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**Committee on the Peaceful
Uses of Outer Space
Scientific and Technical Subcommittee**

Report on the Workshop of the Working Group on the Long-term Sustainability of Outer Space Activities

(Vienna, 6 February 2024)

I. Introduction

1. At the fifty-ninth session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space, in February 2022, the Working Group on the Long-term Sustainability of Outer Space Activities agreed on and adopted its terms of reference, methods of work and workplan ([A/AC.105/1258](#), annex II, para. 7 and appendix). The workplan included a workshop to be held in 2024.
2. The Workshop of the Working Group on the Long-term Sustainability of Outer Space Activities was held in Vienna on 6 February 2024, on the margins of the sixty-first session of the Scientific and Technical Subcommittee.
3. The present report was prepared by the Chair of the Working Group on the Long-term Sustainability of Outer Space Activities, Umamaheswaran R. (India), with the support of the secretariat, and describes the background and objectives and programme of, and participation in, the Workshop and provides a summary of the discussions held.

A. Background and objectives

4. At its sixtieth session, in February 2023, the Scientific and Technical Subcommittee agreed that the full duration of the slot normally allocated for the holding of an industry symposium during the sessions of the Subcommittee would be allocated, at the sixty-first session of the Subcommittee, in 2024, to the holding of the workshop of the Working Group on the Long-term Sustainability of Outer Space Activities, upon its request, and as mandated in the Working Group's multi-year workplan ([A/AC.105/1279](#), para. 309).
5. At its sixty-sixth session, the Committee on the Peaceful Uses of Outer Space noted that the Working Group had agreed that the following three topics would form the basis of the agenda of the workshop to take place in 2024: (a) regulatory and policy aspects (possible subtopics of specific presentations could include, inter alia, licensing and supervision, space object registration, the role of guidelines in enhancing the utilization of space and the perspectives of developing countries and Indigenous/tribal communities); (b) safety of space operations (possible subtopics of specific



presentations could include, inter alia, space situational awareness, large constellations and the sustainability and resilience of space systems); and (c) scientific and technical research (possible subtopics of specific presentations could include, inter alia, space debris monitoring, mitigation and remediation, sustainable human presence in outer space and the role of academic and higher education institutions) (A/78/20, para. 143).

6. The Workshop of the Working Group on the Long-term Sustainability of Outer Space Activities was aimed at raising awareness of the long-term sustainability of outer space activities and supporting capacity-building and represented an opportunity to collect views from entities that might not normally participate directly in the work of the Working Group (A/AC.105/1279, annex II, para. 8).

B. Programme

7. The Workshop's programme was developed by the Chair of the Working Group, with the support of the secretariat, on the basis of nominations for speakers and/or panellists received from Working Group members, with the aim of incorporating diverse views and taking into account gender and geographical balance among panellists (A/AC.105/1279, annex II, para. 12). It was based on the three topics agreed on by the Working Group.

8. As there were more nominations for speakers and/or panellists than could be accommodated in the allotted three hours, nominees who were not assigned a formal presenting role were invited to attend the Workshop and engage in the interactive discussions. Those nominees were also invited to provide written contributions in support of the Workshop.

C. Participation

9. In-person participation in the Workshop was open to all delegates accredited to the sixty-first session of the Scientific and Technical Subcommittee. The proceedings of the Workshop were interpreted into all six official languages of the United Nations and were publicly webcast on United Nations Web TV (webtv.un.org).

10. The abstracts and presentations of the panellists, as well as the written contributions provided in support of the Workshop, were made available on the website of the Office for Outer Space Affairs of the Secretariat (www.unoosa.org).

11. The views expressed during, and in support of, the Workshop were those of the panellists and other participants and contributors, and did not represent the formal positions of States.

II. Summary of the discussions

12. The Workshop was moderated by the Chair of the Working Group and consisted of three panels. Each panel discussion included a series of short presentations, followed by an interactive discussion in which views were expressed both by panellists and by other participants.

