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Long-term sustainability of outer space activities

Working report of expert group D: Regulatory Regimes and Guidance for Actors in the Space Arena

Summary

This report presents guidelines for actors in the space arena to improve the long-term sustainability of outer space activities. The guidelines presented are designed to facilitate best-practice regulation and information sharing in a way that benefits the long-term sustainability of outer space activities. Some of the guidelines are applicable to all space actors, while others are applicable only to space actors who design regulatory regimes.

I. Introduction

Role of expert group D

1. Expert group D submits this report with the primary objective of providing guidance to space actors on measures to ensure the long-term sustainability of space activities. The work of expert group D is focused on regulatory regimes and guidance for actors in the space arena.

Establishment of the expert group

2. At its fifty-fourth session, the United Nations Committee on the Peaceful Uses of Outer Space (the Committee), as set out in paragraph 147 of the report of the Committee,[1] endorsed the recommendations of the Scientific and Technical

[1] A/66/20.

Subcommittee and the Working Group on the Long-term Sustainability of Outer Space Activities, made at the forty-eighth session of the Subcommittee, relating to the long-term sustainability of outer space activities.

3. The Working Group considered a proposal contained in A/AC.105/C.1/2011/CRP.17 to group the proposed topics listed in section IV ("Scope") of the draft terms of reference and methods of work as contained in document A/AC.105/C.1/2011/L.307, in order to allow for a more efficient consideration of closely related items. The following clusters were proposed:

(a) Sustainable space utilization supporting sustainable development on Earth;

(b) Space debris; space operations and tools to support collaborative space situational awareness;

(c) Space weather;

(d) Regulatory regimes and guidance for actors in the space arena.

4. The Working Group agreed that the proposed clustering of topics could be considered as a basis for the establishment of expert groups. As a result, expert group D was established to consider and report on regulatory regimes and guidance for actors in the space arena. Expert group D met several times on the margins of the sessions of the Scientific and Technical Subcommittee and the Committee in Vienna and held its final informal coordination meeting on the margins of the International Astronautical Congress (IAC) in Beijing in October 2013 in order to finalize its report.

Purpose of these guidelines

5. This report is aimed at providing guidance to both current and future space actors. That is, the advice is aimed at States and non-governmental actors that are involved in, or propose to be involved in, activities that may impact the continued sustainability of outer space activities by all nations.

6. It is recognized that the guidelines must be read by all space actors in the context of the varying capacity and experience of those actors. The guidance contained within this report is neither prescriptive nor inflexible. Indeed, as set out in the recommendations of the Subcommittee, it was agreed that any guidelines that might be developed should be implemented on a voluntary basis and be focused on practical and prudent short- and medium-term measures that could be implemented in a timely manner.

7. The guidelines are not mandatory. However, they have value because they provide a benchmark, or best practice model, against which existing and prospective space actors may measure their activities. It is important to reflect on the fact that outer space activities that do not adequately consider long-term sustainability may ultimately adversely affect all States and space actors, including those who choose to act outside the scope of these guidelines. These guidelines are written in the spirit of providing a consensus and firm foundation for all States and space actors to promote long-term sustainable use of the great, universal resource that is outer space.

8. The guidance in this document is intended to provide complementary information to that which is produced by the Subcommittees and other Working Groups of the Committee and its Subcommittees.

Current regulatory practices and procedures relating to long-term sustainability

9. At present, there exist a wide range of regulatory practices and procedures which relate to the long-term sustainability of outer space activities.

10. These practices and procedures vary in many respects. Some are binding obligations, and some are non-binding. Some are internationally applicable, others are designed for application only in particular countries. Regulation is undertaken in some instances by governments, in others by international organizations, and in still other instances by particular industries or communities.

11. It is impossible to list here all regulatory practices and procedures currently existing which relate to the long-term sustainability of outer space activities. Many of these regulatory practices and procedures were examined by the expert group in developing the guidelines which follow.

