

LEGAL ASPECTS OF MONITORING AND PROTECTING EARTH ENVIRONMENT BY SPACE TECHNOLOGY

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The United Nations General Assembly at its 44th session approved the designation of 1992 as International Space Year¹ which placed special emphasis on earth-looking activities. With the use of space technology greatly expanded, the earth has never been so closely observed as contemplated in the past. The year 1992 could be a milestone in the search for understanding the earth. The efforts in this direction have been further progressed and environmental issues have proceeded from scientific and technical studies to the probes of legal and institutional measures, designed to cope with and prevent dangers involved.

Potentials of Monitoring Environment by Remote Sensing from Space

In the application of space technology, remote sensing has become increasingly important. That is because remote sensing by satellite has planetary dimensions. The synoptic view and the possibility of frequent repetitive coverage of large and inaccessible areas of the earth, makes global monitoring of changing environmental phenomena technically feasible and economically attractive. While LANDSAT of the United States and SPOT of France have been widely used, other countries, including a number of both developed and developing countries, have used their own and other satellites for remote sensing purposes.

Land

The inherent capabilities of space observation is particularly suited to the study of land masses and nearly every facet of human activities on land, such as resources management, agricultural production, forestation, hydrology, the prevention of floods, droughts, desertification, soil erosion and other natural disasters, etc.

The various space programs, such as, for instance, the International Geosphere-Biosphere Programme (IGBP), demonstrate clearly how these programs on land are critically dependent on the data gathered by space technology. Data obtained by remote sensing satellites often unobtainable

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¹ U.N.G.A. Res. 44/46 of 8 December 1989.

truth," have been used with great success and brought huge benefits to mankind. In this context, the United States proposed the so called "Global Habitability"² focusing on the study relating to habitability of the earth.

Sea

Marine remote sensing is an integral part of space technology. Data derived therefrom were extremely helpful for predicting and analyzing periodic and cyclical phenomena of the ocean, thus making climate forecasts more reliable and valuable.

Satellite surveillance is also the best way in discovering ocean pollution by detection of chemicals, oil, petroleum, hydrocarbons, sewage, solid wastes and radioactive substances, etc. in the sea. The Global Investigation of Pollution in the Marine Environment (GIPME), founded by UNESCO's Intergovernmental Oceanographic Commission (IOC), provides continuing assessment of the health of the sea through various projects and methodologies. The primary objective of this Commission is to establish the relationship between marine pollution and its effects on ocean organism and man, constituting an important contribution to the study of Global Habitability.

During the Gulf War, satellite surveys showed that millions of gallons of oil pouring from Kuwait terminals formed a slick of about 56 km long by 16 km wide, causing severe damage to the marine birds and life.³ All these indicate that the application of remote sensing by satellite in the study of marine pollution and other items of oceanography seems to be boundless.

Atmosphere

The study of earth atmosphere involves numerous programs, such as the World Climate Programme (WCP) and World Weather Watch (WWW), established by the World Meteorological Organization (WMO), and the Earth Watch or Global Environment Monitoring Systems (GEMS) organized in the early 1970's by the United Nations Environment Programme (UNEP). These programs were aimed at using international efforts to monitor the

² This term was first proposed by NASA during UNISPACE-82 (see "Global Habitability," printed materials presented at the Conference), and in the statement made by the Head of the United States Delegation in the general debate of the Conference. See *Report of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 9-21 August 1982*, U.N. Doc. A/CONF/101/10, at 126-127.

³ CHINA DAILY, 29 January and 23 February, 1991.

atmosphere over the land and sea. The WWW is a global observing system that gathers and disseminates data of the atmosphere by weather satellites of various space countries. These data serve as the foundation for weather forecasts, storm warnings and other environmental assessment world-wide. The emissions of carbon dioxide and other gases leading to green house effect, and the release of chlorine and hydrogen chloride into the atmosphere which is believed to be the main cause of ozone layer depletion, including the ozone hole in the Antarctica, are grave issues confronting mankind. In dealing with these urgent problems, space technology has an important part to play.

All these developments concerning the utilization of space technology for monitoring and protecting the environment call for a response in the legal field, so as to guarantee and promote continuous progress on this topic of vital importance.

Legal Framework

The monitoring of earth environment by satellite, like any other space activity, is governed by the general principles of space law, as enunciated in the Outer Space Treaty.⁴ One major principle is that outer space shall be free for exploration and use by all states without discrimination of any kind.⁵ This freedom is subject to certain other restrictions prescribed in the Treaty, such as the requirement that space activities must be carried out for the benefit of all mankind and in accordance with international law, that states must bear responsibility for national space activities, that outer space should be used for peaceful purposes, etc.⁶

In addition, specific principles governing remote sensing by satellite were elaborated by the Legal Subcommittee of COPUOS after long years of deliberation. These are a set of principles concerning remote sensing of the earth from space adopted by a United Nations General Assembly Resolution in 1986.⁷ These principles allow states to carry on remote sensing activities from space without advance notice, and implicitly

⁴ 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, 610 U.N.T.S. 205 (hereinafter "Outer Space Treaty").

⁵ Outer Space Treaty, art. I.

⁶ *Id.* at arts. I, III and VI.

