5 Cooperation in space
International institutions

Tom Graham and Darren Huskisson

Introduction

Fostering international cooperation is a key element in the national space policies of numerous spacefaring states. It is an underpinning of the Outer Space Treaty, being addressed multiple times in the text of the treaty in the context of cooperation on legal and scientific issues as well as space exploration, with the ultimate purpose of maintaining friendly relations among states and maintaining international peace and security.[1] While there is a long history of using a multitude of mechanisms to foster international cooperation in various areas of international relations, mechanisms to foster cooperation on issues relating to outer space are comparatively new.

There has, however, been considerable progress made over the last five or six decades toward multilateral international cooperation in support of space activities. These efforts have a direct bearing on US national security. The United States has long recognized that the promotion of international cooperation can "further U.S. domestic, national security, and foreign policies."[2] Broad and sustained international cooperation in outer space activities is a key to a more secure future for the United States.

Various international institutions support the international goals relating to cooperation in outer space. It is the purpose of this chapter to describe the infrastructure underlying these institutions. First, the more formal system of the United Nations and how it supports space cooperation will be addressed, followed by regional telecommunications organizations, and then a discussion of various other methods used for international cooperation. Finally, we will examine what the future may hold for international space organizations and the role that the United States might play in those organizations.

The UN system

While examples abound of less formal avenues of international cooperation, probably the best known forum for space cooperation is the UN

system. The United Nations has been involved in outer space activities from the early days of space exploration. Shortly after the launch of *Sputnik*, an ad hoc Committee on the Peaceful Use of Outer Space came into existence, becoming a permanent committee the following year.[3] Since that time, the outer space activities of the United Nations have greatly expanded and cover numerous functional areas.

United Nations Security Council

The Security Council of the United Nations is important in addressing UN support of space activities. While the UN Charter does not specifically mention outer space in its enumeration of the powers of the Security Council, under Chapters V, VI, and VII of the Charter, the functions and powers of the Security Council include the authority to maintain international peace and security; to investigate any dispute or situation which might lead to international friction; to recommend methods of adjusting such disputes or the terms of settlement; to formulate plans for the establishment of a system to regulate armaments; and to determine the existence of a threat to the peace or an act of aggression and to recommend what action should be taken, including calling on members states to apply economic sanctions and other measures not involving the use of force to prevent or stop aggression and military actions.[4]

These powers almost certainly apply to the resolution of disputes involving outer space. The international community has chosen to explicitly apply the UN dispute resolution system, including the Security Council, to outer space activities. Article III of the Outer Space Treaty states:

> States Party to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding.

Thus, the Security Council has broad authority to take action in the case of a dispute or an incident in space which could affect space if it involves a threat to the peace, breach of the peace, or an act of aggression. While these terms have never been applied to an outer space dispute, they have been interpreted very broadly to include a wide variety of situations and would certainly be broad enough to cover numerous potential situations relating to outer space.[5] The day may come when the Security Council seizes itself an international dispute involving outer space, since a major dispute or incident in space would appear to almost automatically involve at least a threat to peace.

United Nations General Assembly

The United Nations General Assembly (UNGA), created under Chapter IV of the UN Charter, has, among other powers, the power to make recommendations on the maintenance of international peace and security, including the principles governing disarmament and arms regulation; to discuss any question relating to international peace and security; and, except where a dispute or situation is being discussed by the Security Council, to make recommendations on it; to make recommendations in furtherance of the promotion of international political cooperation, the development and codification of international law, the realization of human rights and fundamental freedoms for all; and international collaboration in economic, social, cultural, educational and health fields; to make recommendations for the peaceful settlement of any situation, regardless of origin, which might impair friendly relations among nations.[6] The General Assembly has less enforcement power than the Security Council but has been an active forum for the discussion of outer space issues.[7]

Since 1958 the UNGA has taken action on nearly 100 resolutions relating to outer space, with nearly one-third of those resolutions relating to the prevention of an arms race in outer space and one-fifth of those resolutions relating to international cooperation and peaceful use of outer space.[8] Perhaps the most well known and most authoritative actions of the General Assembly relating to outer space have been the attempts at "law making" through the issuance of declarations and principles covering various space activities. These include the 1963 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space,[9] the 1982 Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting,[10] the 1986 Principles Relating to Remote Sensing of the Earth from Outer Space,[11] the 1992 Principles Relevant to the Use of Nuclear Power Sources in Outer Space,[12] and the 1996 Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries.[13] These declarations and principles do not in and of themselves constitute law; however, some aspects of these documents are recognized as reflective of customary international law. They can also be seen as a starting point in the formation of customary international law or form the basis of future treaty law. With the international treaty process as it relates to outer space stalled since 1979, it is likely that the General Assembly will continue to act in the issuance of international declarations and principles.

United Nations Office of Outer Space Affairs

While the Security Council and the General Assembly have wide mandates, some organs of the United Nations focus specifically on space-related issues.

The United Nations Office for Outer Space Affairs (UNOOSA), located in Vienna, is the UN office tasked with promoting international cooperation in the peaceful uses of outer space. In its implementation of this mandate it serves multiple functions. One of its most prominent functions is serving as the secretariat for the Committee on Peaceful Use of Outer Space (COPUOS), discussed in greater detail below. Additionally, UNOOSA implements the UN Programme on Space Applications (PSA).[14] PSA, created in 1971, seeks to further the knowledge and experience of space applications for countries that lack space expertise, with a focus on developing countries. Under PSA, the UNOOSA provides training and other activities in space-related topics such as basic space science, space law, remote sensing, satellite communications, satellite meteorology, search and rescue, and global navigational satellite systems. In recent years it has conducted workshops and training programs in Brazil, Australia, Algeria, Austria, Argentina, Japan, the United Arab Emirates, Nigeria, and China. A third function UNOOSA performs is providing secretariat support for the United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE). The latest UNISPACE conference was held in 1999, and resulted in numerous recommendations.[15] UNOOSA supports and participates in the implementation of those recommendations.

