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AN EXPERT LEGAL ANALYSIS OF ARTICLE XI OF THE OUTER SPACE TREATY

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I. INTRODUCTION

The International Institute of Space Law (IISL) is a non-governmental organization dedicated to promoting the rule of law in outer space. IISL holds permanent observer status with the Committee on the Peaceful Uses of Outer Space (the Committee) and has been supporting the work of the Committee's Legal Subcommittee through various efforts, including the organization of the Annual Space Law Symposium in collaboration with the European Center for Space Law of the European Space Agency.

The purpose of this paper is to present an expert legal analysis of Article XI of the Outer Space Treaty (OST), particularly focusing on current practices, gaps, ambiguities and barriers to the provision's implementation, with a view to supporting relevant discussions within the Committee's Legal Subcommittee, including within the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space (WG TRE).

II. ANALYSIS OF ARTICLE XI OF THE OUTER SPACE TREATY AND CURRENT PRACTICES

The analysis of Article XI OST below is structured into its scope and interpretation, including key terminology (Part 1) and existing reporting channels and practices (Part 2).

1. Scope and interpretation of Article XI of the Outer Space Treaty

Article XI OST reads:

> *In order to promote international cooperation in the peaceful exploration and use of outer space, States Parties to the Treaty conducting activities in outer space, including the Moon and other celestial bodies, agree to inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities. On receiving the said information, the Secretary-General of the United Nations should be prepared to disseminate it immediately and effectively.*

The key terminology of the provision is analyzed below.

1. Meaning of key terms

Article XI requires States to inform the **Secretary-General of the United Nations**, **the public**, and **the international scientific community** about the **nature**, **conduct**, **locations** and **results** of **activities in outer space to the greatest extent feasible and practicable**.[1] Upon receipt of such information, the Secretary-General should be prepared to disseminate it immediately and effectively. Through this mechanism, Article XI OST promotes international cooperation in the peaceful exploration and use of outer space.

Recipients of Article XI information

Secretary-General of the United Nations: Long-standing practice across multiple international agreements has established procedures for informing the United Nations Secretary-General through formal reporting channels and administrative mechanisms.

The public: The inclusion of the public reflects the intention that broader awareness of space activities contributes to a cooperative and transparent regime for the peaceful exploration and use of outer space. Although the drafters of the OST in 1967 could not anticipate contemporary digital communication, information today may reach the global public through internet-based platforms, institutional publications and media channels.

International scientific community: Article XI OST refers to the international scientific community, encompassing scientists, research institutions and organizations engaged in space-related research worldwide. The provision does not distinguish between governmental and non-governmental entities, nor does it expressly include or exclude scientific activities sponsored by commercial actors.

Key terms defining the range and scope of information

Nature: The "nature" of a space activity refers to the type or purpose of the activity, such as scientific investigation, technological demonstration, space exploration, human spaceflight or commercial missions. This concept addresses the question of what kind of activity is being conducted.

In the context of the OST, the term "nature" may encompass scientific research, commercial use and infrastructure installations related to space exploration and utilization. Scientific research reflects the exploration objective described in the OST's preamble and Article I, while commercial activities reflect the use of outer space. Infrastructure installations must also be consistent with the Treaty's prohibition of military bases, weapons testing and military manoeuvres on celestial bodies.

[1] Bold print indicates keywords analyzed below.

Further guidance for interpreting the term may be drawn from transparency practices in other international regimes, including provisions in the United Nations Convention on the Law of the Sea and the Antarctic Treaty requiring States to share information about the nature, location and results of activities.

The nature of the obligation under Article XI OST is primarily one of transparency. It encourages States to share information regarding their space activities in order to promote international cooperation. The provision includes elements of reporting and notification but is not strictly a mandatory reporting regime. Instead, it reflects an expectation that States will provide information in good faith whenever feasible and practicable.

Conduct: "Conduct" can be understood to refer to how a space activity is carried out in practice. At a minimum, this could include operational information such as who is operating the activity (operator), which State is exercising the appropriate authorization and supervision over it, what operations the activity includes or will include, mission timelines, cooperating States or organizations, and the technical approach used to implement the mission including relevant information on operational safety.

As appropriate, it could be useful to submit information on the launch that precedes the activity, by, for example, linking any such submissions that may already exist. For particularly complex activities, such as for example those taking place on the surface of celestial bodies, States may wish to include additional information on the payloads onboard and any specific requirements they may have.