⁷ U.N.G.A. Res. 41/65 of 11 December 1986. According to Principle I concerning the definition of remote sensing, meteorological and military reconnaissance activities by satellites are excluded from the scope of these Principles.

permit free dissemination of data and information without prior consent by the sensed states. Principle X stipulates that remote sensing shall promote the protection of the Earth's natural environment and, to this end, states participating in remote sensing activities shall disclose all information in their possession identified as capable of averting any phenomenon harmful to the Earth's natural environment. Principle XI further provides that remote sensing shall promote the protection of mankind from natural disasters and, to this end, states participating in remote sensing activities which have identified processed data and analyzed information that may be useful to states affected by natural disasters, or likely to be affected by impending natural disaster, shall transmit them to the latter as promptly as possible.

With regard to the acquisition of data and information obtained by remote sensing, Principle XII provides that the primary data, processed data and analyzed information acquired over the sensed state must be made available to that country on a non-discriminatory basis and on reasonable cost terms once they are produced. Meanwhile, international cooperation is provided in Principles V, VIII, and XIII, which call in a number of ways for cooperative actions to benefit as many countries as possible.

It shall be noted that the above mentioned Principles on remote sensing though in the form of a United Nations Resolution and being recommendatory in character, are nevertheless important in carrying out remote sensing activities. That is because most of the substantive content of these principles are already a part of existing treaties, and others are customary rules of international law. Still others may require some operational context to solve the problems likely to arise in the course of implementation. Thus as a whole, these principles are useful and can serve as guidelines in carrying out remote sensing activities.

Need for Global International Coordination

The importance of monitoring and preserving the earth environment by space technology has become increasingly apparent and is being recognized by the world community. As a result, some international research programmes, such as IPGP, WRPC, WWW, GIPME, UNEP (United Nations Environment Programme), etc., have been initiated. However, these programs have been carried on separately. There is no overall coordination of the growing number of existing and perspective earth observation satellite programs.

There have been a number of suggestions of setting up an overall international organization charged with the function of tackling the challenge of monitoring the environment on a world-wide scale. The notable one is the International Satellite Monitoring Agency (ISMA) proposed by

France in 1978,⁸ which though being put forward essentially for arms control verification purposes, could be turned into an international monitoring agency for the environment. Again, a World Environment Authority was proposed recently,⁹ charged with the huge task of setting up both the space system, with satellites stationed in geostationary and polar orbits and the creation of ground infrastructure for gathering, processing and managing data derived from the earth observation system from outer space

However, owing to the tremendous investment and other difficulties involved in these proposals, these propositions could hardly be realized in the near future.¹⁰ The practical way is to accomplish the goal phase by phase or step by step. The initial phase could comprise the setting up of an international coordination center or agency, while the final goal of establishing a complete space monitoring system could be accomplished in the second or final phase.

With the ultimate goal in mind, what is needed at present is an international coordination center or agency, based on comprehensive, continuous and long term acquisition of data and information on earth environment from existing space systems. In view of the key role played by UNEP (United Nations Environment Programme), the proposed agency could be established under the aegis of UNEP and could be charged by an international agreement/arrangement with the following main tasks:

1. To gather and administer all data and information on the environment provided by national ground stations. As provided in Principle X of the Remote Sensing Principles, states participating in remote sensing activities shall disclose all information in their possession identified as capable of averting any phenomenon harmful to the earth's natural environment, and should transmit such information to the international organ for collecting and managing environmental data;

In the field of meteorology, the distribution of data obtained by satellite is provided free of charge to member states of the World Meteorological Organization (WMO) in accordance with the practice of offering international service for public use.¹¹ With regard to

⁸ U.N. Doc. A/S-10/AC. 1/7 (1978).

⁹ S. Courteix, *Towards An International Satellite Monitoring System of the Environment*, 33 PROC. COLLOQ. L. OUTER SPACE 148-151 (1990).

¹⁰ For instance, the cost of building and launching a LANDSAT would be of the order of U.S \$6/800 million, excluding the building of ground infrastructure and operational costs.

¹¹ Cf. John A. Leese, *World Meteorological Organization: Demonstrated Accomplishments and Strong Plans for the Future in Applying Space Technology*, 14 J. SPACE L. 140-147 (1986).

environment, the commercial distribution of remote sensing data and information seems to be inconsistent with the public purpose of using such data and information for environmental protection. This problem has to be faced and there might be two ways of solving it: either adopting the meteorological type of free charge, or taking some sort of hybrid system based on both commercial distribution and free supply, as in the meteorological field. Anyhow, an international coordinating agency is necessary to serve as a data bank or center for the environment. In this way, all these data and information can be better and more widely used, and proposals on environmental issues could be made by UNEP for implementation by the states concerned;

2. To coordinate the activities of various scientific programs on the environment, such as IGBP, GIPME, WCRP, etc. At present, relevant data and information acquired by satellite remote sensing though being used in various scientific programs, still lack coordination and concentration. The proposed agency could be regarded as a kind of effort to rationalize the various observation projects on global level. Through such coordination, access to and exchange of data and information between different international partners could be achieved, thus enhancing the complementarity and compatibility of the earth observation systems;

3. To increase assistance to developing countries by encouraging them to concentrate their attention and efforts to environmental issues and by helping them to acquire the technology of receiving, processing and using remote sensing data and information they need. The center or agency could also be charged with expanding training for developing countries, whose participation is indispensable for monitoring and protecting the earth's environment.

