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Political, Legal, Institutional and Economic Aspects of Space Debris Mitigation and Removal - STM Security (8-E9.1)

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THE SPACE SUSTAINABILITY RATING: AN OPERATIONAL PROCESS INCENTIVIZING OPERATORS TO IMPLEMENT SUSTAINABLE DESIGN AND OPERATION PRACTICES

Abstract

In 2021, more than one million objects larger than 1cm are orbiting the Earth [1], posing significant challenges to current and future operations in the space environment. They also present a risk of affecting people on earth, in case of loss or disruption of space-based infrastructures or activities due to a collision or an explosion. Given the growing number of government and commercial actors, plans of mega constellations, and the complexity if the landscape with standards, norms, and guidelines, there is a critical need to consider implementing tools that will incentivize space actors to foster responsible behavior and implement debris mitigation and remediation measures in order to ensure long-term sustainability of the space environment.

The Space Sustainability Rating was first conceptualized within the World Economic Forum's Global Future Council on Space Technologies, with the goal of providing a standardized and flexible tool to measure the sustainability level of a mission. Developed during the past two years by an international, transdisciplinary consortium consisting of BryceTech, the European Space Agency (ESA), the Massachusetts Institute of Technology (MIT) Media Lab, the University of Texas at Austin, and the World Economic Forum (WEF), the Space Sustainability Rating provides an assessment system to encourage mission designs that are compatible with sustainable and responsible operations, as well as on-orbit behaviors that reduce potential damage to the orbital environment and impact on other operators. Designed as a composite indicator, the SSR consists of six modules highlighting key related decisions faced by space operators in all phases of the mission. In 2021, the EPFL Space Center (eSpace) has been selected to host and operate the Space Sustainability Rating with the target to start operations in early 2022.

This paper will provide an overview on the Space Sustainability Rating process and will highlight how it constitutes an active incentive for operators to implement sustainable behaviors. The process of rating a mission will be described, including a brief description of the modules, a description of the input gathering phase, computational phase, and results communication phase. An emphasis on the SSR recommendations will be further explored, showing how rating's results are analyzed and how several areas of improvement are identified during a feedback process loop. Finally, a description of the future rating process optimization will be presented by introducing the structure of the future rating platform that is being developed at eSpace.

[1] Source: European Space Agency https://sdup.esoc.esa.int/discosweb/statistics/