UNOOSA also promotes the sharing of information related to outer space activities. Both in the spirit of international cooperation and in compliance with international treaties, states provide information on their space activities to the Secretary General of the United Nations. On his behalf, UNOOSA maintains the Register of Objects Launched into Outer Space and disseminates information through the Online Index of Objects Launched into Outer Space.[16]

Committee on the Peaceful Use of Outer Space (COPUOS)

The Committee on the Peaceful Use of Outer Space, also located in Vienna, is the only committee of the General Assembly whose focus is exclusively international cooperation in the peaceful uses of outer space. It was created by the General Assembly in 1958, shortly after the launch of the first artificial Earth satellite by the Soviet Union in 1957, with 18 member nations: Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia, Egypt, France, India, Iran, Italy, Japan, Mexico, Poland, Sweden, the USSR, the United Kingdom, and the United States. These founding states of COPUOS include most of the important space powers today. The original mandate of the Committee was to consider: the resources of the United Nations relating to the peaceful uses of space; international cooperation in space appropriate under the United Nations; UN organizational arrangements to facilitate international space cooperation; and legal issues related to space. In 1958, the General Assembly established COPUOS as a permanent body and reaffirmed its mandate. In 1961, the

UNGA requested COPUOS to: maintain close contact with government and non-governmental organizations concerned with space matters; provide exchanges of information among governments relating to space activities; and assist in measures to promote international cooperation in space. The same UNGA Resolution requested the UN Secretary General to keep a public registry of launchings, based on information supplied by states launching objects into orbit or beyond. These terms have guided COUPOS ever since. In 1959 the Committee was increased to 24 members and currently has 67 members. In addition a number of intergovernmental and non-governmental organizations have observer status with COPUOS and its subcommittees.

COPUOS has two standing subcommittees – the Scientific and Technical Subcommittee and the Legal Subcommittee. The Scientific and Technical Subcommittee holds annual meetings to discuss matters within its purview and issues an annual report on its work.[17] In its forty-third session it planned to discuss matters ranging from remote sensing, space debris, and the use of nuclear power sources in space to space-system-based telemedicine, space-system-based disaster management support, and the physical nature and technical attributes of the geostationary orbit.[18]

The Legal Subcommittee has traditionally played a major role in the evolution of international space policies. It too meets annually and issues a report on its activities.[19] Recent activities include examination of the status and application of the five UN treaties on outer space, the definition and delimitation of outer space, equitable use of the geostationary orbit, the practice of states and international organizations in registering space objects, and a review of the concept of the "launching state" under international law. Some recent proposals for action in the committee have included reviewing the appropriateness and desirability of a new universal comprehensive convention on international space law, a review of the 1982 Principles on Direct Television Broadcasting by Satellite, and a review of existing norms of international law applicable to space debris.[20]

Conference on Disarmament (CD)

The Conference on Disarmament was established in 1979 as the single multilateral disarmament-negotiating forum in the international community. It is based in Geneva and is the successor to other Geneva-based disarmament fora: the Ten-Nation Committee on Disarmament (1960), the Eighteen-Nation Committee on Disarmament (1962–1968), and the Conference of the Committee on Disarmament (1969–1978). Originally it was a forum designed to bring East and West together to discuss disarmament at the height of the Cold War. By the conclusion of the negotiation of the Nuclear Non-Proliferation Treaty (NPT) in 1968, it was recognized as the central forum where multilateral arms control measures are discussed. As originally constituted in 1979, the CD had 40 members. The membership

now stands at 65 nations. There are also other states that attend as observers. In addition to the NPT, the Comprehensive Nuclear Test Ban Treaty, the Chemical Weapons Convention, the Biological Weapons Convention, the Seabed Arms Control Treaty, and the Environmental Modification Convention were all negotiated at the CD or its immediate predecessor, the Conference of the Committee on Disarmament.

The CD has a special relationship with the United Nations; it adopts its own rules of procedure and its own agenda, taking into account the recommendations of the General Assembly and the proposals of its members. The CD reports to the General Assembly annually, or more frequently, as appropriate. Its budget is included in that of the United Nations.

For many years there has been an effort to begin a negotiation on space arms control at the CD in Geneva. This agenda item is entitled Prevention of an Arms Race in Outer Space, or PAROS. This effort has been pressed forward for years by China and Russia, as well as some NATO states. Since the CD operates on the basis of consensus, and the United States has never been comfortable with this process, a working group or subcommittee with a negotiating mandate for PAROS has never been established at the CD. Each year the process starts in Geneva and results in UNGA Resolutions in the fall urging a negotiation on PAROS which passes by a large margin.

Increasingly, the international community of spacefaring nations recognizes the need for restraint and seeks to develop some legal regime to preserve outer space as a non-weaponized realm. Many nations consider the possibility of weapons being deployed in space as highly threatening to their security. The Canadian government has unequivocally stated that it "draws the line at weapons in space." In mid-2003 both Canada and Russia agreed in principle to cooperate with the United States on ballistic missile defense, on the condition that no ballistic missile defense weapons are placed in space. The Outer Space Treaty bans the deployment of nuclear weapons and any other weapons of mass destruction in space, but the treaty does not apply to conventional weapons. While space has long been militarized with the deployment of military reconnaissance and navigation satellites and similar technologies, no offensive or defensive weapons have ever been stationed in outer space. Thus, pursuant to the initiative of President Dwight D. Eisenhower, who at the time of the establishment of NASA made it clear that it was US policy to keep space weapon-free, space remains free of weapons of all kinds.