Operational transparency enhances cooperation by enabling other actors to understand how activities are being implemented. Technical descriptions may include standards, methodologies and materials used, while also reflecting environmental obligations under Article IX OST, including the avoidance of harmful contamination of outer space and adverse environmental changes on Earth.

Location: The "location" of an activity identifies where operations occur. This may include orbital regions such as Low Earth Orbit (LEO) or Geostationary Orbit (GEO), specific regions of outer space or on celestial bodies. Location information may also involve areas indirectly affected by the activity.

It could be useful to link to any relevant registration information to cross reference orbital parameters and add any further information that can integrate the registration submission. Where appropriate, this could also include references to associated frequencies duly filed with the International Telecommunication Union for the purpose of minimizing unintentional radio interference.

Information on location could be particularly useful for activities taking place on the surface of the Moon and other celestial bodies, to enable the identification of opportunities for cooperation and needs for coordination.

The scope of location concerns the operational environment of the activity. Information regarding end-of-life disposal or orbital regimes can enhance transparency and support space debris mitigation efforts.

Results: The term "results" refers to the outcomes of space activities and should be interpreted broadly. These outcomes may include:

- Scientific findings or data produced by the mission;
- Operational achievements, such as mission completion or deployment success;
- Environmental impact on Earth and in outer space including celestial bodies;
- Significant incidents or unexpected events relevant to operational safety;
- Lessons learnt from the activity.

Results may therefore encompass both intended and actual outcomes. These outcomes may be presented through reports detailing achievements, failures and any extension activities undertaken beyond the original mission objectives.

The scope of results encompasses the outcomes of space activities and should not be limited to scientific discoveries. In the current space environment, operational outcomes, mission completion status and incident reporting are also relevant. Results may therefore include both intended and actual outcomes, such as mission

objectives, anticipated benefits, publicly accessible outputs and operational lessons learned, which may be relevant to the goal of promoting international cooperation and understanding.

Activities in outer space: The phrase "activities in outer space" defines the subject matter of the Article XI OST reporting obligation and should be read broadly in light of the OST as a whole. Article I OST refers to the exploration and use of outer space, including the Moon and other celestial bodies, while Article VI confirms that States bear international responsibility for national activities in outer space, whether carried on by governmental agencies or by non-governmental entities. Read in conjunction, these provisions support an understanding of "activities in outer space" as encompassing a wide range of governmental and non-governmental operations conducted in Earth orbit and beyond, as well as on the Moon and other celestial bodies. The term is not limited to scientific missions but may include other activities connected to the exploration and use of outer space. It should also be distinguished from narrower concepts such as "objects launched into outer space" under the registration regime, since Article XI OST concerns the activities themselves rather than only the objects used to carry them out.

In terms of its scope, Article XI OST applies broadly to activities conducted in outer space, including civil, commercial and dual-use missions. While the extent of information shared may vary depending on national security, sensitivity and feasibility, the provision encourages transparency across all types of activities.

To the greatest extent feasible and practicable: This qualifier introduces flexibility into the reporting obligation while encouraging States to maximize transparency. It reflects an understanding that technological developments and operational contexts evolve over time. The phrase allows States to determine what information can reasonably be shared, while promoting good faith efforts to support cooperation and reduce the risk of misunderstanding or misinformation, while recognizing the challenges raised by sensitivities and complexities of space activities. Interpreting the provision today requires considering developments such as commercial operators, mega-constellations and on-orbit servicing activities, which extend beyond the scientific missions prevalent when the OST was drafted.

2. Actors included under Article XI OST and relationship with Article VI of the Outer Space Treaty

Article VI OST establishes that States bear international responsibility for national activities in outer space, including those conducted by non-governmental entities. This supervisory role of States provides a practical mechanism through which States may obtain the information necessary for Article XI OST reporting. Consequently, the formal obligation to provide information under Article XI OST rests primarily with States. However, the contemporary space sector includes a significant number of non-governmental actors conducting space activities. Reliance solely on States may delay or otherwise affect information. At the same time, international law does not directly bind non-governmental entities. A balanced approach therefore involves States collecting relevant information from non-governmental operators through national licensing and supervision regimes. Noon-governmental operators may also publish information voluntarily through their own platforms, while States remain adequate institutions for formal submissions to the United Nations. Although Article XI OST refers to "States conducting" activities, Article VI OST clarifies that this must be understood as encompassing non-governmental activities under their jurisdictions. In this respect, State practice demonstrates that information regarding non-governmental activities is regularly shared. This practice reflects the increasing role of non-governmental, commercial actors and supports a broader interpretation of cooperation that includes coordination and information sharing.