Proposed guidance to actors in the space arena

12. The following section of this report proposes a series of guidelines for space actors which are designed to improve the long-term sustainability of outer space activities.

13. The guidelines are broken into two parts based on the intended audience. The first part (guidelines 1-5) consists of guidelines for space actors in a general sense. Some of the guidelines in the first part are aimed at all States, others are broader and encompass private sector and non-governmental actors.

14. The broad focus of the first part contrasts with the narrow focus of the second set of guidelines (guidelines 6-11). The second set of guidelines is intended to assist regulators of space activities by suggesting methods for making regulation more conducive to the long-term sustainability of outer space activities.

II. Proposed guidelines for regulatory regimes and guidance for actors in the space arena

The following draft guidelines are proposed by expert group D for consideration by the Working Group.

Guideline D.1

Promote and facilitate international cooperation in the peaceful uses of outer space as a means of enhancing the long-term sustainability of outer space activities.

Guideline D.1 applies to all modes of cooperation, including governmental and non-governmental; commercial and scientific; global, multilateral, regional or bilateral; and among countries at all levels of development. All States, particularly those with relevant space capabilities and with programmes for the exploration and use of outer space, should contribute to promoting and fostering international cooperation in the long-term sustainability of space activities on a mutually acceptable basis. In this context, particular attention should be given to the benefit for and interest of developing countries and countries with incipient space programmes stemming from such international cooperation conducted with countries with more advanced space capabilities. States are free to determine all aspects of participation in the exploration and use of outer space on a mutually acceptable basis. The terms in such cooperative ventures, for example through contracts and other legally binding mechanisms, should be fair and reasonable.

Alternative Text:

Guideline D.1 applies to all modes of cooperation, including governmental and non-governmental; commercial and scientific; global, multilateral, regional or bilateral; and among countries at all levels of development. This principle is particularly important since, for many States, international cooperation facilitates their participation in space exploration. Article IX of the Outer Space Treaty, when interpreted in the light of the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, of 1996, bases international cooperation on the free determination of fair, equitable and mutually acceptable contractual terms.

Guideline D.1: The expert group presents to the Working Group both versions of the text accompanying the guideline, with the first version presented as the expert group's recommended text.

Guideline D.2

Share experience and expertise relating to the long-term sustainability of outer space activities.

The experience and expertise acquired by those engaged in space activities are instrumental to the development of effective measures to enhance the long-term sustainability of outer space. Sharing such experience and expertise with others will facilitate and enhance the development of guidelines, rules, regulations and best practices in this area. The exchange need not be limited to a State-to-State level, but can occur between national regulatory authorities, government agencies, international intergovernmental organizations and non-governmental entities. New participants or those with very little experience in space exploration will benefit from the experience and expertise of other space actors, and established actors will also find value in developing new partnerships and sharing experiences more widely.

Guideline D.3

Develop and adopt procedures to facilitate the compilation and effective dissemination of information that will enhance the long-term sustainability of space activities, among the relevant space actors.

In many cases where States and international organizations are willing to share information, the procedures to enable information to be shared are non-existent, slow or lead to incompatible data. The information should be shared as widely as necessary to enhance the long-term sustainability of outer space activities, which means adopting procedures that permit sharing with private sector entities and national non-governmental organizations in addition to sharing between States and international organizations. In some cases, private sector entities already have effective mechanisms for sharing data which States and other organizations might adopt. Ratification of, and compliance with, the Registration Convention should be encouraged as a starting point in the compilation and exchange of information.

(Note: consider merging with B.8, noting information associated with the Registration Convention and the associated resolutions, and other relevant information.)

Guideline D.4

Conduct appropriately targeted outreach, capacity-building, and education on regulations and best practices relevant to long-term sustainability in view of the increasing number and diversity of existing and potential space actors.

