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Mitigation - Tools, Techniques and Challenges - SEM (4)

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EVALUATION OF THE SHARE OF THE SPACE CAPACITY SHARE USED BY A MISSION

Abstract

Space, as any other ecosystem, has a finite capacity. The continuous growth of space activities, due to our increasing reliance on services from Space, the privatisation of the space market and the lower cost of deploying smaller and distributed missions in orbit, is from one side improving human-life quality and however, it is contributing to overloading this delicate ecosystem. As of today, the space debris problem is internationally recognised, and thus the environmental concern in Space activities is becoming a priority. To tackle this issue, a clear and actionable definition of space capacity is required. This paper will perform a literature review of proposed approaches to measure the space capacity and possible definitions of a proxy for measuring it. Then the space capacity mode of the software THEMIS (Tracking the health of the environment and missions in space), developed by Politecnico di Milano and Deimos UK within a project funded by the European Space Agency, will be presented. The tool evaluates the space debris index of a single mission by considering the risk of collisions and explosion and evaluating the effects in terms of cumulative probability of collision of the simulated resulting debris on the active spacecraft population. The space capacity mode is thought to allow the computation of the space capacity share used by orbiting spacecraft. This is obtained comparing the space debris index with long-term DELTA simulations that represent the evolution of the background population and by aggregating and comparing the space debris index of several missions. The paper will present the development and consolidation of the different building blocks required for the definition of the space debris index and the environmental capacity, and the development of a database to support the management of the capacity through its computation and allocation. An overview of the expected user interface functionalities will also be presented.