79 countries had adhered to them. As of July 1975, INTELSAT was composed of 91 member countries.

The structure provided by the Definitive Arrangements under which INTELSAT operates consists of: (a) an Assembly of Parties (governments which are parties to the

[3]Latin American Integration 94 (1974).

INTELSAT Agreement); (b) a Meeting of Signatories (governments or their designated telecommunications entities which have signed the Operating Agreement); (c) a Board of Governors; and (d) an Executive Organ, headed by a Secretary General. The Board of Governors, with a current membership of 24 Governors representing 69 Signatories, is responsible for the design, development, construction, establishment, operation and maintenance of the INTELSAT space segment. The Assembly of Parties provides a forum for governments to consider matters of concern to them. For example, at the first meeting in February 1974, the Assembly authorized the Board of Governors to establish formal relations through the Secretary General of INTELSAT, with the International Telecommunication Union (ITU), the International Civil Aviation Organization (ICAO), and the Intergovernmental Maritime Consultative Organization (IMCO). It was further stated that any such agreement would be subject to ratification by the Assembly. The Assembly recognized, however, that the Board of Governors, through the Secretary General, may have working relations with international bodies.

The Meeting of Signatories consider operational and other matters of interest to investors and participants in INTELSAT. At the third Meeting of Signatories in April 1975, the plans for a new generation of INTELSAT V satellites which are intended to replace, starting in 1979, the INTELSAT IV-A satellite series were reviewed. They are expected to have a capacity of approximately 12,000 two-way voice circuits, plus color television channels. This compares with 4,000 circuits in the currently operational INTELSAT IV satellites and 6,000 circuits anticipated with the INTELSAT IV-A satellites.

The Board of Governors of INTELSAT at a meeting in the summer of 1975 authorized the issuance of a request for proposals (RFP) covering the design, development, manufacture and test of seven INTELSAT V satellitelites. Options for up to eight additional satellites are also requested, such option to be exercised one to five years from the date of the contract. The RFP has been forwarded to an international list of qualified firms. Proposals are to be submitted on a firm fixed-price basis.

As communications satellites enter into their second decade, the resolution of certain legal problems takes on new urgency. The steady advance in technology that has marked those years has required the legal profession to consider problems arising out of the use of satellites for direct broadcasting, for air and surface ship navigation, for weather forecasting, for remote sensing, and for those problems arising out of their use for public communications. Technical feasibility of direct broadcasting from satellites has moved much nearer to practical realization within the last few years, making it possible to predict with some certainty that operational systems could be made available within the forthcoming decade.[4]

In accordance with U.N. General Assembly Resolution 2916 (XXIII) of November 9, 1972, the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space has been considering the elaboration of principles governing the use by states of artificial earth satellites for direct television broadcasting, with a view to concluding an in-

[4]U.N. Doc. A/AC. 105/100/Add. 3, at 5 (1975).

ternational agreement or agreements. The Working Group established for this item on the Legal Subcommittee's agenda for its fourteenth session in 1975 was able to make progress by drafting texts of principles on several new provisions in addition to continuing work on the texts of the five draft principles considered at the previous session of the Legal Subcommittee. At the conclusion of the fourteenth session, the Legal Subcommittee expressed the opinion that at its next session, it would give high priority to consideration of the elaboration of principles looking toward an agreement on direct broadcasting.[5]

The need for timely issuance or revision of regulations by the International Telecommunication Union (ITU) in order to keep pace with technical developments is illustrated by decisions made by the ITU at the World Administrative Radio Conference for Maritime Mobile Telecommunications held at Geneva in 1974. It was recognized that administsrations had little or no experience in operating a maritime-mobile satellite service and, consequently, it was not possible at present to establish comprehensive regulatory provisions for such a service. Nevertheless, as it appeared that temporary administrative, technical and operational provisions might be required before the next competent world administrative radio conference, the Conference adopted a number of provisions to enable a maritime mobile-satellite to be introduced in an orderly manner. Thus, several amendments were made in the regulations relating to such matters as definitions and operational procedures, and the operators of the maritime mobile-satellite service were taken into consideration.