Appropriately targeted outreach and education can assist all space actors to gain a better appreciation and understanding of the nature of their obligations, which can lead to improved compliance with the existing regulatory framework and the best practices currently being employed to enhance the long-term sustainability of outer space activities. While regulators should always strive for clarity when designing measures to enhance long-term sustainability, outreach and education can assist with any implementation issues that arise out of national regulatory frameworks. This is particularly valuable where the regulatory framework has been changed or updated resulting in new obligations. States are encouraged to foster outreach activities by or with industry, academia, regulators and other relevant organizations.

States, including their regulators and agencies, can also benefit from the input of space actors when designing regulations and issuing guidelines to the space industry. Outreach programmes may provide a valuable, iterative feedback mechanism for regulators.

Outreach, capacity-building, and educational initiatives could take the form of seminars (in person or broadcast over the Internet), published guidelines to complement national or regional laws and regulations, an Internet site with basic information on a regulatory framework, or the availability of a contact person within the Government who can assist participants in finding crucial information.

The availability of resources to support such initiatives varies greatly among States; thus fostering similar initiatives by industry, academia and international organizations is strongly encouraged. These entities can contribute valuable input on regulatory matters and best practices.

(Note that the language of B.7 could be used as an illustrative example under this guideline for potential space actors.)

Guideline D.5

Encourage and promote the activities of non-governmental entities that will enhance the long-term sustainability of outer space activities, such as engaging stakeholders, developing consensus standards and common practices and increasing international cooperation.

Non-governmental organizations and private sector entities conduct activities that have significant impacts, both directly and indirectly, on the long-term sustainability of space activities. Private commercial activities in space are a growing part of the global economy and many entities have taken steps to implement technical measures in conformity with the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space. Universities and other educational institutions have shown increasing interest in using small satellites for scientific and teaching purposes. Given the technical and cost constraints often found in small satellite missions, particular attention being paid to the activities of non-governmental and private sector entities may be warranted to ensure that their activities do not become a significant source of long-lived orbital debris in the future.

Non-governmental organizations play important roles in bringing potential stakeholders together to develop consensus approaches in relation to the conduct of space activities. For example, the International Organization for Standardization has adopted several standards on best practices and data exchange formats for collision avoidance. States are encouraged to evaluate these standards and seek to use common standards where practicable for debris mitigation, orbit lifetime estimates, safe disposal of hardware, re-entry management and satellite characteristics and trajectories. This will, in turn, promote valuable contributions by non-governmental organizations in this field.

Non-governmental organizations, such as industry associations, academic institutions and educational public interest entities can play important roles in increasing international awareness of issues associated with space sustainability, as well as practical measures to enhance sustainability. Such measures could include adoption of the Space Debris Mitigation Guidelines of the Committee, compliance with ITU Radio Regulations related to space services, and the development of open, transparent standards for the exchange of data necessary to avoid collisions, radio frequency interference or other harmful events. To these ends, international cooperation between Governments and non-governmental organizations and private sector entities should be encouraged and fostered.

Guideline D.6

When adopting or implementing national regulatory frameworks, consider the long-term sustainability of outer space activities.

Traditionally, national regulation has been concerned with issues such as safety, liability, reliability and cost. As new regulations are developed, States should consider regulations that enhance the long-term sustainability of outer space activities. There are three major aspects to such regulation. The first is that States, in

enacting new regulation, should bear in mind their obligations under Article VI of the Outer Space Treaty. The second is ensuring that space actors under the jurisdiction of the regulator are encouraged to conduct their activities in a manner that preserves the long-term sustainability of space activities. The third aspect is to encourage appropriate new methods for ensuring the long-term sustainability of space activities. Regulation should not be so prescriptive as to prevent initiatives aimed at improving the long-term sustainability of space activities.

Guideline D.7

Communicate within and among competent authorities to facilitate efficient and effective measures for the long-term sustainability of space activities.