During their administrations, George H.W. Bush and Bill Clinton asserted that there was no need for limitations beyond the existing Outer Space Treaty as no arms race or threat of an arms race in space existed. The Eisenhower policy held in the United States and was supported elsewhere as well. Consistent with the Bush–Clinton position, over the years, the United States at the CD, virtually alone, routinely opposed the creation of a negotiating mandate for outer space. The US position has become more isolated in Geneva in recent years as Russia and China, supported at least in

principle by virtually all other states at the CD, have every year pressed for negotiations on a new treaty prohibiting weapons in space. The United States regularly opposes these efforts and this impasse has now affected other work, so that for some years now there has been a stalemate at the CD.

As part of this evolution, a number of years ago, in addition to draft treaties that have been proposed by Russia and China at the CD, a procedural effort began, both in Geneva and at the United Nations in New York, called the Prevention of an Arms Race in Outer Space (PAROS). This took the form each year of a draft mandate for negotiations in Geneva and a draft resolution in New York. The United States did not support this initiative, opposing the mandate in Geneva by refusing consensus and abstaining from voting on the resolution in the UN General Assembly each year. The resolution always passed the General Assembly by an overwhelming vote. Beginning in 2005, virtually alone among UN member states, the United States voted no on the resolution. Thus, there currently exists a complete impasse in Geneva on all work as a result of the disagreement between the United States and the rest of the world as to whether there should be negotiations on a new legal regime prohibiting the deployment of weapons in outer space.

Other space technology-utilizing organizations of the UN system

There are numerous other organs and specialized agencies within the UN system that deal with issues related to space activities. These organizations include those more typically associated with terrestrial activities, such as the World Health Organization, the World Bank and the United Nations Educational, Scientific and Cultural Organization, and include those who regulate the international air service, telecommunications, and maritime shipping.

While all of these organizations with interests in space are not under one controlling space office within the United Nations, their activities are to some degree coordinated within the United Nations. To coordinate its space activities, the United Nations annually convenes the United Nations Inter-Agency Meeting on Outer Space Activities to discuss "current and future space activities, emergent technologies of interest and other related matters."[21] The meeting produces a report for COPUOS and reports on the coordinated space-related activities of the UN system.[22] Below is a brief description of some of the more prominent UN organizations that have some interest in space activities in furtherance of the goals of their respective organizations.

International Telecommunications Union

One of the most important organizations with a stake in space operations is one whose existence predates even the United Nations itself, the

International Telecommunication Union (ITU). The ITU was founded in the nineteenth century after the invention of the telegraph to standardize and promote interconnectivity among nations. This ultimately resulted in the International Telegraphic Union and international regulations to govern international communication by telegraph. This was later expanded with the evolution of technology to cover international telephone traffic, and even further with the advent of wireless telegraphy in 1896 – the first type of radio communication. In 1932 at the Madrid Conference, it was decided to combine the International Telegraph Convention of 1865 and the International Radiotelegraph Convention of 1906 into the International Telecommunications Convention and the original International Telegraphic Union became the ITU.

In 1947 the ITU became a UN specialized agency, and the headquarters moved in 1948 from Bern to Geneva. At the same time, the International Frequency Registration Board was established to coordinate the management of the radio frequency spectrum. The Table of Frequency Allocations, first introduced in 1912, was made mandatory.

In 1963 the first geostationary communications satellite (Syncom-1) was placed into orbit, and a special ITU conference was held in Geneva to begin the allocation and put in place regulations governing the use by satellites of the radio-frequency spectrum and associated orbital slots. In 1992 allocations were made for the first time for a new kind of space service, using non-geostationary satellites. In the same year spectrum was identified for the ITU-developed next-generation global standard for digital mobile telephone.

Over the decades the role of the ITU has evolved as technology has developed. In 1989 the ITU officially recognized the importance of placing technical assistance to developing countries on the same footing at its traditional activities of standardization and spectrum management. In 1992 the ITU was divided into three sections, corresponding to its three main areas of activity: Telecommunication Standardization, Radio Communication, and Telecommunication Development. The ITU's strategic plan seeks to bridge the international digital divide by working toward the development of fully interconnected and interoperable networks and the development of tools to safeguard the integrity and interoperability of networks.

International Civil Aviation Organization

Another UN specialized agency that should be mentioned is the International Civil Aviation Organization (ICAO). It was established pursuant to the Convention on International Civil Aviation of 1944, commonly known as the Chicago Convention.[23] The organization is made up of an Assembly, a Council with limited membership with subordinate bodies, and a Secretariat. The Assembly meets every three years and decides which states are going to be members of the Council for the next three years. Council

members are chosen on the basis of importance to air transport, contribution of facilities for air navigation, and to ensure that all regions of the world are represented. The Council gives continuing direction to the ICAO; it is in the Council that standards and recommended practices are agreed and appended as annexes to the Convention. The Secretariat, the administrative part of the ICAO, is divided into five main divisions: Air Navigation, Air Transport, Technical Cooperation, Legal, and Administrative.[24]

ICAO's participation in outer space activities is currently limited to how these activities affect the safety of international civil aviation. Some topics of interest to ICAO include sub-orbital flights and global navigational satellite systems.

