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All correspondence with reference to this publication should be directed to the JOURNAL OF SPACE LAW, P.O. Box 1848, University of Mississippi School of Law, University, Mississippi 38677; jsl@olemiss.edu; tel: +1.662.915.6857, or fax: +1.662.915.6921.

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THE 2ND INTERNATIONAL CONFERENCE ON THE STATE OF REMOTE SENSING LAW

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FOREWORD

THE *2ND INTERNATIONAL CONFERENCE ON THE STATE OF REMOTE SENSING LAW*: A COMPREHENSIVE LOOK AT THE STATE OF REMOTE SENSING LAW

Joanne Irene Gabrynowicz[*]

This volume of the JOURNAL OF SPACE LAW contains most of the papers presented at the *2nd International Conference on the State of Remote Sensing Law* held at the National Center for Remote Sensing, Air, and Space Law at the University of Mississippi School of Law, 16-18 January 2008. The first conference was held in the same location 18–19 April 2002.

In the time between the two conferences three broad trends in remote sensing law can be discerned. First, there is a continuing trend to address advanced capabilities in a regulated environment. Second, there is a growing distinction between the data policies set for newer, more advanced systems and those

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[*] Joanne Irene Gabrynowicz is the Editor-in-Chief of the JOURNAL OF SPACE LAW. She is also a professor of space law and remote sensing law and the Director of the National Center for Remote Sensing, Air, and Space Law at the University of Mississippi School of Law. Prof. Gabrynowicz was the recipient of the 2001 Women in Aerospace Outstanding International Award and is a Director of the International Institute of Space Law and a member of the American Bar Association Forum on Air and Space Law.

that apply to more established systems. These distinctions generally run along the lines of high-spatial resolution, commercial data; and, lower spatial resolution, civil, noncommercial systems. Data from the former category is more controlled and market-priced. Whereas, data from the latter category is increasingly becoming more open and with little or no cost. Third, commercial systems—however "commercial" is defined—are increasingly being controlled by their nation of origin.

These trends are giving rise to some intriguing questions that have emerged, particularly regarding commercial high-resolution systems. First, when will some of these systems simply be openly recognized as the surveillance, or in a different parlance—spy, systems they are? This is particularly interesting in light of some companies openly selling secrecy measures as premium products. A related question is whether or not the high-resolution systems that are increasingly being regulated by a number of nations should be merged or coordinated. If these systems are primarily viewed as surveillance systems, it is unlikely there is the political will to do so. However, if these systems are primarily viewed as profit making activities, there may be a different outcome. Either way, interesting questions would be raised at international law. Another approach would be to have these systems be recognized as governmental systems. There is some national legislation that now hold data providers/vendors responsible for making what are substantially geopolitical decisions in their distribution sales process, imposing criminal sanctions for bad decisions.

The purpose of the *2nd International Conference on the State of Remote Sensing Law* was to fill in some of the defining details in these trends and emerging questions. The speakers were the people who were actively involved in their national legislative processes. Their papers and discussions gave insight into the "hows" and "whys" of the processes and policies that led to the law in their respective nations as well as what expectations could be considered going forward.

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Volume 34, Issue 2

The National Center for Remote Sensing, Air, and Space Law of the University of Mississippi School of Law is delighted to announce that it will publish Volume 34, issue 2 of the JOURNAL OF SPACE LAW in the second half of 2008.

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ARTICLES

FRENCH REMOTE SENSING LAW

Philippe Achilleas[*]

INTRODUCTION

In 1986, France launched the first *SPOT* (*Satellite Pour l'Observation de la Terre*), an optical imaging Earth observation satellite system operating from space. *SPOT*'s objectives are (1) the exploration of Earth's resources, (2) the detection and forecast phenomena involving climatology and oceanography, and (3) the monitoring of human activities and natural phenomena with a resolution of 10m (panchromatic) / 20m (multispectral). *SPOT 5*, launched in 2002, offers a 2.5m resolution. The program initiator is the French space agency (*CNES - Centre national d'études spatiales*). Its participants are *CNES*, *SSTC* (Belgian scientific, technical, and cultural services) and *SNSB* (Swedish National Space Board). Beside this civilian system, France is also carrying on *Helios*, a military program, in order to give France a high-resolution military surveillance system. First-generation *Helios* satellites, with 1-meter optical imaging resolution (no infrared capability), were launched in 1995 (*Helios 1A*, still operational) and in 1999 (*Helios 1B*). *Helios*, a second-generation satellite with a 50 centimeters optical and infrared resolution, is composed of *Helios 2A* (launched in 2004) and

[*] Director, Institute of Space and Telecommunications law – IDEST, Master in Space Activities and Telecommunications law, University Paris-Sud 11.

Helios 2B (expected to be launched late 2008). The initiator of the program is *DGA* (*Delegation Generale pour l'Armement* – French defense procurement agency). France (*DGA*, *CNES*), Italy, and Spain are participating in the *Helios 1* program, whereas France (*DGA*, *CNES*), Belgium, Spain, Italy, Germany, and Greece are participating or will participate in the *Helios 2* program. The dual Earth observation system, *Pleidades*, initiated by *CNES*, is intended to replace the *SPOT* fleet with smaller, cheaper satellites which offer better performance, in particular due to a resolution of 0.7 m. The first satellite, of two, will be launched by the end of 2009 in order to provide data for civilian uses as well as for military ones. The program, developed within a cooperation framework between France and Italy, will be open to Sweden, Belgium, Spain, and Austria.

France's civilian remote sensing policy is based on the promotion of a space imagery global market where data could be acquired on a nondiscriminatory basis. To ensure active French participation in this market, Spot Image, a private law company, has been established in order to manage *SPOT* data distribution and to propose data of a better resolution than the major alternative foreign systems (e.g. *Landsat* in the 1980s). The major shareholders of Spot Image are *CNES* (41%) and *EADS* (40%). The company sells data collected by *SPOT* satellites but also foreign systems such as *QuickBird*, *Ikonos*, and *Radarsat*. Furthermore, in order to secure the market from a legal point of view, France has supported the adoption by UNCOPUOS of the Principles Relating to Remote Sensing of the Earth from Outer Space.[1] This resolution, not applicable to military activities, acknowledges the three following principles: (1) freedom of data collection and distribution; (2) respect of the principle of full and permanent sovereignty of all States and peoples over their own wealth and natural resources; and, (3) right of the sensed state to access data and information concerning its territory on a nondiscriminatory basis. The 41/65 resolution represents one of the basis of the work on the adoption of a French legal framework.

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[1] Principles Relating to Remote Sensing of the Earth From Outer Space, G.A. Res 41/65, U.N. Doc. A/RES/41/65 (Dec. 3, 1986) [hereinafter U.N. Principles on Remote Sensing].

From the point of view of military remote sensing policy, in 1978 at the Conference on Disarmament France proposed to set up an international satellite body for monitoring disarmament treaties. This project has not been implemented. Recently, the 2003–2008 Military Program Law[2] stressed the objectives of France in the field of military uses of remote sensing satellites, in particular: (1) strengthen French military surveillance capability for prevention, deterrence, and peacekeeping purposes; (2) maintaining technical skills in France and Europe, in certain key defense fields such as the major optical sensor devices; and, (3) ensuring that certain civil programs comply with defense requirements. Among others, the Military Program Law recommends the funding of completion of *Helios 2* second-generation optical Earth observation satellites to provide France with a satisfactory level of situational awareness capabilities. The law also recommends access, via capability exchanges, to images from the high-resolution German SAR-Lupe and Italian Cosmo-Skymed space radar systems.

This paper will (I) initially present the current legal framework for remote sensing activities in France (II) and analyze the new French legislation proposed in Parliament.

I. CURRENT LEGAL FRAMEWORK

At the moment, there is no special French legislation on remote sensing. Therefore, general rules of law are regulating (A) military and (B) civilian Earth observation activities.

A. Military Activities

Military satellites and ground stations as well as their components are subjected to export control of military goods and assimilated goods. The legislative decree of 18 April 1939 on war materials, arms, and munitions[3] represents the major legal source to be applied. France also complies with the 1995 EU

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[2] Act No. 2003-73 of 27th Jan. 2003, Journal Officiel de la République Française [Official Gazette of France].

[3] Military Program Law, Journal Officiel de la République Française, June 13, 1938.

code of conduct on arms exports. According to the French law, exports[4] and imports[5] of military goods and assimilated goods are prohibited unless a license is issued at a ministerial level. The office responsible for delivering the license is the Prime Minister's after advisory opinion of CIEEMG (*Commission Interministerielle pour l'Etude des Exportations de Materiel de Guerre* - Inter-ministerial commission for examining exports of defense equipment). CIEEMG is chaired by the Deputy Secretary General for National Defense (*SGDN – Secretariat General de la Defense Nationale)* and is composed of representatives of Ministry of Foreign Affairs, Ministry of Defense, and Ministry of Economy and Finance. International transfers of remote sensing data as such collected and distributed via military satellites and/or ground stations are not controlled.

B. Civilian Activities

France has neither general legislation on space operations nor specific legislation on remote sensing activities. Therefore, collection and distribution of remote sensing data are first regulated by international space law, in particular the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies of 27 January 1967[6] (Outer Space Treaty), ratified by France, and the Principles Relating to Remote Sensing of the Earth from Outer Space adopted by the UN General Assembly in resolution 41/65 of 3 December 1986 (U.N. Principles on Remote Sensing)[7]. Article I of the Outer Space Treaty[8] and Principle IV of the UN Principles on Remote Sensing[9] guarantee free use of outer space for remote sensing activities. Data collection and distribution are also protected by general French law. First, they benefit from the freedom of trade and industry proclaimed

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[4] CODE OF DEFENSE, at art. L.2335-1.

[5] CODE OF DEFENSE, at art. L.2335-3.

[6] 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.S.T. 205 (entered into force Oct. 10, 1967) [hereinafter the Outer Space Treaty].

[7] Principles on Remote Sensing, *supra* note 1.

[8] Outer Space Treaty, *supra* note 6, at art. I.

[9] Principles on Remote Sensing, *supra* note 1, at princ. IV.

since the French Revolution (Decree of 2 and 17 March 1791, so called "*loi d 'Allarde*"). The Council of State (*Conseil d'Etat*) has acknowledged that this freedom represents a French general principle of law[10]. Furthermore, the Constitutional Council (*Conseil constitutionnel*) considers this freedom to have constitutional value[11]. Second, data collection and distribution are protected by the freedom of information as a consequence of freedom of expression as proclaimed in Article 11 of the French Declaration of the Rights of Man and of the Citizen adopted 26 August 1789. This declaration has constitutional value (Preamble of the French Constitution of 4 October 1958). Freedom of information is also proclaimed in Article 10 of the Convention for the Protection of Human Rights and Fundamental Freedoms[12] of 4 November 1950 that constitutes a basic legal document in the field of human rights for all European countries. In addition legal rules applicable to remote sensing activities derive from contracts concluded between CNES and Spot Image.

Even in the absence of legal text, governmental control is imposed on the Spot Image commercial policy in order to ensure protection of national interests and respect of international obligations of France. To this end, SGDN has proposed the establishment of an informal working group called GIRSPOT, which is composed of representatives of SGDN, the Ministry of Foreign Affairs, the Ministry of Defense, the Ministry of Space, the Ministry of Research, and CNES. The role of GIRSPOT is to make reports on specific situations that could necessitate restrictions to the commercial activities of Spot Image. GIRSPOT would not have the power to impose directives to Spot Image. The Prime Minister has the sole responsibility to impose limitations to Spot Image after recommendation of GIRSPOT. These directives are implemented through CNES. Most of the reports deal with the installation of direct receiving ground stations in foreign countries. Restrictions may also be imposed on data when hostile entities might use data representing protected and sen-

[10] CE Ass., June 22, 1951, Daudignac; CE, Ass., May 13, 1983, Société René Moline.

[11] CC decision no. 81-132DC, Jan. 16 1982, Loi de nationalisation.

[12] Convention for the Protection of Human Rights and Fundamental Freedoms, Nov. 4, 1950, ETS No. 5, 213 UNTS 222.

sitive French areas (e.g. nuclear plants), location of French troops abroad (e.g. Ivory Coast), or the location of allied troops abroad (e.g. U.S. army in Iraq).

Despite the absence of reliance on any legal document, GIRSPOT data control policy works, but it is based on the good will of Spot Image, the special relationship between the company, and the mandate that it not oppose CNES as its major shareholder. Furthermore, apart from the limitations imposed in 1991 during the Gulf War preventing Spot Image from distributing data concerning Iraqi territory to Iraq (despite Principle XII of the UN Principles on Remote Sensing), the activity of GIRSPOT remains confidential. Data control is applied on a non-transparent basis and its legality, in the absence of a text, remains questionable. For this reason the adoption of a specific legislation was necessary.

II. NEW LEGISLATION

The French Senate adopted on 16 January 2008 the law on space operations that will have to be passed by the General Assembly by the beginning of summer 2008.[13] The working group of the Council of State, set up to draft the law in fall 2004, decided to focus only on legal issues associated with spacecraft control (launch services, in-orbit satellite operations). The main purpose was to deal with international obligations of France deriving from the Outer Space Treaty Article VI (authorization and control of activities in outer space), Article VII (liability for damages caused by space objects), and Article VIII (registration of space objects).[14] Satellite applications, such as remote sensing, were not in the mandate of the working group. In parallel to the work of the Council of State, the Ministry of Defense was drafting legislation on data control. It was then decided to add a Chapter on space data into the law on space operations. Therefore, chapter VII of the Act contains three articles on space-based Earth remote sensing data to organize their control when necessary. These articles have to be implemented by decree.

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[13] Need source.

[14] Outer Space Treaty, *supra*, note 6, at arts. VI, VII, and VIII.

The name of the Administrative Authority responsible for the space data regime is not designated in the law. It is however obvious that the decree should designate the Prime Minister, who would delegate the implementation of the regime to SGDN. The preparatory works mention that the Administrative Authority would coordinate an inter-ministerial working group composed of representatives from SGDN, the Ministry of Defense, the Ministry of Foreign Affairs, the Ministry of Space, and the Ministry of Research.

The Administrative Authority will be responsible (A) for the declaration procedure established and (B) for the implementation of possible restrictions.

A. Declaration

The principle of authorization (license) proposed in the original draft by the working group on space data policy has not been confirmed in the final version. Article 23 paragraph 2 of the law establishes a declarative regime. Any data provider at a primary stage has to make a prior declaration to the Administrative Authority. It seems that the prior declaration obligation is a sufficient and proportionate measure to meet the objectives of the law to impose restrictions when necessary.

The declaration regime deals with any data originated from the sensing of the Earth's surface from space. The decree to be adopted will have to give a concrete definition of data concerned. It should recall the definitions of primary data and processed data of the U.N. Principles on Remote Sensing. Data originated from military spacecrafts or collected on behalf of the Ministry of Defense are excluded from the scope of the law according to Article 26, since they are already subject to direct governmental control.

The declaration concerns any primary operator of space based remote sensing data, defined as any physical or judicial person responsible for the programming of a remote sensing satellite or responsible for the collection of space based Earth remote sensing data (Article 1 paragraph 6). The French legislation only deals with activities carried on in France by French or foreign persons. The drafters acknowledge that there might be

some trouble with companies established in foreign countries, but the issue could be solved on the basis of international cooperation, especially if the foreign country has adopted national legislation establishing data control. Furthermore, CNES is not concerned by the data control procedure (Article 27).

The decree to be adopted has to identify activities subject to declaration based on the following characteristics: data resolution, frequency band used, data accuracy, and data quality (Article 23 paragraph 2).

A fine of € 200,000 might be imposed to any person providing space-based data without declaration in violation of Article 23 (Article 25).

B. Control and restrictions

According to Article 24 paragraph 1, the Administrative Authority shall control that the licensee does not interfere with the fundamental interest of the nation. In French law, the

> fundamental interests of the Nation … covers its independence, the integrity of its territory, its security, the republican form of its institutions, its means of defense and diplomacy, the safeguarding of its population in France and abroad, the balance of its natural surroundings and environment, and the essential elements of its scientific and economic potential and cultural heritage[15] (Article 410-1 of the criminal code).

Article 24 of the French law on space operations stresses in particular protection of defense and foreign policy and compliance with international obligations of France.

Restrictions can be imposed to protect the fundamental interests of the nation. The decree to be adopted should define the type of limitations that can be established. Preparatory works mention the immediate suspension on data distribution for a limited period of time, the obligation to delay the distribution,

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[15] C. PÉN., at art. 410-1.

and the permanent distribution prohibition[16] (e.g. very sensitive zones as defined in Article L131-3 of the Civil Aviation Code).

The restriction regime, if proportionate, is compatible with the provision of the Treaty establishing the European Union in its 2002 version.[17] Indeed, first, Article 30 allows restrictions on imports, exports, or goods in transit justified on grounds of public policy or public security. Second, Article 46, authorizes provisions laid down by law providing for special treatment for foreign nationals on grounds of public policy or public security. At least, according to Article 296, no Member State shall be obliged to supply information that it considers contrary to the essential interests of its security if disclosed.

A person declared not complying with any data restriction imposed is sanctioned by a fine of € 200,000 in violation of Article 24 (Article 25).

[16] For example, the very sensitive zones as defined in C. CIVIL AVIATION, at art. L131-3.

[17] European Community Offical Journal, n° C 325, Dec. 24, 2002.

CURRENT STATUS AND RECENT DEVELOPMENTS IN BRAZILIAN REMOTE SENSING LAW

Hilcéa Santos Ferreira & Gilberto Câmara[*]

I. INTRODUCTION

Earth observation and GIS technology is one of the great successes of advanced information technology for improving humankind. The powers provided by satellite imagery, digital maps, and associated information have transformed our ability for understanding the forces that shape the geographical space. In developing nations, many of which lack strong traditions of cartography and mapping, these technologies have proven essential for developing public policies on issues such as deforestation assessment and management, urban planning, agricultural production, and environmental assessment.

Brazil is one of world's leading countries on Earth Observation (EO). It builds satellites, receives and distributes remote sensing data, and develops applications. Brazil's EO projects for monitoring tropical deforestation are recognized worldwide as one of the prime examples of using EO data for the benefit of society. Brazil is the world's largest provider of EO data, with more than 100,000 remote sensing images delivered yearly via the Internet.

Since 1961, INPE (National Institute for Space Research), a Brazilian governmental entity, has been carrying out most of civilian R&D in remote sensing. INPE has managed a *LANDSAT* ground station, receiving data since 1974. It set up a Remote Sensing Division in 1972, which has been conducting research and application projects, and a graduate program in Remote Sensing and GIS that has granted more than 150 Masters degrees since 1974 (a Ph.D. program was started in 1998).

[*] National Institute for Space Research (INPE) Av dos Astronautas, 1758, São José dos Campos SP 12227-001, Brazil, e-mail: hilcea@dpi.inpe.br; gilberto@dpi.inpe.br.

INPE has also developed free and open source software for GIS and image processing. China and Brazil have a joint program called the *China-Brazil Earth Resources Satellite*. The *CBERS* satellites have global coverage, using optical multispectral cameras. Currently, the CBERS program includes five satellites. They are: (a) *CBERS-1*, launched in October 1999, operations ended in July 2003; (b) *CBERS-2*, launched in October 2003; (c) *CBERS-2B*, launched in September 2007, now fully operational; (d) *CBERS-3*, to be launched in October 2009; (e) *CBERS-4*, to be launched in October 2011. *CBERS 5, 6* and *7* are under final discussions.

All institutions work in a historical and social context, and INPE is no exception. In remote sensing, INPE's actions have been constrained by laws that date back to Brazil's military regime (1961-1985). This paper will examine how remote sensing law has evolved in Brazil in the last thirty years, and how a civilian institution which is committed to openness has managed to overcome constraints and controls.

II. REMOTE SENSING LAW UNDER BRAZIL'S MILITARY REGIME (1964-1985)

From 1964 to 1985, Brazil was ruled by a military regime, which acted under a dual-tier doctrine. The first part of this doctrine was a broad definition of national security that included defense against external aggression and internal defense against insurgency and communism. Using repressive measures, the military countered domestic insurgencies successfully from 1967 through 1973. The second part of the doctrine was a belief on economic development as a means of regional assertiveness. Under the military, the role of the State in the economy grew by expanding Brazil's industrial base. High economic growth rates between 1968 and 1973 helped to legitimize military rule. Although the military government was fiercely anti-communist, its relationship with the United States was troubled by Brazil's nationalistic tradition and its rejection of external controls. Thus, from 1970s onwards, Brazil's military developed a strategy of assertiveness as a local power. It promoted scientific and technological development, especially in technological

areas such as nuclear, energy, agribusiness, space, aeronautics, telecommunications, and computers.

This dual strategy of national security and regional power assertiveness brought a legacy of contradictory actions. On the positive side, the military promoted R&D institutions such as INPE, encouraging research and open scientific international relations. Thus, in 1974, INPE set up a *LANDSAT* ground station, which has worked continuously since then[1]. Remote sensing images received by INPE were distributed without controls and many different applications were encouraged. On the other hand, the regime controlled aerial surveys and the main decisions of the space program were decided by the military.

In 1971, Gen. Emilio Médici, then president of Brazil, signed Decree no. 68099, that created the Brazilian Commission for Space Activities (COBAE), headed by the chief of EMFA, Brazil's equivalent to the Chairman of the Joint Chiefs of Staff. COBAE's mandate was to help the president in planning and carrying out national priorities in space-related matters. Although INPE continued to be a civilian institute, its plans had to be approved by the military.

The military felt the need to control all cartographic activities. Thus, in 1971 the government signed Decree-Law 1177/71, which determined that all aerial surveys should be strictly regulated by EMFA. Private companies needed authorization to perform any survey, and they had to keep the originals to provide to the government if needed. This decree did not deal with remote sensing data from satellites.

Decree-Law 1177/71 was subsequently amended by the Decrees 71,267/72, 75,779/75), and 84,557/80[2]. None of them included remote sensing, since it was felt the 80-metre resolution of the first three *LANDSAT* satellites had no intelligence value. Thus, up to the end of the military regime in 1985, satellite remote sensing activities in Brazil were technically unregulated.

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[1] Álvaro Fabrício dos Santos, *Remote Sensing in Brazil*, 84 REVISTA DA SBDA DIREITO AERONÁUTICO E DIREITO ESPACIAL [BRAZILIAN JOURNAL OF AVIATION AND SPACE LAW] (2004), *available at* http://www.sbda.org.br/revista/Anterior/1768.htm.

[2] Raimundo Mussi, *O Sensoriamento Remoto E Sua Regulamentação*, 86 REVISTA BRASILEIRA DE DIREITO AEROESPACIAL [BRAZILIAN JOURNAL OF AEROSPACE LAW] (2003), *available at* http://www.sbda.org.br/revista/Anterior/1752.htm.

In practice, however, there was an indirect control of INPE's actions by COBAE.

III. THE TRANSITION TO DEMOCRATIC RULE (1985-2000)

Brazil's transition from a military regime to a full-fledged democracy was a negotiated process. Partly because of Brazil's historical tradition of negotiated transitions and partly because the regime had been much less repressive than countries such as Chile and Argentina, there was an implicit consensus. Although politics is now under full civilian control, the military continues to preserve an influence over areas which are judged to be sensitive to national security, including space policy.

The natural solution after the regime change would have been to assign INPE, which had developed into one of Brazil's main scientific institutions, the powers of a civilian space agency. This would have been similar to what had happened in the U.S. in 1958 when NASA was created. The negotiated nature of the transition dictated otherwise. Thus, in 1994, after lengthy and delicate negotiations, the government passed Law 8854/94, which created the Brazilian Space Agency (AEB) and ended COBAE. AEB is a civilian organization which is in charge of deciding space policy matters. AEB and INPE are independent bodies, a state of affairs which is unusual among nations that have a space program. AEB's highest body is its Superior Council, which has seventeen members, of which six are from the military.

Also, the vision that aerial survey was a sensitive national security issue and should be subject to strict government control continued to prevail after the transition to democracy. By the 1990s, government officials started to regard remote sensing data as also being of intelligence value. Thus, in 1997, the civilian government of President Fernando Henrique Cardoso signed Decree 2278/97, which regulates both aerial surveys and remote sensing and remains valid to this day. The decree treats remote sensing data as aerial photography taken by satellites.

Due to this misunderstanding about remote sensing, Decree 2278/97 contains inappropriate dispositions. It ignores the technical nature of remote sensing and disregards the United Na-

tions Remote Sensing Principles. To distribute or use remote sensing data in Brazil, a satellite operator would need an authorization from the Brazilian Ministry of Defense. Since this condition is non-applicable in practice, Brazilian companies that carry out remote sensing activities and international operators that distribute images in Brazil have ignored the legislation, without any practical consequence.

IV. FIGHTING ARCANE LEGISLATION WITH OPEN ACCESS: INPE'S DATA POLICY

Recognizing the need to reform the remote sensing law, but fearing that political negotiations could lead to a compromise where some military control of remote sensing activities would remain, INPE decided to adopt a *de facto* data policy. Such policy was to give out free on the Internet all remote sensing data received by INPE, the resulting maps, and the software for image processing and GIS. The SPRING software was placed on the Web in 1997, the Amazon deforestation maps in 2003, *CBERS* images in 2004, and the INPE's full *LANDSAT* archive (30 years of data) in early 2008.

This policy met with a huge success. Before 2004, INPE delivered 2,000 *LANDSAT* images per year. This figure is comparable with the 18,000 images delivered yearly by USGS. Free distribution on the Internet changed this. From April 2004 to January 2008, more than 350,000 *CBERS* images have been delivered by INPE to more than 5,000 users, including government at the federal, state, and municipal levels; educational institutions; non-governmental organizations; and the private sector.

Success at the local front encouraged INPE to promote open access data policies for remote sensing worldwide. China and Brazil agreed to deliver *CBERS* data free to African countries, in a partnership that include Italy, South Africa and Spain. By this proposal, their ground stations covering most of Africa will receive and give out *CBERS* data timely and free-of-charge. Brazil has been vocal at international forums promoting the *CBERS* free data distribution policy, which is considered to be an example to other nations. This international recognition has

been instrumental in supporting INPE's position for open access to remote sensing data in Brazil, despite the legal hurdles.

V. OLD HABITS DIE HARD: THE CURRENT DEBATE ON REMOTE SENSING LEGISLATION (2000-PRESENT)

In 2000, a working group composed of members of the Ministry of Defense, the Ministry of Science and Technology, the Ministry of Foreign Affairs, and the Brazilian Space Agency gathered to discuss a specific legislation for remote sensing and an update of Decree 2278/97. It proposed a new legislation (Project Law 3587/00) that was forwarded to the Brazilian Congress. Once again, this action neglected the Brazilian remote sensing community, ignored the U.N. Remote Sensing Principles and neglected the technological advances.

The proposed legislation defines broadly remote sensing as "the set of operations of reception, processing, interpretation, or distribution of satellite-collected data, that under any form covers part the Brazilian territory." The goal is to allow the government to control the institutions involved in remote sensing and aerial surveys. Any citizen would need permission from the government to use remote sensing data. Such a view conflicts with the open access policy already in place. INPE and members of the remote sensing community have expressed their strong opposition to PL 3587/00. Given such opposition, it is unlikely the proposal will be approved by Congress. Even if it is approved, it will be impossible to be put into practice.

Additionally, the Brazilian Congress is also examining a legislative proposal (Project-Law 1120/07) that mandates an open access policy to all scientific works produced using public grants. This proposal requires all publicly funded R&D institutions to set up institutional repositories that would disseminate papers and reports published by their staff. This open access data policy would directly conflict with PL 3587/00.

VI. PRACTICE MAKES PERFECTION: HOW KANT AND THE INTERNET MAKE A GOOD PAIR

The debate on remote sensing legislation in Brazil is still open. PL 3587/00 awaits final decision by Congress. But INPE

and the remote sensing community have good reasons to be optimistic, especially since we have the moral companion of Immanuel Kant and the effectiveness of the Internet in our side.

In *Perpetual Peace*, Kant writes: "All actions relating to the right of other human beings are wrong if their maxim is incompatible with publicity." Kant refers to it as the "transcendental principle of the publicity of public law."[3] A public debate on PL 3587/00 would result in retracting the proposal, since its flaws are too obvious and it would be untenable in practice. As for the Internet, as Manuel Castells argues in "*The Internet Galaxy,*" it was "purposely designed as a technology of free communication," and "it is a particularly malleable technology, susceptible to be deeply modified by its social practice."[4] The social practice of open access remote sensing data distribution adopted by INPE has changed how remote sensing is used in Brazil.

The trend towards openness and free access to remote sensing data worldwide is gaining momentum. The next decade will likely see the emergence of a global land-imaging consortium, which would provide data access to a constellation of satellites. The land imaging satellite constellation will provide free 10-30 meter global land cover multispectral images available worldwide at least once a week, and if possible, every two days. This timely data will meet the needs for fast-response applications, which are critical in all areas.

Thirty years of experience using land-imaging satellites shows that timely, free and high-quality geospatial data provide significant societal benefits. There is a high likelihood that this policy will become widespread. Then, the currently proposed remote sensing legislation in Brazil will be seen as a failed try to roll back the clock of history.

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[3] IMMANUEL KANT, GROUNDWORK OF THE METAPHYSICS OF MORALS 347 (1785).

[4] MANUEL CASTELLS, THE INTERNET GALAXY: REFLECTIONS ON THE INTERNET, BUSINESS, AND SOCIETY (Oxford University Press, USA, Dec. 13, 2001).

REGULATING REMOTE SENSING SPACE SYSTEMS IN CANADA – NEW LEGISLATION FOR A NEW ERA

Thomas Gillon[*]

On 23 November 2004, then Canadian Minister of Foreign Affairs, Pierre Pettigrew, announced the introduction of legislation to regulate the operation of remote sensing space systems. The press release said, "[t]he legislation is aimed at protecting Canada's national security, national defence and foreign policy interests, while supporting our continued leadership in the provision of remote sensing data and services to government and private sector clients."[1] The *Remote Sensing Space Systems Act* received Royal Assent in 2005 and came into force in April 2007. The legislation, and the regulatory regime that it creates, places Canada at the forefront of establishing rules for the operation of remote sensing space systems and for the dissemination of data and imagery generated by these systems. While it is recognized that the U.S. regulatory regime is one standard by which other such mechanisms will be assessed, the Canadian remote sensing regulatory system is uniquely Canadian.

From Whence it Comes

In the mid-to-late 1990s, advances in satellite remote sensing technology in the private sector started to drive the development of commercial space systems that were increasingly capable, matching in many cases, the performance capabilities that had previously been within the realm of military or intelli-

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[*] Dr. Thomas Gillon is currently the Remote Sensing Space System Policy and Licensing Officer with the Department of Foreign Affairs and International Trade. Previously Dr. Gillon was a Senior Policy Officer in the Directorate of Arms and Proliferation Control Policy in the Canadian Department of National Defence and was Senior Analyst/Acting Section Head-Policy and Cooperation in the Directorate of Space Development, Department of National Defence, Canada

[1] Press Release, Foreign Affairs Canada No. 136, Canada Tables Legislation Regulating Remote Sensing Space Systems (Nov. 23, 2004).

gence capabilities alone. With a note of concern, it was recognized that

> Public availability of timely high-resolution imagery represents a notable break with the past. We are moving from an era in which only a handful of governments had access to high-resolution imagery to one in which every government – and business, non-governmental organizations, and terrorist and criminal groups – will have such access. Non-state actors will be able to peer behind the walls of national sovereignty, accelerating a shift in power that is already under way. Yet, governments around the world are woefully unprepared for the coming era of global transparency. Most countries have chosen to ignore these recent developments. Others have devised flawed policies that will prove unworkable in the long-term.[2]

These developments in satellite technology were occurring globally and across a number of system types. Resolutions dropped, in spatial terms, from tens of metres to less than one metre (in the case of optical sensors) within the span of a single decade. In 1999, Space Imaging's *Ikonos* satellite, followed soon after by Digital Globe's *QuickBird* satellite, improved the best optical resolution available to the public to one meter and sixty-centimeter spatial resolutions respectively. While these systems were remarkable in the quality of the images that they produced, they are, nevertheless, limited by the very nature of optical systems – they cannot image at night or through cloud cover.

Synthetic aperture radar (SAR) systems provide a different sort of image than optical systems, however, in that SAR sensors collect reflected energy emitted from the satellites themselves, and do not collect naturally reflected energy in the form of light waves from the earth, as is the case with optical sensors. Given the active nature of SAR systems, they can penetrate cloud cover and be used to image at night – in short they can provide all weather/day-night coverage. Where U.S. companies

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[2] Jessica Tuchman Mathews, *Foreword* to YAHA A. DEHQANZADA & ANN M. FLORINI, SECRETS FOR SALE: HOW COMMERCIAL SATELLITE IMAGERY WILL CHANGE THE WORLD (Carnegie Endowment for International Peace 2000).

have been leading the international market for optical imagery, Canada has emerged as a world leader in the development of SAR systems.[3] *RADARSAT-1*, owned and operated by the Government of Canada, has provided eight metre resolution SAR imagery to the international market for over a decade now.

In an effort to further develop the Canadian space sector, particularly in the area of remote sensing, the Government of Canada made the decision in the late-1990s to increase private sector involvement in Canada's remote sensing missions, beginning with the ownership and operation of *RADARSAT-1*'s successor, *RADARSAT-2*. *RADARSAT-2*, owned and operated by MacDonald Dettwiler and Associates Ltd. (MDA),[4] with a commercially available spatial resolution of three meters and a significantly improved polarimetric capability, posed an interesting dilemma for the Government of Canada. While developing a viable space industrial base was the driving impetus behind the privatization of remote sensing, it was quickly realized that the capabilities of the proposed *RADARSAT-2* system raised concerns within the Canadian defence and security community and by Canada's allies. Three metre resolution satellite SAR imagery would provide detailed information to the public that had hitherto only been available to governments for arms control verification and monitoring of conventional weapon limitations, typically collected by aircraft operating under the Open Skies Treaty. SAR data, specifically, phase history data (or raw data), in the hands of a competent imagery analyst could also reveal more information than desired given the extra information contained within the phase information of the raw data itself. In

[3] Canada has been at the forefront of SAR technology development for several years and *RADARSAT-2*'s commercially available three metre image capability will be among the most advanced in the world. It should be noted, however, that several countries are pursuing SAR capabilities that equal, and in some cases surpass *RADARSAT-2* in terms of spatial resolution. For example, Germany's *TerraSar-X* has a one metre resolution capability, as will the Italian *Cosmo-Skymed* constellation. *RADARSAT-2*, however, also has full polarization capabilities that other systems do not. This will make it an extremely powerful tool for new data exploitation techniques. As a C-Band SAR system, *RADARSAT-2* will also offer better maritime and geological imaging than the X-Band sensors that will produce different types of images, including the tops of forest canopies. (Source?)

