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Author: Dr. Vitali Braun
IMS Space Consultancy, Germany

Ms. Xanthi Oikonomidou
European Space Agency (ESA/ESOC), Germany

Ms. Lucía Ayala Fernández
Technische Universität Braunschweig, Germany

Mr. Stijn Lemmens
European Space Agency (ESA), Germany

A PARTICIPATIVE APPROACH TO SPACE DEBRIS RISK AND MITIGATION ANALYSES

Abstract

The European model MASTER (Meteoroid and Space Debris Terrestrial Environment Reference), which has been developed by the European Space Agency (ESA) since the 1990's translates the knowledge on the space debris environment into its digital twin. With improved understanding of the space debris environment over time, the model's complexity has grown accordingly. In parallel, space debris mitigation guidelines have been developed, mainly through the technical expertise in the Inter-Agency Space Debris Coordination Committee (IADC). The recognition of the need for space debris mitigation in view of a growing number of space debris in the same orbital regions valuable satellites are operated in, led to the development of means to assess a space mission's compliance with the proposed guidelines. The Debris Risk Assessment and Mitigation Analysis (DRAMA) tool suite is based on MASTER's background population and is being used in the mission design by different entities globally today. The growing complexity in space activity as result of an increased number of involved entities; the intensified dependency of our technological society on space infrastructure; and the disruptive changes in the space sector in these days, requires associated space debris risk and mitigation analysis tools to reflect on this. A possible way to address this challenge is through engaging with stakeholders in the development of space debris models and associated risk management practices. To this end ESA hosted, in collaboration with TU Munich's Center for Technology in Society (MCTS), the first community workshop in March 2021 to discuss various modelling aspects with stakeholders, to understand the interconnectedness between groups and sub-domains and seek for ways to improve stakeholder involvement. A second workshop is planned to continue on this work in 2022, with a focus on space debris mitigation practices, their effectivity and especially the availability of means to assess mitigation practices. Various stakeholders have contributed to the development of the DRAMA software suite over the past few years and the aim of the workshop is to further broaden and strengthen that approach. At the same time, various developments are currently on-going within a set of activities combined under ESA's Debris Mitigation Facility (DMF). In this paper the current progress will be presented with a strong focus on the participation of different groups, for instance through the series of workshops or the user communication platform developed under DMF.