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Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Systems (2A)

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EVOLUTION OF ISS AS TECHNOLOGY DEVELOPMENT, DEMONSTRATION, AND DEPLOYMENT (TD**3) INFRASTRUCTURE TO SUPPORT COMMERCIALIZATION OF LOW EARTH ORBIT AND BEYOND

Abstract

The commercialization concepts, business plans, and viability of habitable platforms in Low Earth Orbit (LEO) are critically dependent on an evolvable infrastructure that will provide the necessary utilities and ancillary services to accommodate addressable markets for the International Space Station (ISS) directly as well as for free-flying spacecraft and their aggregations. Markets for the above are and will be driven by explorations, operations, and applications that will be run by a combination of government, international partner, non-profit, and commercial entities.

Orchestrated extraordinary innovative public/private partnerships that leverage existing and evolving space and ground infrastructure, commercial investments, academic and non-profit resources, and intergovernmental agreements to blaze a roadmap to the commercialization of LEO are essential for the cost-effective commercialization of LEO and beyond.

The author postulates that these markets are best developed by the support of the evolution of ISS as a Technology Development, Demonstration, and Deployment (TD**3) infrastructure to support the commercialization of LEO and beyond. By facilitating the ISS' ability to serve as LEO commercialization infrastructure that can foster the definition, execution, and accomplishment of a pipeline of TD**3 missions, the synergistic effects can be maximized along with the other modes (e.g., science laboratory, operations center, transportation node, etc.) of utilization. This provides a progress report on the research, identify, and articulate the qualitative and quantitative narratives for TD**3 missions detailing how to stimulate the private demand for commercial LEO services in order to sustain the long-term LEO addressable markets with primarily non-NASA commercial revenue.

For each TD**3 mission, the combination of "technology development push," "mission requirements pull," and "commercial applications/infrastructure playout" will be researched and evaluated. Every ISS system and element will be examined for opportunities for stand-alone and integrated evolution to support multiple applications consistent with the context of the defined TD**3 missions.