[4] As of writing, MDA is in the process of being acquired by the US firm Alliant Techsystems Inc. (ATK).

contrast, optical imagery will provide just magnitude information, but SAR imagery can also provide phase information that is more amenable to detecting changes and shapes in the images of the terrain below. Furthermore, fully polarimetric data available from *RADARSAT-2* would be the best available on the international market.

The first milestone in the Government of Canada's effort to come to grips with the privatisation of remote sensing space systems was formally announced on 9 June 1999, when then Minister of Foreign Affairs, Lloyd Axworthy, and Minister of National Defence, Art Eggleton, made public the Government's desire to develop new legislation to control commercial remote sensing satellites.[5] This policy established firm guidelines as to what the Government expected the legislation to look like, and furthermore, made it clear that the policy would apply to all commercial remote sensing space systems and to agreements between the operators of these systems and their international partners. As such, it is important to note that while *RADARSAT-2* was the immediate driver behind the regulatory regime, the regime itself was designed with an eye to systems that will be developed well into the future. The 1999 Access Control Policy, as it came to be known, focused on the two essential elements of remote sensing systems that comprised the bulk of the security concerns: the operation of the satellite and the dissemination of the data and images produced by the space system. The announced policy was comprehensive and set out in broad terms the parameters of Canada's nascent remote sensing access control regime (as no regulatory regime yet existed).

It is essential that the context of the period be understood. In addition to the rapid development of remote sensing technology, the military sensitivity surrounding high performance systems, and the shift of the operation of these systems into private hands, a number of other factors were at play that would influence the development of the Canadian regime. When the *RADARSAT-2* program was privatized and the contract awarded to MDA, MDA was, at that time, a wholly-owned Ca-

[5] Press Release, Foreign Affairs Canada No. 134, Canada to Control Imaging Satellites 1 (June 9, 1999).

nadian subsidiary of Orbital Sciences Inc., a U.S. aerospace company. To address jurisdictional issues related to the licensing of remote sensing satellites, Canada and the United States entered into an agreement to ensure that *RADARSAT*-2 would be licensed by Canada, as the United States would itself otherwise license the U.S. parent. This was because *RADARSAT-2*'s operations would be done from within Canada, while the administrative control obtained via ownership, would be held by a U.S. parent company.

The Agreement between the Government of Canada and the Government of the United States of America concerning the Operation of Commercial Remote Sensing Satellite Systems (Intergovernmental Agreement), June 16, 2000, Washington DC, set in place an understanding that both countries would ensure that remote sensing space systems would be controlled in such a manner "as to protect shared national security and foreign policy interests while promoting the commercial benefits derived from these systems."[6] Furthermore, the agreement recognized that "Canada and the United States share mutual interests in regulating and controlling commercial remote sensing satellite systems operating from their respective territories and subject to their respective jurisdictions."[7] In the end, it was concluded that Canada would establish a regime comparable to that already existing in the U.S., through the Land Remote Sensing Policy Act of 1992.

The United States' Presidential Decision Directive Number 23 (PDD-23) of 9 March 1994, also influenced the development of Canada's legislation. That document required a legally-binding agreement between the recipient of sensitive U.S. technology and the U.S. Government, before needed technology could be made available for export. At that time, *RADARSAT-2* was to make use of U.S. technology and to benefit from an American launch service provider.[8] The U.S. Government re-

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[6] Press Release, Foreign Affairs Canada No. 153, Canada and United States Sign Agreement Concerning Operation of Commercial Remote Sensing Satellite Systems 1 (June 16, 2000).

[7] *Id*.

[8] Ultimately, *RADARSAT-2* employed European technology still reliant on key US export controlled components, and it was finally launched on a Franco-Russian launch

quires such agreements to gain assurances from the recipient government that the technology will not be subsequently re-transferred to third parties without the U.S. Government's prior written approval. International agreements in Canada can require additional domestic legislation to give them effect, in this case, for the prohibition on the transfer of operational control of the satellite once it has been launched.

Coincidently, on 16 April 1999, the United States rescinded Section 126.5 of International Traffic in Arms Regulations (ITAR) – otherwise known as the Canadian Exemption. ITAR is the set of U.S. regulations that controls foreign access to sensitive U.S. technologies. As a cornerstone of the U.S. export control regulatory framework, ITAR is extremely important in determining the ability of foreign companies, particularly those that rely on U.S. technology, to do business. Only after a significant amount of additional regulatory effort in Canada, associated with Canada's Controlled Goods Programme, was a Canadian Exemption restored to ITAR. While the 2000 Intergovernmental Agreement and the 1999 Access Control Policy were focused specifically on the issues of regulating remote sensing satellites, and *RADARSAT-2* in particular, the ITAR episode served as an unwelcome backdrop that only exacerbated the otherwise simple conditions set out in PDD-23.

The policy process for Canadian officials was in so many ways mind-bogglingly complex, as it touched on so many areas. There are likely few areas of work in the Government of Canada that have addressed such complex technical (and technological), legal (Charter, commercial, and international law), and policy (economic development, foreign, defence, and national security) issues. In many cases, simply communicating among such a diverse set of interests and issues required educating and re-educating different sets of individuals as to the issues involved in other areas of the file. Lawyers required technical briefings on remote sensing satellite capabilities and technologies. Engineers required briefings on domestic and international law, as

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vehicle from Kazakhstan in December 2007, after the prime contractor encountered numerous technical and programmatic difficulties associated with building a state-of-the-art satellite system.

well as public and private law. Policy officers required a broad understanding of the file in order to ensure that it all fit under the roof of the 1999 Access Control Policy and Canada's 2000 Intergovernmental Agreement obligations. There was also the requirement for numerous consultations with industry to ensure that they were well aware of what the new regulatory structure would require of them, and to afford them the opportunity to provide their comments on that expectation during the lengthy process.

As the effort moved ahead it was quickly determined that amending existing legislation was simply not a viable option. While there is some legislation in Canada that deals with space systems, none offered the scope of Ministerial authority or had the flexibility to accommodate something as inherently complex as remote sensing. For example, the Radiocommunications Act and the Telecommunications Act both address satellite communications. Neither addresses remote sensing. Both of these Acts reside under the authority of the Minister of Industry. While an industry or economic development element exists within the remote sensing issue, the Minister of Industry lacked the authority to act in the defence of Canada or for foreign policy reasons.

Similarly, Transport Canada houses the Government Launch Safety Office that licenses launch activities in Canada. Again, satellites are not included under Transport Canada's authorities, nor typically are defence of Canada, foreign policy, or industrial or economic development. Placing the regulation of remote sensing space systems under a number of different pieces of legislation, and outside of a Minister's specified powers, was not seen as a practical option. Not only would it be extremely awkward and cumbersome, a timely response to a national security crisis would be virtually impossible. A new "stand-alone" Act would be required.

With the stage set by these efforts, it was acknowledged that there came a responsibility to ensure that the data and images produced by these systems did not place Canadians or Canada's allies in harm's way. To this end, the Government of Canada embarked on a lengthy and challenging journey, culminating in 2006 with the passing of the Remote Sensing Space

Systems Act. This Act ensures that remote sensing space systems are operationally controlled, and that the data and images that they produce are disseminated in a manner befitting a military utility dual-use technology. The Act and its regulations came into effect in April 2007. With a mandate spanning security, foreign policy, and international trade interests, the Minister of Foreign Affairs became the licensing authority for the Government of Canada.

Licensing Remote Sensing Space Systems

The cornerstone of the regulatory regime established under the Remote Sensing Space Systems Act is the licensing of the remote sensing space systems themselves. It is essential, particularly in the case of privately operated systems, that the Government has insight into the capabilities of a proposed space system and an element of control, should the capabilities of a space system warrant it, over the collection and distribution of data and imagery. As remote sensing satellite technology advances and resolutions improve, the dual-use nature of these systems has become increasingly apparent. The Government of Canada cannot license and regulate the operation of satellites owned and operated in other jurisdictions. It has a responsibility, however, to regulate systems operated by Canadians and persons that have a substantial connection to Canada.

The licensing of remote sensing systems in Canada addresses two primary concerns: the operation of the satellite itself and the distribution of raw data and remote sensing products produced by such satellites. With respect to the operation of the remote sensing satellite, the regime established in Canada is particularly interested in ensuring that such operations are secure from cradle to grave. In other words, under the Act, the government wants to ensure that positive control of a satellite is maintained at all times throughout its mission life, and that at the end of its mission life, the spacecraft is disposed of in such a manner that orbital debris risks are mitigated and the spacecraft is de-orbited safely. Positive control can be assured through the implementation of appropriate command uplink security measures, as well as by establishing robust security

protocols for the terrestrial infrastructure associated with a space system. By implementing such measures, risk to unauthorized access to the spacecraft and to the data it produces, can be significantly reduced.

Canada, in support of the recently established United Nations Orbital Debris Mitigation Guidelines, has also put in place through the Remote Sensing Space Systems Act a requirement for prospective licensees to demonstrate that they have in place an effective disposal plan for their space system. Following standards set by NASA, the objective is to see space systems deorbited safely upon the end of their mission life within 25 years.

While it is essential that spacecraft operations be licensed, what the regime is seeking primarily to regulate is the collection and distribution of raw data and remote sensing products generated by remote sensing space systems. There are, in fact, three inter-related definitions in the Act that give effect to the regulatory touchstone of the regime: the definitions of "raw data" (the zeros and ones of the digital information); "transform" (processing the data – the zeros and ones – to form an image such that it is impossible to reverse engineer the raw data); and, "remote sensing products" (i.e. finished products produced by this transformation, such as images or digital elevation models).

The raw data, particularly from high-resolution SAR systems, should be controlled. In the right (or perhaps wrong) hands it can be manipulated to reveal a great deal about the capabilities of satellites that might permit an adversary to develop methods to counter observation or to deceive observation by such systems. Controlling the raw data is important in that it works to keep the most sensitive information out of the hands of those who could use it against Canada or Canada's friends and allies.

As the Government, under the administrative leadership of the Department of Foreign Affairs (in cooperation with the Departments of National Defence, Public Safety and Industry Canada) licenses remote sensing space systems, a significant effort will be put into understanding as much about these systems as possible, in cooperation with prospective licensees. In addition to the technical elements of a license application review, the Government will need to understand the applicant's

business models; who will be its proposed system participants and clients; who will be operating the system; who will own the system; and, how the sensitive information will be managed. Ultimately, how the spacecraft will be disposed of, during or once the mission is over, will also be of interest to the regulators.

As a part of the licensing process, the Government in turn will ensure that the prospective licensee understands its obligations under the Act, including the concepts of shutter control and priority access; command and data protection (encryption and information assurance measures required); and, possible offenses and/or violations should the licensee contravene the Act, the regulations or the license. A license will only be granted once the Government is satisfied that the system and its raw data and remote sensing products are controlled in a manner sufficient to ensure that Canada's national security and defence interests are met along with Canada's foreign policy and international obligations.

One interesting aspect of the licensing section of the Act is the ability of the Minister of Foreign Affairs to exempt systems, on a case-by-case basis from the Act. This clause was incorporated in response to concerns raised regarding the need to license systems that would pose no threat to Canada or Canadians. If it can be demonstrated to the satisfaction of the Minister that a proposed system would pose no harm, if for example, it was of a sufficiently coarse resolution or that it would never distribute data outside of the Government of Canada, then the Minister could exempt it, relieving both the Government and the prospective licensee from the burden of going through the licensing process.

Review of System Participant Agreements

Virtually all remote sensing space systems have system participants that operate a part of the system, either for the licensee, or under commercial license to acquire, archive, process and distribute raw data and remote sensing products. This is most often the case where the operation of ground receiving stations and data processing and distribution are concerned. Re-

call that a system is comprised of the mission control segment, which provides commands to the satellite; the satellite itself that collects the raw data; and, the ground receiving stations with its attendant storage means, processors and distribution channels for the production of raw data; and, remote sensing products. In most cases, the licensee would operate the command facilities and the satellite, but given the global nature of remote sensing and the laws of orbital dynamics, a satellite may downlink its raw data to a receiving station anywhere in the world for subsequent processing and distribution by yet other system participants under license.

Due diligence is required on the part of the Government of Canada to review each agreement between the licensee and its system participants to ensure that they operate the system with no less rigor than the licensee must. The licensee, for its part, must bind the system participants to the rules established in the license issued by the Minister of Foreign Affairs and to the undertakings of their command and/or data protection plans. Rules established in the license for the release of raw data and remote sensing products must also be adhered to by the system participants. As the Government will likely have little or no jurisdiction directly over the end-users or foreign system participants, the Canadian licensee will have to ensure that their system participants and their end-users comply with the rules. If it should be discovered that there has been a disregard of the rules established by the Government, the licensee could face the repercussions that range from administrative penalties, through revocation of the license or, in the most extreme cases, criminal offences.

Interruption of Normal Service (Shutter Control)

Despite the fact that licensing and the review of system participant agreements will comprise the bulk of the effort with respect to regulating remote sensing space systems, most attention has been focused on the Government's ability to invoke shutter control to interrupt the normal service of the satellite, and on the Government's ability to order priority access service. Beginning with shutter control, it should be noted that this par-

ticular authority, while essential as a last resort, is not expected to be used often. The U.S. has had such authorities in its legislation for over a decade and has never invoked shutter control.

Normal service can only be interrupted at the Ministerial level and only for the most serious of national security, national defence, and foreign policy/international obligations concerns. In keeping with the intent of the Act to respond as appropriate to a whole spectrum of circumstances, shutter control is a highly tailorable concept. Imagery may be restricted over specific areas, for specific times, and at specific resolutions. It is not necessarily the case that a licensee will be ordered to stop collecting and distributing images of a particular area. Instead, distribution of images could be delayed or the resolution at which they may be acquired may be limited to coarser resolution collection modes. As shutter control could affect the business activities of a private company, the threshold for invocation has been set at the Ministerial level. This is to ensure that it is only invoked for the most serious of reasons. It is therefore expected that shutter control will be invoked only in the rarest of circumstances.

Priority Access

Priority access to satellite imagery may be required in cases of emergency response (i.e. during ice storms, forest fires, or floods), in support of requests for aid of a civil power, or in support of Canadian Forces operations where access to remote sensing satellite images could be beneficial. While the International Charter on Space and Major Disasters makes satellite imagery available globally,[9] the priority access provisions of the Act are

[9] The Charter is based on voluntary contributions, by all parties, of Earth observation satellite data. Its main purpose is to supply states or communities whose populations are exposed to risk or have been affected by a natural or technological disaster with data providing a basis for anticipating and managing potential or actual crises. It relies on limited space capabilities offered by the parties but "this is a focused, concrete demonstration of what a more ambitious programme of global environment and security monitoring can deliver to disaster mitigation and crisis management authorities," said Jose Achache, Director of Earth Observation Programmes for the European Space Agency. Press Release, European Space Agency, N° 31-2004: Space and Major Disasters

specific to Canadian satellites. It is anticipated that the majority of Canadian uses for such imagery can be managed through normal sales channels, and therefore, priority access will not be invoked regularly. It could, however, be invoked more often than shutter control, and as such, the threshold has been set at the level of Deputy Minister.

Deputy Ministers and, in the case of the Canadian Department of National Defence, the Chief of the Defence Staff will have the authority to order priority access service should it be determined that the Government of Canada requires timely and/or assured access to satellite imagery for significant events. Priority access simply moves the government to the front of the order queue for satellite imagery in order to ensure timely or guaranteed access to the collection of raw data. It is the government's intent that commercial providers will be paid for any services that they provide, using a prescribed formula to determine the price of such payments.

CONCLUSION

It has been observed that,

> One of the new millennium's defining features is rapidly growing global transparency. This trend is driven by a combination of factors, including more open political and economic institutions, rising expectations about public access to information, and an explosion of information technologies. Key technologies include global telecommunications networks, the Internet and the World Wide Web, commercial and civil observation satellites, and other enabling technologies that encourage worldwide connectivity and awareness. [Earth] Observation satellites are playing a leading role in expanding transparency on a global basis because they offer a broad range of actors (i.e. governments, corporations, the new media, NGOs, and even individuals) and unprecedented ability to acquire relevant infor-

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Charter agencies strengthen ties with UN-Colloquium at UNESCO, Paris (June 15, 2004), http://www.esa.int/esaCP/Pr_31_2004_p_EN.html.

> mation on natural and human developments occurring nearly anywhere in the world.[10]

The Remote Sensing Space Systems Act represents a lengthy effort to achieve a balance of security and economic interests in an internationally competitive environment. There is no doubt that the Act is timely. Satellite technologies are advancing rapidly and the Government, through this Act, continues to work to establish a predictable framework for addressing current and future issues raised by these new technologies. The Act, should therefore serve Canadians well into the future.

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[10] JOHN C. BAKER, ET AL., COMMERCIAL OBSERVATION SATELLITES: AT THE LEADING EDGE OF GLOBAL TRANSPARENCY 7 (2001).

CURRENT STATUS AND RECENT DEVELOPMENTS IN UK AND EUROPEAN REMOTE SENSING LAW AND POLICY

Ray Harris[*]

"Law is nothing other than a certain ordinance of reason for the common good, promulgated by the person who has care of the community."

Thomas Aquinas (1225 - 1274)

I. INTRODUCTION

There is no doubt that service to the common good is behind most of European remote sensing and Earth observation activity. Weather satellite data through *EUMETSAT* have made the transition from research into operational applications, largely through providing information for the common good through weather forecasts. The common good, although not specifically the public good as used in economics, is behind many space initiatives such as Global Monitoring for Environment and Security (GMES), the *GALILEO* navigation system and the U.N. Charter on Space and Major Disasters. Is there a need for a policy or legal basis when technology is used for the common good? Many scientists would argue that because public funds are used to launch spacecraft and to provide data from space platforms, the data should be provided openly and free of charge, so there is no need for regulation, policy, or law to intervene. However, that is not the experience of many in practice who see a clear need for at least harmonisation of rules and procedures or the development of new policy or legal structures to develop the Earth observation sector further.

Europe has had an interest in space policy for many years and so provides a useful case of what Aquinas calls "a certain

[*] Professor, Department of Geography, University College London, Gower Street, London WC1E 6BT, UK, email: ray.harris@ucl.ac.uk.

ordinance for the common good."[1] Through the European Space Agency and the European Commission, Europe is continuing to build an independent and autonomous capability to exploit space, including Earth observation, and at the same time is building a firmer policy and legal framework. This paper first examines the development of data policy for Earth observation in the European Space Agency, and then goes on to examine relevant directives developed by the European Commission that apply to Earth observation data. This has, in part, provided the backdrop to a long running concern for a coherent European space policy that was agreed upon in 2007 between the European Space Agency and the European Union. After considering the European level, the paper examines the case of the United Kingdom which had an outer space act as early as 1986. The U.K. has preferred a rather weak set of strategy statements instead of a policy, and this stance reflects its funding composition.

II. EUROPE

A. European Space Agency

The European Space Agency (ESA) has launched three major Earth observation satellites: *ERS-1* in 1991, *ERS-2* in 1995 and *Envisat* in 2002. While the major part of the financial investment in these three Earth observation satellites was in the technology, ESA did prepare at the policy level for the exploitation of the data collected by the satellites. The data policy for *ERS-1* was not agreed for some years after the launch of the satellite, which led to months and years of confusion over the conditions of access to the Earth observation data. Given this experience, ESA was keen to prepare the way for a data policy for the *Envisat* satellite well ahead of the launch of the satellite

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[1] European Commission, *Space: a New European Frontier for an Expanding Union. An action Plan for Implementing the European Space Policy* (Nov. 11, 2003), *available at* http://ec.europa.eu/comm/space/whitepaper/whitepaper/whitepaper_en.html [hereinafter *New European Frontier*]. *See also* K. Madders and W. Thiebault, *Carpe Diem: Europe Must Make a Genuine Space Policy Now*, 23(1) SPACE POL'Y 7-12 (2007) [hereinafter *Carpe Diem*].

itself. The reason for this preparation was not only to have a plan for the dissemination of data by ESA itself, but also to prepare for the desired shift to operational and possibly commercial use of the *Envisat* data. During the period 1997–1999 ESA and its member states developed a policy and then an accompanying implementation plan for *Envisat* data that codified the conditions of access to the data. The data policy was then subsequently retrofitted to the *ERS-1* and *ERS-2* satellites to become the data policy for all three Earth observation missions and the foundation for all of ESA's Earth observation data policy as new satellites are developed.

The objectives of the *Envisat* data policy are to maximise the beneficial use of *Envisat* data and to stimulate a balanced development of science, public utility, and commercial applications consistent with the objectives of the *Envisat* mission.[2] The Envisat data policy recognises two categories of use of the data, namely (ESA 1998):

> *Category 1 Use*. Research and applications development use in support of the mission objectives, including research on long term issues of Earth system science, research and development in preparation for future operational use, certification of receiving stations as part of the ESA functions, and ESA internal use.
>
> *Category 2 Use*. All other uses which do not fall into category 1 use, including operational and commercial use.[3]

ESA is normally responsible for the distribution of the data that falls into category 1 use; that is data that are normally used for scientific purposes by Principal Investigators on approved (typically peer-reviewed) applications, technology development, or science projects. The category 2 use distribution is

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[2] Ray Harris, *The New ERS and Envisat Data Policies*, *in* FROM DATA TO INFORMATION 341-45 (Remote Sensing Society, Reading, Conference Proceedings, 1999). *See also* Ray Harris, *Earth Observation and Principles on Data*, *in* LAW AND GEOGRAPHY 539-55 (C. Harrison and J Holder, eds., 2003).

[3] *See generally*, European Space Agency, The Envisat Data Policy, ESA/PB-EO(97)57 rev.3, Paris (Feb. 19, 1998), *available at* http://www.knmi.nl/samenw/geoss/esa/Envisat/ESA_PB-EO_97_57,REV_3.pdf.

assigned after a competitive procedure to what ESA calls *distributing entities*, a clumsy term that leaves the door open to a wide variety of distribution organisations but in practice consists of Earth observation companies in Europe. These distributing entities then sell the *Envisat* standard products plus the value-added products that they produce themselves, often in association with the research and development activities carried out by Principal Investigators leading research on ESA-approved projects.

B. European Commission

The European Commission has had a long-term interest in space policy. The European Commission is essentially the civil service arm of the political entity of the European Union. The next section of this paper considers the development by the European Commission of policy that is specifically related to space, including Earth observation, but before that consideration is given to policies developed by the European Commission that implicitly include remote sensing data through directives either on the environment or on general data bases.

The European Council Directive 90/313/EEC of 7 June 1990 defined the terms of access to environmental information held by public bodies with the main objective being freedom of access to the data.[4] This was and is very much in the spirit of freedom of information now common in the legislation of many countries. The directive mandates European Union (E.U.) Member States to ensure that public authorities make available information on the environment, including implicitly information on the environment provided by remote sensing instruments, to any natural or legal person and that the charge for supplying the information must not exceed a reasonable cost.[5] The term "reasonable cost" is somewhat similar to the concept of the cost of fulfilling a user request (COFUR) that is used in the United States for federally-produced data, although the term "reasonable cost"

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[4] *See* European Council Directive 90/313/EEC (June 7, 1990), *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31990L0313:EN:HTML.

[5] *Id.*

is not as clear as the term COFUR.[6] The 7 June 1990 directive was replaced by Directive 2003/4/EC of the European Parliament and Council which entered into force on 14 February 2003.[7] The 2003 directive ensures that environmental information is systematically available and disseminated to the public. The definition of environmental information in the 2003 directive is more explicit and includes the following.

- Data on activities affecting the environment
- Environmental impact studies and risk assessments
- Reports on the state of the environment
- Environmental authorisations and agreements

Earth observation data can be readily included in two of the four categories, namely data on activities affecting the environment, such as pollution events or natural disasters, and reports on the state of the environment because by their nature Earth observation data provide an update report on the environment of planet Earth. The 2003 directive mandates that the environmental information must be available no later than one month after the receipt of a request and that "all information held by public authorities relating to imminent threats to human health or the environment is immediately disseminated to the public likely to be affected."[8]

By contrast the directive on the legal protection of databases, Directive 96/9/EC of 11 March 1996, is designed to afford an appropriate and uniform level of protection of databases to secure remuneration to the maker of the database.[9] There is

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[6] *See* RAY HARRIS, EARTH OBSERVATION DATA POLICY AND EUROPE (A. Balkema, Lisse, The Netherlands (2002)).

[7] *See* Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC, 2003 O.J. (L 041) 26-32 (EC), *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0004: EN:HTML.

[8] *Id.*

[9] *See* Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, 1996 O.J. (L 077) 20-28 (EC), *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0009: EN:HTML.

some scope for conflict between the 2003 environmental information directive and the 1996 database directive. The first is targeted at public information and the second is targeted at private-sector information; indeed the database directive was stimulated by concern for protection of the music industry as the industry became more digitized.[10] However, even though the database directive was intended for the digital music industry it is also applicable to the digital remote sensing sector in that it applies to all digital data within its scope.[11]

The European Commission has worked in recent years to develop a directive that is concerned with the more specific sector of spatial data. On 14 March 2007 the European Parliament and the Council established Directive 2007/2/EC to establish the Infrastructure for Spatial Information in the European Community (INSPIRE).[12] It entered into force on 15 May 2007.[13] The INSPIRE directive recognises that there is fragmentation of spatial data and a lack of harmonisation in data availability between different countries and at different spatial scales. The INSPIRE initiative is intended to stimulate the creation of a European spatial infrastructure that delivers integrated spatial information services.[14] Earth observation data is a major source of spatial information in Europe and will fall within the remit of the INSPIRE directive. It may be that Earth observation data used in Europe will have to become "INSPIRE-compliant" in line with the directive.

C. European Space Policy

The European Space Agency and the European Union through the European Commission have spent over two decades preparing for a new European space policy. A Framework Agreement between the European Union and ESA was agreed

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[10] *Id.*

[11] *Id.*

[12] *See* Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), 2007 O.J. (L 108) 1 (EC), *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:108:0001: 01:EN:HTML.

[13] *Id.*

[14] *Id.*

in May 2004 to formalise the shape of the relationships, followed by meetings of a Space Council in 2004 and 2005.[15] The development of a European space policy gave birth to high hopes that real progress would be made and not "merely seek to rearrange what is already there or expose yet again what is being done."[16] The European space policy documents speak in strong terms about the space sector being a strategic asset for Europe, an asset that provides an important strand of independence and autonomy for Europe in the context of existing and developing major space and economic powers such as the U.S., Russia, and China. Space is vital to Europe's sustainable development strategy and is relevant to the European Common Foreign and Security Policy. The Vice-President of the European Commission who launched the European Space Policy report, Gunter Verheugen, even claimed that:

> Without the European space policy, Europe could become irrelevant. With this [policy], we intend to live up to Europe's global leadership aspirations in important industrial and research areas, which will provide growth and jobs for the future.[17]

The natural balance between ESA and the E.U. is for ESA to take responsibility for leading on space science, space exploration, and the development of tools to access and exploit space, while the European Union leads on applications that contribute to the achievement of European policies.[18] The overall aims of the European space policy go beyond that simple division and the policy lists the following five elements of its strategic mission.[19]

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[15] Council of the European Union 2007, *Outcome of the proceedings of the Council (Competitiveness) on 21-22 May 2007 – Resolution on the European Space Policy*, 10037/07, Brussels 25 May 2007.

[16] *Carpe Diem, supra* note 1, at 7.

[17] *See* ESA, *Europés Space Policy Becomes a Reality Today*, ESA NEWS (May 22, 2007), *available at* http://www.esa.int/esaCP/SEM4UU8RR1F_index_0.html.

[18] *New European Frontier*, *supra* note 1. *See also* N. Peter, *The EU's Emergent Space Diplomacy*, 23(2) SPACE POL'Y 97-108 (2007) [hereinafter *EU's Emergent Space Diplomacy*].

[19] EC 2007, *Communication from the Commission to the Council and the European Parliament - European Space Policy*, COM(2007) 212 final (Brussels, April 26, 2007).

- To develop and exploit space applications serving Europe's public policy objectives and the needs of European enterprises and citizens, including in the field of environment, development and global climate change.
- To meet Europe's security and defence needs as regards space.
- To ensure a strong and competitive space industry which fosters innovation, growth and the development and delivery of sustainable, high quality, cost-effective services.
- To contribute to the knowledge-based society by investing strongly in space-based science, and playing a significant role in the international exploration endeavour.
- To secure unrestricted access to new and critical technologies, systems and capabilities in order to ensure independent European space applications.

After this statement of its strategic mission the European space policy examines the main applications of space, the technology foundations or platforms for space exploitation, the role of a European space industry, and the governance of space in Europe. Earth observation appears under the main applications section, along with satellite navigation (essentially the *GALILEO* mission), satellite communications, and security and defence use of space. In Earth observation the need for European independence and autonomy is clearly stated, with an emphasis on developing further the initiative on Global Monitoring for Environment and Security (GMES)[20] which itself is Europe's contribution to the Global Earth Observation System of Systems (GEOSS).[21] Under security and defence the policy sees a closer coordination between civilian and defence space programmes, much has occurred in the U.S. with the NOAA and DMSP programmes.

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[20] Anne Barbance, *A market for GMES? Results of the Graz Conference*, 23(1) SPACE POL'Y 53-56 (2007).

[21] Conrad C. Lautenbacher, *The Global Earth Observation System of Systems: Science Serving Society*, 22(1) SPACE POL'Y 8-11 (2006).

D. Trends in European Earth Observation

The new European space policy is part of a wide process of making more explicit Europe's position on space. Through ESA, Europe has had a highly successful experience of space missions. The European Union though has explored space in a much more uncertain way but has now alighted on the use of space to support its own policies for which it has legitimate political authority.[22] As money is often considered the demonstration of political will, there is now scope for European Earth observation to have stronger autonomy and independence, be more closely tied to global competitiveness by exploiting high technology, and to continue the political thrust of the expansion of the European Union eastward to enlarge the markets open to the European space industry.[23] These trends are not only concerned with the technology but with the ways in which the technology of Earth observation is used in the wider world.

III. UNITED KINGDOM

A. U.K. Space Law 1986

The United Kingdom was one of the first countries to adopt a space law, the Outer Space Act of 1986. The purpose of the act was relatively restricted as it concerned the authority of the Secretary of State to grant licences to launch and operate space objects or carry out other activities in outer space by persons connected with the U.K. An important dimension of the purpose of the act was to enable the U.K. to be compliant with its international obligations. The core power was contained in section 4(1) of the act which states that, "[t]he Secretary of State may grant a licence if he [sic] thinks fit," followed by general guidance on the scope of the conditions under which and to whom the licence may be granted. The U.K. now intends to review the Outer Space Act of 1986 in the light of new technol-

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[22] *See Carpe Diem, supra* note 1.
[23] *EU's Emergent Space Diplomacy*, *supra* note 18.

ogy.[24] Virgin Galactic and other companies will soon be offering space tourism opportunities, and the U.K. is expected to review its space law to control the space tourism industry, the behaviour of British subjects in space, criminal offences in space, dumping of waste, and damage to celestial bodies.

B. U.K. Space Strategy Since 2003

The U.K. space law has not until recently had a high profile because the U.K. government has used its investment in ESA as the method of gaining access to space. The U.K. Outer Space Act of 1986 is notable for lacking a consideration of the objectives of the use of space. However, such considerations have been present in a series of space strategies developed by the British National Space Centre (BNSC) since the 1980s. The BNSC is not a single entity, but is a partnership of the following government departments and research councils: the Department for Environment, Food, and Rural Affairs (Defra), the Foreign and Commonwealth Office (FCO), the Department for Transport (DfT), the Ministry of Defence (MoD), the Meteorological Office, the Department for Innovation, Universities, and Skills (DIUS), the Natural Environment Research Council (NERC), and the Science and Technology Facilities Council (STFC). In 2003 the BNSC produced its *UK Space Strategy 2003 – 2006 and beyond.* The strategy articulated the three main objectives of the U.K. strategy:

1. To enhance the UK's standing in astronomy, planetary and environmental sciences.

2. To stimulate increased productivity by promoting the use of space in government, science and commerce.

3. To develop innovative space systems to deliver sustainable improvement in quality of life.

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[24] Richard Gray, *Ministers Order Review Of Space Law*, THE DAILY TELEGRAPH (Nov. 5, 2007), *available at* http://www.telegraph.co.uk/news/uknews/1568298/Ministers-order-review-of-space-law.html.

To support this strategy the BNSC partners have been spending of the order of £200 million per annum on space in recent years,[25] of which about two thirds is spent through ESA and about one third nationally. Earth observation is the largest element of the BNSC budget. Of the total spent in 2005-06 of £207.1 million, Earth observation accounted for £82.3 million split between £45.2 million through ESA and £37.1 million nationally.

It is arguable that the objectives in the 2003-2006 strategy were rather capacious and as a result anodyne. Unfortunately, the 2007-2010 strategy has not provided much more focus. The new strategy also has three objectives which are extensions of the previous objectives. The three objectives are to deliver world class science, to deliver public benefits through working with government agencies, and to maximise the potential for wealth creation. This anodyne approach to strategy is perhaps not surprising given the partnership structure of the BNSC. Each partner needs to satisfy its own stakeholders that the financial contribution to space activities meets the organisation's own needs and goals. A good case in point is the Natural Environment Research Council (NERC) whose spending on space (primarily Earth observation) rose from a level of about £11 million per annum to a level of above £50 million per annum. This situation resulted from NERC being allocated funds from another government department, but NERC then spends the funds in pursuit of its own environmental science objectives stated in its own corporate plan and not necessarily on the U.K. national objectives on space.

IV. CONCLUSIONS

Member states provide funding to ESA on the order of €3 billion euros per annum and, in addition, spend nationally at around the same level. During the period 2007-2013 the European Commission will devote a total of €2.8 billion to space applications. The industry in Europe is substantial. In 2005,

[25] HMSO 2007, *A Space Policy*, Science and Technology Committee, Seventh Report, HC 66-I, House of Commons, London (July 4, 2007).

European space manufacturing industry turnover was €4.4 billion, with a workforce of 28,000 people. One clear conclusion from examining European Earth observation is that a stronger policy and legal basis is now being developed to underpin the high quality scientific and technology base.

The European Union through the European Commission sees a role for itself in providing clearer regulation or at least harmonisation in how digital data, including Earth observation data, are treated. The European Commission, the European Space Agency, and the member states have invested in GMES to provide Earth observation information to support environmental and civil security projects and, in the process, contributed positively to the development of the ideas that saw the birth of the Group on Earth Observation and its global organisation at high political levels.

It is highly likely that in Europe there will continue to be a strengthening of the policy and legal dimensions to space, not least when Earth observation technology takes substantial steps beyond research and into operational and commercial systems.