The universal dimension of the work requires international cooperation. While the final goal will be achieved at a later stage, the imminent aim seems to be some sort of global coordinating center or agency for comprehensive gathering and administering data and information provided by existing satellite systems. Such an organization is actually a data bank on environment, and would be an important step toward the ultimate goal of setting up a World Environment Authority with global space monitoring system for the protection of the earth.

TWO EUROPE IN ONE SPACE: THE EVOLUTION OF RELATIONS
BETWEEN THE EUROPEAN SPACE AGENCY AND THE EUROPEAN
COMMUNITY IN SPACE AFFAIRS

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Introduction

The adoption of the Single European Act (SEA) in 1987¹ formally conferred competence upon the European Community (EC) in the field of research and development (R&D), so paving the way for the EC to develop and implement its own set of strategies regarding the technologies of the future. Once the EC sought to map out its new domain, however, it was evident that in one area, space R&D, European integration was both well organized and already far advanced. Over several years, the European Space Agency (ESA) had been the principal instrument of such integration, having used to the full the mechanisms available to this intergovernmental organization under its 1975 Convention.²

Despite the tendency of some academic writers to relish the prospect of conflicts of interest between two European organizations in such a situation, the more appropriate question in practice is -- precisely because both have similar goals -- why the EC and ESA did not start to cooperate earlier and how far have they been able to do so now? For with its obvious potential to stimulate growth, inspire and motivate Europe's youth and challenge the hidebound ways of thinking that continue to hamper too much of European industry, the exploration of humankind's last frontier allows ample room for, and indeed would seem to demand, such cooperation.

As will be seen below, up to around the time of the SEA, the EC and ESA Europes could in fact almost have inhabited parallel worlds, each

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Editor's note: the authors were bound by ESA's practice and could not provide references to internal sources of ESA throughout this article.

¹ Single European Act, signed at Luxembourg on 17 February 1986 and at The Hague on 28 February 1986. See COMMISSION OF THE EUROPEAN COMMUNITIES, TREATIES ESTABLISHING THE EUROPEAN COMMUNITIES (ECSC, EEC, EAEC) - SINGLE EUROPEAN ACT - OTHER BASIC INSTRUMENTS 523-602 (1987).

² For text, see Convention for the Establishment of a European Space Agency, UKTS no 30 (1981), CMND 8200.

moving in its own direction and speaking a similar polyglot language but with each missing large segments of the other's vocabulary. The cause for this is simple, and springs from the specialization of function native to any class of international organization. With this observation in mind, this article will seek to show how the two bodies' different paths did meet up and also to outline the means which have been created to help them better understand and relate to each other's systems.

1. *The Europe of Space Cooperation and Integration*

The birth of the space age and the epoch of major European economic integration share a rough contemporaneity, the Treaty of Rome being signed on 25 March 1957 and the first Sputnik flight taking place on 4 October of the same year. The order of events meant that, if Europe were later to consider engaging in space activities of its own, the question would be posed at some point as to whether the European Communities might not be a suitable device for pursuing them, especially since signature of the EEC Treaty, which joined in one Community the six signatories' manufacturing and agricultural markets, was accompanied by signature on the same day of the Treaty establishing the European Atomic Energy Community (Euratom). What was proposed in 1959 was that a space science program be undertaken by a new European Community called "Eurolune."³

Had, as we must assume, membership of Eurolune been restricted to the original six EEC/Euratom Member States (France, Germany, Italy and the Benelux countries), space activities in Europe would then probably have become an integral part of the Communities' system. But, to the surprise of Amaldi, Auger and most observers, the United Kingdom -- the only European nation with a significant space-related capacity at that time -- entered the discussion and proposed to participate fully, so firmly excluding the Eurolune option. The result of the ensuing negotiations, which were matched by a further initiative in the launcher field, was the creation of a European Space Research Organization (ESRO),⁴ an intergovernmental organization that drew its inspiration from CERN and not from Euratom. For launchers, the European Launcher Development Organisation (ELDO)⁵ was set up with a membership of the EEC States (minus Luxembourg), the United Kingdom and Australia (because of the

³ See, especially, E. Amaldi, *Créons une organisation européenne pour la recherche spatiale*, L'EXPANSION DE LA RECHERCHE SPATIALE 6-7 (Dec. 1959), reprinted in translation as *Why We Need a European Organisation for Space Research*, EUROPE: TWO DECADES IN SPACE (N. Logsdon and D. Guyenne eds.), ESA SP 1060, at 9-11 (1984).

⁴ Convention for the Establishment of a European Space Research Organisation, UKTS no. 56 (1964), CMND 2489.

⁵ Convention for the Establishment of a European Organisation for the Development and Construction of Space Vehicle Launchers, UKTS no. 30 (1964), CMND 2391.

Woomera launch site).

The treaties establishing ESRO and ELDO were signed in 1962 and entered into force in 1964. These two organizations were in 1963 joined by a third body, the Conference Européenne de Télécommunications par Satellite (CETS), which was an offshoot of the Conference Européenne de Postes et Télécommunications (CEPT) and was intended to formulate Europe's response to the US initiative to set up a global satellite telecommunication system. CETS acted as Europe's voice in negotiations with the US Government and Comsat to set up Interim Intelsat, while also providing a forum to investigate European communications satellite proposals.

With three quite independent space bodies on the scene, some coordination was necessary and this came in the form of a ministerial level European Space Conference (ESC), created in 1966. The essence of the ESC was to provide a badly-needed framework at a sufficiently high level for the elaboration of space policy, chiefly through acting as a broker for the budgetary and programmatic problems facing ELDO and addressing the need for an appropriate applications satellite program. As time passed, it had become evident that the absence of telecommunications, meteorological and similar programs was a major deficit in Europe's space arrangements that no single country could remedy.

