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Safety and Quality for "Low Cost" Space Programs (1)

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CHALLENGES AND NOVEL APPROACHES FOR TESTING LARGE NUMBERS OF SMALL SATELLITES

Abstract

Recent innovations in space technologies and new applications led to a paradigm shift in spacecraft design - from multi-functional big single spacecraft towards small, distributed, networked satellites which promise a higher time resolution at significantly reduced cost and development time. Especially global Earth observation and communication services require a globe-spanning network consisting of a large number of small spacecraft collecting and transmitting the data. The growing amount of small satellites involved in a single mission introduces new challenges to spacecraft design, integration, testing and operations.

Where previously one big satellite was integrated, tested and operated as a single unit, hundreds of small satellites require the same tasks to be performed in the future with regard to planned mega constellations - while being even more cost effective. Therefore, the effort for integration, testing and operation must not relate to the number of satellites. New approaches are required to overcome traditional approaches and to carry testing and operational aspects to the Newspace sector.

This contribution addresses the mentioned challenges and will provide an overview for approaches with focus on standardization and automation to enable rapid spacecraft design, integration and testing. This allows the economical usage of a large number of small satellites to enable big data applications.