IMPROVEMENT TO THE LEGAL REGIME FOR THE EFFECTIVE USE OF SATELLITE REMOTE SENSING DATA FOR DISASTER MANAGEMENT AND PROTECTION OF THE ENVIRONMENT

Atsuyo Ito[*]

ABSTRACT

Satellite remote sensing is increasingly used to assist critical decision making related to disaster management and protection of the environment. However, the current legal environment surrounding remote sensing from space is not regulated sufficiently and is full of uncertainties. Particularly, the issues of data policies and liability are not well addressed and restrict the widespread use and realization of the full benefits of this powerful tool. There is an urgent need for clarification as well as a more comprehensive regime. The aim of this paper is to examine the current legal framework surrounding remote sensing, identify the shortcomings of the current regime, examine the issues, and then propose improvements to the current regime.

INTRODUCTION

More than ever before, human beings are now exposed to the degradation of environment and are vulnerable to the risks of natural disasters. On the other hand, our capability to deal with such risks has broadened and enhanced, thanks to the state-of-art technologies. Remote sensing by Earth observation satellites is increasingly recognized as a vital tool to gain better understanding of ever-changing natural phenomena. It enables more effective response to disasters and allows us to better cope

[*] PhD Candidate at the University of Paris XI, Institute of Space and Telecommunications Law (IDEST). This article summarizes the author's Ph.D. thesis prepared for the University of Paris XI.

with environmental problems. Not only is it well suited for the assessment and mitigation of risks, but it also appropriate for the verification of a range of international treaties including claims related to environmental protection. It is becoming a significant source of information to assist critical decision making.

Following the Indian Ocean tsunami, a number of satellite images were used to assess the location and the extent of the devastation, target relief services, and aid agencies most effectively by comparing these images with those taken before the tsunami. Remote sensing data has also been used for a number of environmental applications including oil spill monitoring and assessment of a rate and extent of deforestation of the Amazon.

The use of the remote sensing for such purposes is governed by international space law; however, there are issues, particularly with respect to supply and the use of data, which are not addressed sufficiently under the current legal framework.

Concrete problems lie in the inadequacy of the existing regime regarding two points. First, divergent data policies are commonly set by the different entities. Second, there is currently an ambiguity over the responsibility and liability arising from supply and/or use and misuse of the data and resulting products. These create obstacles for protecting the balanced interests of all parties concerned in the generation, supply, and use of the remote sensing data.

Users may be hampered from accessing and sharing data effectively as a result of the restrictive access and pricing policy. Users as well as third parties face the risk of damage arising from incorrect data. On the other hand, data suppliers may face uncertainties with regard to securing their rights associated with the data including intellectual property rights, and they bear the liability risks arising from the data.

The uncertain legal environment surrounding remote sensing from space is thus restricting the widespread use and realization of the full benefits of this powerful tool. Hence, there is an urgent need for clarification as well as a more comprehensive regime. This paper examines the legal framework surrounding remote sensing, identifies the shortcomings, examines the issues in depth, and finally provides recommendations to the current regime.

I. THE CURRENT LEGAL FRAMEWORK SURROUNDING REMOTE SENSING

The current international regime governing outer space and remote sensing from space consists of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies,[1] and the 1986 Principles Relating to Remote Sensing of the Earth from Outer Space.[2] These documents endorse the principles governing outer space and the fundamental rules in conducting remote sensing from space. The Outer Space Treaty establishes clearly that sovereignty does not extend to outer space[3] and that outer space is free for use by all countries.[4] The treaty also states, however, that there is a general State responsibility in conducting such activities,[5] which could result in international liability for damage caused to other States.[6] This point was elaborated on further in the 1972 Convention on International Liability for Damage Caused by Space Objects.[7] The U.N. Remote Sensing Principles, international legislation dedicated to remote sensing activities, establish the legality of sensing from space and data availability in a non-discriminatory manner to all States.[8]

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[1] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Oct. 27, 1967, 610 U.N.TS 205 [hereinafter Outer Space Treaty].

[2] Principles Relating to Remote Sensing of the Earth from Outer Space. G.A. Res. 41/65, U.N. Doc. A/RES/41/65 (Dec. 3, 1986) [hereinafter U.N. Remote Sensing Principles]. This resolution is considered to reflect a customary law that is binding on nations. *See* Joanne Irene Gabrynowicz, *Expanding Global Remote Sensing Services*, *in* PROC. OF THE WORKSHOP ON SPACE LAW IN THE TWENTY-FIRST CENTURY 101 New York (2000).

[3] *See* Outer Space Treaty, *supra* note 1, at art. II.

[4] *Id.* at art. I.

[5] *Id.* at art. VI. Article VI of Outer Space Treaty establishes the States Responsibility for space activities conducted either by governmental agencies and non-governmental agencies.

[6] *Id.* at art. VII.

[7] Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T 2389, T.I.A.S No. 7762 [hereinafter Liability Convention].

[8] Principle IV of U.N. Remote Sensing Principles stipulates that, "[r]emote sensing activities shall be conducted in accordance with the Art. I of the Outer Space Treaty," which establishes freedom of exploration and use of outer space. U.N. Remote Sensing Principles, *supra* note 2, at princ. IV.

On the other hand, the current regime is inadequate to address the critical legal issues arising from remote sensing. The primary focus of the U.N. Remote Sensing Principles is on the debate of rights and duties of sensing States and sensed States which reflects the situation more than two decades ago. Furthermore, the principles focus mainly on the rules concerning data collection and dissemination, but not the supply, use, and application of the data. The U.N. principles do not sufficiently regulate the current environment surrounding remote sensing activities that have changed dramatically since 1986.

Currently, a number of nations[9] as well as private entities[10] have sensing capabilities, and data distribution takes place on a more commercial basis. Indeed, there are more and more non-State actors including data generators, processing wholesalers, and value added entities.[11] These non-State actors are involved in data collection and data handing operations. Likewise, users have diversified and increased in numbers; nowadays users can range from aid agencies, U.N. organizations, universities, media, insurance companies, to any individual that can afford the data. Data is used for a variety of purposes including damage and impact assessment, verification of insurance claims, environmental studies, and map making. Whatever the uses, they have a critical impact upon the end-users as well as on third parties. It is critical to clarify the current rules associated with the supply and use of the data and identify shortcomings that need rectification. Let us now examine how the provisions of the current regime are insufficient and raise the specific issues.

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[9] Nations include Algeria, Brazil, Canada, China, Columbia, France, India, Italy, Japan, Korea, Nigeria, Taiwan, Turkey, U.K., U.S.A., and Russia. *See* Joanne I. Gabrynowicz, *The Land Remote Sensing Laws and Policies of National Governments: A Global Survey* (National Remote Sensing, Air & Space Law Center, Jan. 3, 2007), *available at* http://www.spacelaw.olemiss.edu/activitiesandevents/2007/RS%20Law%20Global%20Survey.pdf.

[10] Entities include GeoEye, Digital Globe, and ImageSat International.

[11] Entities include SERTIT, GAF, Digitech International, Infoterra, Euromap, and Eurimage.

II. IDENTIFICATION OF THE PROBLEMS

As mentioned previously, the U.N. Remote Sensing Principles establish the fundamental rule regarding data collection. Principle IV, stipulating that "remote sensing activities shall be conducted in accordance with Article I of the Outer Space Treaty," established the freedom of exploration and use of outer space and legitimatised remote sensing from space by all of the States. Later, it mentions the sovereign rights of the sensing States;[12] however, it is not explicit as to the conditions for sensing from space in terms of respecting the rights of sensing States. Hence, the data collection policy provides: 1) no restrictions based on geography; objects observed including natural resources and the sea surface; and, territories beyond national jurisdiction; 2) no prior consent, consultation, or notification is required before sensing; therefore, no veto right is granted to the sensed States with regard to their territories being sensed;[13] 3) no conditions are imposed for sensing capabilities with varying degrees of the spatial resolution, or type of sensor such as radar or optical.

However, as to the access, distribution, and use of data, the principle is not sufficient to address issues concerning data availability and accessibility or the rights of data generators associated with the data. Principle XII is the only provision that refers to the issue of data policy. Principle XII stipulates that "as soon as the primary data and the processed data concerning the territory under its jurisdiction are produced, the sensed State shall also have access to them on a *non-discriminatory basis* and *on reasonable cost terms.*" (Emphasis added.) Common interpretation of "non-discriminatory basis" is that the sensing States have an obligation to provide the data to the sensed States under the same conditions as other States that

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[12] Principle VI states that, "[t]hese activities shall be conducted on the basis of respect for the principle of sovereignty of all States, and peoples over their own wealth and natural resources", and "[r]emote sensing activities shall not be conducted in a manner detrimental to the legitimate rights and interests of the sensed States". U.N. Remote Sensing Principles, *supra* note 2, at princ. VI.

[13] Frans Von Der Dunk, *United Nations Principles on Remote Sensing and the User, in* EARTH OBSERVATION DATA POLICY AND EUROPE 33 (Ray Harris, ed., 2002).

wish to access the data. Hence, no distinctions are made as to data use for different purposes as well as different types of users.

Furthermore, the provision "reasonable cost terms" is ambiguous and open to different interpretations. It is not defined under the U.N. Remote Sensing Principles; it could mean marginal costs or market price in so far as it is reasonable for the particular data in question. It in no way serves as a general guideline for price settings expected for different types of products or for uses by the divergent data generators. Although Principles X and XI encourage the disclosure of information for the purpose of environmental protection and disaster management,[14] they do not concretely state on what terms the data should be supplied in such cases. Therefore, they do not serve as a legal basis to allow data use and sharing for public benefit purposes at favorable conditions.

The U.N. Principles are completely silent on the rights of data generators associated with data such as intellectual property rights and conditions for the use of data. The principles do not serve as an international guideline to govern activities of data suppliers or recipients. Consequently, data access, distribution, and use are governed largely by data policies that an individual supplier sets. This specifically raises issues as to the accessibility of data, as well as rights associated with data not ensured by all parties concerned.

In turn, the current regime does not sufficiently address responsibility and liability issues. Article VII of the Outer Space Treaty, together with the Liability Convention, establishes international liability of a launching State for the damage caused by a space object or component part incurred on Earth. The Li-

[14] Principle X stipulates that, "States participating in remote sensing activities that have identified information in their possession that is capable of averting any phenomenon harmful to the Earth's natural environment shall disclose such information to States concerned." U.N. Remote Sensing Principles, *supra* note 2, at princ. X. Additionally, Principle XI states that, "States participating in remote sensing activities that have identified processed data and analysed information on their possession that may be useful to States affected by natural disasters, or likely to be affected by impending natural disasters shall transmit such data and information to States concerned as promptly as possible." *Id.* at princ. XI.

ability Convention stipulates that "a launching State shall be absolutely liable for damage caused by its space object on the surface of the Earth or to an aircraft in flight."[15] The most common interpretation of the Liability Convention is that it covers identifiable physical damage directly caused by the space object. It only appears to address liability in cases where a remote sensing satellite falls on the Earth's surface and causes damage.

The Outer Space Treaty and Liability Convention are silent as to the types of damage associated with the satellite remote sensing which are subject to liability. Indeed, one cannot find the types of provisions which would be of help in settling claims, such as responsibility to provide accurate information by remote sensing and/or responsibility not to cause damage to others by use and misuse of remote sensing derived information.

Furthermore, the international responsibility expected of States engaged in the remote sensing activities is ambiguous as to the types of remote sensing activities the responsibility extends to. The scope of the remote sensing activities covered is "the operation of remote sensing space systems, primary data collection and storage stations, and activities in processing, interpreting and disseminating the processed data." From this, it can be interpreted that responsibility extends to data handling activities and distribution, but not likely to the use and application of data.

Lastly, it can be construed that Principle XIV, stating that "States operating remote sensing bear international responsibility for their activities," does not impose the responsibility on end-users or other third parties who use the data. Indeed, the principle limits its extent of liability within the supplier side. Hence, the U.N. Remote Sensing Principles are not comprehensive to cover the responsibilities of all potential defendants or consequential liabilities arising from use and application of data.

In these ways, the present regime neither promotes, nor regulates remote sensing activities. It does not address clearly the rights and obligations of all the potential parties concerned

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[15] Liability Convention, *supra* note 7, at art. II.

in generation, supply, and use of remote sensing data, including data suppliers, recipients, and third parties. It fails to address important commercial and operational aspects, such as data policy issues, including intellectual property rights and responsibility and liability associated with the data.

The legal considerations are undoubtedly beyond the scope of the current regime surrounding remote sensing. The uncertain legal environment surrounding remote sensing from space restricts widespread use and realization of the full benefits of this powerful tool. The inadequacy of the current legal framework needs to be rectified so that remote sensing data can be rigorously and fully exploited with legal power.

III. ISSUES OF DATA POLICIES AND LIABILITIES

Absence of international rules has created a complex legal environment surrounding data supply and use, through a variety of contractual agreements provided by individual data suppliers under the national law governing the respective entity.

1. Data Policies Surrounding Data Supply

Data policies clarify who has access to which data under what conditions. Divergent data policies including access/distribution policies, pricing, conditions for use, and intellectual property rights are set commonly by different suppliers. They affect the degrees of accessibility to and utilization of data for the full benefit of end-users and third parties. Now let us look at the practice of data suppliers with respect to access, distribution and pricing policy, conditions associated with the data, and intellectual property rights respectively.

A. Access and Pricing Policy

The existing data policies adopted by different entities, in terms of access and pricing policy can largely be categorized as two types. Clear distinction is made between governmental agencies and commercial entities that operate satellites and generate data. As far as governmental agencies are concerned, policies appear to be further categorized into two types 1) open

access policies with free or marginal costs pricing, which is the policy adopted by the U.S. and 2) more regulated access policies with categories of uses or users and cost recovery pricing adopted by European entities.

With regard to U.S. governmental agencies, *Landsat* data is available on a non-discriminatory basis at the cost of fulfilling user requests,[16] while *QuickSCAT* data and *MODIS* data are available free of charge for scientific and educational use with few restrictions.[17] The non-U.S. space agencies, including the European Space Agency,[18] adopt two or multiple tier systems to regulate the distribution of their satellites. The data from the latter agencies are provided at marginal cost or free of charge if they are categorized as for "public" use including internal, educational, and research use.[19] Data is provided free of charge for humanitarian needs to assist aid agencies in disaster relief within certain frameworks such as the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters.[20] Data categorized as commercial use is distributed to the end-users by their data distributors on a commercial basis.

Private entities operating remote sensing systems, such as Digital Globe and GeoEye, distribute their data on a purely

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[16] Land Remote Sensing Policy Act of 1992, 15 U.S.C. § 5601, § 5615.

[17] Ray Harris, *Data Policy Assessment for GMES Final Report*, at 38 (University College London, Department of Geography, 2004), *available at* www.ucl.ac.uk/laws/environment/satellites/docs/DPAGFR(v2).pdf.

[18] ESA for instance, with respect to *ENVISAT*, distinguishes between category 1 and 2 use where category-1 is for research and application development use, and where category-2 is for other uses including operational and commercial use. *See* Envisat Data Policy, ESA/PB-EO (97) 57, rev 3 (hereinafter Envisat Data Policy). For *ERS*, there are five categories, namely: A-internal use; B- research and demonstration use; C-national meteorological services belonging to WMO members; D-those organizations of participating states engaged in operational services for public utility; and E-Commercial use. *See* Principles of the Provision of ERS Data to Users, ESA/PB-EO (97) 57, rev. 6 (Paris, May 9, 1994).

[19] *See* Principles of the Provision of *ERS* Data to Users, ESA/PB-EO (90) 57, rev. 6, Paris, 9 May 1994, (European Space Agency, Earth Observation Programme Board). Principles of the Provision of *ERS* data to users state free of charge for category A and cost of fulfilling user request for category B. For *ENVISAT*, it is at or near the cost of reproduction of the data for category 1. *See* Envisat Data Policy, *supra* note 18.

[20] Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, Rev.3 (25/4/2000).2 (2000) [hereinafter Disasters Charter], available at http://www.disasterscharter.org/main_e.html.

commercial basis. The commercial data generators hold a single category of commercial users unless a special arrangement is made such as the aforementioned Disasters Charter.[21]

The distinction appears to be that U.S. governmental data are normally available at no cost or marginal cost for all users, whereas data from non-U.S. agencies reserve certain capacity for public use and distribute the remaining data at no cost or marginal cost. Private entities allow such data distribution special treatment.

B. Conditions for Use of Data

The practice of most data generators is that data supply and use is regulated through agreements with respect to end-users. They do not sell their data away, but issue licenses to use their products under conditions they set, and retain control over data through such licenses.

With respect to licensing agreements, the data generator imposes various conditions on data recipients associated with the data. The overall tendency is that they prohibit reproduction other than for backup purposes, further distribution of products to third parties, sales of products, and sub-license without authorization.[22] These conditions are not uniform and can vary depending on the data supplier.

Let us closely look at the conditions for further distribution. Generally, licensees are allowed to let their sub-contractors use data on behalf of licensees, but are not allowed to share data with the other entities without authorization.[23] Data suppliers often charge higher in case of multiple users sharing the same

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[21] Digital Globe and GeoEye, represented by U.S. Geological Survey (USGS), have joined the partners of the International Charter on Space and Major Disasters. *See* Press Release, International Charter, Space and Major Disasters (April 12, 2007), *available at* http://www.disasterscharter.org/press/press20070413_e.html.

[22] See, for instance, data policies of EROS, Disaster Monitoring Constellation International Imaging(DMCII), and Spot Image.

[23] For instance, in the case of Digital Globe, end users can share the data with affiliated entities only if they agree to be bound by the conditions of the license and images and derived products may not be retained by affiliated entities.

data.[24] Hence, end-users' sharing of data is mostly discouraged and restricted. This creates hurdles for critical knowledge sharing derived from the satellite among the relevant communities for effective disaster preparation and response as well as for environmental agencies in need of certain data sets for different projects. Establishing data policies to allow effective data sharing will rationalize and enhance data use for public services.

C. Intellectual Property Rights Associated with Data

In terms of the intellectual property rights, the current practice is that the ownership of data stays with data generators and the copyright is claimed by the majority of data generators with some exceptions among the US governmental satellites including *Landsat 7*, *MODIS* and *NOAA-17*.[25]

Complications arise as each data supplier is bound by the intellectual property law of the nation whose jurisdiction covers the data supplier. The intellectual property right of copyright is applied to expressions in literary and artistic work[26] and raises uncertainties for application to satellite images whatever the jurisdiction. Many national laws require certain degrees of human intellectual intervention and hence it is particularly questionable as to whether they apply to raw data and processed data.[27]

While a copyright is likely to be applicable to value added products that involve intellectual creation,[28] the data policies by those claiming copyright for their products are generally ambiguous as to the types of products that are subject to protection. This implies that whatever degree of data handling activi-

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[24] Geo Eye, Spot Image and DMCII levy higher charges for the multiple uses depending on number of entities sharing their products.

[25] Ray Harris, *Legal Approaches: Contractual and Regulatory; the European Commission Directive*, *in* PROC. OF THE INTERNATIONAL CONFERENCE; SATELLITE REMOTE SENSING IN AID OF DEVELOPMENT: LEGAL CONSIDERATIONS, at 37 (Tunis, Sept. 26-27, 2002).

[26] Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, 1161 U.N.T.S. 3.

[27] Martha Mejia-Kaiser, *Satellite Remote Sensing Data in Databases Copyright or sui generis Protection in Europe?* XXII-I ANNALS OF AIR & SPACE L. 496 (1997).

[28] See, for instance, copyright recognized for a map that involves intellectual inputs in *Mason v. Montgomery Data Inc.*, 967 F. 2d 135 (5th Cir. 1992).

ties are involved in the products, a copyright may still be held by data generators. The exception appears to be the *Advanced Land Observing Satellite* (*ALOS*). Its license agreement explicitly states that the copyright for highly value added products rests with persons that conducted value added operations.[29] Looking at satellite derived maps and other value added products delivered under the framework of the Disasters Charter, one will find value added entities are credited but not copyrighted. It can be argued that under the current practice, the rights of value added entities over the value added products derived from satellite images are not safeguarded properly. It implies that the value added entities would not be able to pursue their claims independently when there has been a copyright infringement of value added products. There appears to be a gap between the intentions of the data generator seeking protection for whatever the types of products and the regime for copyright applicable to the author's original expressions that supports the copyright protection value added entities more than the data generators that have invested in the development and operation of the remote sensing systems.

These uncertainties affect all concerned parties associated with the data due to the cross border nature of data generation, supply, and use. In these ways, the data policies need to be clarified in order to ensure easier access as well as to safeguard the rights of the all concerned parties in the supply chain.

2. The Uncertain Liability

The current ambiguity over responsibility and liability is a major problem as the risks for damage and liability are conceivable, and consequences thereof can be detrimental.

The damages can arise from relying on inaccurate data and/or misuse of data. There have been a number of instances involving misinterpretation and misuse of data in the past. For example, the media misinterpreted satellite imagery and aired incorrect information to the public following the 1986 Chernobyl

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[29] *See* ALOS End User License Agreement, at art. 4.2, *available at* http://www.alos-restec.ip/pdf/ALOS.

accident by announcing that two reactors were on fire instead of one.[30]

There has also been a case involving an intentional misrepresentation of data in Kansas. The U.S. Postal Inspection Service brought fraud charges against Psytep Corp. for giving Kansas authorities satellite imagery that turned out to be an aerial photograph taken at a time that was irrelevant to the case at issue.[31]

In a case before the International Court of Justice involving Nigeria and Cameroon,[32] Nigeria used a satellite image to prove that Tipsan was located in Nigerian territory. Using the same imagery, however, Cameroon claimed that Tipsan was located in Cameroon's territory.[33]

The above examples are only a few of the conceivable claims. Indeed, any person, either natural or juridical, and/or State is exposed to the risk of liability as well as damage arising from remote sensing data. Data suppliers bear liability risks in cases where the population is affected by disasters or aid workers are injured as a result of inappropriate instructions. On the other hand, users may have potential risks for liability if misuse of data incurs damage to data suppliers or to third parties.

Under the current uncertainty, undesirable results of the existing risks would directly hit the parties concerned when damage occurs. Users may not recover compensation from the loss they incur. As a result, users are less confident when using data for critical decision making that significantly affects either their interests or the third party's. On the other hand, suppliers

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[30] R. Dalbello & L. F. Martinez, *The Legal and Political Implications of Media Newsgathering From Space*, *in* PROCEEDINGS OF THE COLLOQUIUM OF LAW OF OUTER SPACE, at 200 (American Institute of Aeronautics and Astronautics Inc, 1987).

[31] W. Ferester, *Firm Suspected of Misrepresenting Imagery*, SPACE NEWS (Jan. 16, 1995).

[32] In this case, the entire land boundary from Lake Chad in the north Bakassi Peninsula in the south was disputed by the two States, both claiming the village of Tipsan to be in their territory. See The Land and Maritime Boundary Between Cameroon and Nigera (Cameroon v. Nig. Eq. Guinea Intervening), (Judgment of Oct. 10, 2002), *available at* http://www.icj-cij.org./icjwww/idocket/icn/icnjudgment/icn_ijudgment_20021010.pdf

[33] NPA Group, *BNSC Sector Studies, Applications of EO to the legal Sector*, at 73 (Aug. 2001), *available at* www.ucl.ac.uk/laws/environment/satellites/docs/EOdataLegalSector.pdf.

may incur unnecessary litigation costs under uncertain liability. Consequently, it may make data suppliers reluctant to provide data particularly on a voluntary basis.

IV. ISSUES OF LIABILITY: HOW DISPUTES MAY BE ADDRESSED CURRENTLY

At present, if a dispute arises, how it is likely to be addressed under the current regime depends on the setting:

1. Disputes between the parties in contractual relations: data generator/supplier and data recipient, and data generator and their sub-contractor;

2. Disputes between the parties outside contractual relations: between the data supplier and third party, and between the third parties.

1. Approach from Contractual Liability

When damage arises, the liability is dealt with under the terms of the contract in case of 1, the parties in contractual relations. There is no standardization of contractual liability in the field of satellite remote sensing as there is in the field of international air transport.[34] Hence, contractual provisions agreed upon by the disputing parties are likely to be the primary legal basis to settle the claim.

The contractual agreements of data suppliers with respect to end-users are commonly characterized by limited rights granted to data recipients; limited warranty provided the remedies available limited to replacement of a product or refund in case of claims, and liability disclaimer to data recipients as well as to the third party. The liability disclaimers of the data suppliers in distribution agreements generally attempt to waive any potential liability.[35]

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[34] *See* Convention for the Unification of Certain Rules Relating to International Transportation by Air, Oct. 12, 1929, 49 Stat. 3000, 137 L.N.T.S. 11 [hereinafter Warsaw Convention]. The Warsaw Convention deals with liabilities of air carriers with respect to passengers.

[35] An example of the liability disclaimer by Spot Image is, "[i]n no event shall Spot Image, nor anybody having contributed to development and or production and or deliv-

The intention of data suppliers is that the liability of data suppliers for any damage is waived irrespective of fault on the side of the suppliers. The question arises as to whether such exemption clauses are actually enforceable if the action is brought to court. For this it is necessary to look at some cases. In reality the exoneration clauses included in the contract are not always enforceable. It is likely to be enforceable between parties of equal bargaining power as in *McCullagh v. Lane Fox & Partner*,[36] but tends to be not enforceable when an intentional breach of contract or gross negligence occurs as illustrated in *Boucher v. Riner*[37] and in *State Highway Admin. v. Greiner Eng'g Sciences*.[38] Exoneration clauses may not be enforceable against third parties either, as held in the *Ministry of Housing and Local Gov't v. Sharp*[39] and *Lexington v. McDonnell Douglas*.[40] Data generators' intention to exonerate from any potential liability relying on contractual liability disclaimers may fail and generate unnecessary litigation costs in case of lawsuits brought against the data supplier. Looking at these cases invokes the need to clarify enforceability of liability disclaimers in satellite remote sensing.

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ery of the product, be liable for any claim damage or loss incurred by the End-USER, including without limitation indirect, compensatory, consequential, incidental, special, incorporeal or exemplary damages arising out of the use of or inability to use the product, and shall not be subject to legal action in this respect." An example by the Canadian Space Agency states, "[i]n no event shall Canadian Space Agency or anyone else who has been involved in the creation, production, distribution or delivery of the Data, be liable for any damages whatsoever arising out of or resulting from the use of or inability to use the Data or the performance of the Data, storage media or other CSA provided material, whether in an action in contract or tort, including, but not limited to, negligence."

[36] McCullagh v. Lane Fox & Partner, [1996] 1 EGLR 35.

[37] Boucher v. Riner, 68 Md. App. 539, at 543 (1986) Boucher sued Parachute and Fun Inc. after he parachuted into power lines. It was held that contractual waivers cannot shift risks of a party's own wanton, reckless, or gross conduct.

[38] State Highway Admin. v. Greiner Eng'g Sciences, 83 Md. App. 621 (Md. Ct. Spec App., 1990). The court held that an unambiguous no-damage- for –delay clause was enforceable, but noted that exemption clause is not enforceable if the damage is caused by intentional wrongdoing or gross negligence or fraud misrepresentation. *See* STEPHEN GOROVE, CASES ON SPACE LAW TEXTS, COMMENTS AND REFERENCES, at 69, 1996.

[39] Ministry of Housing and Local Gov't v. Sharp, [1970]2 QB 223, [1970]1 All ER 1009.

[40] Lexington v. McDonnell Douglas (May 8, 1992).

The current practice among data generators regarding contracts governing data use by no means properly addresses the potential liabilities concerning the parties in contractual relations, not to mention the liability arising outside the contractual relations. Hence liability needs to be addressed in the broader framework of tort law, which deals with a private or civil wrong or injury to a person or property.

2. Approach from Tort Liability

Currently, the court has great discretion in deciding how to approach a particular claim arising from remote sensing outside of contractual relations. The fundamental question is on what basis the alleged parties should be responsible for damage arising from remote sensing data. For this it is necessary to look at different bases of tort liability, namely, absolute/strict liability and fault-based liability.

A. Absolute/Strict Liability

The absolute/strict liability standard has been applied particularly to dangerous operations and/or those accompanied by high risks of causing direct damage, including death and personal injury. Such operations include those involving nuclear installations,[41] launching space objects[42] and international air transport.[43]

Let us look at the aforementioned Liability Convention as an example of the absolute liability regime. The Convention stipulates that "[a] launching state shall be absolutely liable to pay compensation for the damage caused by its space object on the surface of the Earth or aircraft in flight." It is a victim ori-

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[41] *See* Vienna Convention on Civil Liability for Nuclear Damage, May 21, 1963, 2 I.L.M. 727. *See also,* Paris Convention on Third Party Liability in the Field of Nuclear Energy, July 29, 1960, 956 U.N.T.S. 251.

[42] *See* Liability Convention, *supra* note 7, at art. II. Article II of the Liability Convention stipulates that the "[l]aunching State shall be absolutely liable to pay compensation for the damage caused by its space object on the surface of the earth or to aircraft in flight."

[43] *See* Warsaw Convention, *supra* note 34. *See also*, Convention on Damage caused by Foreign Aircraft to Third Parties on the Surface, Oct. 7, 1952, 310 U.N.T.S 181 [hereinafter Rome Convention].

ented convention which takes into account that launching space objects is an ultra hazardous activity and accidents are easily foreseen, in which case the potential impact thereof is likely to be devastating. Thus, the responsible State parties must compensate if damage is actually caused by their activities irrespective of their fault in causing such damage. Under this absolute/strict liability standard, defendants may be exonerated from liability in only limited circumstances such as contributory negligence on the claimant's side.[44]

With regard to international air transport, the Rome Convention of 1952 stipulates that the operator of an aircraft should be strictly liable for damage caused to third parties as long as the damage is a direct result of the incident.[45] This standard suggests that recoverable damages under the convention are of a direct nature rather than consequential.

Under the strict liability standard, there is no distinction between the cases where the damage resulted from the fault of the operator and cases where the accidents were unforeseeable. If strict liability is applied to the regime of remote sensing, it would be burdensome to the supplier and discourage data suppliers providing data particularly on a voluntary basis.

Applying damage arising from the supply and the use of remote sensing data is not appropriate for three reasons. First, data collection and data handling activities and the use of the products present little risk for damage; second, the conceivable damage arising from remote sensing is consequential rather than direct; and third, the strict liability approach generally does not take the circumstances surrounding the occurrence of damage into account.

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[44] Article VI(1) of the Liability Convention states, "[e]xoneration from absolute liability shall be granted to the extent that a launching state establishes that the damage has resulted either wholly or partially form gross negligence or act or omission done with the intent to cause damage on the part of a claimant State". Liability Convention, *supra* note 7, at art. VI(1).

[45] Article 1 of the Rome Convention states that, "[a]ny person who suffers damage on the surface shall, upon proof only that the damage was caused by an aircraft in flight or by any person or thing falling therefrom, be entitled to compensation as provided by this convention. Nevertheless there shall be no right to compensation if the damage is not a direct consequence of the incident." Rome Convention, *supra* note 43, at art. 1.

2. Fault-based Liability

On the other hand, fault-based liability determines the fault of the alleged party taking into account the circumstances. If we look at cases in the U.K., fault-based liability holds the alleged party liable in case of negligence by taking into account elements including the reasonableness of the alleged party's behavior and foreseeability of the damage.

The foreseeability of the harm is applied to the case to hold the alleged party liable only if the damage was foreseeable. For instance, in *Bolton and Stone*,[46] a ball hit by the defendant went into the highway and injured the plaintiff. The court held that the defendant was not liable because the incident was unforeseeable.

The reasonableness of the defendant's behavior leading to the damage was considered by the court in *Latimer v. AEC Ltd.*,[47] when the plaintiff employee slipped on the floor of a factory after a flood had occurred and injured himself. The court held that the defendant company was not liable because it was not reasonable to expect the company to close the factory.[48]

Furthermore, fault-based liability takes into account the different standards of duty of care depending on the nature of the tortfeasors. Professional liability is invoked for those who claim a special skill and use that skill in a proper manner.[49] In *Hedley Bryne v. Hellers Partners*,[50] and *White v Jones*,[51] the defendant professionals were held to a higher standard of care and therefore held liable for damages despite the fact that the damage was purely economic and consequential.

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[46] Bolton and Stone, [1951] AC 850.

[47] Latimer v. AEC Ltd., [1953]AC 643, [1953] 2 All ER 449, HL.

[48] RICHARD A. BUCKLEY, THE MODERN LAW OF NEGLIGENCE 42 (Butterworths, London, 1999).

[49] S. Hedley & A Grubb (eds.), *Professional Liability*, *in* THE LAW OF TORT 685 (Leed Elsevier, 2002).

[50] Hedley Bryne v. Hellers Partners, [1964] AC 465, [1963] 2 All ER 575, HL. *See also, Spring v Guardian Assurance,* BGE 111 II 471; *Spring v Guardian Assurance* [1995] 2 AC 296, [1994] 3 All ER 129, HL; *White v Jones* [1995] 2 AC 207, [1995] 1 All ER 691, HL; *Henderson v Merrett Syndicates* [1995] 2 AC 145, [1994] 3 All ER 506, HL.

[51] White v Jones, [1995] 2 AC 207.

Fault-based liability, taking into account the circumstances, is able to approach the liability of data suppliers, end-users and third parties. The elements of fault-based liability, foreseeability of the harm, reasonableness of the defendant's behavior, and professional negligence, are highly relevant to determining cases associated with remote sensing. They make it possible to distinguish cases concerning the intentional misuse and misinterpretation of data from unintentional ones. It can further assist the court to determine whether such unintentional misinterpretation and other operations leading to the inaccuracy of the resulting products were within or beyond the reasonable limit under the circumstances in particular. The element of professional negligence would be useful in adjusting to different settings of disputing parties more effectively. It would be of help in reaching a more favorable decision for the end-user who is a less knowledgeable individual as opposed to the data generators that are specialized in the remote sensing operations. In these ways, the consideration of elements determining the fault of the responsible party adopted in the fault-based liability approach is suited to apply to cases involving remote sensing and helps settle potential claims more effectively.

CONCLUSIONS AND RECOMMENDATIONS

Today, the role of legal framework is increasingly critical to make the most of remote sensing data. Insufficient standards lead to questions concerning the accessibility to and intellectual property rights of data as well as liability issues arising from the data. The need for improvement in this area has become urgent.

Data policies developed differently by each data generator, affecting the degrees of accessibility to and the utilization of data by end-users and third parties. We can conclude that it is difficult to achieve a single data policy as a whole, yet certain guidelines need to be set to facilitate easier access and the wide use of data for public service without burdening the commercial operations.