With ESC's creation, one can say a consolidated "space Europe" came into being, even though one should remark that ESC remained a fairly informal body for the nine years of its existence. It was through ESC that, eventually, the problems of organizational form and program arrangements were ironed out. Inputs to the ESC's deliberations were provided by fora such as the Western European Union Assembly and the Council of Europe Consultative Assembly but, in fact, the most productive source of ideas on future programs was ESRO. The result of the ESC's efforts was agreement to establish a European Space Agency in which ESRO's management mechanisms were continued and extended to optional launcher, manned space and applications programs alike, with the possibility for the Member States participating in a program to decide upon the particular modalities for that program. ELDO was "merged" into ESA, but in effect this meant that its personnel and assets were integrated into the ESRO structure. Having acted as midwife to ESA's birth in 1975, the ESC too passed out of existence, its policy-making function having been assumed by the ESA Council under Art. XI. 2 of the ESA Convention, with the Council, like the ESC, meeting at ministerial level where appropriate.

The other provisions of the 1975 ESA Convention reflect and amplify the political character of Europe's new space authority, and one may mention here Art. II (Purpose), under which ESA is to provide for and promote peaceful space activities, *inter alia*, by:

"elaborating and implementing a long-term European space policy;"

"concerting the policies of the Member States with respect to other

national and international organizations and institutions;"

"integrating [national programmes] progressively and as completely as possible into the European space programme;"

"elaborating and implementing the industrial policy appropriate to its programme;"

as well as by recommending a "coherent industrial policy to the Member States."

These were generous goals, particularly when seen together with ESA's wide R&D (and operational) mandate under Article V, which leaves ESA free to undertake any space activities, including commercial ones, so long as internal approval requirements and Art. II's supreme condition of "exclusively peaceful purposes" are met. Moreover, Art. VII, which enlarges upon ESA's industrial policy, takes account of the far-reaching structural effects that implementation of ESA's program will have in the European space industry and provides rules applicable to the placing of ESA contracts. When ESA distributes work, Art. VII and Annex V of the Convention state that ESA is to meet its industrial requirements cost-effectively but, at the same time, is to promote European industry's international competitiveness and its rationalization, and to ensure a fair return to Member States which contribute to an activity.

Working within this framework, and the other provisions which ensure that the Director General has sufficient powers for the efficient management of programs, ESA has made Europe the Third Space Power, by progressing since 1975 through its early Ariane and applications satellite programs toward, with Spacelab's first flights, manned space experience and thereafter to the era of the present Long-Term Plan (LTP), adopted by ESA ministers in 1987, whose main feature is the development of a European In-Orbit Infrastructure (IOI) composed of Ariane 5/Hermes, Columbus and the Data Relay Satellite (DRS).

Recently, the ESA Ministerial Council at Munich in November 1991 affirmed the LTP, although steps were initiated to take account of a radically changed international situation and to encourage international cooperation in the IOI's execution.

While ESA's success in hardware development is generally considered one of the outstanding examples of what European integration can achieve, a space policy must also be judged according to the effectiveness with which that hardware is put to use, especially in the applications satellite sector. Here, ESA's approach has been to transfer competence where it can to structures better adapted to commercialization than ESA itself, so restricting ESA mainly to its prime area of practical competence, R&D. It has thus encouraged the formation of a range of

different utilization bodies, being Eutelsat⁶ (grouping Europe's public communications entities in a public international organization), Eumetsat⁷ (similar to Eutelsat, but this time serving the meteorological community and using ESA Meteosat satellites), Arianespace, a private company responsible for Ariane's marketing and production, and Eurimage and other companies to which remote-sensing data is passed for marketing and distribution.

2. *The EC Europe and Space Affairs*

2.1 *Early Developments*

The EEC's first involvement with space affairs (other than procuring aerospace industry surveys) was in 1970, when the Belgian Government hosted an ESC session in Brussels and invited the President of the EEC Commission to attend as observer. This invitation was repeated for each ESC session thereafter, a tradition which has been extended to ESA Council meetings at ministerial level. The EEC thus was able to follow ESA's genesis, birth and the highlights of its development afterwards at first hand.

That the Commission played a marginal role at the time of ESA's formation has to be understood in the context of the EEC's general competence in science and technology (S&T) affairs, which was acquired only gradually and with considerable difficulty from 1974 onwards. As science and technology projects came to be recognized as a legitimate domain of activity, however, the European Parliament began to show specific interest in space matters, and began to add its own contribution to the flow of reports and recommendations already coming from the Council of Europe and WEU's assemblies.

The content of the Parliament's reflections was nonetheless fairly unexceptional up to the 1985 Report of the Parliament's Committee on Energy, Research and Technology. This report⁸ contained criticisms of ESA's Long Term Plan, fearing undue dependence on the United States through Europe's participation in the international Space Station project. It instead proposed that an autonomous lunar base program should be Europe's long-term aim, and that a "budgetary and administrative locus" should be established within the EC. Finally, it indicated that the Parliament should henceforth monitor space activities more actively.

⁶ Convention establishing the European Telecommunications Satellite Organisation ("Eutelsat"), CMND 9069, Misc. no. 25 (1983)

⁷ Convention for the Establishment of a European Organisation for the Exploitation of Meteorological Satellites ("Eumetsat"), CMND 9483, Misc. no. 2 (1985).