States are encouraged to ensure that appropriate communication and consultation mechanisms are in place within and among the competent bodies that oversee or conduct space activities. This is because the regulation of space activities draws on many disciplines such as economics, law, public policy and the social sciences, in addition to physical science and engineering, and no single entity can be expected to cover all disciplines. For example, licences imposing conditions on space operations may involve many distinct activities such as launches, on-orbit operations, radio frequency usage, remote sensing activities and end of life disposal of space objects in orbit. Communication within and among relevant regulatory bodies can promote regulations that are consistent, predictable and transparent so as to ensure regulatory outcomes are as intended.

Guideline D.8

Encourage advisory input from affected national stakeholders in the process of developing, refining, and implementing national regulatory frameworks governing space activities.

States may find it beneficial and efficient to receive advisory input from affected national stakeholders during the process of developing regulatory frameworks governing space activities. These stakeholders may include private sector entities, universities or research organizations, non-governmental organizations operating under the jurisdiction of the State, agencies of the State, or other bodies that play a role in space activities and that will be affected by the proposed regulatory initiative.

For a State with advanced space capabilities, stakeholders are likely to have a practical understanding of how a regulatory framework affects or will affect the operations or administration of the space activities. By allowing early advisory input, the State can avoid unintended consequences of regulation that have an adverse impact on key stakeholders. Those stakeholders might also be aware of conflicting obligations by law or agreement. Identifying such conflicts early can avoid jurisdictional disputes after the regulatory framework is adopted.

States with developing space capabilities should identify the essential components of a national regulatory framework after advisory input from, or consultation with, relevant stakeholders. Without such input, the State might regulate its stakeholders too heavily by writing a regulatory framework that is more restrictive than is needed. In instances in which the State has not previously attempted to legally control or regulate space activities, the State might wish to

consider other States' space legislation or, by analogy, other national laws, as a guide to drafting. Without experience, however, the State might inadvertently write laws that are not applicable or not technically accurate for the particular space activities or space actors under its control.

In developing or refining national regulatory frameworks, all States should consider the need for appropriate transition periods and milestones for the implementation of measures to improve the long-term sustainability of space activities.

Guideline D.9

Weigh the costs, benefits, disadvantages and risks of a range of alternatives in developing regulatory measures applicable to the long-term sustainability of outer space activities and consider the potential benefits of using existing international technical standards and definitions.

States should create and implement their own regulations, applicable to those persons subject to their jurisdiction or control as appropriate, and share such regulations and resulting experience with other States as models for consideration.

Regulations should be practicable in that they should be capable of actually being implemented in terms of the technical, legal and management capacities of the State imposing the regulation. A closely related concept is that of technical feasibility in that a regulation should not require a technical innovation or exceed the current state of practice for the space activity.

The effect of regulations should be predictable. The groups to which the regulation applies should know the effects of the regulation on their activities in advance of conducting those activities, as far as possible. A reporting regime to gather information on how the regulations are being applied in practice should be considered.

Regulations should be both efficient and effective. Effective regulations are those that accomplish their intended purpose. An important component of effective regulation is to ensure that the regulation has a clear intended purpose. At the same time, regulations need to be efficient in terms of imposing the least cost for compliance (e.g., in terms of money, time or risk) compared with feasible alternatives. Compliance costs fall upon the regulator and the entity being regulated in both immediate and long-term effects. A best practice for controlling compliance costs is to ensure that regulations are performance-based and responsive to technical innovation. Their requiring a particular technical approach or proprietary solution that constrains future innovation should be avoided.

Guideline D.10

Adopt national regulatory frameworks suitable for space activities that provide clear guidance to actors under the jurisdiction and control of each State.

With the globalization and generalization of space activities, in particular the emergence of new actors in non-governmental services and operations, States should adopt regulatory frameworks to ensure the effective application of international norms considering the specificities of non-governmental entities for

which States bear international responsibility. States are encouraged to consider the application of relevant, generally accepted standards and best practices.

States are notably encouraged to consider not only existing space projects and activities, but also the potential development of their national space sector, and to envisage appropriate timely regulation in due time in order to avoid legal lacunae. It is important that national regulation address the specific nature and characteristics of the State's space sector, as well as its general economic framework which provides the context in which the space sector may further expand.