It is recommended that the public services should have a common access and pricing policy, whereas commercial services

should be left unregulated. Data should be made available under a single gateway free of charge to the public for unlimited use by any number of users without case-by-case authorization. However, both categories apply the common intellectual property standard although some rights of data generators need to be compromised for the public services. Particularly, the conditions for protection for value added products need to be clarified and adjustment with the national law concerning the intellectual property rights may be necessary.

At present, the issue of liability is not sufficiently dealt with anywhere: not under the current legal framework surrounding remote sensing and not in contractual agreements. Most fundamentally, the gap exists between the tendency towards unenforceability of liability disclaimers in certain cases and practice of satellite data suppliers who wish to waive any potential liability. The examination of cases clearly raise doubts as to the enforceability of a liability disclaimer in cases of 1) exoneration with respect to third parties and 2) liability disclaimers with respect to the party with unequal bargaining power. It is clear that liability has to be consulted within a broader framework of tort

A single regime should cover the damage arising from remote sensing both for contractual and third party loss. The fault based liability should be adopted for all potential defendants and cover all settings: contractual relations, relationships between data suppliers and third parties, and between third parties. However, there should be different degrees of the duty of care expected depending on the bargaining power of the alleged party vis-à-vis the claimant party. The regime should allow the exoneration of liability in commercial settings, but should not allow the exoneration when an intentional tort or gross negligence has occurred. The key elements determining the fault will be the foreseeability of the harm, the reasonableness of the alleged party causing the damage, and equal bargaining power of the concerned parties.

If the proposed recommendations are applied, then the current situation will be much improved: misinterpretation will be minimized and misuse discouraged whilst the potential claims could be addressed more robustly. The recommendations ra-

tionalize the data access and enhance confidence in the wider use of EO data for critical applications. This would provide the clarity and improvement needed for the full exploitation of EO data in support of disaster management and protection of the environment.

FIRST LICENCE ISSUED UNDER CANADA'S REMOTE SENSING SATELLITE LEGISLATION

Bruce W. Mann[*]

BACKGROUND

Since the launch of the first *RADARSAT* satellite in 1995, the Canadian Space Agency (CSA) has been responsible for the collection, processing, and delivery of its synthetic aperture radar (SAR) satellite imagery worldwide, including sales and distribution through private sector partners.

However, when CSA announced in February 1998, that they had awarded a contract to MacDonald, Dettwiler and Associates (MDA) to construct, own and manage a new, more powerful SAR satellite, *RADARSAT-2*, it became apparent that regulation of the commercial satellite operator would be required to protect Canada's national security and international affairs interests, as well as public interests in the environment and safety of persons and property.

On June 16, 2000 the Agreement between the Government of Canada and the Government of the United States of America concerning the Operation of Commercial Remote Sensing Satellite Systems[1] (2000 Canada-US IGA) was signed, facilitating the export of United States technology, with the *RADARSAT-2* satellite specifically in mind. A very clear expectation was established in the first clause of the Agreement about the nature of legislation that would be enacted in Canada:

> The parties agree to ensure that such commercial remote sensing satellite systems will be controlled by each Party in a com-

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[*] Barrister & Solicitor, Department of Justice, Ottawa, Ontario, Canada.

[1] Agreement between the Government of Canada and the Government of the United States of America concerning the Operation of Commercial Remote Sensing Satellite Systems, U.S.-Can., June 16, 2000, 2000 Can. T.S. No. 2000/14 [hereinafter 2000 Canada-US IGA].

> parable manner in order to protect and serve shared national security and foreign policy interests.[2]

Canada's Remote Sensing Space Systems Act[3] (Act), and Remote Sensing Space Systems Regulations[4] (the Regulations) implement a licence and control regime comparable to the United States Land Remote Sensing Policy Act and related licensing rules.[5] The legislation places obligations on the satellite operator ranging from the requirement to maintain positive control of the satellite from Canada at all times to the requirement to make data available to sensed states in accordance with the United Nations Principles Related to Remote Sensing of the Earth from Space.[6] This paper builds on and complements other works[7] tracing the development of Canada's Access Control Policy for remote sensing satellite data through to the issuance of the first satellite licence to MDA Geospatial Services Inc on November 15, 2007. The *RADARSAT-2* satellite was successfully launched on December 14, 2007.

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[2] *Id*.

[3] *See* Remote Sensing Space Systems Act, 2005 S.C., ch. 45 (Can.).

[4] *See* Remote Sensing Space Systems Regulations, SOR/2007-66 (Can.).

[5] *See* Land Remote Sensing Policy Act of 1992, 15 U.S.C., ch. 82 (1992*). See also* Licensing of Private Land Remote-Sensing Space Systems*,* 15 C.F.R. § 960 (2006).

[6] Principles Relating to Remote Sensing of the Earth from Outer Space, United Nations Resolution 41/65, adopted on December 3, 1986 [hereinafter Principles Relating to Remote Sensing].

[7] Phillip Baines outlines the development of Canada's Access Control Policy from 1995 to 2003 for satellite data in Phillip Baines, *Balancing Interests: Toward further progress in the development of a regulatory regime for commercial remote sensing space systems in Canada*, *in* PROCEEDINGS, THE FIRST INTERNATIONAL CONFERENCE ON THE STATE OF REMOTE SENSING LAW (Joanne Gabrynowicz, ed., The National Remote Sensing and Space Law Center, 2002) Bruce Mann joined Mr. Baines in 2003 to put Canada's Access Control Policy into law, and reports on work to 2006, from the perspective of a legal practitioner in, Bruce Mann, *Drafting Legislation to Regulate Commercial Remote Sensing Satellites: A How-to Guide from Canada*, *in* IISL/IAC-06 E6.3.12 (2006) [hereinafter *Drafting Legislation*]. *See* Thomas Gillon, *Regulating Remote Sensing Space Systems in Canada – New Legislation for a New Era,*34 J. SPACE L. 19 (reviews the evolution of Canada's Access Control Policy for remote sensing satellite data from its genesis in 1998 to the coming into force of Canada's legislation in 2007).

WHY REGULATE?

Canada's National Interest in Regulating Remote Sensing Satellites

With the prospect of non-governmental entities in Canada launching satellites capable of collecting sensitive data about Canada and other territories, and selling it abroad, five factors of a national character were instrumental in the Government of Canada's decision to enact legislation regulating the operation of remote sensing satellite systems:

–national security,

–the defence of Canada,

–the safety of Canadian Forces,

–Canada's conduct of international relations, and

–Canada's international obligations.

These factors are referred to as Canada's "national interests" in this paper.

Three other "public interest" factors, for which the Government of Canada at the national level has a shared responsibility with the provincial governments, also appear in the Act:

–the environment,

–public health, and

–the safety of persons and property.

All of the above factors are recited throughout the Remote Sensing Space Systems Act as matters to guide the government in the issuing of licences and the regulation of remote sensing satellite systems.

Liability

At both the national and international level, a fundamental driver of Canadian legislation was the issue of Canada's liability for damage caused by Canadian space activity, even when car-

ried out by non-governmental entities. Under the United Nations Outer Space Treaty[8] and the Liability Convention,[9] Canada is liable to other states or persons in other states for injury or loss caused by satellites if the launch was carried out in Canada, or was procured elsewhere by Canada or by a Canadian person. As a matter of risk management, it is up to Canada to regulate its own nationals and any other persons whose activities could incur liability on the part of Canada.

Although the focus of the Act is the security of remote sensing data, Canada has remained sensitive to the physical risk presented by uncontrolled de-orbiting of satellites following the January 1978 re-entry of the Soviet *Cosmos 954* satellite, which spread radioactive material across Northwest Canada.

The importance of being able to bring the entire satellite back to Earth at mission end was highlighted by China's controversial test of a medium-range ballistic anti-satellite (ASAT) weapon to destroy a defunct weather satellite in January 2007. The explosion of the weather satellite created an orbiting debris cloud, increasing the risk of collision with another satellite at a comparable altitude by a factor of thousands—although the level of risk still remains extremely low. The real danger is that pieces of orbital debris, some so small that they cannot be tracked and avoided, are capable of disabling another satellite, leading to the possibility of chain reaction collisions that could eventually create multiple rings of debris, rendering the low earth orbit (LEO) region of 200 – 1000 km altitude virtually unusable for a lengthy period of time, and greatly increasing the risk to spacecraft passing through the LEO region to geosynchronous orbits or other space missions.

With the foregoing risks in mind, a detailed System Disposal Plan must be submitted and approved with an application for a licence under Canada's Remote Sensing Space Systems

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[8] *See* Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, arts. VI-VII, Oct. 10, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205.

[9] *See* The Convention on International Liability for Damage Caused by Space Objects, arts. II, VIII, Sept. 1, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187, which set out Canada's liability to other states or persons for damage caused by Canadian commercial satellite operators.

Act. A satellite licence typically will include a requirement that a satellite maintain sufficient on-board propellant to de-orbit the satellite in a controlled manner at mission end.[10]

In addition to a System Disposal Plan, Canadian licence applicants must propose arrangements to guarantee the performance of their obligations under the Plan. If approved, the arrangements become conditions of the operating licence.

SCOPE OF APPLICATION

Law Governs Anyone in Canada and Canadians Abroad

Carrying on remote sensing space system activities, including satellite control, data collection, data treatment, and data transmission, within or from Canada, is unlawful unless done under the authority of a Canadian remote sensing space system licence.[11] The requirement for a licence also applies to certain persons in respect of their activities *outside* Canada, namely: (a) Canadian citizens, (b) Permanent residents (these are people who have legal status entitling them to remain in Canada, somewhat similar to Green Card holders in the United States), (c) Canadian corporations, and (d) classes of persons as may be specified in the Regulations.

The Government of Canada can enact regulations defining classes of persons (individuals, corporations, partnerships, etc.) who have a connection to Canada related to remote sensing space systems that warrants bringing them within the ambit of the legislation.[12] An example might be foreign persons who procure the launch of a satellite from Canada, or who acquire a satellite from a Canadian person and intend to exercise control of the operation from outside Canada. No such regulations have been enacted yet.

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[10] There can be exceptions. The tiny *CanX* satellite, the size of a half-gallon milk carton, to be launched by the University of Toronto in 2008, will not require positive de-orbiting so long as its orbit is low enough to bring it back to Earth in less than 25 years through natural orbital decay.

[11] Remote Sensing Space Systems Act, 2005 S.C., ch. 45, § 6 (Can.).

[12] Please cite to the source.

Law Applies to Both Public and Private Sector

In addition to private individuals and corporations, government departments and agencies at all levels in Canada are subject to the legislation.[13]

Many Types of Satellites Covered

The definition of remote sensing satellite[14] under the Act is broad in scope and includes satellites with optical, radar, thermal infra-red, multi-spectral, and other types of sensors. Even weather satellites come within the purview of the Act.

This broad approach was used in the legislation because of the difficulty and uncertainty in attempting to confine the application of the legislation to satellites that are intended for commercial remote sensing use. In fact, the term commercial is not even used in the legislation, and the intended use is irrelevant. A satellite's capability determines whether it must be licensed under the Act.

Exemptions

The far-reaching provisions of the Act were drafted *ex abundante cautela* to promote Canada's national interests and public interests to the maximum extent possible, and to protect Canada from liability. To avoid inappropriate application of the Act, the Minister of Foreign Affairs is authorized to exempt[15] any persons, satellite systems, or data, on an individual or class basis, from any or all aspects of the licensing regime, so long as the Minister is satisfied that none of Canada's national interests will be compromised. For example, if Canadians are involved in the operation of a satellite system licensed by a foreign country, it would be appropriate to clarify by Ministerial order that the system is exempt from the Act, or at least is exempt insofar as those Canadians are concerned.

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[13] *Id.* § 4. "This Act binds Her Majesty in right of Canada or a province."

[14] *Id.* § 2. Definition: "remote sensing satellite" means a satellite that is capable of sensing the surface of the Earth through the use of electromagnetic waves.

[15] *Id.* § 4(3).

Where the Department of National Defence or the Canadian Space Agency operates a remote sensing satellite system, the government may issue a Cabinet order modifying or adapting any provisions of the Act for that use. This will ensure that any commercial operations carried out by either entity (most notably the CSA) will remain subject to the same international data distribution controls set by the Minister of Foreign Affairs for normal commercial operators, while strictly governmental operations can be exempt from the Act.

Effect of United States ITAR

Although the Canadian Access Control Policy in the 2000 Canada-U.S. IGA states that satellite operators will obtain import or export permits pursuant to "applicable laws,"[16] no express reference to, or obligation deriving from the United States International Traffic in Arms Regulations (ITAR)[17] appears in the Act. Nevertheless, the ITAR has had a significant impact on the *RADARSAT* programs as well as other aerospace and defence-related industries where technology has been exported from the United States to Canada under an export licence. As the United States Department of State applies the ITAR, contact with or exposure of ITAR technology to a person who is a national of a proscribed country constitutes a "deemed export" of the technology to that proscribed country. This discrimination, based on place of birth, has meant that some dual-national Canadian citizens, even though they hold high level security clearances and may have renounced their other citizenship, have not been allowed access to certain sensitive technology or meetings where technology was discussed.

Because several components of the *RADARSAT-2* satellite are ITAR-sensitive technology subject to US export licences, the operator of *RADARSAT-2*, or the exporter of the technology, could conceivably risk contravention of the ITAR if the United States Department of State concludes that there has been an unauthorized "deemed export." Canada's legislation does not

[16] 2000 Canada-U.S. IGA, *supra* note 1, at Annex I, obligation no. 4.
[17] 22 C.F.R. §§ 120-130 (2007).

incorporate the ITAR in any way, but neither does it prevent it extraterritorial application in Canada.

Ironically, the ITAR rules facilitated the *RADARSAT-2* launch plans in 2005 when, for technical reasons, it became necessary to use a *Soyuz* launch vehicle from Baikonur, Kazakhstan. A tripartite agreement between the United States, Russia, and Kazakhstan enables the launch of United States spacecraft from Baikonur under the supervision of United States Defense Technology Security Administration (DTSA) personnel and exempts spacecraft from customs inspections in Russia and Kazakhstan. Because *RADARSAT-2* contains ITAR technology requiring United States export permits, *RADARSAT-2* qualified as a United States Spacecraft under the Baikonur launch agreement, and was launched without Canada having to negotiate a separate agreement with Russia and Kazakhstan.

Performance Limits

Annex II of the 2000 Canada-U.S. IGA sets out certain controls on the performance of the *RADARSAT-2* satellite that Canada agrees to implement. The actual performance limits are stated to be commercially confidential and are not published with the IGA. Specific performance limits are not set out in the Act, but the Act does authorize the Cabinet to make regulations[18] about the operation of satellite systems and the Minister of Foreign Affairs to set conditions in a licence[19] restricting the resolution, timeliness, geolocation accuracy, etc. of raw data and data products.

THE LICENCE

The first licence under the Act was issued to MDA Geospatial Systems Inc on November 15, 2007, in anticipation of the launch of *RADARSAT-2* which took place on December 14, 2007.

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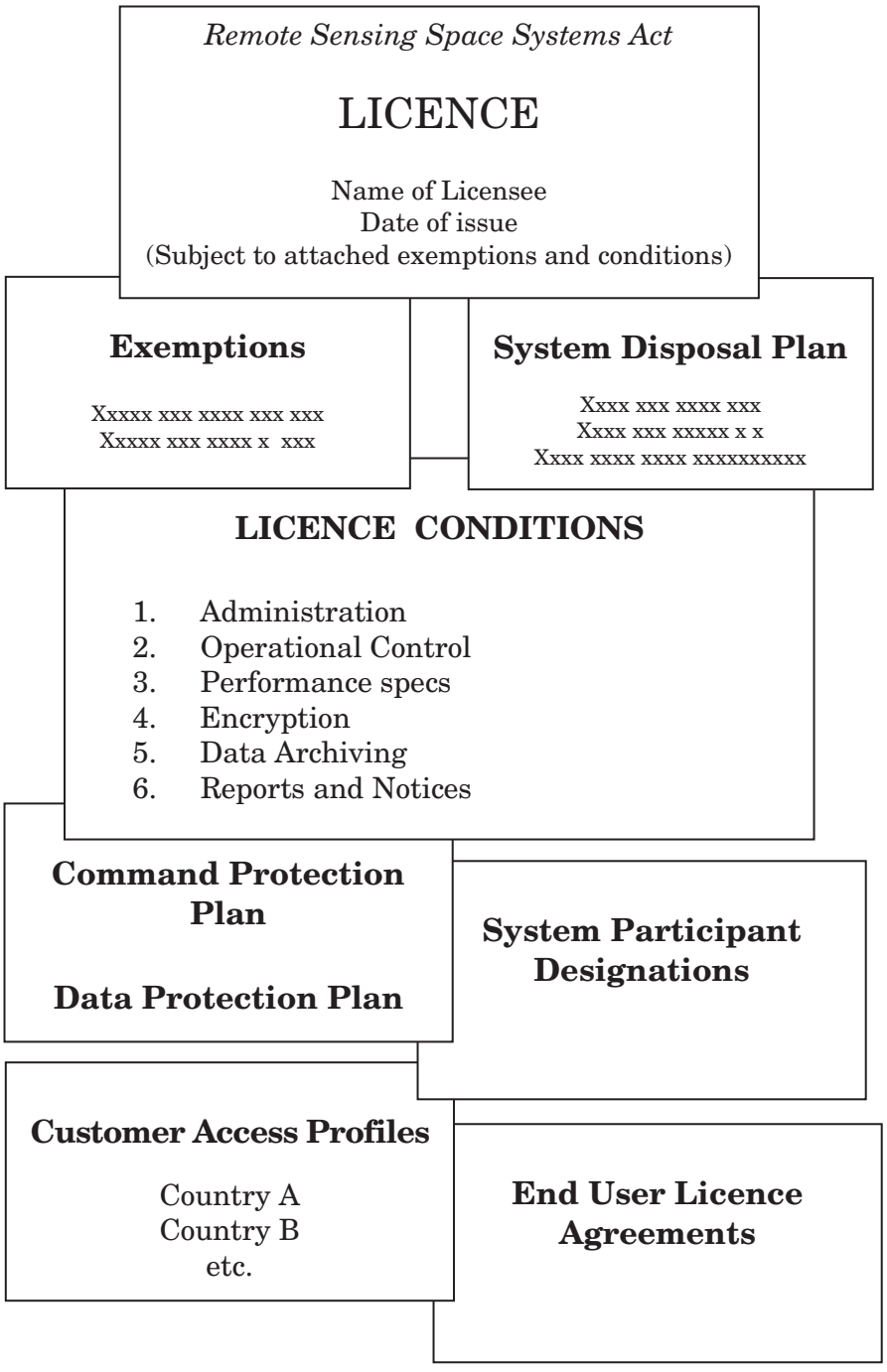
[18] Remote Sensing Space Systems Act, 2005 S.C., ch. 45, ¶ 20(1)(f) (Can.).
[19] *Id.* § 8(5)-(7).

System Disposal Plan

No licence can be issued without a system disposal plan. The Plan will vary depending on the nature of the satellite and its proposed orbit. Some mandatory elements of a Plan are set out in the Regulations, Schedule 1:

– method of satellite disposal
– amount and nature of debris expected to reach Earth
– expected location of the debris path
– space debris upon accidental or deliberate explosion
– probability of loss of human life upon satellite disposal
– disposition of satellite data.

Typical Form of Remote Sensing Space System Licence



Mandatory Licence Conditions

Although the Minister of Foreign Affairs can set out conditions of any kind in a licence, mandatory conditions were included in paragraphs 8(4)(a) to (g) of the Act to inform satellite operators and data customers of certain fundamental obligations:

Control of the System

Paragraph (a) obliges the licensee to keep control of the system. This refers to functional control by the person who operates the system. There are a number of exceptions, perhaps better referred to as clarifications, elsewhere in the Act which permit others to control a satellite of a system, so long as the licensee maintains overriding control. Also, the Minister may specifically approve someone else taking control of a satellite, or approve a complete transfer of the licence to someone else.

Controlled Activities

Paragraph (b) requires that the licensee ensure that only persons specifically authorized in the licence perform certain controlled activities. In the normal operation of a remote sensing space system, the Act does not call on the government to directly regulate the activities of anyone but the licensee.

Sensed States

Paragraph (c) is based on Principle XII of the 1986 United Nations Principles Relating to Remote Sensing of the Earth from Outer Space[20]—that sensed States should be able to obtain data about their own territory. Inherent limitations in the 20 year old principle render it largely ineffective with respect to today's technology and the heightened security concerns engendered by that technology.[21]

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[20] Principles Relating to Remote Sensing, *supra* note 6. Principle XII deals with sensed states right to information about their territory.

[21] *See Drafting Legislation*, *supra* note 7, at pp. 6, 7 where the inherent limitations in Principle XII are discussed.

Principle XII, as incorporated in Canada's legislation, offers no advantage to non-governmental purchasers of data in a sensed state, and does not override restrictions or prohibitions on data transfer to the country in question.

The net effect of Principle XII, from Canada's standpoint, is that a Canadian satellite operator is not allowed to give *exclusive* rights to data and data products to someone in country X about the territory of country Y, and thereby prevent the government of country Y from obtaining data or data products that they otherwise would have been allowed to receive. While Principle XII may be of some value to sensed states, its real value today lies with commercial satellite operators, as it allows them to make a second sale of data that might otherwise have been sold on an exclusive basis.

Principle XII appears to be incorporated with the same effect in Germany's recent Satellite Data Security Act, which was enacted in time to regulate its new satellite, *TerraSAR-X*, launched on July 15, 2007. In fact, the German legislation may go even further by prohibiting a commercial operator from allowing a customer to prevent a third person (not just the government of a sensed state) from accessing data about a specific region.[22] In all cases, however, data dissemination is subject to a sensitivity check.

Archiving and Disposal of Data

Paragraph (d) is a condition requiring the licensee to keep control of raw data and remote sensing products until they are disposed of. The condition has two facets to it. First of all, the "sale" of data to customers cannot be an outright transfer of all proprietary rights to the customer. It is standard industry practice to maintain such control by entering into system participant

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[22] Bernhard Schmidt-Tedd and Max Kroymann, *Current Status and Recent Developments in German Remote-Sensing Law*, 34 J. SPACE L. 97, under Part A IV, "Conformity with UN Space Law", explain the incorporation of UN Principle XII in the *Satellitendatensicherheitsgesetz* (SatDSiG) Germany's Satellite Data Security Act in force December 1, 2007. They say, "[t]his limitation of contractual freedom in the dissemination of commercial data is the specific result of the observation of remote-sensing principles." *Id.*

agreements and end-user licence without conveying intellectual property rights associated with the data. The other facet to condition (d) is the requirement to honour the terms of the system disposal plan (see section 9), which will spell out the circumstances in which the licensee may dispose of data and products. The plan could call for the destruction of data, the government's right to acquire all interests in the data or the right to convey all interests in data to other persons approved by the Minister.

The archiving obligation is developed more fully in the Regulations, section 17. A licensee is required to archive raw data for at least 15 months, and is not allowed to destroy it before notifying the Minister of Foreign Affairs of the intent to destroy it. The Minister can be notified of the intended destruction any time after the data is 12 months old, and upon being notified has 3 months in which to order that the data be made available to anyone specified by the Minister, at cost.

This public interest provision is designed to give educational institutions and other entities access to data that they might not be able to afford data in the commercial market, rather than allow it to be destroyed.

Handling Raw Data

Paragraph (e), a condition that raw data from the system may be communicated only to authorized persons, is fundamental to the security of the system. Normally raw data will be communicated only to system participants, since the communication of raw data is a controlled activity, but this provision recognizes that there can be exceptions–where the government of a sensed state is entitled to receive raw data in accordance with condition (c) discussed above, or where the Minister, in the licence, expressly authorizes such communication to other persons.

Licensee Must Police Restrictions on Data Use

The condition in paragraph (f) is somewhat unusual. Under paragraphs 8(6)(b) and 8(7)(b) of the Act the Minister of Foreign Affairs can require that the communication of raw data or re-

mote sensing products be done under a legally enforceable agreement respecting their security and non-disclosure. It is up to the licensee to police the agreement and "encourage" system participants and other persons who receive data to handle it appropriately. This encouragement could be accomplished through legal action for breach of the agreement or other means, such as cutting off the supply of data or products to customers who do not comply. The Minister, in turn, can require the licensee to enforce the agreement by means of administrative monetary penalties or by suspending the licence if the licensee violates this condition.

Fees

Paying fees (paragraph (g)) has been set as a condition of a licence so that failure to pay can be dealt with as a breach of condition.

Conditions Set by the Minister

Two kinds of conditions that are important for the security of data handling are described in subsection 8(5): conditions relating to cryptography and information assurance and conditions designating system participants and the controlled activities the licensees may allow system participants to perform.

Subsections 8(6) and (7) of the Act constitute the legal authority for the Minister of Foreign Affairs to establish Customer access profiles (CAPs), the detailed sets of conditions on the dissemination of raw data and remote sensing products, including rules for the communication of raw data and remote sensing products among the licensee, system participants and their customers. CAPs are likely to include a proscribed entity list, naming entities that are prohibited from receiving raw data or remote sensing products under various circumstances.

Shutter Control

By analogy to restrictions on time and place of exposures taken by a conventional camera, orders for the interruption or restriction of land sensing operations of a remote sensing satel-

lite[23] are popularly called "shutter control" orders. It is noteworthy that Germany's legislation does not provide for shutter control, although the Federal Office of Economics and Export Control (BAFA), the responsible authority, may temporarily prohibit the dissemination of data.[24] In an environment where data encryption is the norm, the German law accomplishes the same practical effect as shutter control, with the advantage that the opportunity to collect data at a critical time is not lost.

The capacity for quick fine-tuning of the CAPs in Canada, allowing raw data collection but prohibiting or restricting its distribution, coupled with robust encryption of data downloaded from the satellite, should reduce or eliminate the need to invoke shutter control. Corresponding authority under United States legislation has never been used.

Priority Access

Priority access refers to the government's right to jump the queue for the provision of services from a remote sensing space system in urgent circumstances. It is anticipated that government needs, even on an urgent basis, will be met through the licensee's commercial priority service ordering process and, as in the United States, a statutory order for priority access will never be necessary.

ENFORCEMENT

Powers of Inspection and Audit

The powers of inspectors in the Remote Sensing Space Systems Act are typical of those found in other Canadian statutes, and respect the right to be secure from unreasonable search and seizure under the Canadian Charter of Rights and Freedoms. For example, a judicial warrant is required before an inspector

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[23] Remote Sensing Space Systems Act, 2005 S.C., ch. 45, § 14 (Can.).

[24] SatDSiG, part 3, chapter 1, section 16. The unofficial English translation of the SatDSiG is available at 34 J. SPACE L. **. The German text is also available online at http://www.bgblportal.de/BGBL/bgbl1f/bgbl107s2590.pdf.

can enter a private dwelling without the consent of the occupant.

While the Act specifically claims jurisdiction over Canadians and certain other classes of persons outside of Canada in respect of the prohibition on operating a remote sensing space system without a licence, no extra-territorial claim is made about the powers of inspectors outside Canada.

This does not necessarily mean that inspectors are prohibited from entering the premises of system participants and other persons in foreign jurisdictions. The authorities in other countries may be prepared to allow, or even assist, inspectors to enter premises in their jurisdiction under mutual legal assistance agreements between Canada and foreign countries. Also, a licensee may enter into agreements with system participants or end users in foreign jurisdictions in which those persons specifically agree to let the licensee, or persons designated by the licensee (including Canadian government inspectors), enter their premises to conduct inspections and perform audits.

Rather than require inspectors to cart away boxes of documents, tapes and data storage devices, which could harm the affected person's capacity to carry on business, the Act gives inspectors the slightly more intrusive, but less disruptive, powers to examine things on site, test equipment, use equipment to generate records, and make copies of records to take away for examination.

Both the obligation to assist inspectors and the prohibition against obstructing inspectors or providing false information to them are offences under the Act.

Requests for Information

For the most part, monitoring compliance with the Act will be a matter of reviewing records of data collection, treatment, and transmission. The Minister can request any person to provide pertinent information or documents. There is no reason to expect non-compliance, but if a request is refused or ignored it can be the basis for an order by a superior court or the Federal Court of Canada for an order requiring production of the information or documents. A judge may order a person to produce

information or documents if satisfied that the public interest in having the information or documents outweighs other interests, including the person's right to privacy.

The advantage of a judicial order is that it can be enforced through the court system by means of access to the person's premises and the possibility of penal sanctions for contempt of court.

Foreign countries may not be willing to enforce a Canadian Minister's request for information or to give Canadian inspectors the right to operate in their jurisdiction. However, at the judicial level, most courts of superior jurisdiction in the world honour the custom of *letters rogatory*, or mutual legal assistance conventions, under which they will exercise their own inherent jurisdiction to compel persons within their territory to appear, produce documents, and answer questions, at the request of a judge in another jurisdiction.

Administrative Monetary Penalties

Except for a few very serious contraventions of the Act, for which heavy fines and prison sentences may be imposed, the Act regulates conduct through administrative monetary penalties (AMPs) for violations, with the option of entering into voluntary compliance agreements and terminating the violation proceedings. The emphasis is on correcting conduct at the earliest possible opportunity.

For the most part the violation provisions are directed at licensees, including employees of licensees, for breaches of licence conditions. Licensees are expected to make sure that their system participants and customers follow the rules.

Violation proceedings begin with the issuing of a notice of violation. The recipient may pay the fine set out in the notice, ending the matter. Alternatively, the person may exercise the right to make representations about the violation to the enforcement officer, who will decide whether the person committed the violation. During the course of the representations, the enforcement officer may enter into a compliance agreement with the person, ending the proceedings without a violation record—so long as the person abides by the compliance agreement.

If a penalty is imposed, the person has the right of appeal to the Minister. As with any Ministerial decision, the Minister's disposition of the appeal is subject to judicial review by the Federal Court of Canada.

Penalties for Violations

Schedule 2 of the Remote Sensing Space Systems Regulations sets out 43 provisions in the Act and Regulations which, if contravened, could constitute violations under the Act. The following table illustrates typical violations and the maximum penalty that could be imposed for each.

MAXIMUM PENALTIES FOR VIOLATIONS, PER DAY

Operating when licence is suspended	$ 25,000
Disposal Plan not up to date	25,000
Allowing unauthorized person to give command to satellite	20,000
Failing to assist an inspector when requested to do so	10,000
Giving false or misleading information to an inspector	10,000
Failure to notify Minister that control of satellite has been lost	25,000
Failure to notify Minister of cryptography malfunction	25,000
Poor management of sales records	5,000
Archived data not readily retrievable	25,000
Disposal of data without proper notice	15,000
Late provision of copy of satellite launch contract	10,000
Late report of satellite launch, orbit and performance	15,000
Failure to maintain control of system	25,000
Unauthorized disclosure of raw data	20,000
Contact person does not possess required security clearance	15,000
Fee not paid when due	5,000

Offences under the Act

More serious offences may be prosecuted in the criminal courts. Some examples, with maximum penalties:

OFFENCE	INDIVIDUAL	CORPORATION
Operating satellite system without a licence	$ 50,000 and 18 mo.	$ 250,000
Transfer control without permission	$ 50,000 and 18 mo.	$ 250,000
Disobey order when licence is suspended	$ 50,000 and 18 mo.	$ 250,000
Obstructing an inspector	$ 25,000 and 6 mo.	$ 125,000
Disobey order for priority access by government	$ 25,000 and 6 mo.	$ 125,000

Injunctions

Consistent with the principle of adjusting conduct at the earliest opportunity, rather than penalizing parties for breach after the fact, the Act contains a special injunction authority, enabling the Minister, with the assistance of a Court, to take steps to prevent someone from operating a remote sensing space system unlawfully. The proposed or purported transfer of ownership of a remote sensing satellite system, without having notified the Minister, could be grounds for an injunction against the licensee, or former licensee, or the person intending to acquire the system, blocking the transfer.

The injunction power is the only way to deal with persons who are not, and never have been, licensees, before they actually commence an unlawful operation. The Court can order them to take any measure that a licensee could be ordered to take under the Act.

PRIVACY

Although concerns about privacy were raised early and often in the legislative process, there are no provisions in the Act or Regulations dealing with privacy, and no privacy conditions

have been incorporated in the first remote sensing satellite system license.

Synthetic aperture radar (the technology under discussion for the *RADARSAT-2* satellite) does not even detect human beings as such, nor is it capable of detecting other indicia of human activity at a level considered to be a violation of individual privacy.

In this respect, Canada's constitutional protection of privacy rights has taken a different direction than the United States Fourth Amendment protection of privacy within the home and its curtilage. The *Kyllo v. United States*[25] decision in the U.S. dealt with the police use, without a search warrant, of forward looking infra-red (FLIR) sensors to detect heat emanation from a suspected marijuana grower's home. The United States Supreme Court, in a 5-4 decision authored by Justice Scalia, held that such detection revealed intimate details of human activity within the home and therefore violates the Fourth Amendment right against unreasonable searches and seizures. Justice Scalia also discussed how future technology can invade on one's right of privacy and in what he called "the long view" of the Fourth Amendment purported to extend protection against more sophisticated surveillance equipment, possibly including synthetic aperture radar of the type used in *RADARSAT-2*.

Justice Stevens, writing for the dissent in *Kyllo* stated:

> Although the Court is properly and commendably concerned about the threats to privacy that may flow from advances in the technology available to the law enforcement profession, it has unfortunately failed to heed the tried and true counsel of judicial restraint. Instead of concentrating on the rather mundane issue that is actually presented by the case before it, the Court has endeavored to craft an all-encompassing rule for the future. It would be far wiser to give legislators an unimpeded opportunity to grapple with these emerging issues rather than to shackle them with prematurely devised constitutional constraints.[26]

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[25] Kyllo v. United States, 533 U.S. 27 (2001).

[26] *Id.* at 51.

Three years later, in the *R. v. Tessling*[27] case in Canada, which involved circumstances identical in all respects to *Kyllo*, Canada's Supreme Court concluded that infra-red imaging did not constitute an unconstitutional search without warrant, stating: "The United States Supreme Court declared the use of FLIR technology to image the outside of a house to be unconstitutional in Kyllo v. United States, 533 U.S. 27 (2001), based largely on the 'sanctity of the home' (p. 37). We do not go so far."[28]

And in contrast with the "long view" taken by Justice Scalia, the sentiment of dissenting Justice Stevens was echoed by Canada's Supreme Court, which held:

> [T]he spectre of the state placing our homes under technological surveillance raises extremely serious concerns. … such technology must be evaluated according to its *present* capability. Whatever evolution occurs in future will have to be dealt with by the courts step by step. Concerns should be addressed as they truly arise.[29]

Privacy rights are adequately protected under the search and seizure provision of Canada's Charter of Rights and Freedoms, as well as the Privacy Act, which regulates government handling of personal information, and the Personal Information Protection and Electronic Documents Act which regulates the handling of personal information in the private sector in Canada. As a result of the Canadian jurisprudence, and upon consultation with the Office of the Privacy Commissioner of Canada, it was decided that there was no need to enact additional privacy protection in the Remote Sensing Space Systems Act.