International Atomic Energy Agency

The International Atomic Energy Agency (IAEA) is also an important UN specialized agency. The Agency and its Director-General, Mohamed El-Baredi, shared the Nobel Peace Prize for 2005. The IAEA is the world center for nuclear cooperation. It was set up in 1957 as the world's "Atoms for Peace" agency and as part of the UN structure. It was inspired by the famous speech by President Dwight D. Eisenhower before the UNGA in December of 1953. This led to the adoption of the IAEA statute, which was approved by 81 countries in the fall of 1956.

The IAEA was designed to be the agency to promote the peaceful use of atomic energy. However, as more countries mastered nuclear technology, concerns began to arise that nuclear weapons might sweep the world. France and China brought the number of nuclear weapon states to five, and it was known at least to some governments that Israel and India were far along in their programs. There were predictions during the Kennedy administration of 25–30 nuclear weapon states by the end of the 1970s. There was growing international support for legally binding constraints along with safeguards to stop the proliferation of nuclear weapons. This led to the negotiation and signing of the Non-Proliferation Treaty (NPT) in 1968 and its entry into force in 1970. The NPT set up a system of safeguards to ensure that peaceful nuclear power programs are not diverted into weapons programs. The IAEA administers the safeguards, and as of today, the NPT has been effective in that only four additional nations have acquired nuclear weapons since 1970 and two of them (India and Israel) were well along in their programs prior to that date. Thus, only Pakistan and perhaps North Korea are truly new additions to the list of nuclear weapon states in the last 35 years.

However, after the first Gulf War it was learned that Iraq had a clandestine nuclear weapon program and was perhaps only a year or two away from having the capability to construct a nuclear weapon. Thus the IAEA safeguards clearly had been inadequate; this led to the negotiation of an additional protocol to the Safeguards Agreements – signed in 1997 –

which considerably increased the power of the IAEA to conduct more intrusive inspections in NPT non-nuclear weapon states. All of this is important to space, because, as we have seen, nuclear power sources have been in space, and under the UNGA "Principles" document are formally permitted to be there, with certain limitations.

The IAEA has, in recent years, become the principal debating forum for international disputes in the nuclear nonproliferation field. The battle in the early 1990s over the North Korean nuclear weapon program and the threatened North Korean withdrawal from the Nuclear Nonproliferation Treaty was all played out at the IAEA. The same thing has been happening currently with the Iranian nuclear program. It is the IAEA that has been conducting the inspections and it is at IAEA Board of Governors meetings in the past where the debates have been held. While the Board of Governors last year voted to send the Iranian case to the United Nations Security Council, the IAEA is still very much involved – witness the recent agreement between Iran and the IAEA for Iran to fully disclose its past nuclear activities. The IAEA does have a tangential relationship with space issues in that, first, the Outer Space Treaty prohibits the deployment of nuclear weapons in space and second, pursuant to a UN Resolution, the deployment of nuclear power sources in space must be regulated. Ultimately, the IAEA will have to play an important role should there be further efforts to utilize nuclear power sources in space.

International and regional telecommunications organizations

Intelsat, Ltd

In 1945, the famous science fiction author Arthur C. Clarke published his article "Extra-terrestrial Relays" in *Wireless World*, setting forth his theory that three satellites positioned over each ocean region in geostationary orbit would provide global communications. These are the fundamentals by which Intelsat and all other geostationary satellite systems were formed.

In 1964, Intelsat established the first commercial global satellite communications system. Intelsat services involve the delivery of information and entertainment worldwide. The system uses a combination of satellite and terrestrial connectivity technology to help enterprises, governments, and service providers deliver content around the world. Fundamental services include: capacity services for quality point-to-point or point-to-multipoint transmissions; managed services to meet broadband, trunking and media requirements; specialized services, including such things as disaster recovery, co-location services and consulting and technical management support. The global integrated Intelsat communications satellite includes 28 geostationary satellites in prime orbital locations and a worldwide ground-based network of teleports, fiber and Internet points of presence at strategic exchange points.

Intelsat has more than 700 customers around the world, including the world's largest Internet service providers, telecommunications companies, broadcasters, and corporate network service providers. The total revenue of the company in 2004 was $1.04 billion; it has a staff of 800 and has offices in Brazil, Hong Kong, France, Germany, India, Singapore, South Africa, the United Arab Emirates, and the United Kingdom. The past history of Intelsat includes the first live global television broadcast of the *Apollo 11* Moon landing in 1969 and compressing 40,000 hours of programming into two weeks for the Sydney Olympics in 2000. In 2001 Intelsat became a private company after 37 years as an intergovernmental organization. The International Telecommunications Satellite Organization (ITSO) serves as the legacy international organization.[25] It is tasked with serving as the supervisory authority of Intelsat, Ltd., to ensure the performance of core principles for the provision of international public telecommunications services, with high reliability and quality, and to promote international public telecommunications services to meet the needs of the information and communication society. The ITSO is headquartered in Washington, DC, and currently has 148 members.

Inmarsat

Inmarsat came into being as an intergovernmental organization in 1979 to provide global safety and other communications for the maritime industry. Starting with a customer base of 900 ships in the early 1980s, it grew rapidly to offer similar services to other users on land and in the air. In 1999 Inmarsat became the first intergovernmental organization to be transformed into a private company. It now supports links for telephone, fax, and data communication to more than 287,000 ship, vehicle, aircraft, and other mobile uses. The company operates a fleet of geostationary satellites that extend mobile phone, fax, and data communication to every part of the world, except the North and South Poles.