An important recommendation adopted by the Conference, Recommendation No. Mar 2-15, provides that while gaining experience to provide a basis for the adoption of detailed regulations by the next competent Administrative Radio Conference, administrations participating in the maritime mobile-satellite service should agree on temporary administrative technical and opeerational provisions, notify them to the Secretary-General, and invite other administrations to adopt them without future commitment. Another resolution adopted by the Conference, No. 2-17, states that those provisions of the Radio, Telegraph, and Telephone Regulation of the International Telecommuunication Convention, and the Recommendations of the Vth Plenary Assembly of the International Telegraph and Telephone Consultative Committee (CCITT) which are applicable or useful to stations in the maritime mobile and maritime-mobile satellite services should be assembled by the Secretary-General for inclusion in a revision of the manual entitled "Manual for Use by the Maritime Mobile Service."[6]

[5]For text of the Working Group's Report to the Legal Subcommittee, see U.N. Doc. A/AC.105/147, Annex II (March 11, 1975), reproduced in 3 J. Space L. 89 (1975).

Ed. Note: At the time this report was submitted, the fifteenth session had not been held. At that meeting in Geneva, May 3-28, 1976, it was initially agreed to continue consideration of the set of principles "with a view to removing square brackets" (brackets were used in the draft texts to indicate lack of consensus) "and alternatives, as well as to improving the language of agreed texts." U.N. Doc. A/AC. 105/171/Annex II, at 1 (1976). For a reference to the nine principles, as agreed to by the Working Group, see U.N. Doc. A/AC. 105/171/Annex II, at 1-5 (1976).

[6]U.N. Doc. A/AC. 105/100/Add. 3, at 13 (1975).

Since 1966, the Inter-Governmental Maritime Consultative Organization (IMCO) has been studying the operational requirements for a satellite communication system for maritime purposes. A Panel of experts which had been working on the problem since 1972 produced a report which included not only an examination of the operational requirements, but also a draft agreement creating organizational and institutional arrangements for a new international organization to provide a maritime satellite capability. The report formed the primary documentation for an Intergovernmental Conference on the Establishment of an International Maritime Satellite System, held April 23-May 9, 1975 in London, England. The Conference agreed on the need for a world-wide maritime satellite system and also that there was a need for an International Inter-Governmental Organization to administer and manage the system.

The year of the first Intergovernmental Conference on the Establishment of an International Maritime Satellite System also marked the advent of MARISAT, the world's first commercial maritime satellite system designed specifically for maritime needs. MARISAT, whose services are offered by COMSAT General Corporation, a wholly owned subsidiary of COMSAT, is capable of providing telex, TWX, facsimile, data and telephone services. Other capabilities include those for distress, safety, search and rescue, and weather reports. Work is also being done on the establishment of a system for the use of communications satellites to assist aircraft. In August 1974, the U.S. Federal Aviation Administration (FAA), the Euroopean Space Research Organization (ESRO), now known as the European Space Agency, and the Government of Canada agreed to a joint program named AEROSAT, to test and evaluate the use of communications satellites to assist aircraft flying transatlantic routes. In September 1974, COMSAT General was selected as the U.S. company to participate with ESRO and Canada in the provision of the space segment for the AEROSAT program. Under a joint agreement signed in December 1974, COMSAT General and ESRO each has a 47 percent ownership interest, and Canada, a six percent interest. COMSAT General will lease its share of satellite capacity to the FAA. The space segment will include two satellites (each with a communications capability in VHF and UHF frequencies) and related ground control facilities and electronics equipment. The first of the two satellites is planned for launch late in this decade.[7]

The accuracy of weather reports is being steadily improved through the activities of the world Weather Watch. In 1974 both near-polar orbiting and geostationary satellites continued to play important roles in the daily operations. The highlight of the satellite-related activities within the World Meteorological Organization (WMO) was the convening of the first session of the Executive Committee Panel of Experts on Meteorological Satellites in May 1974. The role of the panel is to co-ordinate the programs of various satellite activities within WMO, and provide a forum for the satellite launching members and satellite user members, so that maximum benefits may be derived from the satellite information. One of the important recommendations of the panel was that WMO should prepare and distribute to all members a series of publications describing the national programs of the satellite operating members, a

[7]Communications Satellite Annual Report, at 9 (1974).

guide on direct broadcast systems, and technical notes describing various uses of satellite data. Action on these items has since been initiated in WMO.[8]