⁸ Reference: PE 95.639/fin ; doc. A2108/85, prepared by Mr. Toksvig as Rapporteur.

2.2 *The 1988 Communication from the Commission to Council*

Thereafter, the next significant move came in July 1988 from the side of the EC Commission. It published a Communication to Council, entitled "The European Community and Space: A Coherent Approach".

The 28-page Communication (with annexes) responds to a request of the European Parliament made originally in 1981 (although the EC's Research Council was the actual recipient of the Communication). It is an informal document and its role should be seen in the perspective of EC policy formation and monitoring generally, where a summary of the state of affairs in a field of developing interest to the Community is provided in some detail in such a paper, frequently based on research accomplished by outside consultants. At the same time, the Commission avails itself of the opportunity to air initiatives it may like to see taken in that field. It thus acts mainly as an information paper, by focusing attention on a given field, but also partly as a discussion paper, containing seminal elements of a policy already being considered by the Commission but upon which no definite view has been reached. Over time, and this can mean over a period of several years, a paper of this kind will recede in importance as the Commission puts forward more and more concrete ideas and measures, including the eventual creation of specialized Commission services and, finally, decision-making structures to take matters further.

Seen within this tradition, "A Coherent Approach" falls into two parts, one programmatic and the other institutional.

(a) Programmatic Aspects

This part provides a survey of programs and spending profiles in the space field in Europe and beyond, drawing mainly on ESA and consultants' inputs. All the main user segments (telecommunications, Earth observation, microgravity) are covered there in some depth. The user sector is, indeed, where the report's emphasis lies, relatively little attention being given to launch services (a field nonetheless, where European industry commands the international market) or to ESA's In-Orbit Infrastructure, the dominant item on ESA's agenda for the next several years.

Various assessments are made in this part. Europe's space program is, thanks essentially to ESA, "altogether positive." But European space spending is still too low when judged by international standards, project fields are, perhaps as a result, too "selective", and European industry is still not thought to be sufficiently competitive. Further, no framework exists for security applications and, more serious, space applications generally have slipped behind the undoubted successes made in space R&D. In sum, as the report puts it: "Europe still lacks a cogent overall policy. . . which incorporates economic, social, industrial and even defence considerations . . . a policy which helps to ensure that better use is made of

the technological and industrial expertise acquired both within and outside the Community."

The passage just quoted deserves particular attention since, for the first time really since the late 1960s, it put the finger on space as an integral part of European society and the attendant need -- not altogether satisfied by ESA's space-policy mandate -- to deal with the full range of implications of space activities on Earth.

The Communication was able to point, especially in this regard, to regulatory deficiencies in both the DBS and satellite communications ground equipment sectors. Earth observation, an infant sector, for its part suffers from variant approaches towards exploitation and weakness in developing ground equipment. Furthermore, even though Europe is making good progress in the microgravity sector, additional means are needed to foster the user community's growth. Finally, the report highlights the fragmentation of the European space telecommunications market and insufficient promotion on ESA's behalf of commercial applications (compounded by ESA's *juste retour* principle).

These are all fair comments. ESA, while its emphasis under its Convention is on developing the space segment, has in fact long been aware of the deficiencies in the ground segment sector in particular and is currently considering steps to improve the situation within the framework of its (telecommunications) Payload and Spacecraft Development Programme. More will, however, remain to be done. Deregulation of the satellite telecommunications market is, of course, a matter for the Community in conjunction with other interested bodies such as CEPT and Eutelsat. Further afield, extra measures of course can be taken, but one may remark that regard has always to be paid to the incremental nature of civil space investment in Europe (as opposed to the more global pattern in the superpowers, due to their military requirements), which has thus far dictated a gradual, carefully phased increase in spending profiles.

(b) *Institutional Aspects*

It is interesting that most of the document's executive summary is connected not with programmatic matters but with a recapitulation of this part, so pointing to its importance. It proceeds from the proposition that "Community action in space is both possible and desirable." It then observes that the contribution the EC should be to provide "specific added value," noting though, that "the Community must naturally be mindful of the need for consistency between its own activities and those of the ESA and of other European organizations in this field, which have primarily specialised in the development of space systems or operational system management." The EC's role is, therefore, to be a complementary one.

Within this context, the report offers ideas on what shape EC involvement may take. They are in brief:

- putting the "full weight of [the EC's] democratic legitimacy and its

established role in European society" behind ESA's programs, and also to enhance Europe's "political credibility" here by "strengthening its links with ESA;"

- framing "favorable" policies for exploitation and for integration of space applications in the "socio-economic framework of the Community;"
- creating "organic consultation mechanisms" for ensuring that ESA and other European space organizations act consistently with Community law on competition, trade policy, [and] opening up of public procurement, etc."

The reference to "democratic legitimacy" under the first item seems partly to be a genuflection in the direction of the European Parliament (and should surely not be taken as meaning that the Parliaments of ESA's Member States do not play a democratic or legitimate role). But its rather grand words perhaps obscure the more profound point that the Community's political weight should be made available when circumstances demand, including when space matters intersect with broader foreign policy considerations. The second item can only be cause for general satisfaction, while the third has its roots in the completion of the Single European Market by the end of 1992 and explains the desirability for consistency with the law applicable in that market. One may add that the scope for inconsistencies is in fact largely theoretical although both ESA and the EC should clearly seek to avoid any that may arise (see further, below).