The Inmarsat satellites are controlled from Inmarsat's headquarters in London. Inmarsat communications connect over 80 countries around the world. London is also the home of an intergovernmental organization, the International Mobile Satellite Organization, whose mission is to supervise the Company's public-service duties to support the Global Maritime Distress and Safety System and satellite-aided air traffic control for the aviation community.

Arab Satellite Communication Organization

The history of the Arab Satellite Communications Organization begins in 1967 when the Arab Ministers of Information and Culture developed the vision of a satellite communications network to integrate the activities of the League of Arab States. On April 14, 1976 the vision came into reality

when the Arab Satellite Communication Organization (ARABSAT) was established by the Arab League member states with the mission to provide satellite services to serve the needs of telecommunication, information, cultural, and education sectors of the Arab world.

ARABSAT is governed by multiple organs. The General Assembly is made up of the communications ministers of the member states or their representatives. It meets once a year and is the main body of the organization. The Board of Directors is tasked to secure, invest, and maintain the space sector and implement the policies of the General Assembly. It holds meetings every three months to carry out these duties. The Board consists of nine members from member states who are selected annually by the General Assembly. The Executive Organ carries out the day-to-day duties of the organization, and is led by the president and chief executive officer. Other executive officers in the organization include three vice presidents who head the Finance and Administrative Affairs Department, the Technical Department and the Marketing & Customer Service Department.

ARABSAT offers various satellite services, including television, telephone, Internet, and other interactive services. It owns and operates two control stations to control the satellites during the launch phase and in orbit, one in Saudi Arabia and one in Tunisia. Currently, Saudi Arabia and Kuwait hold the greatest share in paid capital in the organization, with their combined shares totaling greater than 50 percent. Libya, at 11 percent, and Qatar, at 9 percent, are the next largest contributors, with 17 others contributing less than 5 percent of paid capital.

Intersputnik International Organization of Space Communications

The Intersputnik International Organization of Space Communication (Intersputnik), one of the world's first satellite operators, has been offering telecommunication services since 1971. Originally nine countries signed an agreement on the establishment of a global satellite communications system, supporting cooperation and coordination of efforts aimed at its design, manufacture, operation, and development in the interests of its member countries. Today Intersputnik has 25 member countries, including Afghanistan, Azerbaijan, Bulgaria, Belarus, Hungary, Vietnam, Georgia, India, Yemen, North Korea, Kazakhstan, Kyrgyzstan, Cuba, Laos, Mongolia, Nicaragua, Poland, Romania, Russia, Syria, Tajikistan, Turkmenistan, Ukraine, and the Czech Republic. The organization has a three-level management structure made up of its Board, the main governing body which meets annually, the Operations Committee, responsible for supervisory control which reports to its Board, and the Directorate, which manages the operations of the organization.

In the past, Intersputnik operated Russian-built spacecraft only, which it leased from Russian space organizations. In the early 1990s the changing political and economic conditions caused Intersputnik to radically change

its business practices and strategies. As part of its new strategy, Intersputnik, together with Lockheed Martin, established in June 1997 the Lockheed Martin Intersputnik (LMI) joint venture. LMI was tasked with full-scale satellite communications services encompassing the manufacture and launch of satellites as well as their long-term in-orbit operation. In 1999 the joint venture placed in geostationary orbit an advanced satellite, the LMI-1. Since April 2000, based on a long-term cooperation arrangement with the Russian Satellite Communications Company, Intersputnik offers services on the new-generation Russian-built Express-A-Series satellites. As a result of agreements signed with Eutelsat and Rascom (see below) in 2001–2002, the coverage area and the capabilities of the Intersputnik systems have been greatly expanded.

Eutelsat S.A.

The European Organization for the Exploitation of Meteorological Satellites was originally set up in 1977 as an intergovernmental organization, the European Telecommunication Satellite Organization, to develop and operate a satellite-based telecommunications infrastructure for Europe. It began operations with the launch of its first satellite in 1983. Initially established to address satellite communications demand in Western Europe, Eutelsat rapidly developed its infrastructure to expand coverage to additional markets, such as Central and Eastern Europe in 1989, and much of the rest of the world in the 1990s. Eutelsat was the first satellite operator in Europe to broadcast television channels direct-to-home. By the mid-1990s, through its five HOTBIRD satellites, Eutelsat was able to attract hundreds of channels to the same orbital location, thereby appealing to widespread audiences for consumer satellite TV.

In the context of the general liberalization of the telecommunications sector in Europe, Eutelsat's operations were transferred to a private company called Eutelsat S.A. in July 2001. In April 2005 the principal shareholders of Eutelsat S.A. placed their investment in a new entity, Eutelsat Communications, which is now the holding company of the Eutelsat Group, owning 95.2 percent of Eutelsat S.A. The group operates a fleet of 23 satellites (18 of which are fully owned) supplying capacity to operators who in turn provide their customers with radio and TV broadcasting services, professional data network solutions, and broadband Internet access. While Eutelsat is a private company, its shareholders are predominately governments. Eutelsat holds 12.4 percent of the global market share of the fixed satellite services industry.[26]

European Organization for the Exploitation of Meteorological Satellites

The European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), headquartered in Darmstadt, Germany is an

intergovernmental organization which was formed in 1986 to establish, maintain, and exploit a European system of meteorological satellites that provide Earth observation for its member states and 11 cooperating states. In particular, its systems have been used in weather forecasting and monitoring global climate change. It is also involved in projects fostering international cooperation, such as the WMO Global Observing System and the Global Monitoring for Environment and Security (GMES) initiative.