Another of the subjects scheduled for priority treatment by the fourteenth Session of the U.N. Outer Sapce Committee's Legal Subcommittee has been remote sensing of the earth from satellites. The Working Group on this subject had before it three draft international instruments and other documents which were examined in detail. It was found that there were certain common elements in the three drafts, and the views expressed by many members in several areas. Among these were:

(1) that remote sensing activities by means of space technology should be conducted for the benefit and in the interest of all mankind; (2) that remote sensing activities by means of space technology should be conducted in accordance with international law; (3) that the maximum benefits to all countries could be obtained by international co-operation at all levels, particularly on a regional basis; (4) that States undertaking programs for remote sensing activities by means of space technology should encourage international participation; and (5) that in remote sensing activities by means of space technology measures should be taken to promote efforts for the protection of the natural environment of the earth.

Several other questions were raised and considered by the Working Group. Among these were, whether sovereign rights of states over their natural resources apply also to information on these resources, and whether a distinction should be made between the question of access to information on resources within national jurisdiction and on resources outside national jurisdiction. No definitive decisions were reached, and it was recommended that the work on the legal aspects of remote sensing should be continued as a matter of high priority at the next session of the Subcommittee, bearing in mind the views expressed by states, including proposals for draft international instruments.[9]

We turn now to the hemisphere-wide activities of the Inter-American Telecommunication Conference (CITEL). Various permanent technical committees of CITEL have held meetings, and there have also been meetings of a group of specialists on tariffs, as well as a working group in the structure and functioning of CITEL. The tariff specialists adopted resolutions to be submitted to Permanent Technical Committee I for its approval, one of which called for a study of the tariff structures of the member countries for services to the public to be prepared and submitted for consideration at the Second Conference, looking toward the establishment of a uniform tariff structure for the member countries.[10] Permanent Technical Committee III: Resources, at its second meeting, adopted, among others, a resolution of great importance for member countries in developing their telecommunications plans.

[8]U.N. Doc. A/AC. 105/100/Add. 3, at 27 (1975).

[9]U.N. Doc. A/AC. 105/147/Annex II, at 2-3 (1975).

[10]Informe (provisional OEA./Ser. L/XII. CITEL/Com I/95 Rev. (5 April 1975; original in Spanish).

Recognizing that for this purpose, the countries require timely and effective information support, the Committee resolved to recommend that each member country establish within the appropriate agency an information center or clearinghouse specializing in the technical, scientific, administrative and social-economic aspects of telecommunications. It was further recommended that such agency instruct the responsible officials in such information center to maintain and furnish the information they consider necessary to the CITEL-created Latin American Telecommunications Information Center (CILAT), with headquarters in Mexico.[11] The establishment of such information centers, and transmission of individual country information of the nature described to CILAT, would be of inestimable value in the development of communications in the Americas. But its full value can be realized only if authentic copies of the pertinent international agreements, telecommunications laws and regulations are also made a part of this body of information. As a basis for use of new and improved telecommunications systems, the countries of the Americas are constantly adopting new or amended telecommunications, and related, laws and regulations; a bank of information on this legislation would enable one country to profit from the experience of the other.[12]

It was therefore recommended that the Inter-American Bar Association urge CITEL at its Second Conference in November 1975 to adopt a resolution recommending that the material to be supplied to the individual country information centers, and through them to CILAT, include the pertinent international agreements, and current telecommunications and related laws and regulations of each country.

Katherine Drew Hallgarten
Chairperson, Section on Communications
Comm. on Commercial Law,
Inter-American Bar Association

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[11]Resolution CITEL/CTP. III-11/74 "Organization of National Telecommunications Centers or Clearinghouses," Final Act of the Second Meeting of Permanent Technical Committee III: Resources, OEA/Ser L./XII, CITEL/Com III/43 Rev. 1, at 16 (August 15, 1975; original in Spanish).