In terms of future action, the report sets the following goals:

- regular information exchanges with ESA, including EC assistance in spin-off commercialization;
- project coordination and cooperation, for example in strengthening Earth-observation and telecommunications applications and those in microgravity This would include addressing not only the relevant regulatory frameworks but also the establishment of market research and user group support;
- study of the potential economies-of-scale and other implications of the Single European Market;
- definition of a trade policy for space goods and services, and attention to developing legal security for space-based activities;
- improving training.

As to implementation of these goals, greatly expanded consultation

is called for, particularly with ESA. A "policy and coordination" unit was foreseen within the Commission for in-house and external consistency of position.

2.3 The 1991 Gibson Report

Both of the main implementation goals just referred to were quickly met, and the consultation mechanisms established with ESA will be discussed specifically below (Section 3.2). Here, matters will be brought up to date by mentioning the most recent policy development on the EC's side that specifically relates to space. This was the publication, in September 1991, of "The European Community, Crossroads in Space: Report by an Advisory Panel on the European Community in Space."

The 33-page report is known by the name of its Chairman, ex-ESA Director General, Roy Gibson. The 11-member Advisory Panel included representatives from ESA, the Commission, industry, the German space establishment and the academic sector.

Like the Communication, the report seeks to review the state of the European space sector and offer thoughts on the EC's future role. But its content and direction is significantly different. It begins with a review of perhaps the kernel of the space sector in functional terms, launch services capacity, and there, while the presently funded generations of Ariane vehicles provide Europe with a good competitive profile, the report makes the observation that it is not too early to develop a "flexible strategic framework" for the period after Ariane 5 (whose first launch is due in 1995). On science, another key element, the suggestion is made that a good role for complementary action exists in the funding of space science experiments. On Earth observation, greatly enhanced inner-European and external cooperation and coordination is urged, and ESA is gently encouraged to consider including this segment in ESA's mandatory program (at present limited to science and basic technology programs). In fact, this was a proposal taken up for further consideration both within the ESA Executive and by ministers at the 1991 Ministerial Council, with the strong support of the relevant user community. For the EC, a number of areas of interest are highlighted in Earth observation, a field seen by the Panel as the main area for developing EC action. The most important is the proposal for planning to be commenced that would lead to an operational Earth observation capability for environmental protection purposes. This idea links in with a proposal that the EC develop a flagship activity rather than spread resources too thinly.

Regarding telecommunications, recognition is given that a good deal of study still needs to be made in the field before the finer points of EC policy can or should be addressed. One line of possible action already offered, though, is to target second-generation ground systems, having learnt from experience that the market in and for Europe in first-generation systems has already largely been lost to the US and, increasingly, Japan.

As to in-orbit infrastructures and microgravity, greater EC involvement is, as elsewhere, foreseen, but guidelines of policy (e.g. avoiding isolating microgravity into a separate discipline) rather than structural changes are mentioned. On general R&D, however, more specific lines for action are advanced, perhaps the most interesting idea being to monitor space technology development in the much broader context of the space-related sector. This would represent a real enhancement on what ESA has so far been able to achieve and sits well with the areas of the EC's proven expertise.

Under a section entitled "General Considerations," longer-range thinking is amplified. The Leitmotif is clearly one of encouraging, stimulating and supporting the main lines of space activity in a strategic manner, which should be the product of ever closer coordination and cooperation in Europe, and most especially between the EC and ESA. Sensitivity is shown to the requirements for "fair return" in ESA's industrial policy, though short of endorsing its application de rigueur. The EC's role here is acknowledged as best when kept indirect as, for example, in its actions within the framework of the GATT negotiations and through encouragement of consortia of world-class competitive scale. Furthermore, on security, where ESA has evident constraints in light of its dedication to "exclusively peaceful purposes," a limited contribution of ESA capacity is mooted but decisive (non-ESA) development of ground segment capacity is advocated. Finally, on the theme of cooperation and coordination, there are questions raised as to how to tackle this on the basis of existing structures; some new mechanisms will in the short or long term be needed. The same equally applies within the Commission itself.

In conclusion, the Gibson report reflects the growing sophistication of the EC in coming to grips with space issues. The report was prefaced by an admission that the space field is one of "intimidating complexity" and this observation undoubtedly led the panel to tread warily, but well.

Subsequent to the report's publication, the European Parliament again debated space policy in October 1991. The resultant Resolution invited the Commission to define and implement a global and balanced European space policy, paying particular attention to the optimal exploitation of space applications (Earth observation and telecommunications). A series of studies and other actions should be initiated on this.

3. The Development of ESA-EC Cooperation and Coordination

Having surveyed above how events have evolved within ESA and the EC respectively, we turn now to the course mutual relations have taken. Not included in this discussion are the dispositions of the 1991 Maastricht accords which, despite their reinforcement of the SEA on European political, social and economic union, have not thus far raised new issues specific to the space sector. It is an obvious though that, when achieved,

European political and economic union will require new solutions to be found in the space domain in common with many other fields.

