Non-paper by the Chair of the Working Group on the Long-term Sustainability of Outer Space Activities - 19 June 2024

Note: The content of the present non-paper was circulated prior to the Working Group's online informal meeting, held on 16 May 2024, as well as an annex to the Chair's summary of the informal meeting. The substance is being reproduced for ease of reference and to support the Working Group in taking a decision on whether the tables in the non-paper could form a basis for subsequent substantive discussions working through the challenges to the long-term sustainability of outer space activities.

I. Introduction

1. At the sixty-first session of the Scientific and Technical Subcommittee, in 2024, the Working Group on the Long-term Sustainability of Outer Space Activities agreed to hold an informal online meeting in April or May 2024 to discuss approaches to categorizing challenges to the long-term sustainability of outer space activities, with a view to including the ideas of all member States. That informal meeting would be used to seek feedback on approaches before future meetings (A/AC.105/1307, annex II, para. 10).

2. At the same session, the Working Group also agreed that, during its meetings at the sixty-seventh session of the Committee, in June 2024, it would work through the challenges to the long-term sustainability of outer space activities, including categorization of the challenges, without prejudice to the prioritization of challenges. The intention would be to develop a common understanding of the challenges and potentially uncover new challenges not previously discussed (A/AC.105/1307, annex II, para. 14).

3. In accordance with the Working Group's multi-year workplan (A/AC.105/1258, annex II, appendix, para. 18), by the end of 2024, the Chair is to prepare a draft report, taking into account the work of the Working Group. It would be helpful if the discussions on categorizing challenges informed the Chair of what Working Group members would like the Chair to include in that report.

4. The present non-paper by the Chair provides food for thought and it meant to help delegations prepare for discussing approaches to categorizing challenges to the long-term sustainability of outer space activities. Ideas are drawn from previous Working Group inputs and discussions and are not meant to capture all positions or represent a definitive list.

II. Existing proposals for guidelines and/or recommendations to address challenges to the long-term sustainability of outer space activities

5. During the sixty-first session of the Scientific and Technical Subcommittee, in 2024, a new guideline was proposed on making special provisions for human spaceflight missions (see A/AC.105/C.1/2024/CRP.32).

6. There is an option to take up the topics covered in the guidelines that did not meet consensus during the work of the first Working Group on the Long-term Sustainability of Outer Space Activities (see A/AC.105/L.367).



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7. One possible recommendation could be that the Working Group encourage continued reporting of experiences, practices and lessons learned in relation to the implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee (A/74/20, annex II) through the use of non-papers and conference room papers and, ultimately, in the proposed information repository

III. Ideas on approaches to categorizing challenges to the long-term sustainability of outer space activities

8. The Chair has heard the view that Guidelines and/or recommendations coming out of the work of the current Working Group should be based on evidence and documented experiences.

9. The Chair has heard the view that the Working Group should develop a series of specific criteria for new guideline proposals.

10. The Chair has heard the view that the Working Group can help in the deliberation of general, overarching recommendations about activities in Earth orbit: 1) that are novel and where very little practical experience exists yet, 2) that are expected to have a relevant and significant impact on the long-term sustainability of outer space activities, 3) for which no full clarity exists about their proper, safe and sustainable conduct, and 4) that are close to or already being undertaken by one or more space actors, therefore creating an urgency to reach such clarity about their proper conduct.

11. The Chair has heard the view that categorizing challenges into 1) challenges related to the implementation of the Guidelines, 2) challenges related to capacitybuilding in the framework of the Guidelines, and 3) challenges related to new areas that may not be directly captured in the adopted Guidelines may be useful for advancing the work of the Working Group. The below tables reflect that approach. The provisional lists of challenges currently inserted in the working versions of the tables are not meant to reflect definitive lists. Content may also fit into more than one category and relate to more than one Guideline.

I. Challenges related to the implementation of the Guidelines			
Section A: Policy and regulatory framework for space activities			
A.5: Enhance the practice of	registering sp	ace objects	
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?
Mechanisms for improving registration practices for large constellations.			
Special responsibilities of launching States related to uncontrolled re-entries.			
Section B: Safety of space operations			
B.1: Provide updated contact information and share information on space objects and orbital events and			

B.2: Improve accuracy of orbital data on space objects and enhance the practice and utility of sharing orbital information on space objects			
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?
The increased need for timely and accurate space situational awareness information and related data to be made available in a common/interoperable format			
Improvements to space situational awareness and connected information- sharing, for conjunction-free launches and the safety of human spaceflight missions			
Improved mechanisms to locate the appropriate points of contact for operational communications			
Improved mode of inter- operator coordination			
The contact information of small satellite operators for coordination and data exchange to mitigate collision risk			
The contact information of small satellite operators for coordination and data exchange to mitigate collision risk			
A standardized method of risk assessment and a common protocol for collision avoidance			
Air traffic coordination during the passage of space objects in airspace			
A standardized method of risk assessment and a common protocol for collision avoidance			

