Paper ID: 33147
oral

23rd IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Highly Integrated Distributed Systems (7)

Author: Prof. Mengu Cho
Kyushu Institute of Technology, Japan

Prof. Filippo Graziani
G.A.U.S.S. Srl, Italy

IAA STUDY ON LEAN SATELLITES

Abstract

In recent years, the explosive growth of small satellites launches raises concern over space debris, safety, radio spectrum use, and so on. Small satellites range from a 1kg CubeSat to a satellite weighing well over 100kg, but have a common characteristic of low-cost and fast-delivery. Nowadays, even commercial CubeSats have started to appear. In 2014, an activity started at ISO/TC20/SC14 to make an ISO standard that defines what is a small satellite and sets requirements for small satellites to answer those concerns and to lay down the foundation for commercial activities utilizing small satellites. Since 2015, a new work item ISO/WD/20991, "Requirements for Small Spacecraft" is being discussed at ISO. Under these circumstances, the study group 4.18, "Definition and Requirements of Small Satellites Seeking Low-Cost and Fast-Delivery", was initiated in 2014. The objectives are to examine the definitions of small satellites, identify the requirements every satellite should follow regardless of its size or development philosophy and then reflect some of the findings to the ISO draft. After a series of meetings, the final draft of the study group report has been submitted to IAA Commission 4 in March 2016. The purpose of the present paper is to provide overview of the study group findings. The definition of small satellite was discussed extensively. The major conclusion of the study group is that mass nor size is not suitable to define small satellites and they should be defined by the philosophy of design, manufacturing, mission, program management and others. The study group came to conclusion that "lean satellite" is the most suitable word to describe a satellite that utilizes untraditional risk-taking development approaches to achieve low-cost and fast-delivery with a small number of team. The smallness is merely the result of the approaches. Scaling to measure how closely a given satellite fits into the concepts of lean satellites in terms of (1) total cost, (2) delivery time, (3) simplicity, (4) risk taking, (5) risk mitigation, (6) reliability requirement, (7) mission duration, (8) launch, and (9) waste minimization has been developed in. The scaling has been tested against nearly 30 satellites all over the world. At the symposium, the contents of the study group final draft will be presented as well as the update of the ISO standards related to lean/small satellites.