

## SPACE SYSTEMS SYMPOSIUM (D1)

Hosted Payloads - Concepts, Techniques and Challenges, Missions and Applications (7)

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## NANOSATELLITE MISSION ASSURANCE – A TURNING POINT

**Abstract**

The nanosatellite market has been changing rapidly in the last few years. Only a few years ago nanosatellites were being seen as educational projects or vehicles for technology demonstration only. Now their potential of enabling operational distributed space systems is taken seriously. Large constellations of very small satellites such as Planet Labs' flock or QB50 are providing solutions for commercial Earth Observation and world class scientific research respectively. With larger 6U and 12U nanosatellites in development, the performance of nanosatellite based missions will start to seriously compete with systems that use a more traditional approach in the fields of Earth Observation, communications and science.

Higher performance missions generally have larger budgets and come with educated customers. The future success of nanosatellite systems will largely depend on their ability to provide these customers mission assurance without impacting the cost and schedule advantages of nanosatellites. This is being recognized by the European Space Agency, who kicked off an activity to look at tailoring the ECSS standard for nanosatellite missions.

This paper explores the possibilities for optimizing nanosatellite mission assurance by analyzing the different aspects of a nanosatellite mission life-cycle. A top 10 of recommendations is provided that are considered to be most helpful and suitable to nanosatellite missions. For instance, improvements in design can be made by adding redundancy or electronic failure protection circuits and using a good margin approach for consumables such as propellant or battery capacity. Selection of equipment that has in-orbit heritage or has been qualified by other means can reduce the risk of failures. A multi-model development approach and an extensive testing campaign will also improve the probability of mission success. All these aspects are analyzed to identify which measures benefit the mission most without having too much impact on the cost and schedule. Another important aspect that is discussed is the balance between mission risk and the level of innovation.