13. The Workshop provided an opportunity to explore three interrelated aspects of a key and pressing issue: how to maintain the conduct of space activities indefinitely into the future in a manner that realizes the objectives of equitable access to the benefits of the exploration and use of outer space for peaceful purposes, in order to meet the needs of the present generations while preserving the outer space environment for future generations.

A. Policy and regulatory aspects of the long-term sustainability of outer space activities

14. The first panel focused on regulatory and policy aspects of the long-term sustainability of space activities. The panellists were Jesús Roberto Romero Ruiz, Deputy Director of Space Security at the Mexican Space Agency (AEM); Kwanwoo Jung, Director at the Ministry of Science and Information and Communications Technologies of the Republic of Korea; Vasily Gudnov, Head of the Multilateral Cooperation Division of the International Cooperation Department of the State Space Corporation “Roscosmos” of the Russian Federation; and Joanne Wheeler, Managing Partner of Alden Legal and founder and Director of the Earth and Space Sustainability Initiative (panellist nominated by the United Kingdom of Great Britain and Northern Ireland).

15. Participants in the Workshop were provided with examples of efforts to integrate the Guidelines for the Long-term Sustainability of Outer Space Activities ([A/74/20](#), annex II) into national legislation. A model from Mexico was showcased as it could be used by emerging countries to establish regulatory frameworks for addressing space weather and space debris. The establishment of a working group, educational programmes, a national space weather service and a laboratory contributing to space weather research and disaster prevention policies were also put forward as effective national practices and endeavours.

16. Panellists discussed strategic efforts in revising national space policies and regulations for sustainable space activities to align them with the Guidelines. Initiatives in the Republic of Korea on space debris management, space traffic coordination and satellite operation were highlighted as practical examples of cases in which efforts had been made to harmonize national activities with international standards.

17. Panellists considered ways to drive responsible behaviour in space while also influencing and enabling, and not hindering, commercial activities and innovation. The panellists discussed how the consistent implementation of standards at the national level can create a level playing field for all space actors. The need to incentivize industry to adopt responsible behaviour was discussed, as were ideas for regulatory frameworks that would appeal to the financial and insurance sectors.

18. It was pointed out that effective regulation in support of sustainability goals enabled both industry and investment and that it was increasingly recognized as necessary to include environmental, social and governance criteria in regulatory approaches.

19. In that context, the Workshop participants were informed about the work undertaken by the Earth and Space Sustainability Initiative to develop a set of practical sustainability standards linked to financing and insurance, which could be implemented in national regulation and licensing regimes to incentivize sustainable behaviour, and by the Space Sustainability Rating, which supported satellite operators by offering a tiered rating system that incentivized sustainable practices in outer space. The Space Sustainability Rating was aimed at reducing collision risks and space debris by leveraging industry best practices while not discrediting operators.

20. Panellists considered the importance of various provisions contained in the preamble to the Guidelines for the Long-term Sustainability of Outer Space Activities, including that the activities of States in the exploration and use of outer space are to be carried out in accordance with international law. They also reflected on the relevance of refining conceptual terminology, in particular when considering the regulation of newer technologies, such as those employed for space debris removal. In that connection, the draft guidelines on which consensus had not been reached during the period of the mandate of the first Working Group on the Long-term Sustainability of Outer Space Activities were recalled (see [A/AC.105/C.1/L.367](#)).

21. Workshop participants discussed challenges related to including private space actors in regulatory frameworks, including the challenge of ensuring that all actors have the information they need to comply with regulations. They also considered the possibility of penalties for non-compliance.

22. Panellists emphasized that, given the multisectoral and multidisciplinary nature of space activities, there was a need for a holistic approach to policy and regulation that included, *inter alia*, international engagement, efficient and enabling licensing, and effective tools to ensure compliance with standards. Cooperation among all stakeholders in such efforts was underscored as essential.

