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Emerging Space Ventures, including Space Logistics and Space Safety for Sustainability (9-D6.2)

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TECH POLICY INSIGHTS: A SYSTEM DYNAMICS MODEL-BASED ASSESSMENT OF THE GROWING NEWSPACE ECOSYSTEM

Abstract

The past two decades have seen a paradigm shift in the space industry with the proliferation of distributed satellite systems, Commercial-Off-The-Shelf (COTS) components, and above all: small satellites, constellations composed of these architectures and a growing number of ventures focused on commercializing them, bringing in vast amounts of private capital. The increased interest of both public and private entities in small satellites and satellite constellations has created a positive feedback loop fueling further technology development and eventually an exponential growth of objects in space. The growth of the satellite industry is not simply a matter of private investment and technology innovation; indeed, public policy plays a role in the progress for both upstream and downstream participants in the New Space industry as it should, given the common pool resource-nature of space and particularly the low Earth orbits. However, to create strong and effective policies simultaneously regulating the space industry for public benefit but also enabling its further growth, it is paramount to understand the direction in which the industry is heading, ultimately rooted in the dynamic behavior of the satellite ecosystem. Building off previous research in systems of systems, technology road mapping and risk management, this paper proposes a system dynamics model augmented by time series forecasting methods to conceptualize the complex interactions amongst participants in the NewSpace economy in an attempt to assist the creation of informed public policy. Therefore, in addition to creating a system dynamics model of the industry and various constituents of it, it also posits a forecasting model for industry growth based on historical data from among other sources the International Telecommunications Union (ITU), applying a Machine Learning/time-series forecasting methods that—along with with the system dynamics model—could help forecast potential risks and failures in the industry and direct the focus of policy makers to the right domains.