Astroscale: A Perspective on Space Sustainability and Commercial Debris Removal Servicing

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The rise of large commercial satellite constellations in low Earth orbit (LEO) will provide services that improve quality of life on Earth. They will also lead to an increase in the number of objects in key orbits, raising the risk of further debris creation and threatening the very services space systems provide. Strategies for post-mission disposal are required to maintain the safe use of LEO orbits for the benefit of humankind. Founded in 2013, Astroscale's vision is to secure safe and sustainable development of space for the benefit of future generations. Astroscale is developing innovative and scalable solutions across the spectrum of on-orbit servicing missions, including specifically End-of-Life and Active Debris Removal (ADR) services, to mitigate the growing and hazardous build-up of debris in space.

The presentation will firstly start by reviewing what is needed in terms of both preparations to remove future failed constellation satellites and removal of existing space assets, in order to maintain a sustainable space environment.

Then there will be a brief review of the outcomes of past relevant, and any recent ELSA-d operations. The ELSA-d (End of Life Services by Astroscale-demonstration) mission launched on March 22, 2021. ELSA-d has demonstrated technologies for Rendezvous and Proximity Operations (RPO) with a servicer satellite (~175 kg) attached to a small client satellite (~17 kg), which enabled key technologies and capabilities to be matured including client search, long-range approach, rendezvous, and magnetic docking.

The presentation will continue to consider the design of Astroscale's next generation vehicle called ELSA-M (where "M" stands for multi-client), which has been under development for over 4 years under the ESA Sunrise programme with OneWeb. ELSA-M leverages ELSA-d technology to work towards a commercial debris removal solution which can remove assets in a multi-client approach.

Finally, the commercial and policy angles of space sustainability will be addressed – where the market is heading with in-orbit servicing and particularly ADR, and what policy changes are underway or being considered that may lead to the rise of future ADR services.