

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Engineering - Methods, Processes and Tools (2) (4B)

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INTEGRATION OF QUALITY TOOLS TO DEFINE THE SCOPE OF A CUBESAT
SCIENTIFIC/TECHNOLOGY DEMONSTRATION MISSION.**Abstract**

Tailoring requirements based on the expectations of stakeholders is a complex task for any space mission. The typical stakeholder expectation definition process relies heavily on the stakeholders' clear understanding of the necessity and impact of the potential design solution. Contrary to commercial missions, in which the customer has a better understanding of the requirements needed to satisfy their goals, in science and technology demonstration missions stakeholders only have a vague idea of the expected capabilities of the technology being developed. In fact, many of these missions are a pathfinder for the expected performance of future missions. This issue leads to uncertainty in the design, difficulty in establishing precise requirements and, consequently to unsatisfied stakeholders and failed objectives in the end. In this paper a method to coincide stakeholders expectations with the development of a science and technology mission from an early stage is presented. The method consists of the creation of a task force focused on understanding the problem presented by the stakeholders at greater depth. Afterwards, this task force works with the systems engineering team in the following analyses. First, a quality function deployment has been developed to determine the importance of certain features and requirements in the design in regards to that problem. Also, a Pareto diagram has been created to focus the design effort into the issues that have greater significance to the stakeholders. The feedback from this task force has enabled the systems engineering team to assess the risks in a better informed way. These changes have helped the team to agilize the decision making process and added certainty about the direction of the design alignment so it can fulfill stakeholders' expectations. Moreover, it ensures that the mission has the maximum possible value for the stakeholder's objectives, due to the fact the task force's main objective is to study in greater depth the problem presented by them. This method has been tested within the development of a 3U Cubesat for the study of atmospheric density using electric propulsion designed and built by undergraduate students. The method proposed provides value in two of the most important aspects in spacecraft development: it ensures that the spacecraft is developed according to stakeholders' expectations and reduces the time consumed in the process of capturing these expectations by all the technical team, which can be significant when these are not absolutely clear.