3.1 *Project Cooperation*

Already in 1978, ESA and the EC Commission concluded a Memorandum of Understanding on an Experimental Project for High-Speed Data Transmission by Satellite. Its object was to serve the needs of the Commission, CERN and organizations with similar technical requirements, by providing data links over capacity on ESA's Orbital Test Satellite (OTS), the first telecommunications satellite the Agency had launched. The then 'Interim' Eutelsat was to coordinate the experiments that would be conducted. Each participant contributed its own equipment and resources for the 4-year project's realization. Shortly afterwards, the EEC, represented by the Commission, and ESA entered into a Cooperative Agreement whereby the EEC paid ECU 420000 to cover the costs of supplying experimental ground equipment which would then be operated by CERN.

A second project was established on 31 July 1985 when the CEC and ESA signed an Agreement on Cooperation in ESA's Apollo Programme. This program aimed at exploring advanced electronic delivery of documents using high speed digital satellite links provided by the ECS system built by ESA and run by Eutelsat. Under the cooperative arrangements, the Commission committed itself to purchase 20 ESA-developed receive-only Earth stations and to put these stations at the disposal of national authorities for experimental purposes. The Commission, however, felt that continued sponsorship of such a project might be at odds with its policy of deregulation as expressed in the Green Paper on Satellite Communications and decided in 1987 to abandon its participation in Apollo so as to avoid the potential for any conflict of interest.

A further ESA-EC cooperation of note, which was successful and began in 1990, related to the EC program "Lutte contre la faim dans le monde" (Sahel). The Commission there agreed to upgrade the ESA Maspalomas (Canary Isles) ground station in order to acquire Landsat Multispectral Scanner data from over West Africa, while ESA agreed to acquire and process the data and place them at the disposal of the Commission. In the meantime, the Maspalomas station has been again upgraded under an amendment to the Agreement so as to allow it to receive French Spot satellite data. A similar arrangement to permit Sahel's use of ERS-1 data is currently under discussion.

3.2 *Institutional Coordination: Joint ESA-EC Working Groups*

Significant coordination activities were initiated following a meeting between Prof. Reimar Luest, then Director General of the European Space Agency, and CEC President Jacques Delors on 7 February 1989.

The meeting was aimed at presenting the organizations to each other

at the highest level, and resulted in a declaration of solidarity concerning future cooperative relations which would be instituted on the basis of respect for one another's competences. It was recognized that cooperation was particularly desirable in the fields of Earth observation, telecommunications and microgravity.

The meeting permitted the establishment in late 1989 of five joint ESA-CEC working groups on:

- 、 international relations (I);
- 、 industrial competitiveness and the internal market (II);
- 、 telecommunications (III);
- 、 Earth observation and the environment (IV); and
- 、 research and technology (V).

All of the groups were charged with exchanging information and views. Among the points of interest under Working Group I was international launch services policy, although the practical aspects of this matter continue to be dealt with outside that group. A further subject was joint assistance that the EC and ESA could offer the ASEAN countries, while a major topic of current discussion is relations with East European countries. In Working Group II studies were performed on the competitiveness of European space industry and information was exchanged on procurement policies in both organizations. Under Working Group III, considerable discussion has focused on the land-mobile market for satellite telecommunications, VSATs and research being conducted under the EC's RACE and other programs. In Working Group IV, the EC was able to learn in detail about the performance characteristics of ESA's ERS satellite series and thus to assess how better it could integrate this capability into its research planning. ESA and the Commission have also defined here the goals for a future ERS-1 pilot project aiming at studying the problems of the tropical forests through use of ERS-1 all-weather radar survey techniques. Finally, Working Group V has succeeded in acquainting ESA and the Commission with the status of each other's projects, thus avoiding duplication, especially on materials (Brite-Euram) and robotics (Teleman).

3.3 COST

Parallel to the previously-mentioned kinds of cooperation, ESA became involved in parts of the wide-ranging set of programs the Commission is now promoting under its post-SEA science and technology competence pursuant to a June 1990 Communication to the Council on European Cooperation in the field of Scientific and Technical Research (COST).

Such cooperation extends broadly to the OECD and EFTA countries and may cover fields such as biotechnology, nuclear physics, global change or, of course, space. Criteria applied for approving funding of a project on the EC's side are public interest or the reinforcement of the science

community or of existing R&D initiatives like Eureka, ESPRIT, BRITE and RACE. The range of projects so far undertaken by international agreements (known as "Cost Actions") merits its own discussion in another place, but it is the multilateral rather than bilateral projects under COST in which ESA has been involved under Agreements with the Commission and other parties.

The Cost Actions in this group to which ESA is a signatory are as follows:

- Cost 207 European research project on digital mobile radiocommunications;
- Cost 204 Project on phased array antennae;
- Cost 205 Project on the influence of the atmosphere on radiopropagation on satellite-Earth paths at frequencies above 10 GHz;
- Cost 213 Project on antennae in the 1990s (electronically steered antennae for future satellite and terrestrial telecommunications);
- Cost 223 Project on antennae in the 1990s (Active Array Antennae for future satellite and terrestrial communications);
- Cost 226 Integrated space and terrestrial networks for fixed telecommunications;
- Cost 227 Integrated space and terrestrial networks for mobile telecommunications.

It will be noted that all relate to telecommunications in one form or another. As with COST generally, participation in any of these COST Actions implies the pooling of data among the signatories.

4. *The Single European Act and its Consequences for ESA*

At the beginning of this article, it was mentioned that the EC's new competence in science and technology R&D is contained in the Single European Act. Having now described the EC's post-SEA moves in the space field and the development of EC-ESA relations, we shall turn the SEA around and recount how ESA has taken account of the SEA's potential consequences from its own point of view.

