

SPACE SYSTEMS SYMPOSIUM (D1)  
Lessons Learned in Space Systems (5)

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INSIGHTS OBTAINED BY THE USE OF FAILURE ANALYSIS DURING DEVELOPMENT OF AN  
INTRICATE SPACE SUBSYSTEM**Abstract**

This paper refers to a risk analysis applied during the development of a satellite subsystem. The subsystem's main function is to reduce the velocity impact of a satellite, after its reentry phase and before its landing. Called "Rescue Subsystem", it has some specific characteristics that make it more exposed to failure. In addition, many failures that might occur lead in consequence to a complete loss of the mission. Thus, special attention to the development of this subsystem is given. For this reason, one of the actions taken is to accomplish the risk analysis, from the beginning of the "Rescue Subsystem" development on. Therefore, the FMEA analysis is to be applied to: the product solution, the product assembly, handling and storage processes and also to the sequence of events. The risk analysis and all the work developed are registered in a document named "Technical Risks Preliminary Analysis for the SARA Suborbital Rescue Subsystem ". The term "Preliminary Analysis" is used because it is intended to be updated in between project reviews. The work being developed is meant to reduce not only the subsystem failures and risk probabilities, but also to look for the reduction of cost and project time, as well as verification test, in an effective, productive way. Interestingly, the first application of the FMEA analysis, indicated failure that required the modification of the subsystem design in order to fix it. Most failures identified might have as cause organization aspects, like unprepared human resources for the assembly and integration processes at the launch site. These finding, revealed the importance of a simultaneous development. The present work, demonstrates how the "Rescue Subsystem" development is being managed, concerning its specific characteristics. It also explains the methodology and the conduction of the FMEA analysis, difficulties encountered and solutions attained. In addition, some feedback like reactions from people involved, procedures that led to satisfying results and others that ran into difficulties are cited. In resume, the present work aims at formally registering the lessons learned in the development processes of the most intricate subsystem, in scope of risk and failure management.