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THINK DIFFERENT – GENERIC ECONOMIC MODELS FOR ON-ORBIT SERVICING (OOS)

Abstract

The evolution of space activities since the moon landing is impressive. However, major steps in the context of "nextgen" space endeavors, in particular exploration and large space infrastructure will have to make use of approaches involving on-orbit servicing (OOS), on-orbit assembly (OOA), based on modularized concepts using standardized subsystems and components.

A major subset of OOS is unmanned satellite servicing using robotics and automation technologies. To date various concepts OOS of satellites have been developed and investigated, mostly driven by the technological challenges involved. Associated economics have not been fully understood, why related government support measures as well as private sector funding remained absent, at least were sub-optimal in terms of nursing an OOS industry. Now, activities seem to experience a renaissance, recently also stimulated by intensified discussions on active debris removal (ADR) and general avoidance of space debris. Particularly life extension of GEO telecommunication satellites and ADR missions are currently being promoted by various actors around the globe, both government and private sector. However, no OOS business, nor space debris removal are either operational or commercially successful yet.

This paper provides an overview of generic OOS building block approaches – in particular the DLR-backed iBOSS concept – and particularly commercial models, with traditional and innovative or creative elements to best serve government and private stakeholders alike and to counter-encourage those. As space projects come in dierent avors with regards to their timeframe, cost, risk, commercial potential and organization, etc., and therefore dier signicantly by nature and scope, synthetic and simplied cases elaborate on basic issues related to government support and private sector involvement in space projects, especially with regards to equity nance as a basis for leveraging on nancial, strategic, managerial and cultural assets. However, as governments should promote demonstration missions towards OOS-supported future scenarios and mission architectures materializing on OOS in the long run, space (OOS) service industry could and should align associated business development strategies.

Backgrounds of the findings presented are experiences made by the authors for decades of involvement in space projects and technology development, venture capital, education, international partnerships and strategy on global level.