The exchange of operational ephemeris			
Mechanisms and standards needed to implement the Guidelines that require data-sharing or consultation			
Transparency and safety assurance to encourage private sector actors to implement space debris removal activities			
B.4: Perform conjunction as	sessment durii	ng all orbital phases of controlled	d flight
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?
The observance of spacecraft manoeuvring rules to avoid collisions (e.g. between human-rated spacecraft, robotic spacecraft and constellations)			
Operational transparency (e.g. notifications of manoeuvres that may result in safety issues to other operators)			
Requirements related to spacecraft manoeuverability in various orbits			
Predominance of a competitive environment motivated by commercial and political views, which will prevent the formation of an interactive and cooperative approach among Member States			
Deployment of thousands of satellites in near-Earth space in the form of large or mega constellations, which can cause orbital congestion and limit the free and equal access of other Member States to the peaceful exploration and use of outer			

space, which is recognized as the common interest of all humanity.			
B.8: Design and operation o characteristics	of space objec	ets regardless of their physical	and operational
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?
Development and implementation of criteria and procedures for the preparation and conduct of space activities aimed at the active removal of space objects from orbit			
Safe conduct of operations for the destruction of in- orbit space objects			
Long-term contributions and challenges of large-scale commercial space launches.			
Sustainability of on-orbit operations and on-orbit manufacturing			
Failure to reach an international agreement on mechanisms and standards required for the implementation of some Guidelines that require data- sharing or consultation			
Section C: International cooperation, capacity-building and awareness			
C1: Promote and facilitate international cooperation in support of the long-term sustainability of outer space activities			
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?

The promotion of interactive and cooperative approaches among members to avoid a		
competitive space		
environment		

II. Challenges related to capacity-building in the framework of the Guidelines			
Section A: Policy and regulat	tory framewor	·k for space activities	
A.5: Enhance the practice of	registering sp	ace objects	
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?
<i>Timely registration of space objects</i>			
How to address ongoing complexities related to the status of launching States			
Section B: Safety of space op	erations		
B.2: Improve accuracy of orl of sharing orbital informatio	oital data on sj n on space obj	pace objects and enhance the praisers	actice and utility
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?
Trackability and manoeuverability of CubeSats and nanosats			
Prevention of on-orbit failures of space systems, especially those that are mass-produced using commercial off-the-shelf components			

B.8: Design and operation of space objects regardless of their physical and operational characteristics				
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?	
Approaches to the design and operation of small-size space objects				
Section C: International coo	peration, capa	city-building and awareness		
C.3: Promote and support ca	pacity-buildin	ıg		
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?	
Lack of required data, information, knowledge, technology and infrastructure to implement the Guidelines				
Mechanisms to ensure that emerging spacefaring nations enjoy inclusive participation in space activities				
Mechanisms to ensure equitable access to low- Earth orbit				
Mechanisms to address the lack of required data, information, knowledge, technology and infrastructure to implement the Guidelines				
Need for the cooperation of all Member States and the full support of developed countries in the implementation of research and the sustainability of space exploration				

III. Identification and consideration of new challenges to the longterm sustainability of outer space activities

Section B: Safety of Space Operations

Section D. Safety of Space Operations				
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?	
The safety of human space flight and space stations				
The supervision and safe conduct of close-proximity rendezvous operations				
Prevention of dangerous alterations of space environment parameters resulting from intentional modifications				
Implementation of policy aimed at precluding interference with the operation of foreign space objects through unauthorized access to their on-board hardware and software				
Preclusion of activities that could damage foreign ground and information infrastructure related to space activities				
Appropriate solutions for the active removal and destruction of non - registered space objects				
Transparency and safety assurance to encourage private sector actors to implement space debris removal activities				
Implementation of operational and technological measures of self-restraint on States' space activities in order to prevent adverse developments in outer space				

Section C: International cooperation, capacity-building and awareness				
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?	
Assignment of ownership to space debris				
Section D: Scientific and tech	hnical researc	h and development		
Challenges identified	Whether Working Group members agree that it is a challenge?	If yes, possible recommendation	Any re- categorization required?	
Development and implementation of criteria and procedures for the preparation and conduct of space activities aimed at the active removal of space objects from orbit				
Good practices for active debris removal				
Protection of the dark and quiet skies, including for astronomical observations				
Sustainability of deep space missions				