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[27] R. v. Tessling, 2004 S.C.C. 67, [2004] 3 S.C.R. 432.
[28] *Id*. at 37.
[29] *Id*. at para. 55 (italics in original).

BELGIAN LEGAL FRAMEWORK FOR EARTH OBSERVATION ACTIVITIES

Jean-François Mayence[*]

In many respects, Belgium illustrates the involvement of small and medium size space-faring nations in everyday space activities, from basic research and development to commercial operations and exploitation of derived products. Such an involvement requires an active participation in the definition, the elaboration, the implementation, and the updating of the corresponding legal framework, be it at the international or national level.

Through its participation in the European Space Agency's (ESA) programs (which allows Belgium to use that intergovernmental organization to some extent as its own national space agency) and through bilateral cooperation with other States, the Belgian Government commits itself to bearing the risk of certain activities that are under third parties' actual control. This may appear unsatisfactory in regard to the current effort to enhance the effective control on space activities, of which earth observation is not the least hazardous area.

A country that mainly acts in outer space through the framework of an intergovernmental organization raises questions regarding the implementation of some provisions of the United Nations' space treaties. The fact that Belgium adopted, in September 2005, national space legislation does not answer all such questions because some are linked to the application of international law.

While article VI of the 1967 United Nations' Outer Space Treaty (Outer Space Treaty) imposes on State parties an international responsibility based on the control and the *continuous supervision* of the activities performed under their jurisdiction,[1]

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[*] Head of the Legal Unit "International Relations", Belgian Federal Office for Science Policy, Brussels.

[1] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18

article VII of the Outer Space Treaty, complemented by articles II and III of the 1972 United Nations Liability Convention ("Liability Convention"),[2] holds State parties liable for damage caused by objects they launch into outer space.[3] Furthermore, article VII of the Outer Space Treaty reserves to the State that registers the space object the monopoly of the control and the jurisdiction to be exercised on and onboard the space object.[4]

Considering the possibility of having several States and/or international organizations involved, each of them concerned by a different provision among those mentioned above, (namely articles VII and VIII of the Outer Space Treaty), the respective responsibilities of the States is unclear. According to article VI of the Outer Space Treaty, when the State responsible for the space activities is not the launching State of the space object, a potential conflict might arise between the State exercising jurisdiction on the activities (which are located with the operator) on the one hand, and the State exercising jurisdiction on the space object itself (namely the registering State) on the other. While the former will logically be interested in supervising the exploitation of the space object (the way it is used and for what purpose), the latter will be interested in the space object's in-orbit operation (making sure it does not cause any damage on Earth, and that it complies with applicable rules and standards aimed at preventing collision, interference, or space debris production). Most of the time, both States' interests will converge and maintain a close cooperation between them in the management and/or the supervision of the activities involving the space

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U.S.T. 2410, T.I.A.S. No. 6347 [hereinafter Outer Space Treaty]. Article VI of the Outer Space Treaty reads in pertinent part: "The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State party to the Treaty." *Id.* at art. VI.

[2] Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 28 U.S.T. 2389, T.I.A.S. No. 7762.

[3] Article VII of the Outer Space Treaty reads in pertinent part: "Each State Party to the Treaty that launches or procures the launching of an object into outer space . . . and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party . . . ." Outer Space Treaty, *supra* note 1, at art. VII.

[4] Article VIII of the Outer Space Treaty reads in pertinent part: "A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object . . . ." *Id.* at art. VIII.

object. However, in some cases, such a situation could become a source of conflict. For instance, the launching State may be willing to adhere to the standard from the Inter-Agency Space Debris Coordination Committee Space Debris Mitigation Guidelines (IDAC Guidelines), which recommends a de-orbiting of the satellite within 25 years after the launch, [5] but such a policy might impose a severe restraint on the commercial exploitation of the satellite, because of the need to save enough fuel for the purpose of the de-orbiting manoeuvre.

In regard to Earth observation and remote sensing activities, the issue of the actual State's jurisdiction, which applies on and onboard the satellite, might appear even more sensitive. Earth observation instruments onboard satellites generate (raw) data that immediately becomes subject to rights and regulations. Hence, it is essential to determine which law will apply to such data at the very moment it is generated. This does not prejudice the subsequent application of third parties' jurisdiction on the raw data or on the derived products, but it determines which rules will apply at the source.

Data acquired by an Earth observation satellite can be used for various purposes, some deemed legal and illegal by international law. Such acquisition is therefore a source of potential international responsibility. Some data need to be protected, even classified, because they are used for specific restricted purposes, are for a specific user, or because they contain information which cannot be disseminated. If such protection is required from the moment the data are acquired by the satellite, the jurisdiction applying onboard the satellite might have an important role to play. On the other hand, according to the "originator rule," the classification mark belongs to the owner of the data, who might be the operator or any other person involved in the exploitation of the satellite.

The combination of articles VI and VII of the Outer Space Treaty is vague and raises questions which, fortunately, have remained primarily theoretical thus far. Nevertheless, other issues are also at stake. The current discussions within several

[5] Inter-Agency Space Debris Coordination Committee Space Debris Mitigation Guidelines, UN Doc. A/AC. 105/C.1/L.260, annex (2002).

international bodies on the theme of the Space Situation Awareness, aimed at delivering a more global, complete, and accurate picture of space activities, has led to the assessment of practices in the fields of space debris mitigation, space objects identification, and space traffic management. The role of international organizations is a key element in that assessment because it represents a large part of today's space business that has not been appropriately recognized by international space law.

The lack of appropriate recognition is particularly obvious in the provisions of the Outer Space Treaty. While implicitly denying any possibility of participation to the international intergovernmental organizations (even though the subsequent treaties were open to *acceptation* by them), article VI of the Outer Space Treaty provides an extension of a State's international responsibility to such organizations. This curious provision seems to place a substantial obligation on the third party without allowing it to participate and without its consent.

However, excluding an intergovernmental organization from becoming a party (even an accepting party) to the Outer Space Treaty has had effects the drafters seem to have failed to take into account. The only way to extend national jurisdiction on space objects once they are placed in orbit is via article VIII of the Outer Space Treaty. Such jurisdiction is limited to only one State, which must qualify as the launching State of the space object. There is no other provision in international law that allows such an extension of jurisdiction. The consequence of this is that a space object that has not been registered is not subject to any national jurisdiction, and no State can pretend to exercise jurisdiction over it.

In some cases, earth observation satellites are launched by intergovernmental organizations. Some of them, such as the ESA, have accepted the provisions of the 1975 United Nations Registration Convention (Registration Convention),[6] and they have developed an internal policy accordingly that allows the organization to register the satellite in the name of its member state.

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[6] Convention of Registration of Objects Launched Into Outer Space, Jan. 14, 1975, 28 U.S.T. 695 [hereinafter Registration Convention].

In 1998, Belgium started the development of a small satellite, named *PROBA*, designed for its specific autonomy of use. The development and the mission were mainly funded by Belgium in the framework of an ESA program that allowed member States to support national activities that benefited from ESA management and expertise. *PROBA* was launched in October, 2001 with an Indian rocket. Since then, it has provided 16 meter resolution images from various places on the globe.

To this day, *PROBA* has not been registered by ESA, despite ESA's internal policy on space object registration. As a product of one of its programs, *PROBA* is owned by ESA. The United Nations Office for Outer Space Affairs has identified *PROBA* under an unofficial international code and indicated that it was launched "*for Belgium.*" Since then, Belgium has adopted its national space legislation, establishing a national register for space objects launched by Belgium. The idea of having Belgium register *PROBA* has been submitted to ESA for several reasons. For instance, registration by ESA as an intergovernmental organization would not allow a complete implementation of the principles of the Outer Space Treaty and would not allow a full application of the jurisdiction required by the treatment of Earth observation data.

These considerations are:

(1) Since the registration of a space object by an intergovernmental organization can only occur when accepted under the provisions of the Registration Convention, it is unclear whether such a registration would have the effect foreseen in article VIII of the Outer Space Treaty. Does excluding intergovernmental organizations from becoming a party to the Outer Space Treaty infer that only a State may exercise jurisdiction on space objects? Likewise, can we infer from the reference to article VIII of the Outer Space Treaty in article II, section 2 of the Registration Convention that the ef-

fect of the registration is the same whatever its legal basis?[7]

(2) Justifying the extent of international organizations' jurisdiction on space objects is not the end of the matter. Effective jurisdiction requires competencies that are not attributed to all international organizations. These only have limited competencies that are expressly provided by their statutory treaty, as is the case for ESA. The 1975 ESA Convention exhaustively defines the mission and the purposes for which the Agency has been established.[8] ESA has legal competence to develop, manufacture, launch, and operate space systems and is entitled to adopt internal regulation for those purposes. ESA has no power of law enforcement, no competence for police order or physical protection of goods or persons, *etc*. In 2003, ESA concluded an intergovernmental agreement with its member States to protect and exchange classified information, but the agreement did not grant ESA the ability to enforce the physical protection of people, goods, or data.

There are several issues related to the application of a national jurisdiction – and thus, of national laws – to Earth observation. One issue relates to determining who owns data, which is often achieved through the application of contract law. ESA rules applicable to information, data, and intellectual property provide that data generated by a payload onboard an ESA mission are, in principle, ESA's property. However, a distinction is made between *raw and calibrated data* on the one hand and *processed data* that may constitute intellectual property on the other.

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[7] Art. II, § 2 of the Registration Convention reads in pertinent part: "Where there are two or more launching States in respect of any such space object, they shall jointly determine which one of them shall register the object in accordance with paragraph 1 of this article, bearing in mind the provisions of article VIII of the [Outer Space Treaty]." Registration Convention, *supra* note 6, at art. II, §2.

[8] Convention for the Establishment of a European Space Agency, May 30, 1975, 14 I.L.M. 855.

Another issue relates to the right of access, with specific conditions, to the data. Such a right of access is foreseen in ESA rules, but also considered under the United Nations Principles on Remote Sensing (UNGA Resolution 41/65).[9] Principle XII of UNGA Resolution 41/65 provides that "[a]s soon as the primary data and the processed data concerning the territory under its jurisdiction are produced, the sensed States shall have access to them on a nondiscriminatory basis and on reasonable cost terms. The sensed State shall also have access to the available analysed information concerning the territory under its jurisdiction in the possession of any State participating in remote sensing activities on the same basis and terms, taking particularly into account the needs and interests of the developing countries."[10]

"Primary data" and "processed data" are defined by the resolution respectively as "[…] raw data that are acquired by remote sensors borne by a space object and that are transmitted or delivered to the ground from space by telemetry in the form of electromagnetic signals […]" and as "[…] the products resulting from the processing of the primary data needed to make such data usable."[11]

This distinction is also interesting when assessing the problematic classification of Earth observation data for military or strategic purposes. With the availability of current technology, notably the internet, the sensitivity of the data must be considered upstream from the very moment of their acquisition by the satellite's payload. Encrypted signals are technical means to protect those data, but the question of the applicable jurisdiction at that stage remains: who is the originator of the data? Under which jurisdiction is he performing? Which protection marking will he use?

Be it for the purpose of implementing UNGA Resolution 41/65, or for the purpose of applying classification methods to

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[9] Principles Relating to Remote Sensing of the Earth from Outer Space, Dec. 3. 1986, GA Res. 41/65 (XLII), U.N. GAOR, 29th Sess. 95th Plen. Mtg. , U.N. Doc. A/Res/41/65 (1987) [hereinafter UNGA Resolution 41/65].

[10] *Id.* at princ. XII.

[11] *Id.* at princ. I (b)(c).

the selected data, or for other purposes, the distinction between primary data and processed data, as defined by UNGA Resolution 41/65, is very close to the distinction between jurisdiction under article VIII of the Outer Space Treaty and jurisdiction under article VI of the Outer Space Treaty. Indeed, considering primary data, it is remarkable that the definition does not include their *reception* on Earth. Only the transmission or the delivery is taken into account. This allows considering the production of primary data under the exclusive jurisdiction of the registering State according to article VIII of the Outer Space Treaty. With the production of processed data, it seems logical to consider that phase from the moment of the reception, on the ground, of the primary data until their transformation into a next level's product. This, of course, raises other questions about the line between space activities and non-space activities, and the actual scope of article VI of the Outer Space Treaty: must Google Earth be considered a potential source of a State's international responsibility under that provision?

These considerations lead to the conclusion that the registration of earth observation satellites by intergovernmental organizations might end up in some legal void when it comes to fulfilling the commitments under other provisions of the Outer Space Treaty. The wrongful or criminal use of *PROBA* or of the data it generates could definitely make Belgium and ESA internationally responsible, not only according to article VI of the Outer Space Treaty, but also according to general international law. The elaboration of an appropriate legal framework regulating earth observation activities would be difficult in such a context, since only the national jurisdiction on the satellite can effectively ensure the application of national law to it.

CURRENT STATUS AND RECENT DEVELOPMENTS IN GERMAN REMOTE SENSING LAW

Dr. Bernhard Schmidt-Tedd & Max Kroymann[*]

ABSTRACT

On December 1, 2007, the German Act on Satellite Data Security (Satellitendatensicherheitsgesetz – SatDSiG)[1] came into force. The purpose of the Act is, firstly, to safeguard the security and foreign-policy interests of the Federal Republic of Germany in connection with the dissemination and commercial marketing of satellite-generated earth remote sensing data especially on international markets. Secondly, the Act will create legal certainty for affected companies and enable emerging companies involved in satellite data marketing to determine the operating terms and calculate the risks in new business areas.[2] This paper provides an introduction to the policy background and to the Act as well as a survey of the practical requirements and Germany's first experiences in its administrative implementation.

PART I: POLICY AND CONTEXT OF THE REMOTE SENSING LEGISLATION

A. Development Trend / Background

The need for national space legislation has been under discussion in Germany for several years. The reason for this is the increasing number of space activities operated by the private sector. The Act to give Protection against the Security Risk to

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[*] Please insert short (up to 5 sentences) bio.

[1] The unofficial English translation of the SatDSiG is appended to this paper in the Annex. The German text is also available at http://www.bgblportal.de/BGBL/bgbl1f/bgbl107s2590.pdf.

[2] Drucksache des Bundestages, BT-Drs. 16/4763, p. 1, available at http://dip.bundestag.de/extrakt /16/019/16019379.htm.

the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote Sensing Data, also known by its abbreviated name, the Satellite Data Security Act (SatDSiG), now regulates one area of application of space activities. This legislative initiative is closely linked with the first large-scale Public-Private-Partnership (PPP) projects in the field of earth remote sensing, in particular, in the field of radar observation.

Germany was first faced with the issue of the security relevance of radar data while participating in the bilateral Shuttle Radar Topography Mission (SRTM) Project with the United States in 2000. At that time, first considerations of a data policy were formulated between the Ministry that was then competent (Federal Ministry of Education and Research – BMBF) and the German Aerospace Center (DLR). Initially a system with a unique non-transferable license for the data in question (digital elevation models) was opted for. This enabled the DLR image archive (DFD) to have an oversight on all users, since these were not allowed to further distribute the data without authorization. The system was found to be incompatible with large-scale commercial dissemination as it had been envisaged when preparing the *TerraSAR-X* case.

Telecommunications were the first space application to be completely privatized. In contrast to telecommunications, observation of the Earth is commercially viable only to a limited extent. The funding of operative systems still relies mainly on public demand. Earlier attempts to achieve complete privatization failed.[3] Nevertheless, the aims to exploit the commercial potential of this application and thereby ease the financial burdens on public budgets remain.[4] In Europe, France was the first country to gradually undertake privatization with Spot Image, and with simultaneous linkage to the French national space

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[3] Project 2001 – Legal Framework for Commercial Remote Sensing Activities Workshop, Toulouse, France (Oct. 28, 1998).

[4] Annie Martin-Moreno, *La Privatisation et la Commercialisation appliquées à l´observation de la Terre*, *in* LAURENCE RAVILLON, DROIT DES ACTIVITES SPATIALES 231 (CNRS, Dijon, France, 2004); L. Dufresne, *Le système de distribution français*, *in* S. COURTEIX, DROIT TELEDETECTION ET ENVIRONNEMENT 149 (SIDSE, Antony, France 1994).

agency Centre National d'Etudes Spatiales (CNES).[5] CNES, as grantor of the license, undertakes the security-relevant aspects of monitoring these activities in an informal manner, i.e. without a specific legal instrument in the form of a law or decree. The general competences of CNES are listed in the Act of 1961 establishing the French Space Agency.[6] It was clear, for the German legal position, that the national provisions on export control provide no legal basis for administrative intervention in the free dissemination of satellite data under existing law. Indeed, the provisions strictly apply to items listed in the applicable regulation, and only concern technology, know-how and material. Earth remote sensing data are not included in the listed items and do not constitute "technology," "know-how," or "material."

There is also no general space act in Germany that could provide a legal basis for administrative regulations (license obligations). On the other hand, it was obvious to the persons involved in the preparation of the *TerraSAR-X* Public-Private-Partnership (PPP) project that there was a need for action. For this reason, the objective was to create a concept that would both support the independent industrial commercialization of Earth observation data whilst adequately accommodating vital security interests.

B. PPP Projects as Triggers

Preparations for the SatDSiG took place during the implementation of the *TerraSAR-X* project. To better understand the SatDSiG, several characteristics of the implementation of this first PPP in the field of Earth remote sensing will be considered.

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[5] Pierre-Marie Adrien, *A US-dilemma – Satellite Remote Sensing Privatization*, *in* II (1) SPACE POL'Y 93 (1986); S. Reif, B. Schmidt-Tedd, & K. Wannenmacher, *Report of the `Project 2001´ Working Group on Privatisation*, *in* `PROJECT 2001´- LEGAL FRAMEWORK FOR THE COMMERCIAL USE OF OUTER SPACE 458 (K.-H Bockstiegel ed., Böckstiegel, Cologne 2002).

[6] Loi No. 61-1382 du instituant le Centre National d´Etudes Spatiales (Dec. 19, 1961), analysed in Tedd B. Schmidt, *Staatliches Engagement bei partiell marktfähigen Raumfahrtanwendungen und die Verankerung des öffentlichen Interesses bei kommerziellen Raumfahrtanwendungen*, *in* LIBER AMICORUM KARL-HEINZ BÖCKSTIEGEL 424, 430 (M. Benkö & W. Kröll,Ed., Cologne 2001).

The *TerraSAR-X*-PPP project is based on investment jointly by the public sector (Federal space budget / DLR Space Agency / DLR Research & Development) and the private sector (EADS-Astrium / Infoterra). Even though there is joint investment in the project, the goals pursued (scientific / commercial) are different. There can be no talk of a common enterprise. DLR retains ownership of the satellite. All data obtained are first received by the DFD of DLR. The industrial partner receives a copy of the data, which means that ultimately both parties have a complete set of data in their archives. Contrary to a common misconception, the data are not split between the DLR and industry; instead each partner has a complete set of all data. The only distinction concerns the different rights that the DLR has on the data, as opposed to those of the industry. While DLR holds the exclusive rights to scientific use Infoterra, as an offshoot of EADS-Astrium, holds the exclusive commercialization rights. "Commercial use" includes both the data request of the private as well as of the public sectors. The public funds for *TerraSAR-X* originate from the research and space budgets. Other ministries, who are potential users of the data, had no intention to participate in the investment. The defense and security sectors deliberately decided against any share in investment and reserved the right to purchase data as required on completion of the system. Consequently, data requests of the public sector are part of the commercial business model. Only the scientific use of the data is excluded. This impacts some provisions of the SatDSiG. Even if the security authorities are mere "customers", and not investors, they must obviously be granted priority in ordering and tasking in times of crises. SatDSiG provides for such events. This means that Infoterra must also be prepared for such a situation within the framework of its commercialization concept. In principle, the *TerraSAR-X*-PPP distinguishes between only two categories, i.e. either scientific or commercial use. Also, data required for preventive environmental measures are regarded as user requirements and, therefore, constitute commercial use. Administrations and organizations acting in the public interest should also allocate regular budgets for recurring data requirements. Subsequent investments can only be financed in the long term through the sale of data. In the *Ter-*

raSAR-X-PPP, EADS-Astrium specifically undertook the obligation to finance the successor satellite *TerraSAR-X 2* from its own funds, respectively from revenues generated by the *TerraSAR-X* business case.

For the sake of completeness, it is necessary to add that, in the wake of the 2005 tsunami disaster and the development of the International Charter on Space and Major Disasters (Charter), to which DLR has also acceded, EADS-Astrium has agreed to make data available outside the normal dissemination channels in urgent crises situations. This adds to DLR's potential as a public entity and member of the Charter.

As a result, it can be said that the *TerraSAR-X*-PPP assumes the creation of a proper market for Earth observation data, which is used by public authorities, including defense, domestic security and public services. A system that would prevent the data provider from accessing sensitive data from the outset would therefore not be suitable.

It must also be clearly noted at this point that, based on the underlying legal principles, even data generated using public funds are legally protected. There is no concept under which data funded by public money should be public property *per se* with the result that anyone should have free access to these data. Throughout the entire project-development and preparation phases, great care was taken to prevent this from happening also by means of indirect influences. The extent to which public organizations provide data free of charge or at preferential rates to scientific organizations, for the public benefit or in general is logically a second independent step in the decision-making process.[7] European regulations on the free exchange of data between administrations[8] do not apply to the present PPP

[7] For basic information about data pricing policy, *see* RAY HARRIS, EARTH OBSERVATION DATA POLICY AND EUROPE 100 (West-Sussex, Great Britain 1997).

[8] *E.g.*, Directive 2003/4/EC of the European Parliament and of the Council of January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC, O.J. (L 41/26)(EU); *see* Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 established an Infrastructure for Spatial Information in the European Community (INSPIRE), at Preamble (9): "This directive should not affect the existence or ownership of public authorities' intellectual property rights."; and Preamble (23): The mechanisms for sharing spatial data sets and services between government and other public administrations…should take into account the need to protect

case. Each PPP partner has the right to decide on its own data within the framework of the division of rights (scientific or commercial).

C. Basic Concepts and Policy

Prior to the commencement of its legislation process, Germany took decisions that also reflected the existing situation in Canada. When developing its own *Radarsat-2*, Canada had undertaken, in an intergovernmental agreement with the United States in June 2000, to adopt a security check comparable with the United States' standards. The Bill C-25: Act governing the operation of remote sensing space systems, which followed at the end of 2005, implements the provisions of the agreement in the domestic law system with effect towards non-governmental operators and data providers. Germany could have taken this easier course of action but this would have considerably reduced the ability to allow for German national particularities.

The first of these particularities is that the underlying economic conditions in Germany are entirely different. In the United States, the public sector's demand for data is very high, so that genuine private data requests can be considered merely as a small part of the whole. If the State buys all the data of a data provider at once for security reasons during a crisis situation, this may interfere with the operation of the market but it certainly will not have the same repercussions as in a country with a relatively low public demand and a market primarily for commercial data.

Further particularities include, in some cases, significant differences in the conception of the applicable national legal

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the financial viability of public authorities, in particular those that have a duty to raise revenue."

Art. 1(2) "INSPIRE shall build upon infrastructures for spatial information established and operated by the Member States."

Art. 2(2) "This Directive does not affect the existence or ownership of public authorities' intellectual property rights."

Art. 4(5) "In case of spatial data sets…in respect of which a third party holds intellectual property rights, the public authority may take action under this Directive only with the consent of that third party."

framework. This is true of the concept of a "public good" in the case of data funded with public money, largely entrenched in the United States' legal system. Differences also exist in export-control regulations, which have similar importance for the security check in the case of sensitive Earth remote sensing data. United States' law gives exporters trading privileges and not trading rights.[9] The German law on Foreign Trade and Payments (AWG) is based on the principle of freedom of foreign trade. Approvals for legal transactions, for which a license is required (export list), must be granted if the competent authorities consider that the objectives of the Act are not endangered or only insignificantly so (§ 3.1.1 AWG).

As a result, Germany decided in favor of the more complicated method of drafting its own statute, which not only satisfies national requirements but also the legitimate expectations of international partners. Given the requirements of constitutional law, it was also clear that a purely administrative or informal rule without legal foundation could not be considered.

The following elements were taken into account during the legislation process of the SatDSiG:

- Prevention of an obvious gap between export-control provisions and loopholes in the regulation of security-relevant data.
- Basic principles of the freedom of trade on the one hand, and comprehensible, transparent decisions in case of necessary restrictions on a legal basis on the other hand.
- Support of the development of an autonomous commercial Earth observation data market for private and public users (outside scientific purposes).
- The legal protection of the data of Earth remote sensing PPP Projects, regardless of whether they are publicly or privately funded.

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[9] Jürgen Cloppenburg, *Jüngste Entwicklungen im U.S.-amerikanischen Außenwirtschaftsrecht – Die Regulierung von Hochtechnologie-Exporten und ihr Einfluss auf die betroffenen Wirtschaftszweige am Beispiel der amerikanischen Satellitenindustrie* [New Export Regulations with Regard to High Technology and their Impact on the Satellite Industry in the US], 4 ZLW 510, 514 (2001).

- A security check that does not prevent fast data dissemination and based, if possible, on an automated control procedure.
- Flexible adaptation to changing external conditions through separation into general rules in the statute and adaptable, practice-oriented rules in the implementing regulation.

D. Conformity with U.N. Space Law

According to Article VI (2nd sentence) 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space (Outer Space Treaty), "activities of non-governmental entities in outer space … shall require authorization and continuing supervision by the appropriate State Party to the Treaty." This refers primarily to the operation of the remote sensing satellite but also to the conformity of the private space-system operator with international law, in particular international space law.

More explicitly concerned with remote sensing is the United Nations General Assembly Resolution 41/65 on "Principles Relating to Remote Sensing of the Earth from Outer Space,"[10] adopted on December 3, 1986.

Although the Resolution of the General Assembly as a catalogue of principles is not internationally binding, it ended years of discussion with consensus between the States. It is therefore the guiding principle for the practice of Earth remote sensing and was, accordingly, considered in the preparation of SatDSiG and in the development of the *TerraSAR-X*-PPP concept. The core principle is the confirmation of the "open-sky policy", in return of which, Principle XII of the 1986 Remote Sensing Principles states: "As soon as the primary data and the processed data concerning the territory under its jurisdiction are produced, the sensed State shall have access to them on a non-discriminatory basis and on reasonable cost terms."

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[10] *See* THE UN PRINCIPLES RELATING TO REMOTE SENSING OF THE EARTH FROM SPACE: A LEGISLATIVE HISTORY (Joanne Irene Gabrynowicz, ed., Mississippi 2002).

In theory, it could be asked whether restrictions on the dissemination of data for security-relevant reasons affect this principle. However, Principle III provides limitations to remote sensing activities: "Remote sensing activities shall be conducted in accordance with international law, including the Charter of the United Nations." The criteria of Section 19 (2) SatDSiG (Permit) – "if the dissemination of data in the individual case does not harm the vital security interests of the Federal Republic of Germany, does not disturb the peaceful coexistence of nations and does not substantially impair the foreign relations of the Federal Republic of Germany" – is fully in line with the inherent limits of remote sensing and the rights resulting therefrom.

The provisions of the *TerraSAR-X*-PPP and SatDSiG, favorable to commercial dissemination, create *de facto* a wide database accessible to all third persons on a non-discriminatory basis. Without a sensitivity check, such open dissemination would not be feasible. A totally uncontrolled commercial dissemination of Earth remote sensing data would also not be in conformity with Article VI of the Outer Space Treaty.

Moreover, when implementing the *Terra-SAR-X*-PPP, care was taken to ensure that no areas are intentionally "blacked out" from the available data map i.e. it is impossible for a customer to prevent a third person from accessing data about a specific region. This limitation of contractual freedom in the dissemination of commercial data is the specific result of the observation of remote sensing principles.

PART II: SATELLITE DATA SECURITY ACT

A. Background – Legislative Process

1. Technical Development Particularly in Germany

Over the last few years, great advances were achieved in the technical capabilities of remote sensing sensors and significant progress was made in satellite design. As a result, there was great improvement in space-borne remote sensing data and data products. At the same time, the fields of application of the data, the data products, and the geographical information ac-

quired with the data became broader and the instruments to manage and to distribute this information advanced to a similar extent. The quality and the availability of geographical information increased enormously.

With the launch of the German *TerraSAR-X* satellite (up to 1 meter spatial resolution radar satellite with all-weather and day/night observation capabilities; launched June 15, 2007) and the *RapidEye* satellite constellation (multispectral optical observation with a high revisit frequency; launch scheduled for the first half of 2008), Germany will assume an important role in Europe in the field of satellite-based earth remote sensing. This position will be further expanded with even more capable next-generation systems that are already in advanced project phases: *TanDEM-X* (interferometric radar satellite system with three-dimensional observation capabilities; launch in 2009) and *EnMAP* (hyperspectral optical imaging satellite; to be launched in 2011). This progress in remote sensing technologies will be used for a broad distribution of such data for commercial and scientific purposes.

2. Need for Legislative Action

The quality of the acquired space-borne remote sensing data is such that, until recently, it could only have been produced by classified military and intelligence-service satellites and used exclusively in that closely defined environment. As a broad distribution of such data for commercial and scientific purposes is intended, the accessibility of the data is essential. Therefore a secrecy scheme, as it is applies to military remote sensing systems, would be disadvantageous.

Whereas the greater part of the information acquired with a high-resolution remote sensing system is obviously not associated with any risk, some of this information may nevertheless be detrimental to national security or the foreign-policy interests of States.[11] So it is not primarily the data that endanger national security and foreign policy interests, but rather the

[11] Volker Liebig & Kai-Uwe Schrogl, SPACE APPLICATIONS AND POLICIES FOR THE NEW CENTURY 132 (Frankfurt 2000).

combination of the information about a certain area obtained by a certain person and the timing of dissemination. This means, for example, that nothing within Google Earth is detrimental to national security interests, even though the database is accessible to everyone and some data are of very high resolution. However, the information in this database was gathered months and years ago.

Thus, it is necessary to distinguish between the minor portion of the data potentially detrimental to national security or to foreign-policy interests and the remainder, which can be distributed or commercialized without risk. The German Act on Satellite Data Security provides a system to achieve this distinction. Therefore the Act closes the gap in the legislative framework because, unlike the export of the corresponding satellites or related technologies, there are no rules governing the distribution or transfer of satellite data or images and export-control regulations make no provision for such data products.

Giving transparency and certainty to companies, the Act aims to enable German operators to translate satellite applications into commercially viable business models and enter new sales markets.

The German government established a policy to safeguard national security and foreign-policy interests in the dissemination of high-resolution satellite data in 2004/05. Based thereon, the Federal Ministry of Education and Research presented a first draft bill in mid 2005. During the period of consultation with other ministries – in particular the Ministry of Defense, the Ministry of Foreign Affairs and the Ministry of the Interior - the German government was reorganized. Therefore this legislation was assigned to the Ministry of Economics and Technology, which introduced a final draft in the cabinet of ministers in January 2007.

B. Contents of the Act

The Act introduces regulations for the operation of a remote sensing system, for the data provider and the dissemination of the remote sensing data. The Act is intended firstly to cover "high-grade" space-based earth remote sensing systems and to

establish a clearly defined and transparent procedure for the dissemination of earth remote sensing data. "High-grade" Earth remote sensing systems within the meaning of the Act are systems capable of acquiring data of particularly high information content. The criteria assessed to determine whether systems have such capabilities include spatial resolution, spectral coverage, the number of spectral channels, and spectral resolution. Other factors that may play a role in the case of microwave and/or radar sensors are radiometric and temporal resolution, polarization features and phase history.

The backbone of the Act is the establishment of a control procedure for the dissemination of satellite data/images from such high-grade earth remote sensing systems. The Act therefore defines dissemination as bringing data into circulation or making data accessible to third parties. It consequently pertains to primary data providers such as the Infoterra company or the German Remote Sensing Data Center (one of the DLR's cluster institutes), but generally not to typical remote sensing service providers, value-adding firms, or data resellers.

The primary data provider is obliged to review requests for data transactions on a case-by-case basis. This sensitivity check is a key mechanism of the Act. If the data provider finds that the request is sensitive, the case must then be examined by government authorities, which then decide whether to issue or deny authorization.

1. Dissemination of the Data

The essential element of the Act is a two-phase procedure: the sensitivity check undertaken by the data provider and the granting of the permit by the responsible authority. The reason is that the anticipated large number of data requests would make it infeasible for the authorities to review each request; the effort required and the time needed would be excessive and it could result in a lack of efficiency and an impairment of commercialization. The two phases of the review may be described as follows:

The first phase is the sensitivity check of specific data requests that the data provider carries out in accordance with set

procedure and clearly defined criteria with no room for discretionary assessment (Section 17). The check is conducted to determine any potential endangerment of security. The criteria for the sensitivity check take account of the technical parameters and factors such as the observed target area, the customer requesting the data, the country of destination for the data products, and the length of time between data acquisition and the processing of the data request. Where the review classifies the specific data request as non-sensitive, the data provider can provide the requested data products without additional consideration by the responsible authority (Federal Office of Economics and Export Control - BAFA[12]) or allow the download of the data to a receiving station of the customer.

Only where the data provider's check classifies the customer data request as sensitive is the provider initially prohibited from complying with the customer's request. The data provider may, however, apply for consideration by the Federal Office in a second-phase review if it nevertheless wishes to comply with the request (Section 19). The Federal Office then conducts a case-specific review to determine whether the customer request would endanger the security of the Federal Republic. If the risk is ruled out, a permit is issued for the data provider to comply with the request. Another possible result of the review is to rule out a risk if the data request is altered slightly, for example, lowered resolution, time delay, reduced processing quality of the data, or the omission of certain target areas. In such cases, the authorities issue conditional authorizations. If a risk is ultimately sustained despite potential conditions, compliance with the data request remains prohibited. To impair commercial transactions no more than necessary, the Federal Office is required by law to decide on requests within a short period of time (maximum one month).

2. Licensing of Remote Sensing Systems

If a space-based Earth remote sensing system (normally a satellite with Earth remote sensing sensor) is considered to be a

[12] Abbreviation of "Bundesamt für Wirtschaft und Ausfuhrkontrolle."

high-grade system, Section 3 of the Act requires the operator to obtain a license from the Federal Office of Economics and Export Control (BAFA). The criteria determining the high-content nature of the Earth remote sensing system are listed in Section 2(2), inter alia, as the system's capabilities for spatial resolution, spectral coverage, and spectral and temporal resolution. These aspects are defined more precisely in a statutory ordinance.

