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POLICY, REGULATORY AND DIPLOMATIC PERSPECTIVES ON THRESHOLD-BASED MODELS FOR SPACE SAFETY AND SUSTAINABILITY

Abstract

The intensification of space activities and the emergence of new actors along with new technological and business concepts (e.g. large constellations, miniaturized systems, etc.) have raised, and continue raising, new challenges to ensure the safety of operations in space and the long-term sustainability of the space environment.

The current operational reality in the Earth orbital environment leads a number of scientists, industry leaders and public-sector executives and policymakers to voice concern over increasing risks and the inefficient implementation and enforcement of existing rules. This recognized challenge therefore calls for new approaches, philosophies and concepts that could efficiently mitigate and decrease risks related to increasing congestion and debris generation.

In this context, there is a growing need for innovative measures to improve compliance with existing guidelines and to ensure the long-term sustainability of the space environment.

Models leaning on threshold-based mechanisms have and continue to be extensively used (with varying degrees of success) at both local and international levels for managing limited natural resources and the commons, as they address the risk of surpassing levels of exploitation that could lead to the depletion or the destruction of the resource.

Before discussing targets, the prerequisite for defining thresholds is to develop a commonly agreed metric among those benefitting from the resource. The Space Environment Capacity Concept developed by the ESA Space Debris Office is an attempt to ideate, develop and implement a threshold-based approach relevant for the Earth orbital environment.

ESPI built upon this concept and examined, more generally, the relevance of a threshold-based approach in the Earth orbital environment through an assessment of policy, regulatory and diplomatic implications, and understanding whether science-based threshold-based models can incentivize actors towards safer and more sustainable exploitation of the environment.

The analysis involved a consultation campaign consisting of a set of interviews with high-level experts and an interactive online workshop.

This paper presents quantitative and qualitative results of the study undertaken by ESPI and discusses the prospects for threshold-based approaches and mechanisms in the Earth-orbital environment and hopes to offer a layer of informed contributions to discussions and efforts aiming to minimize risks related to the proliferation of objects in the Earth orbital environment and prevent or halt behaviour that could lead to an onset of collisional cascading, thus ensuring the long-term viability and conservation of the Earth orbital environment.