Consequently, States that structure their national licensing and supervision processes to capture Article XI OST information categories may find that compliance with Articles VI and XI OST delivers a measure of mutual reinforcement.

For future developments, providing for a mechanism whereby the sharing of information on non-governmental space activities is facilitated and/or made more efficient, could be considered, such as e.g. a verification granted by States of selected national non-governmental entities under their jurisdiction, to the effect of those non-governmental entities submitting information that would be visible immediately or in shorter time after submission (such as quicker 'greenlighting' of non-governmental information by States to be shared with the United Nations through official channels; difference of 'verified' (State-submitted) vs. 'unverified' (submitted by non-governmental entity) on a publication platform etc.).

3. Relationship of Article XI of the Outer Space Treaty and the Registration Regime

The registration regime, composed of General Assembly resolution 1721 B and the Registration Convention as another reporting mechanism serves a different purpose. Registration focuses on objects launched into outer space and requires technical information such as launch date, orbital parameters and basic function. Article XI OST, in contrast, concerns space activities and their broader context, including information sharing, results and opportunities for cooperation. Although some information submitted under the registration regime may partially satisfy Article XI OST objectives, the two mechanisms remain complementary rather than interchangeable. Registration serves a legal function related to jurisdiction and control, whereas Article XI OST primarily promotes transparency and cooperation.

2. Existing reporting channels and practices

Formal reporting through the Secretary-General remains relatively limited. Slightly more than sixty submissions referencing Article XI OST have been made to date.

Several factors contribute to this under-use:

- The absence of a prescribed reporting format;
- Uncertainty regarding the level of detail required;
- The lack of guidance on timing for submissions.

States frequently rely directly on alternative channels such as press releases, official websites or other voluntary transparency initiatives rather than direct Article XI OST notifications. Existing submissions generally fall into several categories, including registration-like information (mainly used where the States do not consider themselves State of registry), safety assessments relating to nuclear power sources and information on lunar missions. The Artemis Accords have also encouraged the use of Article XI OST to share information about lunar activities. While national publications and voluntary disclosures are valuable, they are often scattered and difficult to access systematically. Consequently, they do not fully fulfil the Treaty's objective of providing a centralized record accessible through the United Nations. Certain types of activities are reported more frequently than others: civil and scientific missions are commonly disclosed, whereas military or security-related missions are rarely reported. Dual-use missions, when disclosed, are typically described only in their civilian aspects.

III. GAPS, AMBIGUITIES, PRACTICAL BARRIERS AND OPPORTUNITIES

1. Lack of clarity on scope and level of detail

Article XI OST does not clearly define the level of detail expected in reporting. Key terms such as nature, conduct, location and results remain open to interpretation, leading to inconsistent reporting practices. However, the flexibility of the OST also reflects its nature as a principles-based instrument designed to remain relevant over time.

2. National security and commercial confidentiality

States may hesitate to disclose information concerning activities linked to national security or sensitive technologies. Similarly, private operators may resist sharing information that could affect commercial competitiveness. These concerns can limit the willingness of States to engage in extensive reporting.

3. Administrative and capacity constraints

Emerging space actors may face challenges in implementing Article XI OST due to limited administrative capacity or regulatory frameworks. Establishing reporting systems may require institutional resources that are not yet fully developed.

4. Distinction between Article XI and Article IX OST

Uncertainty also exists regarding the relationship between Article XI OST on information sharing and Article IX OST consultations. While Article XI OST promotes general transparency, Article IX OST requires consultations in cases of potential harmful interference. Clarifying the relationship between these provisions may help States determine when simple information sharing is sufficient and when consultations should occur.

5. Structural barriers for emerging space actors

Unclear or overly burdensome reporting expectations could unintentionally create barriers for emerging space nations, highlighting the need for transparency mechanisms that remain proportionate and accessible in order to support participation in space activities.

6. Lack of mechanisms or incentives for reporting

Article XI OST does not establish a formal reporting mechanism, timeline or format. The absence of incentives or penalties may reduce motivation for States to submit information.