Pursuant to Section 4, security requirements must be met both by the responsible persons and by the enterprise in order to obtain a license for operations. In addition to the operator, the persons who have access to the essential operational elements of the system must be considered reliable. To allow a better assessment of reliability, a basic security check is carried out in accordance with the Security Clearance Check Act (SÜG). The operational premises must be adequately secured to prevent unauthorized entry and the transmission of commands to the satellite must be safeguarded by means of strong encryption. In this connection, procedures certified by the BSI[13] are used.

In addition, the operators are subject to detailed documentation and information obligations, allowing the responsible government authorities at all times to form a picture of the activities of the operator (Sections 5 - 7). In addition, the government authorities are authorized, as is usual in commercial law, to inspect operators' premises and convince themselves on-site that operators are conducting themselves in accordance with the regulation (Section 8). A general clause entitles the responsible government authorities to take such measures as are necessary to ensure lawful operations or to prohibit operations (Section 9).

3. Licensing of the Data Provider

Those wishing to disseminate the data of a high-grade Earth remote sensing system must obtain a license. The requirements imposed on the licensee by the Act are comparable

[13] BSI is the abbreviation of "Bundesamt für Sicherheit in der Informationstechnik“ (Federal Office for Information Security).

to those imposed on the operator in Section 4 (Section 12), see above point 2.

4. Scope of Application

The scope of application (Section 1) has been extensively defined in order to avoid gaps or possibilities of circumvention. At the same time, it has been limited closely by technical characteristics and thus produces accurate effects. The Act covers all German citizens and organizations under German law. It also covers those foreign enterprises either domiciled in or essentially exercising effective control over their operations within Germany's Territory. That means that all enterprises are covered for which the Act can be effectively enforced.

The scope of application is also restricted to high-grade remote sensing systems. These are systems, which are technically able to generate data, which may be detrimental to national security or to foreign-policy interests. The criteria therefore are given in the Act (Section 2) (spatial resolution, spectral coverage, number of spectral channels etc.) while the precise limits of these criteria are given in the statutory ordinance.

Military and intelligence-service satellites do not fall within the scope of application of the Act; their data are appropriately kept secret by the government authorities, which operate the satellites. Moreover, such systems are or may be exempted if they are subject to comparable foreign-security arrangements with respect to protected property.

Since the scope of application of the Act specifically targets space-based earth remote sensing systems, it has no effect on communications and navigation satellites, on applications for use in conjunction with earth remote sensing data, or on the acquisition and distribution of air-based earth remote sensing data.

5. Other Regulations

With regard to the protection of high-ranking interests of the government, the Act will reserve a right of prior tasking for governmental purposes as well as a right of prior dissemination

of data to the government. These governmental rights will be restricted to rare cases of national crisis.

To insure that no risks arise when foreign nationals acquire an operating company or shareholdings in an operating company, or the earth remote sensing system, such transactions are restricted by Section 10 by imposition of a reporting and licensing requirement. Foreigners can more easily avoid supervision, access, and possibly criminal prosecution. Finally, a number of definitions of administrative and criminal offences have been included in the Act (Sections 28 and 29). This has been done to insure observance of the Act. They are aimed at satellite operators and data providers.

C. Implementation and Experiences

1. Practical Implementation

The most relevant aspect of the practical implementation of the Act is the definition of the criteria to identify the high-grade earth remote sensing system and the criteria for the sensitivity check, both given in the statutory ordinance. As the statutory ordinance has not come into force yet, the criteria have not yet been precisely determined at the present time. Nevertheless, it is possible to outline the basic principles.

The criteria used to identify the high-grade system will be spatial resolution in conjunction with the technique used by the remote sensing sensor to generate the data. The remote sensing sensors are classified into different types: optical sensors, radar sensors, infrared sensors, and multi-/hyperspectral sensors. To be regarded as a high-grade system, a multi-/hyperspectral sensor needs the least spatial resolution and an optical sensor needs the highest spatial resolution of the types. The spatial resolution of radar and infrared sensors lies between the extremes. As the criteria are determined with regard to the international situation and the availability of remote sensing data, remote sensing systems with capabilities like *Radarsat-1*, *Spot 5* or *Landsat* would probably not be classified as high-grade, whereas capabilities of systems like *Radarsat-2*, *Quickbird* or *Ikonos* would probably be classified as high-grade.

The criteria for the sensitivity check - observed target area, spatial resolution, the customer requesting the data, the country of destination for the data products, and the length of time between data acquisition and the processing of the data request – will be implemented in a listing system. As a result, data requests of NATO member states will not be sensitive in most instances. As regards target area, very high resolution data of some regions will be excluded for almost all customers, for example, regions with military-operation zones. Technical parameters like spatial resolution will be defined with regard to the definition of the high-grade remote sensing systems. Transactions of data capable of being generated by a non high-grade system will not be sensitive.

If the data provider's check classifies the customer data request as sensitive, the transaction is not prohibited, but the provider must apply for a permit from the Federal Office of Economics and Export Control.

2. Administrative Experience

The German radar satellite *TerraSAR-X* is the first space object affected by the Act. From the time of the satellite's launch in June 2007, the satellite operations and the generation and dissemination of the data were governed by a contractual regime between the German Ministry of Economics and Technology and the German Aerospace Center (DLR) as satellite operator/data provider and Infoterra as data provider. The contractual regime was designed as an analog to the Act to safeguard the security and foreign-policy interests during the commissioning of the satellite and to reduce the complexity of the period of transition, when the Act comes into force. Due to the contractual regime, administrative experience is based on more than 2000 sensitive data requests. Taking account of the fact that the *TerraSAR-X* satellite became ready for operation in 2008, the number of data requests is relatively high. Moreover, about 99 percent of the applications for permits could be granted. These statistics indicate, firstly, the high demand for *TerraSAR-X* data and, secondly, that the criteria of the sensitivity check in the contractual regime were possibly having too restricting of an

effect. However, this effect was anticipated somehow, because the satellite was commissioned at the same time as the implementation of its regulatory framework with a rather large safety margin. The experience gathered will be applied when determining the criteria of the sensitivity check in the forthcoming statutory ordinance, so that the criteria support the dissemination of data.

2590 Federal Gazette (BGBl.) Year 2007 Part I No. 58, issued in Bonn on 28 November 2007

Act to give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote Sensing Data (Satellite Data Security Act — SatDSiG)

of November 23, 2007

Unofficial Translation

The Federal Parliament (Bundestag) has passed the following Act:

Outline of contents

Part 1
Scope of Application

Section 1

Scope of Application

(1) This Act applies

1. to the operation of high-grade earth remote sensing systems

a) by German nationals or by legal persons or associations of persons under German law,

b) by foreign legal persons or foreign associations of persons with their head office within the territory of the Federal Republic of Germany, or

c) if inalterable sequences of instructions to command the orbital system are transmitted from within the territory of the Federal Republic of Germany;

2. to the handling of data generated by a high-grade earth remote sensing system as described in Number 1 until the moment of their dissemination

a) by German nationals or by legal persons or associations of persons under German law,

b) by foreign legal persons or foreign associations of persons with their head office within the territory of the Federal Republic of Germany, or

c) where the data are disseminated from within the territory of the Federal Republic of Germany.

(2) This Act does not apply to the operation of high-grade earth remote sensing systems by a State agency with military or intelligence duties, provided that the possibility of unauthorized third parties gaining knowledge of the generated data is excluded. This Act may not be applied to the operation of a high-grade earth remote sensing system that is permitted under the applicable law of another Member State of the European Union and the latter is comparable to

the provisions and to the protected interests of this Act. The responsible authority may waive the application of the Act if the legal provisions of a third country satisfy the requirements of Sentence 2 and if there is an international treaty between the third country and the Federal Republic of Germany which affirms the comparability of the provisions and protected interests.

Section 2

Definitions

(1) For the purposes of this Act

1. The "Operator" is the person who has the control of the earth remote sensing system under his own responsibility;

2. "Data" are signals from one or more sensor(s) of an orbital or transport system and all products derived from the same, regardless of their degree of processing and their type of storage or representation; a unit of data for the purpose of Section 27 is each individual detail;

3. The "Data Provider" is any person who disseminates data generated by a high-grade earth remote sensing system;

4. A "high-grade earth remote sensing system" is a space-based transport or orbital system, including the ground segment, by means of which data about the earth are generated, where its sensor is itself/sensors are themselves technically capable either alone or in combination with one or more other sensors of generating data with a particularly high information content within the meaning of Para (2);

5. A "sensor" is a part of a space-based earth remote sensing system, which records electromagnetic waves of all spectral ranges or gravimetric fields;

6. "Dissemination" means bringing data into circulation or making data accessible to third parties.

(2) The Federal Ministry of Economics and Technology shall determine by statutory ordinance without the consent of the

Federal Council the conditions under which data have particularly high information content. The information content shall thereby be determined according to

1. geometric resolution,

2. spectral coverage,

3. the number of spectral channels and the spectral resolution,

4. the radiometric resolution and

5. the temporal resolution.

The information content of microwave sensors or radar sensors shall also be determined according to

1. the polarization characteristics and

2. the phase history.

The provisions consider the possible effects of disseminating data with particularly high information content on the vital security interests of the Federal Republic of Germany, the peaceful co-existence of nations and the foreign relations of the Federal Republic of Germany.

Part 2

Operation of a high-grade earth remote sensing system

Section 3

Operator license

(1) The operation of a high-grade earth remote sensing system requires an operator license.

(2) Subsequent alterations of the operator license are permitted if this is necessary to ensure that the requirements for the operator license are adhered in the event of subsequent occurrences or an amended legal provision.

(3) This does not affect the requirements made by other statutes on the operation of a high-grade earth remote sensing

system. The operator license is granted without prejudice to the private rights of third parties.

(4) If a space-based earth remote sensing system is not high-grade, the responsible authority shall affirm the same on application by the operator. If the need for an operator license is subsequently dispensed with by amendment of the provisions of Section 2(2), the operator license is extinguished.

Section 4

Operator license requirements

(1) Operator license shall be granted if

1. the operator of the high-grade earth remote sensing system possesses the requisite degree of reliability,

2. the sequences of instructions to

a) command the orbital or transport system,

b) control of the sensor(s),

c) control of the transmission of data by the orbital or transport system to a ground segment of the Operator or to a person admitted under Section 11 and

d) control of the dissemination of data directly by the orbital or transport system

are produced within the Federal Republic of Germany and protected against alteration by third parties by means of a method tested and declared suitable by the Federal Office for Information Security (BSI),

3. the transmission of the data by the orbital or transport system to a ground segment of the operator or to a person admitted under Section 11, the transmission of data between various locations of the ground segment of the operator, and transmission of the data by the operator to a person admitted under Section 11, are protected from becoming known to unauthorized third parties by means of a method tested and declared suitable by the Federal Office

for Information Security (Bundesamt für Sicherheit in der Informationstechnik - BSI), and

4. the operator has taken technical and organizational measures preventing unauthorized persons from gaining access to the command installations of the high-grade earth remote sensing system and to the installations for receiving, processing and storing the data and entry to the control rooms used for the same.

(2) The operator shall arrange for persons having access to the command installations of a high-grade earth remote sensing system or to the installations for receiving, processing and storing the data of such systems to undergo a simple security check in conformity with the Security Check Clearance Act (Sicherheitsüberprüfungsgesetz - SÜG) which is performed by the responsible authority.

Section 5

Obligation of documentation

The operator of a high-grade earth remote sensing system is obliged to record

1. the sequences of instructions to command the orbital or transport system,

2. the sequences of instructions to control the sensor(s),

3. details of encryption processes, codes used and code management and

4. the time and path of the command sequences.

The records under Para. (1) shall be filed for at least five years after execution of the relevant command sequence and be made available for inspection by the relevant authority.

Section 6

Obligation of notification

(1) The operator of a high-grade earth remote sensing system shall notify the responsible authority in writing without delay of

1. Changes in facts which it is obliged to notify to the commercial register (Handelsregister) or register of associations (Vereinsregister), and

a) if the operator is organized under the legal form of a partnership, changes in the articles of partnership or

b) if the operator is organized in the legal form of a limited-liability company (GmbH), changes in the persons of the corporate members or in the extent of their participation,

2. Actual indications that a third party is transmitting or attempting to transmit the sequences of instructions to command the orbital or transport system, to control the sensor(s) or to control the transmission of data from the orbital or transport system, and

3. any changes made to the measures taken under Section 4 (1) No. 4.

(2) The operator of a high-grade earth remote sensing system shall notify the responsible authority without delay in writing of the persons admissible under Section 11 to whom he transmits data.

Section 7

Obligation to provide information

(1) The operator of a high-grade earth remote sensing system shall provide the responsible authority with information on demand and submit documents, if this is required to monitor adherence to this Act and the statutory ordinances passed under this Act.

(2) Persons obliged to provide information may refuse to answer any questions if the answers would expose those persons or relatives of those persons as defined in Section 383(1) Nos. 1 to 3 German Code of Civil Procedure (Zivilprozessordnung - ZPO) to the risk of criminal prosecution or to proceedings under the statute on administrative offenses (Gesetz über Ordnungswidrigkeiten - OWiG).

Section 8

Rights of entry and examination

The officers of the responsible authority are authorized to gain entry to the business and operating premises of the Operator of a high-grade earth remote sensing system during normal business and operating hours and to undertake the examinations required in performance of their duties; Sections 196, 197 (1) Sentences 1 and 2 and (2), Section 198, Section 199(2) and Sections 200 to 202 German Tax Code (Abgabenordnung - AO) apply mutatis mutandis.

Section 9

Measures of the responsible authorities

(1) The responsible authority can take measures that are necessary towards the operator of a high-grade earth remote sensing system in the individual case to ensure the due performance of the operator's obligations.

(2) The responsible authority can, in particular

1. temporarily prohibit the transmission of data to a ground segment or to a person admitted under Section 11 or

2. order that operation be transferred wholly or in part to a special commissioner.

(3) The operator of the high-grade earth remote sensing system pays the costs incurred for the appointment of the special commissioner including the compensation payable to the same. The responsible authority determines the amount of compensation.

Section 10

Acquisition of enterprises and participating interests in enterprises; business takeovers

(1) The acquisition of an enterprise that operates a high-grade earth remote sensing system or the acquisition of a direct or indirect participating interest in such an enterprise by

1. foreign nationals or by legal persons or associations of persons under foreign law, or

2. legal persons or associations of persons under German law in which foreign nationals or legal persons or associations of persons under foreign law hold at least 25 per cent of the voting rights

shall be notified to the responsible authority by the buyer without delay. This does not apply if, after acquiring the share, the buyer's direct or indirect share of voting rights in the relevant enterprise does not attain the level of 25 per cent. When calculating the buyer's share of voting rights, the shares of other enterprises held in the enterprise to be acquired shall be attributed to the buyer if the buyer holds at least 25 per cent or more of the voting rights in these other enterprises. The responsible authority can prohibit the acquisition within one month of receiving the complete documents governing the sale, if this is necessary to safeguard the vital security interests of the Federal Republic of Germany.

(2) The complete or partial takeover of the operation of a high-grade earth remote sensing system or parts thereof requires a permit if the takeover dispenses with the need for an operator license under Section 3(1). The acquirer shall apply for the granting of the permit. The permit shall be granted if the further operation of the high-grade earth remote sensing system or of parts of the high-grade earth remote sensing system does not endanger the vital security interests of the Federal Republic of Germany.

Part 3
Dissemination of data

Chapter 1
General requirements

Section 11

Dissemination license

(1) A data provider wishing to disseminate data requires a dissemination license.

(2) Subsequent alterations of the dissemination license are permitted if this is required in order to ensure that the requirements for the dissemination license are adhered to in the event of subsequent occurrences or an amended legal provision.

Section 12

Dissemination license requirements

(1) The dissemination license shall be granted if

1. the data provider possesses the requisite degree of reliability,

2. the data provider has taken technical and organizational measures preventing unauthorized persons from gaining access to the installations for receiving, processing or storing the data of a high-grade earth remote sensing system or entry to the control rooms used for the same.

3. The transmission of the data between various locations of the ground segment of the data provider and the transmission of the data to a different data provider are protected from becoming known to unauthorized third parties by means of a method tested and declared suitable by the Federal Office for Information Security (BSI) and

4. the dissemination of the data generated by a high-grade earth remote sensing system is guaranteed to be secure according to the state of the art.

(2) The data provider shall arrange for persons having access to the command installations of a high-grade earth remote sensing system or to the installations for receiving, processing and storing the data of such systems to undergo a simple security check in conformity with the Security Clearance Check Act (Sicherheitsüberprüfungsgesetz - SÜG) undertaken by the responsible authority.

Section 13

Obligation of notification

The data provider shall notify the responsible authority without delay in writing

1. of changes in facts which it is obliged to notify to the commercial register (Handelsregister) or register of associations (Vereinsregister), and

a) if the data provider is organized under the legal form of a partnership, any changes in the articles of partnership or

b) if the data provider is organized in the legal form of a limited-liability company (GmbH), changes in the persons of the corporate members or in the extent of their participation,

2. of any changes made to the measures taken under Section 12 (1) No. 2 and

3. of any actual indications that the security of data generated using a high-grade earth remote sensing system is not maintained.

Section 14

Obligation to provide information

(1) The data provider shall provide the responsible authority with information on demand and submit documents if this is required for monitoring adherence to this Act and the statutory ordinances passed under this Act.

(2) The data provider may refuse to answer any questions if the answers would expose that person or a relative of that person as defined in Section 383(1) Nos. 1 to 3 of the German Code of Civil Procedure (ZPO) to criminal prosecution or to proceedings under the statute on administrative offenses.

Section 15

Rights of entry and inspection

The officers of the responsible authority are authorized to gain entry to the business and operating premises of the data provider during normal operating and business hours and to undertake the examinations required in performance of their duties; Section 196, Section 197(1) Sentence 1 and 2 and (2), Section 198, Section 199(2) and Section 200 to Section 202 of the German Tax Code (Abgabenordnung - AO) apply mutatis mutandis.

Section 16

Measures of the responsible authorities

The responsible authority can order the data provider in the individual case to take the measures required for due performance of the data provider's duties. It may, in particular,

1. require the dissemination of the data to be adapted to the state of the art, or

2. temporarily prohibit the dissemination of data.

Chapter 2

Process of data dissemination

Section 17

Sensitivity check

(1) The data provider who wishes to comply with a request for the dissemination of data of a high-grade earth remote sensing system shall examine the request for its sensitivity as defined in the statutory ordinance under Para. (3).

(2) A request is sensitive if

1. the information content of the data obtained as a result of the sensor-operating mode used and form of processing used,

2. the target area represented by the data,

3. the time of generation of the data and the period of time between generation of the data and compliance with the request and

4. the ground segments to which the data are to be transmitted,

when viewed as a whole, reveal the possibility of harm being caused to the vital security interests of the Federal Republic of Germany, to the peaceful co-existence of nations or to the foreign relations of the Federal Republic of Germany. The view as a whole according to Sentence 1 takes account of the personal characteristics of the requesting party and should take account of the persons who prospectively come into contact with the data as provided for in the request, including their usual places of residence. The data provider shall check the identity of the requesting party in suitable manner and require the names of the persons who prospectively come into contact with the data as provided for in the request, including their usual places of residence.

(3) The Federal Ministry of Economics and Technology shall, by agreement with the Federal Ministry of Defense, the Foreign Office and the Federal Ministry of the Interior, determine provisions in a statutory ordinance without the consent of the Federal Council regarding the conditions under Para (2) in which there is

a possibility of harm being caused to the aforementioned interests requiring protection. It also takes account of the decisions of the authorities concerned, regarding the security requirements that have to be updated at regular intervals, the obligations assumed and agreements entered into by the Federal Republic of Germany with the Member States of the European Union, the parties to the North Atlantic Treaty of April 4, 1949 (federal gazette BGBl. 1955 II p. 289) as amended by the Protocol of October 17, 1951 (federal gazette BGBl. 1955 II p. 293) and Australia, Japan, New Zealand and Switzerland, the state of the art with regard to the generation of data with particularly high information content, the existing rules under which the requesting party could further transmit the data and the availability of comparable data on international markets. It is necessary to define in the statutory ordinance the procedure according to which the view as a whole required by Para (2). Sentences 1 and 2 is to take place. The statutory ordinance shall not give the Data Provider any scope for own discretion as to whether a request is sensitive. The Data Provider may be notified of forthcoming amendments of the statutory ordinance. The Federal Ministry of Economics and Technology can, by agreement with the Federal Ministry of Defense and the Foreign Office, transfer the authority wholly or partly to the Federal Office of Economics and Export Control (Bundesamt für Wirtschaft und Ausfuhrkontrolle - BAFA) by statutory ordinance without the consent of the Federal Council.

Section 18

Obligation of documentation

(1) The data provider is obliged to record all requests for the dissemination of data of a high-grade earth remote sensing system. This covers

1. the actual request including the persons who prospectively come into contact with the data as provided for in the request and their usual places of residence,

2. checking the identity of the requesting party,

3. the procedure and the results of the check of the sensitivity of the request under Section 17 (1) in conjunction with the provisions of a legal ordinance under Section 17 (3),

4. the data-generation order placed with the Operator of the high-grade earth remote sensing system,

5. the receiving logs of ground segments,

6. the details of encryption processes, codes used and code management,

7. the reports of the processing sequences of the ground segment,

8. the meta data of the data, in particular, target area, time of generation of the data, sensor operating mode and data-processing parameters,

9. the transfer logs or delivery notes including delivery confirmations with regard to compliance with the request and

10. the invoices.

Sentences 1 and 2 Nos. 4 to 10 apply mutatis mutandis if data are disseminated without a request. If a request for the dissemination of data of a high-grade earth remote sensing system is executed out of an archive, a reference to the other logs and documentation suffices for the logging and documentation purposes of Sentence 2 Nos. 4 and 5.

(2) The records under Para (1) shall be filed for at least five years after generation of the relevant data and be held available for inspection by the responsible authority.

(3) The data provider is obliged to have ready similar products and documentation of third-party ground segments, which he has used in complying with the request for dissemina-

tion of data of a high-grade earth remote sensing system. Para (2) applies mutatis mutandis.

(4) The data provider shall notify the requesting party of the storage of the data and the possibility of inspection by the authorities.

Section 19

Permit

(1) If a data provider wishes to comply with a sensitive request, he requires a permit. This also applies in the event that he wishes to disseminate data of a high-grade earth remote sensing system without a request.

(2) The permit of Para (1) shall be granted if the dissemination of data in the individual case does not harm the vital security interests of the Federal Republic of Germany, does not disturb the peaceful co-existence of nations and does not substantially impair the foreign relations of the Federal Republic of Germany.

(3) The responsible authority should decide on the application for the permit within one month of its receipt at the latest.

(4) The permit is granted without prejudice to the private rights of third parties.

Section 20

Collective permit

The responsible authority may grant a collective permit if the data provider wishes

1. to make representations of data with strongly reduced information content or meta data available to anyone or

2. to comply with sensitive requests made by the same person for an indefinite number of quantities of data of a high-grade earth remote sensing system.

The collective permit is granted subject to the conditions of Section 19(2) and may only be granted if a right of revocation is reserved. A collective permit as per Sentence 1 No. 1 shall determine the maximum information content that the data may have. A collective permit under Sentence 1 No. 2 may only be granted for a specific period, which should not exceed three years.

Part 4

Priority compliance with requests from the Federal Republic of Germany

Section 21

Obligations of the Data Provider

The data provider is obliged to give priority to complying with requests for the dissemination of data from the Federal Republic of Germany, represented by the Federal Chancellery, over all other requests, in the following cases:

1. in the event of the casus foederis in accordance with Article 5 of the North Atlantic Treaty of April 4, 1949 (federal gazette BGBl. 1955 II p. 289) as amended by the Protocol of October 17, 1951 (federal gazette BGBl. 1955 II p. 293),

2. in case of defense as per Article 115 letters a to German Basic Law (GG),

3. if the requirements for the internal state of emergency as per Article 91 Basic Law are satisfied,

4. in the event of tension as per Article 80a of the Basic Law or

5. if there is a current danger to military or civil forces of the Federal Republic of Germany deployed in a foreign country or to employees of the diplomatic service employed at German foreign embassies, who are working to counter a concrete impairment to the external security of the Federal Republic of Germany.

Section 22

Obligations of the Operator

The operator of a high-grade earth remote sensing system is obliged, in the events of Section 21, to give priority treatment to orders for the generation of data for the Federal Republic of Germany over all other orders for the generation of data. Without prejudice to Sentence 1, the request for earth remote sensing from the Federal Republic of Germany, represented by the Federal Chancellery, should be made to a data provider. If the request is nevertheless made to the operator of a high-grade earth remote sensing system, the operator does not require any license under Section 11 for the dissemination of these data.

Section 23

Remuneration

(1) Without prejudice to the obligations arising under this Part, remuneration may be required for the generation of data under Section 22 and for compliance with the request under Section 21. The remuneration should correspond to the relevant average market price.

(2) All further claims against the Federal Republic of Germany are excluded.

Part 5

Implementing regulations

Section 24

Responsibility

(1) The responsible authority under this Act, subject to Paras 2 and 3, is the Federal Office of Economics and Export Control (BAFA).

(2) Responsible for performing a security check under Section 4 (2) and Section 12 (2) is the Federal Ministry of Economics and Technology.

(3) A notification under Section 10 (1) Sentence 1 is made to the Federal Ministry of Economics and Technology. The Federal Ministry of Economics and Technology, by agreement with the Foreign Office and the Federal Ministry of Defense, is responsible for prohibiting the acquisition of enterprises or shares in enterprises under Section 10 (1) Sentence 4.

Section 25

Procedure

(1) An operator license under Section 3(1), a dissemination license under Section 11(1) and a permit under Section 10(2) Sentence 1, Section 19(1) Sentences 1 and 2 and under Section 20 Sentence 1 each require submission of a written application. A notification under Section 10(1) Sentence 1 shall be made in writing. An application or a notification shall be accompanied by the documents required to examine the conditions for granting the application.

(2) The Federal Office for Information Security (BSI) shall be consulted at an early stage to determine the suitability of a method under Section 4(1) Nos. 2 and 3 and Section 12(1) No. 3. The BSI provides the applicant with documents on the contents and procedure of the examination.

(3) Orders issued by an administrative authority under this Act shall be issued and served in writing.

Section 26

Fees and expenses

The responsible authorities charge fees and expenses for official acts under this Act. The Federal Ministry of Economics and Technology is empowered to determine in a statutory ordinance without the consent of the Federal Council the fee headings, fee amounts and the expenses to be refunded and to provide for fixed rates or outline rates. The fee rates shall be set in such a way as to cover the costs associated with the official acts.

The significance, economic value or other utility value of the official act to the beneficiary will be given due consideration.

Section 27

Transmission of personal data, operating and business secrets

(1) The responsible authority can transmit personal data which have become known to it in the performance of its duties under this Act to other authorities if it believes that the knowledge of such personal data is required

1. to avert an endangerment to the vital security interests of the Federal Republic of Germany or to prevent a disturbance of the peaceful coexistence of nations or a substantial disturbance of the foreign relations of the Federal Republic of Germany or

2. to prevent or to prosecute criminal offenses.

Transmission under Sentence 1 No. 2 is permitted only if there is actual cause to assume that criminal offenses have been committed or will be committed in the future. Furthermore, the responsible authority may transmit these personal data to the federal intelligence agency (BND) if the requirements of Section 8(3) of the BND statute (BND-Gesetz) are met. The third party to whom the personal data are to be transmitted may only use these data for the purpose for which they have been transmitted.

In criminal proceedings for a breach of this Act, courts and public prosecutors may transmit personal data to the highest federal authorities only if this is required to avert an endangerment to the vital security interests of the Federal Republic of Germany or to prevent a disturbance of the peaceful coexistence of nations or a substantial impairment of the foreign relations of the Federal Republic of Germany. The personal data obtained under Sentence 1 may only be used for the purposes specified therein. The third party to whom the personal data are transmitted may only further transmit the same to a public authority not specified in Sentence 1 if the interest in the use of the per-

sonal data transmitted considerably outweighs the interest in secrecy of the person affected and the investigative purpose of the criminal proceedings cannot be endangered.

(2) Business and operating secrets are deemed equivalent to personal data.

Part 6

Administrative-fine provisions, penal provisions

Section 28

Administrative offenses

(1) A person commits an administrative offense if that person willfully or recklessly

1.operates a high-grade earth remote sensing system under Section 3(1) without an Operator license,

2.in breach of Section 10(1) Sentence 1 fails to make a notification or fails to make such notification on time or in full or correctly under Section 10(1) Sentence 1 or acts in breach of an enforceable order under Section 10(1) Sentence 4

3.without a permit

a) takes over the operation of a high-grade earth remote sensing system or parts of such a system under Section 10(2) Sentence 1,

b) complies with a sensitive request under Section 19(1) Sentence 1 or

c) disseminates data under Section 19(1) Sentence 2 without a request,

4. breaches an enforceable order under Section 9(1), (2) or Section 16.

5. disseminates data under Section 11(1) without a Dissemination license,

6. in breach of Section 17(1) in conjunction with the provisions of a statutory ordinance based on Section 17(3) fails

to examine the sensitivity of a request for the dissemination of data of a high-grade earth remote sensing system, fails to do so correctly or in full or to do so in the prescribed manner,

7. in breach of Section 5(1) or Section 18(1) Sentences 1 and 2, fails to make a record, fails to do so correctly or in full or fails to file the record or fails to do so for at least five years under Section 5(2) or Section 18(2) or

8. in breach of Section 18(3) fails to hold ready the logs and documentation specified therein.

(2) A person commits an administrative offense if

1. in breach of Section 6(1) Sentence 13 that person fails to report a crime, fails to do so correctly or in full or on time or

2. in breach of Section 7(1) or Section 14(1) fails to provide information, fails to do so correctly or in full or on time.

(3) An administrative offense as defined in Para. (1), Nos. 1 to 5 is punishable by a fine of up to five hundred thousand euros; in Para. (1), Nos. 6 to 8 by a fine of up to fifty thousand euros and in Para (2) by a fine of up to twenty-five thousand euros.

Section 29

Criminal offenses

(1) Liable to punishment of a term of imprisonment of up to five years or a fine is a person who commits a deliberate act specified in Section 28(1) Nos. 1 to 6 that is capable of substantially endangering

1. the vital security interests of the Federal Republic of Germany,

2. the peaceful co-existence of nations or

3. the foreign relations of the Federal Republic of Germany.

(2) The attempt is punishable.

Section 30

Offenses committed in foreign countries by German citizens

Section 29 applies independently of the law of the place of the crime, also in foreign countries, if the offender was a German citizen at the time of the offense.

Section 31

Criminal proceedings and administrative-fine proceedings

(1) Where a local court (Amtsgericht) has material jurisdiction for criminal offenses under Section 29, the local court in whose district the Regional Court (Landgericht) has its seat has local jurisdiction.

(2) Section 49(2), Section 63(2) and (3) Sentence 1 and Section 76(1) and (4) Act on Administrative Offenses (OWiG) apply mutatis mutandis in criminal proceedings and in court proceedings with regard to the participation of the administrative authorities in the proceedings of the public prosecutor.

Part 7
Transitional and final provisions

Section 32

Amendment of the Federal Constitutional Protection Act (Bundesverfassungsschutzgesetz - BVerfSchG)

Section 3(2) Federal Constitutional Protection Act (BVerfSchG) of December 20, 1990 (federal gazette BGBl. I p. 2954, 2970), most recently amended by Article 6(1) of the Act of August 19, 2007 (federal gazette BGBl. I p. 1970), is amended as follows:

1. In Sentence 1, the full stop after No. 3 shall be replaced by a comma and the following No. 4 shall be appended:

" 4. in the examination of persons in other cases determined by statute."

2. In Sentence 2, the indication "Nos. 1 and 2" is replaced by the indication "Nos. 1, 2 and 4".

Section 33

Amendment of the Security Clearance Check Act (Sicherheitsüberprüfungsgesetz - SÜG)

The Security Check Act of April 20, 1994 (federal gazette BGBl. I p. 867), most recently amended by Article 10 (5) of the Act of January 5, 2007 (federal gazette BGBl. I p. 2), is amended as follows:

1. In Section 1(2), the full stop after No.3 shall be replaced by a comma and the following No. 4 is appended:

"4. is subject to a security check under other provisions, insofar as reference is made to this statute."

2. In Section 3(2) Sentence 1, the indication "under Section 3(2) No. 1" shall be replaced by the indication "under Section 3(2) Nos. 1, 2 and 4".

3. In Section 24, the phrase "to be entrusted with a security-sensitive activity at a non-state organization under Section 1(4)" shall be is replaced by the phrase "to be entrusted with a security-sensitive activity at a non-state organization under Section 1(2) No. 4 or Section 1(4)".

Section 34

Transitional rule

(1) The operation of a high-grade earth remote sensing system prevailing at the time that this Act comes into force is deemed to have an operator license until a final and non-appealable decision is given on the application for an operator license if such application is made within three months of this Act coming into force.

(2) Para (1) applies mutatis mutandis to the dissemination license as data provider. The obligations of the data provider under Section 17(1) and Section 19(1) are deemed to have been satisfied until the statutory ordinance under Section 17(3) comes into force.

Section 35

Coming into force

(1) Section 2(2), Section 17(3) and Section 26 Sentences 2 to 4 come into force on the day after their promulgation.

(2) This Act otherwise comes into force on 1 December 2007.

The constitutional rights of the Federal Council (Bundesrat) are preserved.

The above Act is hereby executed.

It shall be promulgated in the Federal Gazette (Bundesgesetzblatt).

Berlin, November 23, 2007

The Federal President
Horst Köhler

The Federal Chancellor
Dr. Angela Merkel

The Federal Minister for Economics and Technology
Michael Glos

THE U.N. GENERAL ASSEMBLY RESOLUTION 62/101 OF 17 DECEMBER 2007 ON "RECOMMENDATIONS ON ENHANCING THE PRACTICE OF STATES AND INTERNATIONAL INTERGOVERNMENTAL ORGANIZATIONS IN REGISTERING SPACE OBJECTS"*

*Kai-Uwe Schrogl*** *& Niklas Hedman****

INTRODUCTION

On 17 December 2007, the U.N. General Assembly adopted the Resolution on "Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects."[1] This Resolution emerged from the agenda item on "Practice of States and international organizations in registering space objects," which had been debated from 2005 to 2007 in the Legal Subcommittee (LSC) of the United

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* The authors present their personal views. This is an updated version of the paper "The results of the UNCOPUOS Legal Subcommittee Working Group on 'Practice of States and international organizations in registering space objects' 2005-2007", in: Proceedings of the Fiftieth Colloquium on the Law of Outer Space, International Institute of Space Law, 2008.

