Committee on the Peaceful Uses of Outer Space
Scientific and Technical Subcommittee
Sixty-first session
Vienna, 29 January - 9 February 2024
Item 11 of the provisional agenda*

**Long-term sustainability of outer space activities**

**Bridging the gap: Empowering States in pursuit of space sustainability**

**Paper submitted by the Islamic Republic of Iran**

The present conference room paper was prepared by the Secretariat on the basis of information received from the Islamic Republic of Iran. The information was reproduced in the form it was received

---

A/AC.105/C.1/L.4

V.24-01831 (E)
Long-Term Sustainability (LTS) of Outer Space Activities

**Bridging the Gap: Empowering States in Pursuit of Space Sustainability**

Paper submitted by the Islamic Republic of Iran

I. Introduction

The increase of space debris, the challenges related to large constellations and the increased risks of collision and interference with the operation of space objects as a result of the growth of the accessibility to outer space as well as the increasing number of stakeholders, definitely affect the long-term sustainability of space activities. The COPUOS guidelines for the Long-Term Sustainability of outer space activities (LTS) aim to assist Member States to mitigate the risks associated with the conduct of outer space activities while preserving the outer space for future generations.

The closely study of the guidelines, particularly the section B indicated that the voluntary implementation of the guidelines posed some challenges for Member States. Not all States possess the means to fulfill these requirements, access necessary data, or harness the requisite technology.

II. Requirements for Voluntary Implementation

1. In order to implementation of the guidelines on voluntary basis, it is essential to address three key categories of requirements: (1) *Data and Information*, (2) *Knowledge and Technology*, and (3) *Infrastructures and Technical Resources*. These categories are critical components of a comprehensive approach to promote safe and sustainable space activities. In the subsequent analysis, each of the three categories outlined in *Section B* of the LTS guidelines are thoroughly evaluated (Table No. 1).
### Table No. 1. Requirements for LTS Guidelines (Section B) Implementation

<table>
<thead>
<tr>
<th>Main Requirement</th>
<th>Subcategory (according to the guidelines)</th>
<th>Required Elements</th>
</tr>
</thead>
</table>
| **Data and Information** | Information on Space Objects | • Accurate, precise and up-to-date information on orbital data, status, and properties of space objects;  
• Experiences and information on the operation and end-of-life disposal of space objects;  
• Information on forecasted uncontrolled re-entry of high-risk space objects |
| | Information on Conjunction Assessment | Information on appropriate interpretation and usage of conjunction assessment. |
| | Space Weather Data | • Space weather data, space weather model outputs, and forecasts;  
• Real-time monitoring, identification of critical data sets, addressing gaps and operational models for space weather |
| | Space Object Tracking, Trajectory Prediction, and Conjunction Assessment | • Expertise in space objects monitoring, tracking, and conjunction assessment;  
• Space objects trajectory prediction during uncontrolled re-entries |
| **Knowledge and Technology** | Space Weather Monitoring and Forecasting | • Technical expertise in space weather monitoring, data analysis, and forecasting;  
• Space weather observation, modeling, forecasting;  
• The impact of space weather on space system design and mission planning |
| | Laser Beam Illumination | • Technical expertise in using lasers generating beams in near-Earth outer space;  
• Understanding potential risks associated with laser beam illumination |
| **Infrastructures and Technical Resources** | Information Representation and Sharing | Standards and formats for data exchange, Application Programming Interfaces (APIs) for data access and sharing, Cloud-based platforms to share and disseminate multi-resource information |
| | Space Objects Measurement and Monitoring | • Radar and optical telescopes, ground-based and space-based sensors for measurement, monitoring, and characterization of space objects; |
- Space system design tools, on-board technologies such as transponders, GPS receivers, radio frequency identification as well as computer-aided design software

**Uncontrolled Re-entry Risk Mitigation**
- Design techniques such as heat shields, explosive bolts for controlled breakup of objects during re-entry, design modifications to minimize risk associated with fragments to survive uncontrolled re-entry

**Space Weather Data Collection and Analysis**
- Space-based and ground-based assets such as satellites, magnetic fields, and radiation ground-based observatories, computer models to accumulate space weather data, space weather models and forecast tools for observing space weather

**Laser Beam Illumination Analysis**
- Computer models to analyze probability of accidental illumination by laser beams, quantitatively evaluating laser radiation power, assessing risk to space objects;
- Equipment such as laser rangefinders, laser power meters

### III. Conclusion

- The paper, despite the voluntary implementation of the Guidelines, highlights some key “required elements” which are crucial to the implementation of the Guidelines. In this vein, it is crucial to carefully address the challenges associated with the availability of these “required elements” among Member States within the COPUOS.
- International cooperation and capacity building including joint projects, transfer of technology and equipment, knowledge and data sharing, and providing access to infrastructure play a pivotal role in providing the “required elements”. In this regard, the Member States have the main responsibility to assist other Member States, irrespective of their degree of economic or scientific development, without discrimination of any kind in developing their space capabilities through cooperative endeavors including capacity-building workshops, knowledge-sharing platforms, technical assistance, and the available tools.
- The implementation of the Guidelines shall be pursued in accordance with Member States’ respective needs, conditions, and capabilities, in particular, data and information, knowledge and technology, and infrastructure and technical resource. In this regard, implementation of non-legally binding and voluntary Guidelines is dependent on the international cooperation and technical cooperation delivered to Member States.