For some time, it has been obvious that the expanding web of competences that is the supranational European Community can have significant effects on entities that do not actually form part of the Community itself. Much literature exists especially on the aspects of this question relating to third countries, and most particularly to those of the EFTA grouping. Regulation of these external effects was one of the key objectives of the Oslo-Brussels negotiations of previous years leading to agreement on a "common European economic area." But the phenomenon does not end there, and, despite being an international organization that is

fully independent from the Community under public international law, questions began to be raised in ESA as to what the consequences of such a profound change as the passage into law of the Single European Act would be on the wider European environment, in particular in relation to ESA's own area of European integration.

Analysis of these questions was initiated by the Agency's Legal Department, which produced an internal study in 1989 setting down the various sectors that would be affected by the move from a still nationally demarcated EC to a single market. The list was impressively long. Account was taken, for study purposes, of the exposure of ESA contractors to the legal measures of the new environment. Visits by representatives of the Commission revealed the gigantic scale of the law-making enterprise the EC faced in implementing the SEA: the drafting and implementation of a thousand distinct new instruments of Community law.

These were early moves but, once a sufficient picture had been formed, the ESA Executive reported its preliminary findings and views to the relevant deliberative bodies within ESA, prompting several Member States to initiate their own studies which were provided to the Executive and other Member States.

By February 1990, a consensus had emerged that increasing economic integration at EC level did require a fresh look at ESA's industrial system as well as greater insight into the practical functioning of EC law. Guidelines on any necessary action could then be considered after this educative process. A special working group was thus set up by a decision of the Agency's Council in March 1990 to study the post-SEA landscape. The group met on six occasions. It began by singling out just which parts of EC law might be relevant to ESA and space activity in general. Next, independent studies were presented on points at which the EC and ESA orders met or were likely to meet each other. On these foundations, the Executive then entered a conceptual comparison of EC economic law with ESA's industrial system. Of particular importance here was the distinction between primary and secondary EEC law and the necessary inference according to public international law that the assumptions necessary to bring ESA activities under primary law were not fulfilled, even though EC Member States in ESA might eventually face certain responsibilities individually which derive from primary law. Apart from this conclusion, it was further established that ESA, as an international organization, was anyway specifically exempted from the vast bulk of secondary law, and it was precisely under that secondary law that most of the questions raised during earlier studies had been posed.

Among the other doctrinal ground explored in this phase of the working group's life was the fundamental asymmetry between the EC and ESA. This consists of a basic concern on the EC's part to generate a European system from adjusting the juridical conditions which prevail at the bottom of the economic system, *i.e.* at the level of the individual citizen or enterprise, and then leaving market forces to do their work without further substantial intervention. ESA, by contrast, is an active agent in

forming industrial structures from the top downwards. It is for this reason that it has, and must have, an industrial policy founded in treaty law. This top-down approach leads to all European industrial arrangements for executing ESA programs, along with the necessary degree of functional specialization geographically. It also matches up with the need, under internal ESA rules which ensure that a balance is achieved among all Member States, to provide a sufficient recompense ("juste retour") to those Member States which contribute public funds to such programs.

Since ESA and the EC are fundamentally unlike each other at this conceptual level, the working group was satisfied that the postulate of complementarity was well founded theoretically, and that conflicts of law between the two systems were unlikely. A greater sensitivity towards the potential policy difficulties which could arise in relation to the doctrine of state aids under Art. 92 of the Treaty of Rome did, however, emerge where ESA R&D is concerned in a field that is already close to commercialization. This happens to be the main area where the EC is advocating further spending, and the availability of the coordination mechanisms between the two organizations will therefore be valuable for addressing any questions of consistency in policies in this or other regards.

5. *Conclusion*

The creation of "Europe" as a functioning entity in the economic, technological and political domains has been and continues to be a process which draws upon the energies of European States, groupings and citizens at many levels and in a multitude of forms. Far from being monolithic, therefore, this complex process entails both sophistication in political thought -- whence comes concepts such as "subsidiarity" and now "complementarity" -- and suppleness in approach. Without these elements, indeed, one wonders if the project of European integration itself would not founder on the reefs of particularism.

In the case of the paths towards European integration whose meeting has been recounted in this article, we are now witnessing in the space field the early stages of a new relationship between the European Space Agency and the European Community. Its bywords are synergy and complementarity, words which, like much of the emerging European vocabulary mentioned at the outset, have an abstract ring about them but which, in reality, boil down to everyday imperatives. Preminent among them is the necessity of neighbors first getting to know each other, and then cooperating according to what each can offer. And there is every incentive in so doing to seek a broader relationship than in the past. On the one hand, space technology has become relevant to so many areas of industrial and social life in Europe that promotion of its fuller utilization merits the Community's active attention. On the other, the changing orientation of space technology towards global concerns, including environmental monitoring, provides an opportunity for both ESA and the EC to make a substantial contribution farther afield. Beyond this, it is clear

that, where ESA acts to form and implement a long-term European space policy, its overall effectiveness can only be enhanced through the addition of the EC's growing political weight.

Thus, from the standpoint of Europe achieving the best spread and use of resources, the entry of the EC into the space field is to be welcomed and may lead to yet a further boost in the fortunes of Europe as a major space power.*

* **Editor's note:** The present article was prepared in May 1992. Since then, the EC Commission has issued a further Communication which the authors plan to discuss in a future issue of the Journal of Space Law.