** Kai-Uwe Schrogl is the Director of the European Space Policy Institute (ESPI), Vienna, Austria. Until 2007 he worked as Head of the Corporate Development and External Relations Department in the German Aerospace Center DLR. He has served as chairman to various international committees (i.a. the International relations Committee of ESA). He is member of the Board of Directors of IISL and member of IAA, where he chairs the Commission on Space Policy, Economics and Regulations. He lectures as honorary professor at Tübingen University, Germany.

*** Niklas Hedman is Chief of Committee Services and Research Section of the United Nations Office for Outer Space Affairs. Before joining the United Nations in 2006, he worked in the Swedish Ministry for Foreign Affairs, in particular in the areas of Law of the Sea, Space Law and Space Affairs, as well as on issues related to disarmament and non-proliferation. He represented Sweden to UNCOPUOS for 10 years and held various positions, including Chairman of the UNISPACE III+5 report A/59/174. He is a member of the ILA Space Law Committee and IISL.

[1] Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects, G.A. Res. 62/101 (Dec. 17, 2007) [hereinafter Recommendations].

Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS). The purpose of the corresponding work plan was to enhance the adherence to the Registration Convention.[2] States had identified this as necessary since the registration practice had been rather unsatisfactory during the preceding years and new problems had arisen with the application of the Convention. Such problems had already been touched upon during the deliberations on the legal concept of the "launching State," which led to the adoption of the respective U.N. General Assembly resolution in 2004.

A Working Group dealt with the subject of registration under a multi-year work plan. In 2004, States and international organizations reported on their practice of registering space objects. In 2005, the Working Group started its work with the examination of these reports and turned in 2006 to the identification of common practices and began to draft recommendations for enhancing the adherence to the Registration Convention. In 2007 the work of the Working Group was finalized and a draft U.N. General Assembly resolution was adopted by the UNCOPUOS Main Committee containing recommendations on enhancing the adherence to the Registration Convention. This draft resolution was adopted by the U.N. General Assembly as UNGA Res. 62/101 of 17 December 2007 entitled "Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects."[3]

This article describes the work of the Working Group and assesses its achievements as contained in the UNGA resolution. The co-authors have been chairman (Kai-Uwe Schrogl, 2006-2007) and chairman/secretary (Niklas Hedman, 2005/2006-2007) respectively of this working group.

1. Background to the Working Group

The agenda item on "Practice of States and international organizations in registering space objects" (Registration Prac-

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[2] Convention on Registration of Objects Launched into Outer Space - U.N. General Assembly resolution 3235 (XXIX), annex [hereinafter Registration Convention].

[3] Recommendations, *supra* note 1.

tice) demonstrates a concrete example of a highly productive work conducted by the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space (UNCOPUOS). The deliberations under this agenda item under a multi-year work plan can be regarded as a follow-up of the deliberations on the legal concept of the "launching State." These were conducted from 2000 to 2002 and were the first example of the successful implementation of the new tool of a multi-year work plan in the Legal Subcommittee. The good results of this mode of work[4] made the delegations confident that another effort should be taken to select a topic, appropriate to be treated in such a way. In fact, the discussions under the agenda item "launching State" had made it clear that the registration practice was an area, where an in-depth investigation seemed to be necessary.

It was the delegation of the United States, which gave the specific impetus through explaining its problems with the registration of foreign payloads on board of the Space Shuttle. Other delegations agreed on the importance of this topic and the need of the Subcommittee to continue with substantive work, and submitted in 2003 a working paper with a proposed work plan.[5] The same year the new agenda item on Registration Practice was adopted by the Legal Subcommittee and work plan was laid out.[6] This multi-year work plan contained the following steps:

"2004: Presentation by Member States and international organizations of reports on their practices in registering space objects and submitting the required information to the Office for Outer Space Affairs for inclusion on the Register.

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[4] *See* Kai-Uwe Schrogl & Charles Davies, *A New Look at the Concept of the "Launching State". The Results of the UNCOPUOS Legal Subcommittee Working Group 2000-2002*, 51, 3 ZLW 359-381 (2002). The U.N. General Assembly Resolution was adopted in 2004. *See* Application of the Concept of the 'Launching State', UNGA Res. 59/115 (Dec. 10, 2004).

[5] New Agenda Item on Practice in Registering Space Objects of States and International Organizations, Working paper submitted by Australia, Austria, Canada, the Czech Republic, France, Germany, Greece, India, Japan, the Netherlands, Sweden, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America, U.N. Doc. A/AC.105/C.2/L.241 and Add.1 (2003).

[6] It might be noted that the question of registration practice was already part of the working paper submitted by Germany on behalf of nineteen other European States. *See* U.N. Doc. A/AC.105/C.2/L.211/Rev.1 (Mar. 30, 1998) on improving the Registration Convention., which initiated the agenda item on the "launching State".

2005: Examination by a working group of the reports submitted by Member States and international organizations in 2004.

2006: Identification of the working group of common practices and drafting of recommendations for enhancing adherence to the Registration Convention.

2007: Report to the Committee on the Peaceful Uses of Outer Space."

The mandate was as restricted as the mandate under the work plan on the "launching State" neither modifications of the Convention should be proposed nor an authoritative interpretation of the Convention was envisaged. The item should simply lead to non-binding recommendations on enhancing the adherence to the Convention – and not the Convention itself. As with the work plan on the "launching State" it was very much up to the Chairman of the working group to lead the discussions to any specific resulting format, with the options ranging from a mere statement to formal conclusions.

Throughout the work plan of the Subcommittee and its Working Group on this item, member States of the Committee actively participated in the discussions and several States provided background information in accordance with the work plan.[7] The Working Group had before it several background documents prepared by the Secretariat and the Chairman of the Working Group[8]:

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[7] Reports were received from the European Space Agency and the following States: Australia, Czech Republic, France, Germany, Italy, Morocco, Myanmar, Netherlands, Peru, Republic of Korea, Russian Federation and Sweden (*See* U.N. Docs. A/AC.105/C.2/L.250 and Corr.1 and Add.1, A/AC.105/C.2/2004/CRP.3 and A/AC.105/C.2/2004/CRP.7), as well as a note by the Secretariat containing replies received from Germany and Morocco on harmonization of practices, non-registration of space objects, transfer of ownership and registration/non-registration of foreign space objects (*See* U.N. Doc. A/AC.105/867 and Corr.1).

[8] *See* Practice of States and International Organizations in Registering Space Objects - Background paper by the Secretariat, U.N. Doc. A/AC.105/C.2/L.255 and Corr.1 and 2 of (Jan. 25 2005); Practice of States and International Organizations in Registering Space Objects: Benefits of Becoming a Party to the Convention on Registration of Objects, Launched into Outer Space, U.N. Doc. A/AC.105/C.2/L.262 (Feb. 9, 2006); Practice of States and international organizations in registering space objects – Working paper submitted by the Chairman of the Working Group U.N. Doc. A/AC.105/C.2/L.266 of 30 January 2007; and Information on the Activities of International Intergovernmental and Non-Governmental Organizations Relating to Space law – Note by the Secre-

The plenary of the Subcommittee and the Working Group also heard presentations by the Secretariat on the United Nations Register, by Germany on findings of the Project 2001 Plus workshop on current issues in registration of space objects,[9] and by the European Space Agency on the registration policy of ESA.

2. Problems in registration practice and legal issues addressed in the Working Group

The background paper by the Secretariat, presented to the Working Group during its first year of work, in 2005, (U.N. Doc. A/AC.105/C.2/L.255) provided the information necessary for the substantive work, thus highlighting several issues of concern in the current practice of registering space objects. The following examples taken from that report give a broad picture of the variances in registration practice.

At the outset, the United Nations, through the United Nations Office for Outer Space Affairs (UNOOSA),[10] maintains two separate, yet complementary, registers on objects launched into outer space. One register is maintained with information provided by States in accordance with U.N. General Assembly resolution 1721 B (XVI) of 20 December 1961 and the other with

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tariat Containing Comments by the Space Law Committee of the International Law Association on Registration Issues, U.N. Doc. A/AC.105/C.2/L.265. In addition, the Secretariat prepared two Conference Room Papers: U.N. Doc. A/AC.105/C.2/2005/CRP.10 with statistical information on the number of space objects launched and registered or unregistered during the period 1957-2004, and U.N. Doc. A/AC.105/C.2/2006/CRP.5 with statistical information on States and intergovernmental (or former intergovernmental) organizations that operate or have operated space objects in Earth orbit or beyond 1957-2005.

[9] *See* Stephan Hobe, Bernhard Schmidt-Tedd, Kai-Uwe Schrogl, & Stephan Mick (eds.), *Current Issues in the Registration of Space Objects*, *in* PROCEEDINGS OF THE PROJECT 2001 PLUS WORKSHOP (Berlin Jan. 20-21, 2005). *See also* Bernhard Schmidt-Tedd & Michael Gerhard, How to Adapt the Present Regime for Registration of Space Objects to New Developments in Space Applications?, IAC-05-E.6.4.08; and Bernhard Schmidt-Tedd & Michael Gerhard, *Registration of Space Objects – Which are the Advantages for States Resulting from Registration*, *in* SPACE LAW – CURRENT PROBLEMS AND PERSPECTIVES FOR FUTURE REGULATION 121-140 (Marietta Benkö & Kai-Uwe Schrogl, eds., Utrecht 2005).

[10] Information on the U.N. registers, official registration documents and an on-line index of objects launched into Outer Space, as well as treaty status and texts of the space law treaties can be found on the website of the Office (www.unoosa.org).

information provided by States Parties to the Registration Convention.[11] The Resolution Register is today used to provide information submitted by States that are not parties to the Registration Convention. While the Registration Convention specifies the detailed information to be provided, Resolution 1721 B (XVI) does not. In the majority of cases, States provide basic orbital information similar to that requested in the Registration Convention. However, in some cases, other types of information are provided, including data sets known as "two-line elements," which, using mathematical formulae, can predict the space object's position relative to the Earth at a given time as well as the basic orbital characteristics required under the Convention. Article IV of the Registration Convention specifies the types of information to be provided on a space object and the time frame for submission.[12] States that register space objects in accordance with U.N. General Assembly resolution 1721 B (XVI) generally provide the same information as required under Article IV of the Convention. Most States that operate launch vehicles for their own use or for customers provide information on a bimonthly, quarterly or yearly basis. Others provide information on a case-by-case basis. This practice can range from immediately after the launch to months afterwards. Furthermore, the Registration Convention and resolution 1721 B (XVI) do not require provision of the geostationary satellite orbit (GSO) position. However, of the States that have registered space objects in this orbit, most provide the GSO position. In the majority of cases, GSO positions are registered with the International Telecommunication Union.

Another concern relates to the fact that as of 1 January 2005, only sixteen of the forty-five parties to the Registration Convention had informed the Secretary-General of the establishment of national registers, in accordance with Article II, paragraph 1.

In some instances, a space object has been registered by one State in compliance with the Registration Convention and also

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[11] Resolution on the International Co-Operation in the Peaceful Uses of Outer Space, G.A. Res. 1721 B (XVI) [hereinafter Resolution 1721 B (XVI)].

[12] Registration Convention, *supra* note 2, at art. IV.

registered by another State under Resolution 1721 B (XVI). Multiple launching States can also result in the registration of a space object being overlooked. Consequently, a State may refer to a space object that its launch capabilities placed in orbit as being carried on another State's national registry as opposed to its own. A common issue affecting which Party should register a space object is when ownership is transferred from a commercial entity of one State Party to a commercial entity of another State Party. It should be noted that the Registration Convention has no specific provision for the "change of ownership" of a space object. Such changes in ownership have become common for geostationary communication satellites, which are leased or even sold years after their launch, so that the original State of registry may no longer have control over the space object. In most instances, such transfers of ownership are not reported to the United Nations.

In instances where a space object is placed in orbit on behalf of another State, parties jointly determine the State of registry, pursuant to Article II of the Registration Convention.[13] In some cases, the State that provides the launch services registers the "foreign" object in its national registry. China has registered a number of space objects on behalf of its international launch clients. In cases where the State that provides the launch vehicle does not register the "foreign" functional objects, it only registers space objects associated with the launch vehicle, such as third stages and shrouds. France and the United States follow this practice. Other States include a notification in registration submissions that their launch vehicle were used to place "foreign" space objects into Earth orbit but do not include that object on its national registry. The Russian Federation follows this practice. France, in addition to registering space objects associated with the launch vehicle, also follows this practice. In other cases, States do not provide any information on such objects.

In practice, all States provide the common name of a space object. Most States provide more than one identifier for a space object. Some States also use the Committee on Space Research

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[13] *Id.* at art. II.

(COSPAR) international designator. This designator is nominally assigned by the World Warning Agency for Rockets and Satellites (SPACEWARN) on behalf of COSPAR, which has been done since 1957. The international designator is based on the year of launch, the number of successful launches and the priority/order of the space object's deployment/detection. The international designator is made publicly available through SPACEWARN bulletins, which are in turn made available by facsimile and on the Internet. Other States provide designators based on entries in their national registry, in which case the common name is also provided. Some States also use a designator assigned in a catalogue of space objects maintained by the United States Strategic Command (USSTRATCOM). The catalogue is based on observational/radar data and is made available through a US Air Force Space Command pilot programme. This numerical designator is based on the numerical sequence in which the United States space surveillance network detects an object. In a few cases, States provide the international designator, the USSTRATCOM catalogue designator and the common name.

Some States provide basic orbital parameters for the initial orbit of a space object. Other States provide parameters for the intermediate (parking) orbit and still others for the final operational orbit. Most States provide the nodal period in minutes. On occasion, the nodal period is provided in hours and minutes. This practice is most common when States register space objects in the GSO.

The majority of States use Greenwich Mean Time (GMT), also referred to as Coordinated Universal Time (UTC). GMT is the standard against which all other time zones in the world are referenced. In other cases, parties use the local time at the place of launch or the national meridian time. Most States provide detailed information on where a space object is launched. The information can be specific as the launch facility from which the object was launched. In cases where a space object is deployed from a parent object (i.e. the deployment of a satellite from the Space Shuttle or a space station), some States provide the date of launch of the parent space object, while others provide the time and date of deployment from the parent space object. A few

States indicate only the territory from which the space object was placed into Earth orbit or beyond. Instances can occur when an object that was launched from outside a State's territory is not reported as being so.

The amount of information on the function of a space object ranges from a two-word statement of its function to a detailed account of its mission objectives, the science payload and radio frequency plans. Most States provide very basic information on the space object's function. In the case of States that launch space objects frequently, a standardized list of functions has been developed by each party, which is applied to a space objects on a case-by-case basis.

Article IV, paragraph 3, of the Registration Convention requires Parties to notify the Secretary-General, to the greatest extent feasible and as soon as practicable, of space objects concerning which it has previously transmitted information, and which have been but no longer are in Earth orbit.[14] In practice, of the sixteen Parties to the Convention that have objects that have re-entered Earth's atmosphere, only eight have forwarded this information to the United Nations. Of the States that have, some provide the actual date of re-entry and others provide information on a monthly basis, that is, an objects ceased to exist by the end of a particular month. Some use GMT as a time reference, while others use national time meridians when an object is no longer in Earth orbit. It should be noted that the lack of information or non-specific dates of decay affect the ability to identify a space object that has returned to Earth.

Of the approximately 5,730 functional space objects launched into Earth orbit or beyond since 1957 (as of 1 January 2005), 390 have not been registered with the United Nations in accordance with the Registration Convention or U.N. Resolution 1721 B (XVI). Of the thirty-nine States that have launched space objects into Earth orbit or beyond, sixteen are not Parties to the Convention. The presence of multiple parties in the launch of a space object may contribute to non-registration of space objects. Cases of non-registration are also due to the un-

[14] *Id.* at art. IV (3).

derstanding by States that have acceded to the Registration Convention that registration is only required of objects launched after accession. Consequently, States may have space objects in Earth orbit that are not registered because their launch occurred prior to the State acceding to the Convention. Modules of space stations are sometimes not registered with the United Nations. This may occur even when the modules are the primary payload for the mission. Some space objects that perform national security functions have not been registered by some Parties to the Registration Convention. Probes and recoverable capsules that separate from a space object and either return to Earth or land on another celestial body are also sometimes not registered.

The examples above demonstrate the wide spectrum of registration practice. The Working Group considered not only technical issues of registration. Legal issues and concerns were on the table throughout the workplan. The main legal issues brought up related to the relationship between responsibility under Article VI of the Outer Space Treaty,[15] liability under Article VII,[16] jurisdiction and control under Article VIII,[17] and how the provisions of the Outer Space Treaty relate to the regime laid down in the Liability Convention,[18] and Registration Convention.[19] The concept of the launching State, in particular the element of procurement, also acquired attention in the debate.

In the debate of the Working Group, the view was expressed that when a space object was transferred from the jurisdiction and control of the State of registry to the jurisdiction and control of another State, the State of registry, following the transfer of ownership, would no longer bear international responsibility for the space object under article VI of the Outer Space Treaty. Another concern raised in the Working Group,

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[15] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, art. VI, Oct. 10, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205.

[16] *Id.* at art. VII.

[17] *Id.* at art. VIII.

[18] Convention on International Liability for Damage Caused by Space Objects, Sept. 1, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187.

[19] Registration Convention, *supra* note 2.

was that registration of a space object other than by a launching State was not conceivable under the Registration Convention. The obligation to register provided for by the Registration Convention had a different purpose than was provided for under article VIII of the Outer Space Treaty, which had to be linked to the liability system set up by article VII of the Outer Space Treaty and by the Liability Convention. The point was also made that, with regard to jurisdiction and control over a space object launched by multiple launching States, the State that had registered a space object would retain jurisdiction and control over that object according to article VIII of the Outer Space Treaty. In case jurisdiction and control over the space object were to be changed, an appropriate agreement had to be concluded among launching States in accordance with Article II of the Registration Convention.

As can be seen from the elements of conclusions of the Working Group, as constituted by the resolution (see below), most recommendations target practical and technical issues for enhancing registration practice. Operative paragraphs 3(a-d) and 4(a-b), however, go deeper into legal issues, and define in carefully negotiated consensus language the minimum common denominator for the interpretation of various central legal concerns related, in particular, to a case of multiple launching States and the transfer of ownership of space objects in orbit. These elements in the resolution might look simple at the outset, but in fact provide quite a strong common understanding at the political level on the application of the provisions laid down in the legal regime on outer space. There will of course be views that the resolution is without teeth in a legal sense and that the Working Group failed to provide a thorough legal analysis, but taking into consideration the political dimension involved, the text nevertheless demonstrate outstanding progress. This is furthermore shown by the development in language between paragraph 3 of the "launching State" resolution, with its recommendations on voluntary information regarding on-orbit transfer of ownership, and the detailed recommendations put forward in paragraph 4 of the new resolution on registration practice.

3. The conduct of the Working Group

The Working Group, in 2005 and 2006, was informed of different practices by States in registering space objects and in their respective implementation of the Registration Convention. In particular, the focus of attention was on the establishment and maintenance of national registries and the activities of authorities responsible for maintaining such national registries, criteria for including space objects in national registries, procedures applied in cases where more than one party was involved in the launch or where private entities or international organizations were involved, and practice relating to the registration of functional and non-functional objects.

Information provided by member States in the plenary in 2004 and during the first year of the Working Group in 2005, together with the information provided in the background paper by the Secretariat, opened for the agreement in the Working Group to focus its attention in the following year, on the following four main issues:

a) Harmonization of practices (administrative and practical);

b) Non-registration of space objects;

c) Practice with regard to transfer of ownership of space objects in orbit;

d) Practice with regard to registration/non-registration of "foreign" space objects.

On the basis of those issues, the Working Group in 2006 agreed on elements that could constitute the basis for consensus on specific recommendations and conclusions to be included in the report to be prepared by the Subcommittee in 2007.

The breakthrough on the road to a General Assembly resolution occurred in early 2007. Following the presentations by States and international organizations and the strategic layout of the work during the first two years supported by highly valued background analyses prepared by the Secretariat, the work-

ing group held intersessional consultations (during January 2007 in Berlin),[20] paving the way for adopting concrete recommendations in the regular session of the Legal Subcommittee in March/April of this year. It was only for the second time in recent history that the Subcommittee stimulated such intersessional consultations, but it proved to be useful for the chairman and the secretariat to prepare a comprehensive set of recommendations and finalize them in the form of the draft U.N. General Assembly resolution already after only three years of deliberations (while the translation of the recommendations from the working group on the "launching State" into a General Assembly resolution took two more years). This speedy conclusions were made possible through an interim agreement at the Legal Subcommittee session and a finalization at the Main Committee session in June on the basis of a paper presented by the Chairman of the working group,[21] which reflected the agreement that the results from this endeavour was substantive enough for a U.N. General Assembly resolution, which was consequently adopted by the General Assembly on 17 December 2007 without a vote.

4. The U.N. General Assembly resolution 62/101

The U.N. General Assembly resolution (see the Annex to this paper) reflects all issues discussed in the course of the work plan and contains concrete recommendations where an agreement could be reached. The resolution is composed of a preamble (preamble paragraphs 1-12), four sets of recommendations (paragraphs 1-4), and a set of requests addressed to UNOOSA (paragraph 5) as well as a concluding recommendation (paragraph 6).

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[20] *See* Practice of States and International Organizations in Registering Space Objects, U.N. Doc. A/AC.105/C.2/L.266 (Jan. 30, 2007). Working paper submitted by the Chairman of the Working Group on the Practice of States and International Organizations in Registering Space Objects.

[21] Practice of States and International Organizations in Registering Space Objects, U.N. Doc. A/AC.105/2007/CRP.5 (June 5, 2007). Elements of conclusions of the Working Group.

The preamble contains in preamble paragraph 7 the most important benefits for States of becoming parties to the Registration Convention (utility of the Register, identification of space objects). Following the noting in preamble paragraph 8 of the obligations of States parties to the Convention (furnishing of information, establishing a registry), preamble paragraph 9 provides a picture of what positive effects a universal accession and acceptance, implementation, and observance of the provisions of the Registration Convention could have (i.a. contribution to common procedures). Preamble paragraph 10 then leads to a central statement by highlighting the actual framework conditions, which lead to need for action (in particular the emergence of non-governmental actors). This paragraph – taken from the preamble of the U.N. General Assembly resolution on the "launching State" – is important in the way that it reiterates the joint assessment of the States, how space activities have changed during the past years. Preamble paragraphs 11 and 12 finally contain the desire of States to achieve a most complete registration and to enhance the adherence to the Convention.

The first set of recommendations (paragraph 1) calls upon States to ratify and accede to the Convention and for international intergovernmental organizations to declare their acceptance of the rights and obligations under the Convention. The second set of recommendations (paragraph 2) contains a number of concrete proposals in order to achieve a harmonization of practices (i.a. specific rules with regard to the uniformity in the type of information, suggestions for additional information, and transparency in the designation of focal points for the registries). These two sets of recommendations aim at making the Register and the registries more up to date and more uniform so that they can stay a relevant source of information besides their legal consequence.

The third set of recommendations (paragraph 3) provides the core element of the resolution, since it tackles four areas, which have been the causes for incomplete registration in the recent past. They comprise first the registration of space objects operated by international intergovernmental organizations, where a general fallback option is proposed (such organizations

– respectively the responsible States – have in the course of their privatizations drastically neglected the registration of their space objects). Secondly, it deals with the growing number of providers of launch facilities, which should not lead to situations where it is too complicated or where it is "forgotten" to determine the State that should register the space object. In addition, it suggests a way to deal with joint launches of space objects and finally proposes a way to find appropriate States to register in the nowadays broad sector of private space activities. With this set of recommendations the identification of the changed space environment is dramatically highlighted. This set of recommendations has only declaratory character and is non-binding for States, but if the application of existing international law will not be uniform in the future, formal amendments of the treaties might actually be inescapable. This would then be the only way of maintaining the basic principles of the space law regime (responsibility, liability) in a level-playing field, where flags of convenience will be made impossible. The States will then have to be more courageous than simply drafting U.N. General Assembly resolutions with restricted scope.

Another epitome of the new situation is contained in the third set of recommendations. It deals with the issue of transfer of ownership of space objects in orbit, already identified by the U.N. General Assembly resolution on the "launching State" (paragraph 4). For the cases of "changes in the supervision of a space object in orbit" (this legal expression relating to Article VI of the Outer Space Treaty was used in the text instead of "transfer of ownership") some proposals are made about the content of information to be provided and who should be in charge of that.

The second last operative paragraph deals with a request to UNOOSA to make available registration forms and provide transparency on information to be provided by the States on their contact points and national registries. Finally, States and international organizations are recommended to report on new developments relating to their practice in registering space objects.

The perspectives for the resolution are that States will consider reflecting the recommendations in their national regulatory practice. Since numerous States are currently working on

such regulation, it was very timely to agree on specific elements. The recommendations aiming a greater transparency might also be implemented soon by the respective actors (States, international organizations and UNOOSA). The high visibility of a U.N. General Assembly resolution will certainly help to keep track of the developments in this field.

Another positive impact is the proof that multi-year work plans are useful and successful tools for the UNCOPUOS Legal Subcommittee. The agenda items on the "launching State" and the Registration Practice have both lead to U.N. General Assembly resolutions containing substantive recommendations. While they cannot replace real law-making, they can at least highlight – through this kind of soft law – the needs for development in the practice of implementing the provisions of space law. In this spirit, the successful conclusion of the agenda item on Registration Practice was the impetus for the adoption of a new agenda item, which will also be dealt with under a multi-year work plan (2008-2011) in the framework of a working group. The topic will be "General exchange of information on national legislation relevant to the peaceful exploration and use of outer space". This item will bring together recommendations by the both preceding agenda items and although the title is formulated in the most cautious possible way ("General exchange of information") it will again be up to the Chairperson and the joint will of member States of the Committee, whether they will aim for and accept meaningful and substantive results.

ANNEX

U.N. General Assembly Resolution 62/101 of 17 December 2007: "Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects"

The General Assembly,

Recalling the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including

the Moon and Other Celestial Bodies[22] (Outer Space Treaty), in particular articles VIII and XI,

Recalling also the Convention on Registration of Objects Launched into Outer Space,[23]

Recalling further its resolution 1721 B (XVI) of 20 December 1961,

Recalling its resolution 41/66 of 3 December 1986,

Taking note of the report of the Committee on the Peaceful Uses of Outer Space on its fiftieth session[24] and the report of the Legal Subcommittee on its forty-sixth session, in particular the conclusions of the Working Group on the Practice of States and International Organizations in Registering Space Objects, annexed to the report of the Legal Subcommittee,[25]

Noting that nothing in the conclusions of the Working Group or in the present resolution constitutes an authoritative interpretation of or a proposed amendment to the Registration Convention,

Bearing in mind the benefits for States of becoming parties to the Registration Convention and that, by acceding to, implementing and observing the provisions of the Registration Convention, States:

(*a*) Enhance the utility of the Register of Objects Launched into Outer Space established under article III of the Registration Convention, in which information furnished by States and international intergovernmental organizations conducting space activities that have declared their acceptance of the rights and obligations under the Registration Convention is recorded;

(*b*) Benefit from additional means and procedures that assist in the identification of space objects, including, in particular, in accordance with article VI of the Registration Convention,

Noting that States parties to the Registration Convention and international intergovernmental organizations conducting

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[22] United Nations, *Treaty Series*, vol. 610, No. 8843.

[23] Ibid., vol. 1023, No. 15020.

[24] *Official Records of the General Assembly, Sixty-second Session, Supplement No. 20* (A/62/20), paras. 209-215.

[25] A/AC.105/891, annex III, appendix.

space activities, having declared their acceptance of the rights and obligations under the Convention, shall furnish information to the Secretary-General in accordance with the Convention and shall establish an appropriate registry and inform the Secretary-General of the establishment of such a registry in accordance with the Convention,

Considering that universal accession to and acceptance, implementation and observance of the provisions of the Registration Convention:

(*a*) Lead to increased establishment of appropriate registries;

(*b*) Contribute to the development of procedures and mechanisms for the maintenance of appropriate registries and the provision of information to the Register of Objects Launched into Outer Space;

(*c*) Contribute to common procedures, at the national and international levels, for registering space objects with the Register;

(*d*) Contribute to uniformity with regard to the information to be furnished and recorded in the Register concerning space objects listed in the appropriate registries;

(*e*) Contribute to the receipt of and recording in the Register of additional information concerning space objects on the appropriate registries and information on objects that are no longer in Earth orbit,

Noting that changes in space activities since the Registration Convention entered into force include the continuous development of new technologies, an increase in the number of States carrying out space activities, an increase in international cooperation in the peaceful uses of outer space and an increase in activities carried out by non-governmental entities, as well as partnerships formed by non-governmental entities from more than one country,

Desirous of achieving the most complete registration of space objects,

Desirous also of enhancing adherence to the Registration Convention,

1. *Recommends*, with regard to adherence to the Registration Convention,[2] that:

(*a*) States that have not yet ratified or acceded to the Registration Convention should become parties to it in accordance with their domestic law and, until they become parties, furnish information in accordance with General Assembly resolution 1721 B (XVI);

(*b*) International intergovernmental organizations conducting space activities that have not yet declared their acceptance of the rights and obligations under the Registration Convention should do so in accordance with article VII of the Convention;

2. *Also recommends*, with regard to the harmonization of practices, that:

(*a*) Consideration should be given to achieving uniformity in the type of information to be provided to the Secretary-General on the registration of space objects, and such information could include, inter alia:

(i) The Committee on Space Research international designator, where appropriate;

(ii) Coordinated Universal Time as the time reference for the date of launch;

(iii) Kilometres, minutes and degrees as the standard units for basic orbital parameters;

(iv) Any useful information relating to the function of the space object in addition to the general function requested by the Registration Convention;

(*b*) Consideration should be given to the furnishing of additional appropriate information to the Secretary-General on the following areas:

(i) The geostationary orbit location, where appropriate;

(ii) Any change of status in operations (inter alia, when a space object is no longer functional);

(iii) The approximate date of decay or re-entry, if States are capable of verifying that information;

(iv) The date and physical conditions of moving a space object to a disposal orbit;

(v) Web links to official information on space objects;

(*c*) States conducting space activities and international intergovernmental organizations that have declared their acceptance of the rights and obligations under the Registration Convention should, when they have designated focal points for their

appropriate registries, provide the Office for Outer Space Affairs of the Secretariat with the contact details of those focal points;

3.*Further recommends*, in order to achieve the most complete registration of space objects, that:

(*a*) Due to the complexity of the responsibility structure in international intergovernmental organizations conducting space activities, a solution should be sought in cases where an international intergovernmental organization conducting space activities has not yet declared its acceptance of the rights and obligations under the Registration Convention, and a general backup solution should be provided for registration by international intergovernmental organizations conducting space activities in cases where there is no consensus on registration among the States members of such organizations;

(*b*) The State from whose territory or facility a space object has been launched should, in the absence of prior agreement, contact States or international intergovernmental organizations that could qualify as "launching States" to jointly determine which State or entity should register the space object;

(*c*) In cases of joint launches of space objects, each space object should be registered separately and, without prejudice to the rights and obligations of States, space objects should be included, in accordance with international law, including the relevant United Nations treaties on outer space, in the appropriate registry of the State responsible for the operation of the space object under article VI of the Outer Space Treaty;[1]

(*d*) States should encourage launch service providers under their jurisdiction to advise the owner and/or operator of the space object to address the appropriate States on the registration of that space object;

4. *Recommends* that, following the change in supervision of a space object in orbit:

(*a*) The State of registry, in cooperation with the appropriate State according to article VI of the Outer Space Treaty, could furnish to the Secretary-General additional information, such as:

(i) The date of change in supervision;

(ii) The identification of the new owner or operator;

(iii) Any change of orbital position;

(iv) Any change of function of the space object;

(*b*) If there is no State of registry, the appropriate State according to article VI of the Outer Space Treaty could furnish the above information to the Secretary-General;

5. *Requests* the Office for Outer Space Affairs:

(*a*) To make available to all States and international intergovernmental organizations a model registration form reflecting the information to be provided to the Office for Outer Space Affairs, to assist them in their submission of registration information;

(*b*) To make public, through its website, the contact details of the focal points;

(*c*) To establish web links on its website to the appropriate registries that are available on the Internet;

6. *Recommends* that States and international intergovernmental organizations should report to the Office for Outer Space Affairs on new developments relating to their practice in registering space objects.

COMMENTARY

LOST IN SPACE:

A PRACTITIONER'S FIRST-HAND PERSPECTIVE ON REFORMING THE U.S.'S OBSOLETE, ARROGANT, AND COUNTERPRODUCTIVE EXPORT CONTROL REGIME FOR SPACE-RELATED SYSTEMS AND TECHNOLOGIES

Mike N. Gold[1*]

I. INTRODUCTION

In Science Fiction, Earth is often faced with a variety of space-based menaces, from evil alien robots to rogue asteroids. However, in reality, the greatest threat to developing a new and

[1] Michael N. Gold has served as Corporate Counsel and head of Bigelow Aerospace's Washington, DC area office since 2003. In this capacity Mr. Gold has overseen and been responsible for export control compliance for the company's interactions with all foreign parties. More specifically, Mr. Gold supervised and managed all technical interactions between Bigelow Aerospace and ISC Kosmotras which took place in Dnepropetrovsk, Ukraine, Moscow, and Yasny, Russia. Mr. Gold is a graduate of the University of Pennsylvania Law School, where he founded and served as the first Coordinating Editor of the Journal of Constitutional Law. Mr. Gold is a member of the New York and District of Columbia State Bars.

[*] I would like to dedicate this article to: Robert T. Bigelow, whose vision and courage have made dreams possible; my wife, for tolerating my long working hours at home and extended absences abroad; and to my newborn son, it is for him and his generation that we are trying to build a better, brighter, and more peaceful future.

robust space industry in America is none other than the U.S. Government itself, a force so powerful that it would leave even invading Martians weak with fear and dread.

Specifically, the obsolete and poorly enforced International Traffic in Arms Regulations (ITAR) have become an albatross around U.S. companies' necks, hindering innovation and stunting development.[2]

The great irony is that, in stark contrast to U.S. export control's twin policy goals of maintaining domestic preeminence in the aerospace field and supporting national security, the ITAR is having exactly the opposite effect.[3] Since 1999, when all space-related systems were returned to the United States Munitions List (USML), America's leadership in commercial space capabilities has eroded, while Russian, European, and Asian entities have expanded and deepened their growing dominance.

All too often explicit criticism of the ITAR is either overly vague or made by those who have not had substantive interactions with the regulations. This has led to many government officials either dismissing various complaints outright or failing to identify proper solutions to act upon. This article is intended to provide a critique of the failings of the U.S. export control regime based on the first-hand experiences of the author. Moreover, each example of export control breakdowns are accompanied by a suggested means of remedying or at least ameliorating future problems.

