

Risk Based Decision Tool for Space Exploration Missions

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A large number of proposals for space explorations are submitted to NASA every year. These proposals initially go through a pre-phase A mission design and assessment where they are reviewed and the major elements of the mission are identified, designed and priced. Only a small percentage of proposals that have completed the pre-phase A assessment are actually pursued further. Clearly risk and uncertainty are important factors in the decision to continue with a proposal.

This paper presents an approach to assess and analyze the risks involved in a mission during the pre-phase A design process. This approach is based on creating a risk template for each subsystem expert involved in the mission design process and defining appropriate interactions between the templates. A separate "risk expert" mediates this process and incorporates the information obtained by the various subsystems to produce a report that reflects the weak links of the mission, the major risk elements for each phase, and the overall risk measure. We are currently building a prototype for this purpose in the Center for Space Mission Architecture and Design at JPL. In this paper, we present the approach, the details of the system architecture and design of the prototype and describe the experimental results of this endeavor.