IAF BUSINESS INNOVATION SYMPOSIUM (E6)
Finance and Investment: The Practitioners' Perspectives (2)

Author: Dr. Stela Tkatchova
EISMEA, Belgium

Mr. Sergio Gallucci
SCOUT Inc., United States
Mr. Vladimir Baranov
SCOUT Inc., United States

INITIAL USER-DRIVEN FRAMEWORK FOR DEVELOPING TRADE-OFF SCENARIOS FOR "PERCEIVED RISKS" OF SPACE DEBRIS COLLISION

Abstract

Satellite owners, operators, space agencies and commercial players operating mega-constellations (e.g. Starlink,Kuiper, OneWeb, etc.) will require **economically viable** ways to inspect, refuel, augment, extend, and manage their fleets. Satellite owners are challenged to integrate reliable, low-cost satellite servicing solutions which minimize operational downtime and costs. They'll develop trade-off scenarios to choose from the rich spectrum of upcoming satellite inspection, on-orbit satellite servicing, active debris removal, and end-of-life support. Key examples of the maturation of this market segment are the on-orbit technology demonstrations of MEV-1, MEV-2 and ELSA-d. Satellite owners that have witnessed the loss of profitable satellites (e.g. IS-29e) may develop collision avoidance maneuver capabilities to manage the **"perceived risk"** of space debris collision ; others seek space-based inspections for more **informed decision-making**. Satellite operators and service providers and space agencies, will have to define new and economically viable ways regarding inspection, satellite collision avoidance maneuvers, and operations. This paper proposes an **initial user-driven framework** and integrates the **economic benefits** for consideration when developing trade-off scenarios for inspection, collision avoidance, on-orbit satellite servicing, and active debris removal . The framework will be bolstered by **end-user case studies by SCOUT** , e.g.: space agencies considering collision risks, technology innovations, and operational cost savings from in situ space situational awareness; meanwhile, satellite operators are driven by satellite profitability, continuation of the customer base, and how space-based SSA data will affect their operations. It is possible that satellite owners are investing too much effort into preventing the "perceived risk" of space debris and thus losing potential future cost savings from collision avoidance advancements. The first step is defining end-user requirements, key performance indicators, and potential benefits; the second step is addressing the challenges/opportunities for end-users; the third step will propose elements for both the demand (e.g. collision risk, profitability, time to market, etc.) and supply (e.g. customers, satellite segments, whether they are serviceable or not, solutions, competitors, etc.) sides; the fourth step is to apply selection criteria (e.g. affordability, innovation, new markets, etc.) to the above factors; and the fifth stepis to score the future economic benefits (e.g. profitability, cost savings from avoidance of collision maneuvers) for the stakeholder trade-off scenario. Within the five step-framework the stakeholder's use case scenarios and value-add for e.g. SCOUT's software will be described with **trade-off elements** and **economic benefits**. The factors influencing the end-user choice for satellite inspection, on-orbit servicing or active debris removal services will help satellite owners assess trade-offs for future cost-effective mission scenarios. While, service providers will be able to develop suitable business cases for optimistic, realistic, and pessimistic market scenarios, which will facilitate the process of attracting private investors; all enabling them to offer competitive prices and effective risk analyses.