The organization has a vast array of data collection including the Meteosat series of satellites, ground stations, and the future EUMETSAT Polar System. The total EUMETSAT infrastructure represents several billion euro in investments by its member states.

EUMETSAT has two organs that control its operations, the Council and the Director-General. The Council is composed of representatives of each member state and it meets in ordinary sessions at least once a year. The Council has the power to adopt all the measures necessary for the implementation of this EUMETSAT Convention, with specific functions outlined in Article 5 of the organization's Convention.[27]

The Director-General is responsible for the implementation of the decisions taken by the Council. He acts as the legal representative of EUMETSAT and has numerous powers enumerated in the Convention, including ensuring the proper functioning of EUMETSAT and budgetary powers. The Director-General is supported by a Secretariat.

The Regional African Satellite Communications Organization

The Regional African Satellite Communications Organization (RASCOM) is an intergovernmental, commercially run organization. RASCOM was formed in May 1992, when African states meeting in Abidjan, Cote d'Ivoire decided to create an organization that could provide economical satellite communication service to the entire continent of Africa. This decision was based on the lack of development in the area of telecommunications on the continent and the non-existence of direct communication links among African states. RASCOM's stated mission is

> to provide to all the regions of African countries, efficient and inexpensive telecommunications facilities and meet their radio and television broadcast requirements, by having recourse to every appropriate technology, including a regional satellite communication system well integrated into existing and/or planned national network with a view to facilitating the development of the countries of Africa.[28]

RASCOM offers a variety of services from those designed for public/private telecommunication operators to sound- and TV-broadcasting companies. Among its specific services offered, one will find integrated telephone, thin route trucking services, and transponder lease services. RASCOM provides

persons on the African Continent access to everyday services such as telephone, fax, data transmission, Internet access, and sound/TV reception.

RASCOM is organized around three entities. The first is the Assembly of Parties. The Assembly is made up of all governments who have signed the RASCOM Convention. It serves as the strategic and policy-orientation organ and meets every two years. The Board of Directors has a different function, being more involved in the operational aspects of the organization. It meets every three months and is responsible for the design, development, construction, establishment, operation, and maintenance of the RASCOM space segment and other RASCOM activities. Finally, its Executive Organ is responsible for the day-to-day operation of the organization.

Other venues for international space cooperation

European Space Agency

An important regional multilateral intergovernmental organization, the European Space Agency (ESA), is the gateway to space for Europe. It has 17 member states – Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Not all of the European Union's 25 members are members of ESA and two members of ESA are not members of the EU. The mission of ESA is to shape the development of Europe's space capability and to ensure that investment in space continues to deliver benefits to the citizenry of the EU. ESA develops Europe's space program and carries it through. By coordinating the financial and intellectual resources of its member states, ESA can undertake programs and activities far beyond the capabilities of any single European country. ESA's projects are designed to find out more about the Earth, its immediate space environment, the solar system and the universe, as well as to promote satellite-based services and technologies for Europe.

ESA is an independent organization that nevertheless maintains close ties with the EU. Through a Framework Agreement, ESA and the EU share a joint European strategy for space and together develop space policy for Europe. The headquarters of ESA are in Paris, where policies and programs are determined. ESA also has centers in other European countries.

The European Space Research and Technology Center is the design hub for most ESA spacecraft and technology development, and is located in the Netherlands; the European Space Operations Center is responsible for controlling ESA satellites in orbit and is located in Germany; the European Astronauts Center trains astronauts for future missions and is also located in Germany; and the ESA Center for Earth Observation, which is responsible for collecting and distributing Earth-observation satellite data to the ESA partners is located in Italy. ESA also has liaison offices in

Belgium, the United States, and Russia, a launch site in French Guiana, and ground and tracking stations around the world.

The governing body of ESA is its Council, which sets basic policy guidelines within which the agency develops Europe's space program. Each member state has one vote on the Council regardless of its contribution. The agency is headed by a Director-General with a four-year term, it has around 1,900 employees, and its 2005 budget is €2,977 million or about $3.5 billion.

Among planned future observation projects is the construction and launch of Cryosat II, a copy of an ice-measuring satellite that was destroyed in a failed October launch. The final go-ahead decision was scheduled for a February 2007 meeting. The ESA Council met in Berlin in December 2005, to decide on the agency's 2006–2008 budget. The intent was to include funding for a future mission to search for life on Mars, and to develop a "space plane" jointly with the Russian Federal Space Agency.

International Space Station

The International Space Station (ISS) is a cooperative effort among the United States, the members of ESA, Russia, Canada, Japan, and Brazil. The ISS is an enormous orbiting laboratory and shining symbol of international cooperation in space exploration. Its stated purpose is to provide for a permanently inhabited civil space station to enhance the scientific, technological, and commercial uses of outer space.

The United States has the lead role in the overall management and coordination of the ISS, as well as overall system engineering, integration, and safety issues.[29] The United States is also the primary contributor to this international endeavor, and will develop and operate major elements and systems of the ISS.