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[2] Center for Strategic and International Studies, *Briefing of the Working Group on the Health of the U.S. Space Industrial Base and the Impact of Export Controls,* at 10, Executive Summary, Findings 10 & 11 (Feb. 2008) [hereinafter CSIS].

> Finding 10: The U.S. share of the global space markets is steadily declining, and U.S. companies are finding it increasingly difficult to participate in foreign space markets. Finding 11: Export controls are adversely affecting U.S. companies' ability to compete for foreign space business, particularly in the 2nd and 3rd tier. And it is the 2nd/3rd tier of the industry that is the source of much innovation, and is normally the most engaged in the global market place in the aerospace/defense sector."

Id.

[3] "There are rapidly emerging foreign space capabilities and the U.S. does not control their proliferation.", *Id*. at 8, Finding 4. "The current export control policy has not prevented the rise of foreign space capabilities and in some cases has encouraged it (ITAR-free space products)." *Id*. at Finding 6.

II. A BRIEF HISTORY OF COMMERCIAL SPACE EXPORT CONTROL

In the 1980s the commercial space field was still in its infancy. Commercial launches were few and infrequent and revenues were low.[4] During this period, space systems, such as satellites, were controlled by the Department of State and, just as they are now, were under the auspices of the ITAR.[5] However, toward the end of the decade, when the field began to blossom, permission was given to expand launch opportunities overseas. For example, in 1988, the Reagan Administration approved the sale and launch of communications satellites to China, to be placed into orbit over the course of nine launches.[6]

By the early 90s, the export control regime for commercial satellites was further liberalized. Under the first President Bush dual-use items, including some telecommunication satellites, were removed from the USML.[7] Jurisdiction over these systems was similarly transferred from the Department of State to the Department of Commerce.[8] Although this was certainly a positive change, the U.S. export control regime was already on the verge of obsolescence. As a matter of fact, part of the reason the transfer from State to Commerce took place was that the U.S. had become the *only* nation that still treated commercial telecommunication satellites as munitions.[9]

Later on in the decade (by 1996), under President Clinton after some internal governmental debate, export control jurisdiction for all communication satellites (commsats) was transferred away from State and placed exclusively under the jurisdiction of the Department of Commerce.[10]

However, Commerce's purview over commsats was soon undone by events that had occurred even before Commerce had assumed regulatory control. In 1995 and 1996 China suffered

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[4] FAA - Commercial Space Data – Historical Launch Data, http://www.faa.gov/about/office_org/headquarters_offices/ast/launch_data/historical_launch/.

[5] Ryan Zelnio, *A Short History of Export Control Policy*, THE SPACE REV. (Jan. 9, 2006), http://www.thespacereview.com/article/528/1.

[6] *Id*.

[7] *Id*.

[8] *Id*.

[9] *Id*.

[10] *Id*.

two Long March rocket failures. The ill-fated Long March rockets carried, respectively, commsats produced by Hughes and Loral.[11] Subsequently, both Hughes and Loral produced launch failure analyses that were required for insurance purposes. The Department of Commerce approved the full transfer of this information to the Chinese and the insurers under the auspices of a previous license granted in 1994.[12] This move created a great deal of controversy, and resulted in the following situation, best described below in an excerpt from *The Space Review*:

> This analysis created a major controversy, as it was unclear whether Commerce had the authority to approve such an export. A [C]ongressional review determined that these launch failure reviews were conducted without required Department of State export licenses, and communicated technical information to the PRC in violation of ITAR. This investigation led to the inclusion of a provision in the Strom Thurmond National Defense Authorization Act in 1998 in that [it] returned control of all satellites and related technologies to the Department of State. This was accomplished by the removal of said items from the Commerce list of dual-use items in the Export Administration Regulations and placing them on the State Department's United States Munitions List, controlled under section 38 of the Arms Export Control Act. In addition, a provision was added that the President must certify to Congress 15 days in advance that any transfer of satellite technology to China would not harm US launch companies and/or help Chinese missile technology. – Ryan Zelnio, *The Space Review*, January 9th, 2006

Under pressure from the then GOP-controlled Congress,[13] the Clinton Administration was essentially forced to accept a Department of State regime that placed *all* space-related equipment and hardware on the USML, bringing space technology squarely under the auspices of the ITAR.

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[11] *Id*.
[12] *Id*.
[13] Taylor Dinerman, *Fixing ITAR: The Saga Continues*, THE SPACE REV. (May 16, 2005), http://www.thespacereview.com/article/374/1.

Since this move was completed in 1999, the once dominant U.S. commsat manufacturing sector has seen its control of the market drop from a comfortable eighty three percent to fifty percent.[14] European competitors such as Alcatel Alenia have doubled their market share, U.S. entities are withdrawing from international contracts, and China has of course continued to purchase the same or better technology from European and Israeli suppliers, costing U.S. companies as much as $3 billion in Chinese-related business alone.[15] *In short, if the objective of the 1998 export control reforms expanding the ITAR were to cripple domestic U.S. capabilities, lose billions of dollars, and bolster European competition all without impacting China, then we should rest assured that the mission has been accomplished.*

The purpose of the space-related provisions of the ITAR/USML is to prevent enemy and potential unfriendly nations from gaining and developing advanced space technology. Instead, as it's currently implemented, the only nation whose aerospace capabilities have been blunted by ITAR is the U.S. itself. Not only does ITAR fail to accomplish its stated goals, the regulations have just the opposite effect,[16] serving as a fine example of a completely counterproductive and ignorant national policy.

Of course, Washington has not exactly excelled of late in effectively tackling complex international issues. Moreover, important matters such as the ill-advised quagmire in Iraq and increasing difficulties in Afghanistan are justifiably dominating policy makers' time. However, the good news is that we don't necessarily need to turn to Washington, or at least Capitol Hill, for a solution. Instead, despite being under the USML, ITAR, and State, much can be done to dramatically improve the current regulatory regime via relatively modest reforms that could be enacted unilaterally by the Directorate of Defense Trade

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[14] Ryan Zelnio, *The Effects of Export Control on the Space Industry*, THE SPACE REV. (Jan. 16, 2006), http://www.thespacereview.com/article/533/1.

[15] *Id*.

[16] CSIS, *supra* note 2, at 8, Finding 6. "The grand strategic intent of the space export controls is not being achieved … In some cases, the space export control policy is running counter to the national space policy".

Controls (DDTC) and the Defense Technology Security Administration (DTSA).

What follows is a description of challenges, organized by legal vehicle/activity, and based on real-life examples that the author encountered while supporting the Genesis I and Genesis II programs which took place (from an export control perspective) over the course of 2004 - 2007.[17] As mentioned previously, after describing each difficulty a potential remedy is proposed that could prevent future problems from occurring.

III. TECHNICAL ASSISTANCE AGREEMENTS

PROBLEM: Timing

The Technical Assistance Agreement (TAA)[18] to collaborate with our Russian/Ukrainian launch provider ISC Kosmotras was filed on March 15, 2004 and was approved on July 8th of the same year. Adding the few days to a week that it took to actually receive the paperwork, the review and approval process lasted three full months. Although DDTC claims that it usually processes TAAs in 60 days or less, I have rarely found this to be the case. However, even 90 days wouldn't be too onerous, if in fact the process were over after those 90 days. Unfortunately, receiving TAA approval is often not the end but just the beginning of a fairly lengthy process.

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[17] The Genesis I and Genesis II pathfinder spacecraft were developed by Bigelow Aerospace ("BA"), an entrepreneurial company dedicated to revolutionizing space commerce by producing low-cost, next-generation orbital habitats. Genesis I and II are subscale prototypes designed to test and validate BA's engineering concepts and operations. Both spacecraft flew on the Dnepr launch vehicle, a converted SS-18 rocket (the SS-18 is otherwise used to deliver nuclear warheads and many are still in service today), which literally made this a 'swords into plowshares' program. The launch vehicles were sold to BA by ISC Kosmotras, a joint Russian-Ukrainian company based in Moscow. Kosmotras was also responsible for conducting the launch. Both launches took place from an active nuclear Russian Strategic Rocket Forces Base near the town of Yasny in the Orenburg Region of Russia. Genesis I was the first payload to be launched from what is now referred to as the Yasny Space and Missile Complex.

[18] A TAA provides a company with the authority to transmit technical information (or "defense services" in the misleading parlance of the ITAR regime) to a foreign entity. Nominally, TAAs identify the parties involved in the project, what the effort is going to entail, the purpose of the collaboration, and a description as to the type of information that will be shared. The TAA is a relatively broad and general document.

In the international aerospace arena, TAA approvals inevitably come with five or more pages of standard provisos which are caveats that limit the powers of the license. Often, these provisos are overly broad, too restrictive, or just plain wrong, and, after approval, a licensee will need to work with the DDTC to rectify any such problems. In my experience, this process can take an additional month to three months depending on DDTC's response time and the complexity of the issue.

Furthermore, a common proviso, particularly for working with a Russian entity, is to draft and implement a Technology Transfer Control Plan (TTCP).[19] Developing a TTCP can also be a lengthy and prolonged process, although since the TTCP is handled directly by the DTSA Space Directorate and not the DDTC, response times are much shorter and the feedback is often more sophisticated and accurate. However, even with the enhanced efficacy of DTSA, TTCP development and approval can take an additional one to three months. In summary, to go from no license through drafting a TAA, getting it approved, dealing with any problematic provisos, drafting a TTCP, and gaining approval for the TTCP, it can take six months to a year, or longer, depending on the activity and what nations and organizations are involved.

REMEDY: Hard Deadlines

The DDTC should set hard deadlines for TAA reviews and responses. Sixty days would be a reasonable requirement. If a response was received from the DDTC in 60 days, the next month could be spent resolving any errors or conflicts, allowing a company to proceed with a TTCP at the end of three months instead of four or five. If the resources don't exist to enforce such a deadline, *at the very least*, at the end of a two month period, companies with pending licenses should be informed as to: (1) why additional time is being taken, (2) when a response is

[19] Whereas a TAA provides broad, general authority to share information, the TTCP represents a much more detailed and comprehensive plan as to specifically how information will be shared with a foreign entity, what protections will be in place to prevent abuse, and to document all technology transfers.

likely to occur, and (3) the contact information for the relevant case officer to discuss any issues or questions.

PROBLEM: Insufficient Reviews/Last-Minute Demands

Within Bigelow Aerospace's (BA's) Genesis I TAA, which, again, was initially filed on March 15, 2004, an entire attachment was enclosed that described, in explicit detail, the fact that Kosmotras is a joint Russian-Ukrainian venture wherein not just Russians but Ukrainian nationals serve as company employees, officers, and officials. Additionally, BA included Ukraine as one of only four nations (the others were Russia, the U.S., and Kazakhstan) wherein technical services could be provided. BA's view at the time was that the Ukrainian/Yuzhnoye employees were part of the overall Kosmotras team (which they are) and therefore would not require a separate TAA for BA to have interactions with them. This was the very reason that BA included the attachment describing the joint Ukrainian-Russian nature of the Kosmotras entity. However, despite the inclusion of this attachment, which we expect, in reality, was likely ignored, nearly a year after TAA submission, and, even worse, a scant few days[20] prior to our first meeting with Kosmotras in Moscow, BA was informed by DTSA that no Ukrainians could participate in our upcoming conference. The reason given was that, in the view of our assigned DTSA monitor, Yuzhnoye needed to be a separate signatory to the TAA. Subsequently, the value of the meeting was compromised since key Ukrainian officials could not be exposed to 'technical data'.

BA still believes that it was not necessary for Yuzhonye to become a separate signatory to the TAA. However, for the sake of argument, even if this point were conceded, DDTC/DTSA's failure to raise the issue for nearly a year, and to do so just before a critical meeting, put BA in an extraordinarily difficult position. This is just one example of how a broken system can

[20] My memory may not be entirely accurate in regard to the exact date, but I believe BA was contacted by the DTSA official in regard to this matter on a Thursday afternoon directly before our scheduled Sunday flight to Moscow, leaving virtually no time to deal with the issue or make an appeal.

unreasonably punish companies even if they make every effort to comply with the rules.

REMEDY: Alleviate Staff Workload by Removing Widely Available Commercial Technologies from the Auspices of the USML and the ITAR

BA acknowledges that due to a lack of staff and a constantly increasing workload, DDTC and DTSA may not have the time to thoroughly review TAA submissions. However, it's critical that at least some level of review be done, even for attachments, in order to avoid eleventh hour demands such as the one experienced here by BA. A solution to this problem would be to remove items that can be purchased commercially on the international marketplace from the auspices of the USML and the ITAR.[21] Such an action would eliminate superfluous work and allow DDTC staff to focus their time and effort on conducting thorough and quality reviews of applications and all related materials. It's difficult to blame DDTC staffers for delays or mistakes when they are so completely overworked and overwhelmed. Action must be taken to alleviate their burden by allowing all export control officials, both at DDTC and DTSA, to focus exclusively on technologies that actually warrant protection. It should be noted that this solution would enhance the quality of application reviews without costing the tax payer a single cent.

In any event, both the DDTC and DTSA need to be extremely sensitive about making last minute demands that substantially impact previously planned activities. For example, in this situation, a waiver could have been granted to allow the Ukrainian officials access to the simple, benign 'technical data' that BA wished to share, which in this case was the anticipated mass and external dimensions of the Genesis I spacecraft. As a matter of fact, it's still unclear whether such basic information should have been treated as 'technical data' at all.

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[21] For example, in December of 2007, BA filed a commodity jurisdiction request asking the DDTC to confirm BA's contention that its space habitat technology should be under the auspices of the Commerce Control List ("CCL") and not the ITAR.

PROBLEM: The Failure to Distinguish Between Benign, Commercially Available Civilian Technologies and Those that are Actually Sensitive and Have Military Applications

The failure to effectively distinguish between benign, commercially available technologies and those with actual military relevance is at the very heart of the ITAR problem. *A system that attempts to treat all space hardware/data, regardless of form, complexity, or function, in exactly the same manner, is inherently and deeply flawed.* The BA expandable habitats are an excellent example of this. BA's primary objective is to dramatically lower the costs of space-based activities. To this end, BA utilizes as much off-the-shelf, commercially available technology as possible. Although BA's design work is, of course, business proprietary, there is nothing on a BA module that could not be purchased on the global market or fabricated using commercially available components and practices. BA's Genesis I contained long understood electronics such as cameras, commonly available solar array technology, and did not contain a propulsion system. A majority of the Genesis I launch campaign DTSA monitors confidentially expressed the view that, due to the simplistic nature of the spacecraft, their presence was a waste of time and valuable government resources.

The most egregious example of a failure to differentiate between technologies that actually have military relevance and those that have no value whatsoever is the treatment of the Genesis I stand. The Genesis I stand is essentially a simple metal structure designed to support the spacecraft in a vertical position. If the Genesis I stand were placed upside down, covered with a nice checkered tablecloth, and you put a couple of plates on it, one would be hard pressed to distinguish the stand from any other table already commonly available at Moscow's local IKEA outlet.

However, since the stand had been crafted to fit the spacecraft, it fell under the auspices of the ITAR and was therefore treated accordingly. Specifically, due to one of the afore mentioned provisos to Genesis I's TAA, *BA was required to keep this metal coffee table under guard on a 24/7 basis*. One can only imagine the repercussions of Russian agents gaining access to

the Genesis I stand. Its secrets could have easily been sold to Iran or North Korea, where America's enemies could someday use such technology to serve sandwiches *or even tea* on.

In order to avoid the 24/7 guarding requirement, BA drafted and submitted a General Correspondence (GC) letter on April 26, 2006, and, roughly a month later, was granted a waiver from the TAA proviso requiring monitoring of the stand as well as two other similarly non-technical metallic objects (although, due to the nature of the response to our letter, an additional GC had to be filed to gain clarification on several points, adding more work and a few more months to an already bizarre process). However, the fact that BA had to spend the time, effort, and money to file paperwork to get permission not to guard a metal table, and that even with the exemption, the table was still considered ITAR-controlled, is representative of the overly broad and irrational nature of the current implementation of the regulations.

This is one of the major differences I have observed between Russian and American export control, the Russians tend to focus only on systems that really are sensitive, while we in the States spend a good amount of our time worrying about metal coffee tables.

REMEDY: Judicious Use of Provisos and/or Expedited TAA Processing

Too often, a 'boilerplate' set of provisos is used for any TAA dealing with space hardware. As the Genesis I example illustrates, simply because a piece of technology is space-related does not mean that a company should bear the burden of extreme demands such as 24/7 in-person security. A simple means to avoid such overly harsh and irrational requirements would be to instruct DDTC case officers reviewing TAAs to be more judicious in their use of provisos. Case officers must take the time to determine if an application actually involves militarily sensitive systems, or if, as was the case with Genesis I, the project utilizes largely off-the-shelf commercially available technologies. If the answer to this question is the latter, then highly burdensome provisos such as the mandatory presence of

multiple DTSA monitors for launch campaigns and 24/7 security *should not* be part of the TAA. Moreover, the DDTC should consider establishing an expedited process for the review and rapid approval of TAAs that are space-related but do not involve sensitive technologies. Finally, the DDTC should issue guidance exempting all non-technical objects from the ITAR. Hooks, dollies and stands do not provide any technical information worth protecting and the fact that they are covered by the ITAR is an excellent example of the regulations' overly broad and burdensome nature.

Of course, if, as discussed previously, such items were removed from the auspices of the USML and the ITAR entirely, judicious use of provisos would be irrelevant since TAAs would no longer be necessary in the first place.

IV. TAA AMENDMENTS

PROBLEM: Timing and a Lack of Transparency

If a company is requesting to amend their TAA, the chances are excellent that an urgent problem with the agreement has been discovered and that time is of the essence. Therefore, even more so than with the original TAA itself, the need for an expeditious review of a requested amendment is absolutely vital. Continuing our own example, after being told that BA would need to amend its TAA to include Yuzhnoye (a decision which our company still views with some skepticism), BA filed the relevant application on March 15th, 2005. BA's next in-person meeting was scheduled to take place at Yuzhnoye's Ukrainian facilities in early June leaving nearly three months for this extremely simple amendment to gain approval.

At the time of filing, we were quite confident that the application would be approved well before the Ukrainian meeting would take place, however, the month of March ended with no approval. April went by and, again, no approval for the amendment was forthcoming. In May, BA made numerous attempts to contact the DDTC. These efforts resulted in no information being gained beyond the standard response that DDTC was overwhelmed with a large backlog and that the amendment

would be reviewed as soon as possible. As May ended, BA officials were forced to begin to consider postponing its critical meeting in the Ukraine due to the lack of a response to what was believed to be an extraordinarily simple and standard amendment. Given the fact that BA disagreed with the need for the amendment in the first place, our company's level of frustration was quite high. Numerous calls to a variety of officials at the DDTC went unanswered. Eventually, BA was forced to seek support from NASA, who, due to its interest in the success of the technology and the Genesis I mission, was willing to attempt to facilitate contact with the DDTC.

When June arrived and there was still no word from the DDTC and no calls were being returned, as a last resort, a BA representative went to the DDTC determined to physically remain in their office lobby until someone supplied information in regard to the amendment. Ironically, shortly after arriving at the Department of State, NASA contacted BA with the news that the amendment was being cleared and would be issued before the end of the week. Despite filing the amendment in March, approval was not granted until June 7th, a mere three days before the travel to Ukraine was set to begin. Had the amendment taken just a few days longer, the meeting would have needed to be canceled, creating a nontrivial financial burden for BA, and setting back the Genesis I launch schedule substantially. To this day, BA remains uncertain as to why such a simple amendment took so long to approve. *As a matter of fact, it took nearly as long to gain approval to add Yuzhnoye as a signatory to the TAA as it did to gain approval for the original TAA itself.*

REMEDY: Direct Contact with Case Officers

Again, the ideal solution would be to remove superfluous items from the USML and the ITAR allowing the DDTC staff to dedicate more time and effort to individual applications and license amendments. If this cannot be accomplished there are other options that would help reduce confusion, and, if nothing else, allow companies to do a better job of planning and scheduling their activities. Specifically, when a TAA amendment is

submitted, DDTC should e-mail a notification to the company that contains: 1) the name, e-mail address, and phone number of the case officer assigned to the amendment and 2) the anticipated amount of time it will take to process the amendment (based on the current backlog and complexity of the requested change). These two simple pieces of information would be of incredible value to any company that is attempting to cope with a problematic TAA approval letter, and the burden imposed upon DDTC to transmit such a notification is relatively minimal.

V. DSP-5S

PROBLEM: Blatant Errors

A DSP-5 is the form filed to request the permanent export of unclassified Defense Articles. It is also the form that is commonly used to support the employment of a foreign national in the U.S. It was for this latter purpose that BA filed its first, and, for the time being, last DSP-5. Specifically, BA wanted to employ a Canadian citizen to act as a "Space Architect". In this position the Canadian would help design the interior of future full-scale BA habitats by determining the placement of sleeping quarters, work stations, the galley, etc.

This particular saga began on April 12, 2005 when BA submitted a DSP-5 to support the Canadian citizen's employment. After nearly two months went by, BA began contacting the DDTC to attempt to discover why a relatively simple DSP-5 with a Canadian citizen was taking longer than 60 days to complete. When a license application or TAA is overdue, after checking ELLIE NET (a rudimentary DDTC website that gives only basic information such as when the application was received, if it has been staffed out, the initials or code for the case officer, etc.), a company's only avenue to gain information is to call the DDTC "Response Team". The purpose of the Response Team is ostensibly to "*facilitate your defense trade solutions while affording licensing and other officers in DDTC more time for casework. By handling telephone calls from industry and the public, it supports the work of licensing and compliance officers*

by allowing them to focus on their core activities."[22] Despite the best intentions of the employees who take the Response Team calls, the only feedback I have ever received is that my license or application is delayed due to a large backlog. In my more cynical moments, I've felt that the entire operation could probably be replaced by a single recorded voice message that would simply tell anyone who calls that their application is delayed due to a large backlog.

However, while I have never received substantive information of any sort from the Response Team, what they can help with is to assist in using the clues provided by ELLIE NET (in some instances, the individual's initials) to identify the case officer. More often than not, I would be given a facsimile number and asked to draft a letter of inquiry and fax it to the DDTC. Occasionally I would get lucky and obtain an e-mail address or direct phone number for a case officer.

In this particular instance I eventually penetrated the veil of secrecy and got a phone number for the case officer. Calls and faxes would both go unanswered and myself and my deputy fell into a pattern of leaving daily messages in an attempt to engender a response from the DDTC. After roughly two weeks of trying, the case officer apparently made the error of picking up the phone and explained to me that the reason for the delay is that the DDTC wanted to require a proviso wherein the Canadian citizen would have to become a signatory to our existing TAA with Kosmotras. After recovering from my initial surprise at such an odd request, I patiently explained to the case officer that the Kosmotras TAA related exclusively to launch activities for our sub-scale demonstrator program and had nothing whatsoever to do with the architectural planning for our full-scale habitats that the Canadian citizen would be working on. The case officer told me that they understood and that DDTC would approve the DSP-5 with the proviso that the Canadian could not be exposed to technical data related to our TAA with Kosmotras. This seemed like an excellent solution since the Kosmotras

[22] DDTC Homepage, http://www.pmddtc.state.gov/response_team.htm.

launch operations were in no way related to the Canadian space architect's work.

However, roughly another two weeks went by and still I had received no approval from the DDTC. I began calling the case officer again, and, as before, would leave messages on at least a daily basis and would receive no response. Finally, I again managed to get the case officer on the phone, and, when I inquired about the delay I was told that the problem was that the Canadian would need to become a signatory to the Kosmotras TAA. With our previous conversation apparently forgotten, I repeated my argument that such a proviso would be nonsensical since the space architect's duties had nothing to do with our Russian/Ukrainian launch operations as embodied in the Kosmotras TAA. This time, the case officer seemed less convinced, but, in the end, again agreed that a proviso preventing the Canadian from sharing in the launch operation data under the Kosmotras TAA would be sufficient. Yet another two to three weeks passed and I still had received no word from the DDTC. I began calling and again left daily messages for the case officer, all of which were ignored. If memory serves, after about two weeks of doing this, I never got the case officer to respond again, but, near the end of July, I did receive a license approval in the mail that, of course, included a proviso requiring the Canadian space architect to become a signatory to the Kosmotras TAA!

At this point I gave up trying to work with the case officer and, instead, my outside counsel and I drafted a formal modification request to the Director of the DDTC Licensing Division asking for the removal of the proviso requiring the Canadian space architect to become a signatory to the Kosmotras TAA. We sent the request off in early August, shortly after receiving the license, and nearly *four months* after we had filed the initial DSP-5.

Fortunately, the Canadian space architect in question was married to an American and by November had obtained a green card making her the equivalent of a U.S. citizen in the eyes of the ITAR. On November 7th, 2005, I transmitted a letter to the DDTC, informing them that the Canadian was now a green card holder and I was therefore returning the license.

However, the return of the license did not deter the DDTC. Ignoring the fact that we had effectively canceled the license, in late November (after the Thanksgiving holiday), I opened a letter dated November 21st from the Director of the DDTC Licensing office implicitly conceding our point that the space architect did not need to become a signatory to the TAA, and, instead, the proviso would be modified to simply prevent the Canadian from receiving technical data under our launch operations TAA with Kosmotras. This of course was exactly the prescribed action that the case officer verbally agreed to in June (before forgetting the conversation).

To this day I keep the modification letter on file in case I ever need to remind myself how insane the export control bureaucracy can be. The entire process took up the better part of eight months and absorbed a great deal of time, effort, and money to prepare applications, attempt to solicit information, and file appeals.

Regrettably, this was not an isolated incident. We have also had pages ignored on DSP-73[23] applications (requiring time consuming and stress inducing amendments), and, while this situation with the DSP-5 is an extreme example, it's emblematic of the sorts of problems that occur and the overwhelming costs that companies are forced to pay, both in terms of time and money, to deal with DDTC's own errors.

REMEDY: A Real, Effective Team of Ombudsmen

Unfortunately, due to no fault of the individual employees, the efficacy of the DDTC "Response Team" is negligible. Instead, in order to deal with their own shortcomings, as well as companies' mistakes (we in the private sector are just as capable of errors as the DDTC), the Response Team should be replaced by a cadre of knowledgeable ombudsmen. These ombudsmen, who, ideally will have served previously as DDTC case officers and/or DTSA monitors, could provide real information to applicants in regard to delays and could help act as an

[23] A DSP-73 is an application for the temporary export of space-related hardware. These were the licenses that Genesis I and II were shipped to Russia under.

interface between a company and a case officer to correct any mistakes quickly and easily without wasting months of time on formal, written modification requests. Had such an ombudsman existed, in the case of our DSP-5, I'm sure the issue could have been properly resolved in June instead of November.

No organization is perfect,[24] and, due to the limitations of time and personnel, mistakes will be made. One cannot blame DDTC or specific personnel at DDTC for such errors, since they are an inevitable byproduct of their work. However, given the inevitability of mistakes, the system itself must find a way to try and reduce their impact as much as possible. This is the vital role that a team of ombudsmen could play. Whether it is a simple misreading of a DSP-5 application, or a controversial decision by a DTSA monitor, an alternative means of recourse must be developed. Just as in physical engineering, any pressure-filled system needs an escape valve that can be utilized in the event that something goes wrong. A team of ombudsmen could serve in such a critical capacity and would ultimately save both the government and the private sector a great deal of time and money.

VI. COSTS

PROBLEM: The Excessive Cost of Export Control-Related Monitoring and Document Review

As described above, the export control process can often be a grueling one. However, not only are companies forced to cope with this demanding and often irrational system, but they pay a great deal of money to do so. Specifically, companies are forced to pay for DTSA monitoring of all technical interchanges, both over the phone and in person, and any written communication containing technical data (electronic or otherwise) must be reviewed in advance by DTSA. Although, like all other corporations and citizens, aerospace companies pay their taxes, we are still expected to pay the government again for the privilege of having our overseas activities monitored. Most of my foreign

[24] With the potential exception of the 2004 Boston Red Sox.

colleagues would likely find this quite amusing, that here in America we actually pay our government officials to enforce even the worst aspects of our obsolete export control regulations.

Although paying any amount would be bad enough, the actual size of export control payments can be quite startling and are often too onerous for most small businesses. When companies receive a bill from DTSA, they are only provided a top-level number with no information as to how the figure was arrived at. In our own case, after making several inquiries, BA was able to obtain a spreadsheet that allowed us to determine some rough cost approximations.

BA estimates that in Fiscal Year 2007 our company was paying a rate of more than $130 per hour for monitoring and/or document review services. Even if one were to concede that this monitoring is necessary in the first place, and that some sort of fee is required, such high hourly rates seem excessive. This begs the question as to why the monitoring fees are so high and what this money is going toward. I have yet to see any DTSA monitors driving around in Lamborghinis or Corvettes, so it's safe to assume that they are not receiving the funds. The salary levels for GS-12s, 13s or 14s certainly can't account for such exorbitant fees, and since the company is also responsible for paying monitors' travel expenses (*e.g.*, airline tickets and hotel rooms), it's a mystery why these costs are so high and where the money is going.

In total, for FY 2006, the year of the Genesis I campaign, BA paid $161,896.50 in export control related monitoring fees. The following year, FY 2007, which included the launch of the Genesis II spacecraft, BA paid $147,173.44.

Such fees create a significant barrier to entry for small or entrepreneurial businesses. Due to the financial wherewithal provided by Robert Bigelow, BA was still able to take advantage of the proven and highly cost effective Dnepr launch system[25] for

[25] Beyond offering the most affordable launch prices globally, the Dnepr, a converted nuclear ICBM, supports Russia's peaceful demilitarization efforts by taking weapons of war and transforming them into tools for peaceful commerce. Again, the Dnepr is the literal embodiment of a "swords into plowshares" program.

the Genesis campaigns, despite the expense and trouble of export control. However, many companies, particularly small businesses, are prevented from competing in the global marketplace and/or taking part in international efforts (which dominate the space world) due to the high costs of mandatory export control monitoring. This in turn forces small businesses out of the trade space or bankrupts them entirely. The loss of small businesses in the field blunts the U.S.'s ability to innovate and compete, bolstering foreign providers who, after our own domestic capabilities atrophy and die, America becomes dependent upon. This is yet another example of the counterproductive nature of the ITAR.

REMEDY: Fee Elimination

Ideally, companies should not be asked to both dig their own graves *and* jump into them. In other words, aerospace firms should not have to pay for their own monitoring, particularly under the current nonsensical regime. However, if financial realities make this impossible, at a minimum, fees should be eliminated or substantially reduced for small businesses attempting to support international missions or projects.

Additionally, along with any invoice, DTSA should automatically include a breakdown of their costs, removing the 'black box' effect of the charges. This breakdown should be simple, clear, and show the hourly rates being charged for monitoring services. Such billing information could even be made available on Spacelink which will be discussed further in the next section of this article.

VII. WHAT DOES WORK

Despite all of the problems described previously, there are aspects of the export control system that function in a rational and efficient fashion. Although the primary purpose of this article is to point out the failures of America's export control regime, it's just as important to recognize at least a few of its suc-

cesses which can help inform any attempt to implement reforms.

A. The DTSA Space Directorate

While far from perfect, and, like any organization, it has both strong and weak personnel, the DTSA Space Directorate (SD)[26] should be complimented for, on the whole, acting in a largely rational and efficient fashion. DTSA SD and its officers are charged with enforcing a broken export control regime[27] yet still manage to generally make things work. As opposed to TAAs, the TTCPs and associated security, transportation, and joint operations plans (which, again, all fall under the purview of DTSA SD) are reviewed in a relatively expeditious fashion, and, most important of all, DTSA SD personnel are almost always available to discuss their concerns, edits, or suggestions over the phone or in person. In stark contrast to the TAA or DSP-73 process, DTSA SD personnel work directly with company officials, and will always pick up the phone and respond quickly to questions and feedback. There is no mystery when interacting with DTSA SD. Additionally, since DTSA SD officers are on the front-lines and serve as monitors for both launch campaigns and technical interchange meetings, these individuals are usually quite knowledgeable and can even often make helpful suggestions.

B. Spacelink

Spacelink is the name of the Web portal used to submit technical information to DTSA SD for review. Until 2006, the Spacelink interface was extremely arcane and confusing. At the time, using Spacelink was like trying to solve a Rubik's Cube while blindfolded in a dark room. However, DTSA SD recog-

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[26] The Space Directorate is the division of DTSA responsible for monitoring meetings, launch campaigns, and reviewing "technical" interchanges.

[27] As a matter of fact, many DTSA SD officials see the same problems that we in industry do, and will, at least privately, acknowledge the obsolescence and in some cases utter insanity of the current export control regime. Of course, since DTSA SD is responsible for enforcing policy instead of making it, there is very little they can do.

nized this problem, and replaced the old system with a much more simple, easy, and intuitive interface. The current Spacelink Web portal is a good example of efficient and effective government. Review and responses occur relatively quickly, and it's not unknown for simple or short documents to be reviewed and approved for transfer/export in 24 hours or less. As a matter of fact, Spacelink is the only government system that BA interacts with where decisions have been made in less than one working day.

C. DDTC Leadership

This article should in no way be construed as an attack against individuals within the DDTC, DTSA, or other officials working in the export control bureaucracy. Mistakes have certainly occurred, and the regime is unquestionably broken, however, the fault lies largely with bad policy and an unwarranted overburdening of personnel. The fact of the matter is there are many quality people, particularly in supervisory and leadership roles within the DDTC, that despite the poor environment, struggle to find ways to keep the system moving and bring rationality to the process. It's due to the good work of such individuals that the system manages to function. I would probably do more harm than good by listing their names or titles here, but, it's important to acknowledge that, by and large, the staff and workforce are excellent, it's the rules themselves that create a majority of the problems and lead to the excessive workload.

VIII. CONCLUSION

Via the Genesis I and II campaigns, BA has been on the front-lines of export control in a way that few other entrepreneurial or small companies have. However, the problems and criticisms cited in this article are quite common and are shared by many organizations, both large and small, though most would never discuss such issues publicly for fear of retribution. As a privately funded corporation with little to no interest in ever becoming a government contractor, BA is uniquely able to speak freely about ITAR and other policy issues.

The obsolescence of America's export control regime is the white elephant in the room. Everyone knows it's there, even many regulators, yet nothing is done. Every year that the status quo continues is a year where the American aerospace sector falls further and further behind its international competition. If no action is taken, ultimately, the export control problem will resolve itself, since, eventually, America simply won't produce any aerospace technology worth exporting, leaving the nation vulnerable to economic domination that will be a much more real and pernicious threat than anything ever dreamed of in Science Fiction.

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[*] P.J. Blount is Research Counsel and Instructor of Law at the National Center for Remote Sensing, Air, and Space Law, University of Mississippi School of Law.

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