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STAKEHOLDER VALUE ANALYSIS OF ARCHITECTURE ALTERNATIVES FOR SUSTAINABLE
SPACE SYSTEMS DEVELOPMENTS**Abstract**

The purpose of this paper is to present the stakeholder value architecture trade off method, to demonstrate it analyzing the Mars Exploration System Mission and to compare their results with traditional analysis of alternatives methods. In the late 1950s, the US government planned to take man to the moon. One of the fundamental tenets of the program management concept was that three critical factors - cost, schedule, and reliability - were interrelated and had to be managed as a group. Today's space mission development requires a high level of sustainability that only can be given by stakeholders who need to be assured that they will receive the required amount of system value over a specific period of time. This sustainability is translated by the system architecture attributes as cost, time, performance and risk which represent system effectiveness. This includes identification of alternative architectures and characterization of those elements in a way that helps managers to find out, among the alternatives, a design that provides attributes value maximization to stakeholder. System characteristics such as performance, cost, risk and schedule are the outcomes of the architecture element analysis labeled as evaluation drivers. These characteristics are used to establish connections with stakeholder values. Considering that about 80% of the life cycle cost, performance, risk and schedule of a project are committed by decisions made during design concept exploration; this paper addresses several questions such as: how to improve such architectures evaluations? How to evaluate architectures through how much stakeholder value cost, performance, risk and schedule system attributes? How to anticipate such evaluation to the beginning of design process? How to establish the connection between stakeholder values with the attributes of architecture elements? These questions do reflect the state of art of the design trade off process regarding to conceptual phase. The paper proposes a subtle but closer to reality paradigm shift: trade the importance stakeholders give to performance, cost, risk and schedule attributes rather than those attributes themselves. Thus, the method presented in this paper provides a means for innovate the mission design process by interconnecting stakeholder needs, concept exploration and attribute evaluation drivers in order to capture in trade off process the value given by stakeholders to the architecture effectiveness parameters.