> The U.S. elements include three connecting modules, or nodes; a laboratory module; truss segments; four solar arrays; a habitation module; three mating adapters; a cupola; an unpressurized logistics carrier and a centrifuge module. The various systems being developed by the U.S. include thermal control; life support; guidance, navigation and control; data handling; power systems; communications and tracking; ground operations facilities and launch-site processing facilities.[30]

Complementing the US contribution to the ISS, the international partners are providing key components of the station. Canada, for example, is constructing a huge robotic arm that will be used for various external tasks on the ISS. ESA and Japan will provide laboratories, and Russia will provide multiple complements, including two research modules, living quarters, a solar power source, and Soyuz spacecraft for voyages to and from the station.[31] Additionally, Brazil is participating in the ISS via a

separate agreement that allows the country to use a fraction of the US portion of the ISS in exchange for Brazil's agreement to provide parts and services for the ISS.[32]

The station is governed by an intergovernmental agreement (IGA) signed by the United States, Russia, ESA, Japan, and Canada.[33] The agreement covers such issues as registry, jurisdiction, and ownership, in which each partner retains ownership and jurisdiction over its elements of the station and agrees to separately register its elements. It also governs operation, communications, and evolution of the station, as well as providing a cross waiver of liability among the partner states and rules governing intellectual property and criminal jurisdiction. The IGA is further implemented by four separate Memoranda of Understanding (MOU) between NASA and the international partners. In accordance with the IGA and the implementing MOUs, NASA developed a code of conduct for the ISS crew.[34]

Inter-Agency Space Debris Coordination Committee

Some methods of international cooperation are less formal than others. The Inter-Agency Space Debris Coordination Committee (IADC) is not an international organization, but rather an international governmental forum. Its membership includes the following national space entities: the Agenzia Spaziale Italiana, the British National Space Centre, the Centre National d'Etudes Spatiales, the China National Space Administration, the German Aerospace Center, ESA, the Indian Space Research Organisation, the Japan Aerospace Exploration Agency, the US National Aeronautics and Space Administration, the National Space Agency of Ukraine, and the Russian Federal Space Agency. The committee is governed by the Terms of Reference (ToR) for the Inter-Agency Space Debris Coordination Committee, which establishes the basic principles related to its function.

The IADC coordinates worldwide activities related to issues involving space debris, both man-made and natural. Primarily, the members of the IADC exchange information on space debris research and facilitate opportunities for cooperation in space debris research. The members also review ongoing activities of the committee and identify options for space debris mitigation. Among its other actions, the IADC makes an annual presentation to the COPUOS S&T Subcommittee.[35] The IADC is made up of a Steering Group and four specified Working Groups.

The Steering Group provides guidance and management of the IADC. Among other things, it coordinates the Working Groups, organizes overall IADC activities, defines new areas for work, and represents the IADC in other organizations. It also appoints the chairperson and deputy in each Working Group, approves action items recommended by the Working Groups, and promotes education on space debris matters. The four Working Groups are WG 1 (measurements), WG 2 (environment and database), WG 3 (protection), and WG 4 (mitigation).

WG 1 focuses on all measurement techniques, both those currently in operation and those under development, to gain information on man-made and natural objects in near-Earth space. This includes ground and space-based techniques, onboard detectors and collectors, and the analysis of spacecraft surfaces exposed to the space environment. WG 1 also works on exchanging information related to activities in the area of measurements of orbital debris.

WG 2 is responsible for the characterization and modeling of space debris and the storage and access of this data by electronic means. This includes collision prediction and risk assessment, uncontrolled reentry, the establishment of a joint database for debris and meteoroids, and the development of models which characterize explosions or collisions in space.

Protection is the focus of WG 3, particularly involving the exchange of information relating to on-orbit impacts and shielding design performance and optimization, space vehicle fragmentation events, and research in the area of protection. Additionally, it focuses on test facilities and procedures, hypervelocity impact test data, simulation software, and design and test commonality.

Finally, WG 4 focuses on the area of mitigation. It studies all measures used to mitigate the creation of space debris and to reduce the hazards associated with space debris. WG 4 seeks to identify the sources of space debris and the design and operation of space systems that will mitigate the production of space debris.

Global Earth Observation System of Systems

The Global Earth Observation System of Systems (GEOSS)[36] is a historic initiative that will use a number of systems to revolutionize the understanding of our planet and how it works. Earth observation systems consist of measurements of air, water, and land made on the ground, from the air, or from space. Historically observed in isolation, the current effort is to look at these elements together and to study their interactions. On February 16, 2005 61 countries agreed to a plan that, over the next ten years, will revolutionize the understanding of Earth and how it works.

The agreement came from a 2003 Earth Observation Summit of 33 nations and many international organizations that adopted a declaration setting a goal of a comprehensive, coordinated and sustained system of systems to collect and disseminate data on the Earth.

In April 2004, US EPA Administrator Michael Leavitt and other senior US Cabinet members met in Japan with environmental ministers from more than 50 nations. They adopted the Framework Document for a ten-year implementation plan for GEOSS.

GEOSS is envisioned as a large national and international cooperative effort to bring together existing and new hardware and software, making it all compatible in order to supply data and information at no cost. The

United States and other developed nations have a unique role in developing and maintaining the system, collecting data, enhancing data distribution, and providing models to help all of the world's nations.

The stated goals of GEOSS are disaster reduction, integrated water resource management, ocean and marine resource monitoring and management, weather and air quality monitoring, forecasting and advisories, biodiversity conservation, sustainable land use and management, public understanding of environmental factors affecting human health and well-being, better development of energy resources, and adaptation to climate variability and change.

International Space University

The International Space University (ISU) also merits mention. The ISU is situated in Strasbourg, France and is designed to develop the future leaders of the world space community. The ISU provides graduate-level training to future leaders through its two-month summer session and its one-year Masters program at the Strasbourg campus as well as at other locations around the world. Since its founding in 1987, the ISU has graduated more than 2,200 students from around the world. It offers its students a unique core curriculum which covers all disciplines relating to space programs and enterprises – space science, space engineering, systems engineering, space policy and law, business and management, and space and society. Both its summer program and its one-year Masters program provide international graduate students and young space professionals the opportunity to solve complex problems together in an intercultural environment. At the ISU all programs are interdisciplinary, international and intercultural.

