IAF BUSINESSES AND INNOVATION SYMPOSIUM (E6)
Public-Private Partnerships: Traditional and New Space Applications (2)

Author: Ms. Aza Elyamani
Japan

Mr. Mohamed Harhash
Egypt
Mrs. Nourhan Adel El-Seidy
Student, Egypt

SPACE DEBRIS TO SPACE ASSETS: MONETIZING SUSTAINABLE SOLUTIONS FOR SMALL SATELLITES

Abstract

The rapid growth of the satellite industry by the developments of CubeSats and small satellites has created significant opportunities and challenges in the space debris mitigation field. Currently, about 13,000 active satellites are orbiting Earth and the number is expected to reach 60,000 by 2030. The absence of thrusters on many of these platforms increases collision risks and orbital overcrowding. Space debris poses a significant hazard, with potential losses that could reach $500 million per satellite. As a result, the regulations became stricter, reducing the LEO disposal phase from 25 years to 5 years, putting satellite operators in the challenge of adopting sustainable, clean, and cost-effective deorbiting solutions.

This presentation explores how the pressure of new regulations, growing market demand, and technological innovation can transform space debris mitigation into a sustainable and profitable business. Passive deorbiting techniques offer cleaner, sustainable, and cost-effective solutions for CubeSats and small satellites. We propose revolutionizing solutions like drag sails or inflatable structures, which have proved a huge reduction in deorbiting time. These solutions will help operators comply with new regulations and reduce mass and cost, and that is what makes these solutions ideal for CubeSats and small satellites. Additionally, this presentation will investigate enhancing the viability of passive deorbiting by using emerging methods like solar radiation pressure and magnetic damping as innovative technologies for sustainable deorbiting.

To extract a profitable business out of these solutions, we introduce the Deorbiting-as-a-Service (DaaS) model, where operators pay for end-of-life mitigation services, including systems integration, deployment monitoring, and regulatory compliance. This model aligns with the trend of pay for service in the space industry. Additionally, partnerships with regulatory bodies and insurance organizations could unlock new revenue streams. By aligning economic development with sustainability goals, this model can foster a circular space economy and address the huge need for space debris mitigation.

This presentation also highlights the roles of regulations and investments in shaping the future of the space debris mitigation industry. Regulations are no longer considered barriers. They are advantages that motivate companies to innovate new technologies in the space sector. We provide plans for stakeholders to engage in this market through case studies, market insights, and comparative analysis. By combining profitability with sustainability goals this presentation offers a roadmap for a cleaner, safer, and more economically viable space sector.

Keywords: Space Debris, Debris Mitigation, Space Industry, Satellite Deorbiting, LEO disposal.