B. Safety of space operations

23. The second panel addressed the safety of space operations. The panellists were Pascal Faucher, Chairman of the European Union Space Surveillance and Tracking Partnership (EU SST) and Programme Manager, Defence and Security, at the National Centre for Space Studies (CNES) of France; Ajimandiram K. Nair Anilkumar, Associate Director of the Telemetry, Tracking and Command Network of the Indian Space Research Organisation and Vice-President of the International Astronautical Federation; Sittiporn Channumsin, Acting Director of the Space Technology Development Office at the Geo-Informatics and Space Technology Development Agency of Thailand; Srinivas J. Setty, Director of Products and Operations at NorthStar Earth and Space Europe (panellist nominated by Luxembourg); and Audrey Schaffer, Vice-President of Strategy and Policy at Slingshot Aerospace (panellist nominated by the United States of America).

24. Panellists discussed challenges posed by increases in the number of objects in space, including associated increases in safety risks, as well as approaches to addressing such risks and coordinating space traffic.

25. Workshop participants were informed about EU SST, a regional effort between 15 States members of the European Union, which had set up a unique model for the daily and systematic sharing of space situational awareness data. EU SST had been providing a public operational collision avoidance service for eight years, and since 1 January 2023, the service had been made available to satellite operators worldwide. EU SST demonstrated efforts to implement guidelines B.4 and C.1 of the Guidelines for the Long-term Sustainability of Outer Space Activities. In that connection, the need for spacecraft operators that were unable to perform conjunction assessments to seek support from appropriate entities providing around-the-clock conjunction assessment was emphasized. The opening up of the collision avoidance service would help developing and emerging space-faring nations to protect their satellites from the risk of collision, an example of the implementation of guideline C.3.

26. Participants heard a presentation on a case study of the commitment of India to the sustainable utilization of space, focusing on debris mitigation throughout the life cycle of space objects. Efforts in reorbiting satellites in geostationary orbit, deorbiting objects in low Earth orbit and passivation were detailed. Future plans to minimize the post-mission presence of space objects were also described. Emphasis was placed on the Importance of sharing experiences and providing support among emerging space actors with a view to improving adherence to the Guidelines.

27. Participants were informed about the landscape of space actors in Thailand, including the country's space start-up ecosystem, as well as policy efforts relating to space situational awareness and space traffic management to address the safety of space operations. Related work of the Association of Southeast Asian Nations was also highlighted.

28. Panellists addressed the role of the private sector in contributing to space safety through comprehensive space situational awareness services, as exemplified by Slingshot Aerospace and NorthStar Earth and Space. They discussed tools and services that could support both emerging and established spacefaring nations and

were provided with examples of related technical developments, including a global telescope network and software platform, advancements in sensor technology, space-based sensors, data analytics, the increasing use of artificial intelligence and automated conjunction assessments. They also considered current market requirements and the financial challenges with regard to enhancing space situational awareness capabilities.

29. Workshop participants were also informed about ClearSpace's foundational capabilities for a range of in-orbit services, including inspection, transport, life extension, disposal and more advanced operations such as assembly, manufacture, repair and recycling. In-orbit services, including debris removal and satellite servicing, were highlighted as crucial elements for maintaining space sustainability into the future.

30. Workshop participants discussed the effectiveness of regional centres for space situational awareness as compared to a unified global system. They reflected on the importance of the interoperability of systems, the standardization of interfaces, standard data formats and communication protocols, enhanced data management and collaborative efforts in information exchange. They discussed opportunities to learn from existing space situational awareness models and systems, both public and private, that functioned together and provided collective public services. Participants also considered approaches that could offer "quick wins" that could produce immediate and tangible results. One panellist advocated for worldwide cooperation between existing or developing regional space situational awareness systems, in line with guideline B.1, paragraph 5, of the Guidelines for the Long-term Sustainability of Outer Space Activities, as a pragmatic approach that was more realistic than a universal centralized system.