7. Evolution of space activities

The contemporary space environment includes commercial operators, mega-constellations and new mission types such as on-orbit servicing and debris removal. These developments raise questions about what information should be shared and how frequently updates should be provided.

8. Practical barriers

In practice, national security considerations, commercial confidentiality and the absence of clear incentives continue to limit participation in Article XI reporting. Despite these challenges, Article XI OST remains a potentially valuable transparency mechanism. If implemented through existing national regulatory systems, it could provide legal certainty and support cooperation among space actors.

IV. RECOMMENDATIONS FOR FUTURE APPLICATION OF ARTICLE XI OF THE OUTER SPACE TREATY

In light of the foregoing analysis, several practical steps could support the contemporary application of Article XI OST.

1. Clarifying the interpretation of key terms and the scope of the provision

Providing clearer guidance on key terms such as nature, conduct, location and results would improve consistency in reporting. Interpretative guidance, good practices or reporting templates could assist States in describing their activities, while the qualifier “to the greatest extent feasible and practicable” should be understood as encouraging proportional transparency in good faith.

Article XI OST should be interpreted as applying broadly to space activities, including civil, commercial and dual-use missions. States may collect information from private operators through national licensing systems and incorporate this information into submissions though official channels.

The Committee could develop voluntary interpretative guidelines, best practices and reporting templates to assist States in implementing Article XI OST without creating additional legal obligations.

2. Encouraging use of national licensing mechanisms

States can rely on information already gathered through licensing systems, space object registries, environmental assessments and telecommunications filings when preparing Article XI OST submissions. Information already collected through such procedures could provide a practical basis for reporting. Furthermore, States could consider integrating Article XI OST information requirements into national authorization and supervision frameworks.

3. Supporting practical reporting mechanisms

Voluntary reporting tools, including templates or standardized information categories, may facilitate increasingly consistent reporting. Such tools should remain flexible and non-binding in order to encourage participation. The development of accessible platforms for submitting and accessing Article XI OST information could also support transparency and information exchange.

The Working Group's (WG TRE) reporting template represents a practical step toward improving transparency. Several enhancements may further strengthen its usability, including:

- Allowing early information sharing for proposed missions;
- Including orbital regime categories to improve searchability;
- Expanding keyword lists to include contemporary kinds of activities such as debris mitigation and on-orbit servicing;
- Adding links to safety and sustainability assessments;
- Allowing for flexibility of the reporting template through continuous possibility to amend the keyword list.

An accompanying clause clarifying the voluntary and non-binding nature of submissions may further encourage participation.

4. Emphasising benefits of transparency

Greater transparency can strengthen legal certainty, promote international cooperation and improve coordination between operators. It may also increase commercial confidence by supporting a safer and more predictable operational environment. Emphasis of these benefits of information sharing under Article XI OST could support a strengthening and increased useability of the mechanism as such.

5. Addressing the role of commercial actors

Given the growing role of non-governmental entities such as private or commercial companies, universities and research institutions involved in space activities, States may encourage operators to provide relevant information through national regulatory processes and public communication channels. While the competence and accountability for reporting remains with States, non-governmental actors can play an important supporting role.

6. Supporting emerging space actors

Capacity-building initiatives may assist emerging space actors in implementing Article XI OST. States with established regulatory frameworks may contribute through training, knowledge-sharing and cooperative projects. International organizations could further support these efforts by providing guidance materials, workshops and technical assistance. In this way, emerging space actors could commence by sharing basic mission information and gradually expand their reporting systems.

7. Good faith implementation

Based on Article III OST, Article XI of the Treaty should be implemented in accordance with the principle of good faith and *pacta sunt servanda* as reflected in Article 26 of the Vienna Convention on the Law of Treaties. Even brief submissions demonstrate a genuine effort to promote transparency and cooperation. Regular reporting, updates as missions progress and gradual improvements in reporting practices reflect meaningful engagement with the provision.

V. CONCLUSION

Article XI OST reflects a longstanding commitment to transparency and international cooperation in space activities within the framework of international space law. While the provision has been used only to a limited extent in practice, it remains a flexible instrument capable of supporting contemporary governance needs and of adapting to the evolving space environment. By clarifying its interpretation, developing practical reporting mechanisms including integrating reporting with existing national mechanisms and encouraging voluntary transparency practices and good faith implementation, Article XI OST can increase its importance and value in contributing to confidence-building, cooperation and the sustainable use of outer space.

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