The programs at the ISU promote international cooperation and understanding, help develop an interactive global network of students, teachers and alumni, and encourage the innovative development of space for peaceful purposes. The ISU campus also serves as a neutral international forum for the exchange of knowledge and ideas on challenging issues related to space and space applications.

What does the future hold for space-related international institutions?

We now will briefly look at what the future might hold for the evolution of current and creation of future international space institutions. There are a number of space-related technologies that are ripe for growth and whose growth could result in the need for greater international cooperation. For example, the future growth of global mobile personnel communications systems (GMPCS), with the growing ability of every individual to hand-carry a communication device capable of operating outside a state's

regulated communication systems, will undoubtedly necessitate some form of international cooperation. Intelsat already appears to be pursuing this market, but others may as well. The same can be said of expanded entertainment opportunities, remote sensing, manned spaceflight, global navigational satellite services,[37] and commercial activities.

There is considerable sentiment around the world, except in the United States, to develop a new arms control regime for space, which would prohibit all weapons, offensive and defensive, and provide for considerably more transparency than currently exists – perhaps through a provision for some kind of launch payload inspection. There might also be certain explicitly allowed functions, some of which might relate to space support of terrestrial military operations such as GPS. Will the desire for such expanded arms control regimes lead to agreements without US participation, as happened in the Ottawa process concerning landmines and the Rome Statute for an International Criminal Court, or will the position of the United States change over time?

Notes

1 See Outer Space Treaty, Preamble, Articles I, III, IX, X, XI.
2 Fact Sheet on National Space Policy, available at: www.ostp.gov/NSTC/html/fs/fs-5.html. International cooperation has long been a part of the US National Space Policy. See www.hq.nasa.gov/office/pao/History/spdocs.html.
3 The ad hoc committee was created by UN General Assembly Resolution 1348, Question of the Peaceful Use of Outer Space, available at: www.oosa.unvienna.org/SpaceLaw/gares/html/gares_13_1348.html. The committee was made permanent by UNGA Resolution 1472, International Cooperation in the Peaceful Uses of Outer Space, available at: www.oosa.unvienna.org/SpaceLaw/gares/html/gares_14_1472.html.
4 The UN Charter is available at: www.un.org/aboutun/charter.
5 A complete list of Security Council Resolutions is available at: www.un.org/documents/scres.htm.
6 For a more complete list of the functions, see www.un.org/ga/60/ga_background.html.
7 Under the so-called Uniting for Peace Resolution, it has been argued that the General Assembly has enhanced powers in the event of an impasse in the Security Council. For a copy of the resolution, see www.un.org/Depts/dhl/landmark/pdf/ares377e.pdf.
8 A complete list of General Assembly Resolutions related to outer space is available at: www.oosa.unvienna.org/SpaceLaw/gares.
9 See www.unoosa.org/oosa/en/SpaceLaw/lpos.html.
10 See www.unoosa.org/oosa/en/SpaceLaw/dbs.html.
11 See www.unoosa.org/oosa/en/SpaceLaw/rs.html.
12 See www.unoosa.org/oosa/en/SpaceLaw/nps.html.
13 See www.unoosa.org/oosa/en/SpaceLaw/spben.html.
14 For more information on the Programme on Space Applications, see www.oosa.unvienna.org/sapidx.html.
15 UNISPACE III documents can be found at www.oosa.unvienna.org/unisp-3/index.html.
16 See www.oosa.unvienna.org/OSOIndex/index.html.

17 Annual reports of the committee dating back to 1998 are available at: www.oosa.unvienna.org/COPUOS/stsc/repidx.html.
18 See UN document A/AC.105/C.1/L.283, available at: www.oosa.unvienna.org/Reports/AC105_C1_L283E.pdf.
19 Reports of the Legal Subcommittee dating to 1993 are available at: www.oosa.unvienna.org/SpaceLaw/legrepidx.html.
20 See UN document A/AC.105/826, p. 20, available at: www.oosa.unvienna.org/Reports/AC105_826E.pdf.
21 See www.uncosa.unvienna.org.
22 For copies of these reports, see www.uncosa.unvienna.org/reports/index.html.
23 The full text of the Chicago Convention is available at: www.icao.int/cgi/goto_m.pl?/icaonet/dcs/7300.html.
24 For more information on ICAO, see the organization's website at www.icao.int.
25 Information regarding the International Telecommunications Satellite Organization is available at: www.itso.int.
26 For information on Eutelsat, see www.eutelsat.com/home/index.html.
27 The Convention to establish EUMETSAT is available at: www.eumetsat.int/groups/cps/documents/document/pdf_leg_convention.pdf.
28 RASCOM Mission Statement, available at: www.rascom.org/index2.html.
29 See Article 7of the Inter Governmental Agreement.
30 See "The International Space Station," available at: www.shuttlepresskit.com/ISS_OVR.
31 Ibid.
32 See "Brazilian International Space Station Program," available at: www.inpe.br/programas/iss/ingles/use/Default.htm.
33 A. Yakovenko (1999) "The Intergovernmental Agreement on the International Space Station" *Space Policy*, 15: 79–86.
34 See Code of Conduct for the International Space Station Crew, 14 CFR Part 1214.
35 See www.iadc-online.org/index.cgi?item=docs_pub.
36 See the GEOSS homepage at www.epa.gov/geoss.
37 Jiefang Huang, (1997) "Development of the Long-Term Legal Framework for the Global Navigational Satellite System," *Annals of Air and Space Law*, XXII-I: 585.