Guideline D.11

Address risks to people, property, public health and the environment associated with the launch, in orbit operation and re-entry of those space objects in the development of national regulatory frameworks and international standards.

Taking into consideration the potential risks of space operations and the different liability regimes for harm occurring on the Earth versus in space, States should address risks to public health, safety, and potential harm to persons and property not directly taking part in space operations. Reducing risks to public health and safety should be considered as part of national regulations applicable to the launch, Earth entry of space objects, and in-orbit operations.

Due consideration should be given to international practices of spacefaring States and the development of new practices as a result of new technologies and capabilities. Ways to manage risks to public health and safety can include:

(a) Quality assurance and risk management techniques;

(b) Methodologies to assess probabilities of harm to people and property from objects reaching the surface of the Earth from space or as a result of launch attempts;

(c) Probabilistic risk assessments, hazard analyses, and environmental impact studies that address the complete life-cycle of space missions;

(d) Implementation of "Principles relevant to the use of nuclear power sources in outer space" for space operations using nuclear power;

(e) Measures for planetary protection.

For purposes of developing and implementing relevant national regulations, States are encouraged to consider standards published by the International Standards Organization (ISO), the Consultative Committee on Space Data Standards (CCSDS), and national standardization bodies. In addition, States should consider the utilization of recommended practices by the Inter-Agency Space Debris Coordination Committee (IADC) and the Committee on Space Research (COSPAR). As State and non-State space actors gain experience in space operations, updated standards, recommended practices, voluntary guidelines, and national regulatory measures may be needed to address risks to public health and safety.

Recommended topics for future consideration

There is a range of areas in which future regulatory developments could potentially improve the long-term sustainability of outer space activities. These

issues are not addressed in the guidelines contained in the present document for various reasons. In some cases, the issue is intrinsically legal and best addressed by the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space. In other cases, international practice is not sufficiently established for expert group D to reach consensus on the best way to regulate the issue.

The first area identified for future regulatory development is the development of definitions. Regulation is generally most effective when there is a clear understanding of the scope of the regulation. In managing the key issues affecting the sustainability of outer space activities, a consistently applied definition of "space debris" would be valuable. In addition, the increasing connection between ground infrastructure and space infrastructure indicates that the definition of space activities may become important to States in the future, within their national regulatory frameworks.

The second area identified for future regulatory development is the development of regulations relating to the ownership of space objects. The issue of ownership is not straightforward for various reasons, including the following. First, under existing international law, all objects in space are under the jurisdiction of a State, regardless of their funding source, functionality or integrity. Secondly, space objects increasingly have multiple owners. Hosted payloads are increasingly common, increasing the number of ownership interests in a single satellite. A single launch can now transfer the payloads of many different space actors into orbit (for example, launching a number of CubeSats), which could potentially blur the lines of responsibility and ownership.

The third area identified for future regulatory development is to improve the practice of States in registering space objects. A variety of practices exist with regard to the quality and timeliness of information provided under the Registration Convention. This undermines the utility of the Registration Convention as a global information-sharing mechanism.

The fourth area identified for future regulatory development is to improve the consistency of national regulation globally in order to avoid a disproportionate number of space objects being registered in countries with the least demanding regulations on long-term sustainability of space activities. Inconsistencies in the current practice of States concerning licensing, registration fees and insurance requirements may encourage "forum shopping", which may not encourage efficient practices and procedures in relation to the long-term sustainability of outer space activities.

The fifth area identified for future regulatory development is the legal framework for active removal of space debris. In this context, a number of issues have to be addressed, such as the identification of the launching State and the responsible State in relation to the space object, the question of whether it is necessary to get consensus from the respective State or States, as well as the question of who bears the costs and risks of such an activity. It should be discussed whether active space debris removal could be undertaken or authorized by a single State, or if an international framework for active space debris removal under international consensus would be more suitable. With regard to the latter alternative, existing international organizations or forums could be involved for the development and implementation of appropriate and practicable procedures.