[12]Some examples of new and proposed legislation and regulations include an Acuerdo published in the Diario Oficial of Mexico of August 8, 1974, establishing the Comite Consultivo de Teleinformatica under the Office of Telecommunications; in Costa Rica modifications to the Radio Law were instituted by Law No. 5514 (1974) to raise the cultural level of radio and television broadcasts (see 7 Lawyer of the Americas 100/107 (1975). By Decree Law No. 20643 of June 11, 1974 Peru established the National Aerospace Research and Development Commission (Comision Nacional de Investigacion y Desarollo Aeróspacial—CONIDA) as a public agency with legal personality and administering autonomy, one of the purposes of which is to promote and develop for peaceful purposes research and operations furthering the country's space activities, see U.N. Doc. A/AC. 105/146 at 44 (1975). The Government of Honduras is planning an extensive revision of its telecommunications laws. Shortly after this Section's study of the Telecommunications Laws of Brazil was published in April 1972, by the Inter-American Bar Foundation, Law No. 5792 of July 11, 1972 authorized the Federal Government to organize the Brazilian Telecommunications Corporation (Telecomunicacoes Brasileiras SA—TELEBRAS).

Legal Implications of Remote Sensing From Outer Space, edited by Nicholas Mateesco Matte and Hamilton DeSaussure (Sijthoff, Leyden, 1976, pp. 197).

The second half of the twentieth century may be characterized by that period of human development during which numerous global crises, ranging from a fossil fuel shortage to global environmental deterioration, were encountered. As a result of the global nature of these crises it has become incresingly more evident that the solutions to these problems must be on an international scale. One major new technological advancement which has the potential for contributing vast quantities of data for analyses pertaining to global solutions is remote sensing from space—a direct outgrowth of space age technologies. Whereas most of the space efforts were directed toward outer space, some of the most interesting data have been those gathered about the earth from outer space. Because of the legal and political implications of remote sensing data from outer space which recognizes no territorial or political boundaries, a conference was held at McGill University in October, 1975. The purpose of the conference was to delineate some of the legal problems posed by the emergence of this new technology.

The conference was held at the Institute of Air and Space Law and representatives from the United States, Canada, the Netherlands, Austria, France, and the Soviet Union delivered a series of papers representing varying viewpoints. The results of the symposium are presented in this publication which contains 21 articles by a number of distinguished academic, industrial and governmental representatives. The papers in this publication are literate, articulate, stimulating, and pose far more questions than answers. Perhaps this must be the case considering that remote sensing from outer space is only a few years old, that it is a technology employed primarily up to now by the United States, and considering the number of national independent states which stand to profit (or in the view of some, to be exploited) from this technology.

The papers in this publication are divided into five sections, each of which contains a series of articles by various experts. The section titles are "Technical Applications of Remote Sensing from Outer Space", "Impact of Remote Sensing on the Economic Develoment of Western Europe and Latin America", "Worldwide Utilization and Dissemination of Data Acquired Through Remote Sensing", "Possible Integrated North American LANDSAT Program", and "Role of the United Nations". The sections are arranged to provide an insight into the technology of remote sensing data before introducing the reader to economic implications of the remote sensing programs in Europe and South America. At that point one first encounters the potential international legal problems associated with the remote sensing program. From this point onward throughout the book, one is presented with a variety of opinions regarding the worldwide issue of remote sensing data.

Although the papers are concerned with all remote sensing programs, the emphasis of the book is almost entirely on the data gathered by the U.S. National Aeronautics

and Space Administrations *LANDSAT* I and II satellites, formerly named Earth Resources Technology Satellites which were first launched on July 23, 1972. According to the Preface by the editors, the mission of *E.R.T.S.* I was to "ascertain which natural resources and environmental data could be best acquired from the use of space-craft; to test data acquisition and methods for interpreting it in such diverse areas as forestry, geology, hydrology, oceanography, and ecology; and to determine how outer space remote sensing could serve the commercial, scientific, and governmental communities."

The *LANDSAT* program is, to a great extent, the result of the efforts of the late Dr. William T. Pecora, former Director of the U.S. Geological Survey and Under Secretary of the Interior. Dr. Pecora advocated a completely open remote sensing program; the data of which would be made available to all peoples of the world, regardless of political affiliations. Even though Dr. Pecora did not live to see the results of his untiring efforts, it is a major tribute to him that his viewpoints are those being followed by the United States today.