C. Scientific and technical research

31. The third panel focused on scientific and technical research. The panellists were Michel Doyon, Manager of Flight Operations at the Canadian Space Agency; Thomas Schildknecht, Director of the Swiss Optical Ground Station and Geodynamics Observatory Zimmerwald and Vice-Director of the Astronomical Institute of the University of Bern, Switzerland; Ernst K. Pfeiffer, Managing Director of High-Performance Space Structure Systems GmbH (panellist nominated by Germany); and Aya Iwamoto, Vice-President, Policy and Government Relations, at Astroscale Japan (panellist nominated by Japan).

32. Connecting the discussions of the previous panel with the topic of scientific and technical research, a panellist informed workshop participants about two Canadian national space situational awareness assets and their importance in collision avoidance and debris mitigation efforts. Participants were also informed about the Conjunction Risk Assessment and Mitigation System of Canada, which aided in collision avoidance by generating collision data messages, supporting satellites from various sectors, including government, industry and academia, as well as from foreign countries, upon request.

33. Panellists discussed the role of scientific research and observations in developing a comprehensive understanding of the current space debris environment – not only of the larger debris objects but also small particles – its characteristics and future evolution and the physics behind the proliferation of space debris across different orbital regions. They reflected on the idea that no single data source reflected the full truth, and discussed the need for continual scientific inquiry to inform, guide and provide the rationale for the development of new recommendations and practices, as well as to evaluate the effectiveness of existing practices in space debris mitigation and in the implementation of the Guidelines of the Long-term Sustainability of Outer Space Activities.

34. Panellists considered the need for technological developments to prevent, reduce and monitor space debris, at both the equipment and system levels. They also

discussed how existing equipment-level technologies could be more often utilized. They were informed about technical solutions, such as on-board thrusters, drag sails and tethers, for the high-priority deorbiting of objects in low Earth orbit. They also heard a proposal for limiting the time that defective satellites were in low Earth orbit to a maximum of five years, alongside a suggestion that relevant regulations should be adopted at both the national and international levels to maintain fair industry competitiveness between countries.

35. Participants were informed about the ADRAS-J mission, a commercial debris removal technology demonstration conducted as a collaboration between Astroscale and the Japan Aerospace Exploration Agency. The mission's objectives included approaching, observing and inspecting an upper-stage rocket body, emphasizing technology demonstrations of absolute and relative navigation and control for safe approaches. The project was aimed at commercializing space debris removal and developing new markets for private business. Policy and licensing aspects of the mission were discussed, as was the importance of ensuring transparency and safety in on-orbit servicing.

36. Participants considered how advancing sustainable practices was linked to a sustainable space economy. In that connection, workshop participants were informed about ecological design for a circular economy in space. That approach combined a range of design approaches, including design for reuse, sharing, leasing, repair, refurbishment, remanufacture and recycling.

37. Workshop participants discussed the possibility, and potential consequences, of exempting universities from space debris mitigation measures. They considered, inter alia, equitable opportunities to access and benefit from the use of outer space, questions concerning the reliability of university satellites and the potentially higher collision risks associated with those typically small satellites, and the financial feasibility of implementing deorbiting technology.

38. Workshop participants reflected on the need to ensure that policies keep pace with scientific and technical developments. They discussed possible updates to both the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space and the Guidelines for the Long-term Sustainability of Outer Space Activities and considered the desirability of comprehensive and cohesive global efforts in that regard.

III. Conclusions

39. The Workshop allowed for an exchange of ideas not only on risks and challenges to the long-term sustainability of outer space activities but also on pragmatic actions that were being taken or could be taken at the national, regional and international levels to address such challenges and support adaptive and collaborative approaches to space sustainability. The information shared by the Workshop panellists, and through written contributions, supported transparency and capacity-building.

40. The Workshop also represented an opportunity for representatives from academia, industry and the private sector to share their unique perspectives, practices, experiences and knowledge with the Working Group.