Fears have arisen concerning the acquisition, utilization, and dissemination of remote sensing data. The fears of some countries are summarized in the Preface. The editors state: "In a world composed of approximately one hundred and fifty states, all with their own heritage and own religions, legal, and cultural fabric, remote sensing poses potential threats as well as benefits. These threats appear more real in closed rather than open societies, but they must be expelled to the satisfaction of all countries concerned. The delicate issues concerning State sovereignty, right to privacy, property interest in one's own resources and economic security, must be accommodated if the framework of spaceborn remote sensing activity is to become strong and accepted worldwide.... It is a technology which has no regard for national frontiers. Large segments of the earth can be scanned on each orbit and the information acquired takes no measure of political frontiers marked out by our Nation-State System." One can only hope that a technology which was developed at such a tremendous cost can become a technology for all the peoples of the world to enable international cooperation on problems of global significance. If we cannot agree upon worldwide use of such information to enhance our capabilities for food production, monitor natural hazards and environmental commodities, and to locate potential new sources of badly needed raw material and energy resources, what can we agree upon?

Only one possible weakness may be found in this publication. Little effort has been made to summarize the accomplishments of the thousands of investigators in the United States and elsewhere, of which the economic and social implications are immense. But this information is available in a variety of other sources.

The publication of this book, only four years after the launching of the *LANDSAT I,* is timely. The papers raise a variety of stimulating and difficult legal questions which

must be answered within the next few years. All persons connected with remote sensing, whether scientific, legal, economic, or potential, will find fruitful reading in this small, attractive volume.

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Televisions sans frontières, by Simone Courteix (Economica, Paris, 1975, pp. 342)

The book of Simone Courteix treats television problems in a wide-ranging manner. Starting from an introduction, she continues the preceding discussion of the law relating to international radio communications and specific television questions. She also treats, in this portion of the book, the international cultural relationships of television. Beginning her study on the existing level of cooperation in this field, the author provides in Part I an extensive review of Regional Unions of Radiodiffusion at the global level. Similarly, she studies other forms of association, such as the Commonwealth Broadcasting Association.

After this survey, the practical consequences of certain forms of cooperation are observed, as for example Eurovision, Intervision (an exchange of television programs), Nordvision (exchange and cooperation between the Northern countries, Denmark, Finland, Iceland, Norway and Sweden), and so on. In the second part of the book, the new structures for space telecommunication have been extensively treated, whereas the third part deals with the future development of this field.

In her conclusions, Courteix observes that national interests in telecommunications have always dominated international cooperation and adds that states attempt to advance their own positions, whereas their control over these means of communication becomes more and more difficult. This development has been promoted by the telecommunications satellites in cosmic space. In the opinion of the author, direct broadcasting will—notwithstanding the problems it creates—finally penetrate national frontiers and thereby create a certain universality.

The book contains extensive annexes and is, therefore, a rich and valuable source dealing with telecommunication. Moreover the bibliography is of excellent quality. The total volume will be a welcome accession for all persons interested in telecommunications and space law.

Die Rechtstellung des Raumfahrers nach geltendem Weltraumrecht, by E. W. Herkommer (Thesis, Würzburg, 1974, pp. 159).

As can be seen from his qualifications, the author is a doctor of physics;

consequently, he is especially competent to undertake this study, owing to his exceptionally broad academic background.

Following the introduction, the first chapter provides a general survey of space law, in which the author argues that the law of outer space constitutes a new branch of law. In the second chapter, he treats the legal status of astronauts and spacecraft, including the rescue of astronauts. In the third chapter, an examination is made of the status of the commander of spacecraft. This objective is accomplished by comparing his status with that applied by international regulations promulgated for the benefit of the traditional aircraft commander (*i.e.* the Conventions of Chicago and of Tokyo) and the rules found in German national law.

On the topic of the aircraft commander and, similarly, on that of search and rescue, Dr. Herkommer provides considerable insight into existing legal criteria and, at the same time develops a number of original thoughts. Following his conclusions, Annexes are added, which include the program of the European Space Agency for 1974, the text of the 1971 Convention on Liability for Damage Caused by Space Objects and the 1972 Agreement concluded between the United States of America and the Union of Soviet Socialist Republics, concerning cooperation in the exploration and use of outer space for peaceful purposes. A list of abbreviations and an extensive bioliography strengthen the text.

In general, a very useful addition to the literature of space law has been produced.

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