

SPACE SYSTEMS SYMPOSIUM (D1)
System Engineering Tools, Processes & Training (I) (3)

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RAPID COST ASSESSMENT METHODOLOGY FOR PLANETARY PROGRAM PLANNING

Abstract

Program planning at NASA's Planetary Science Division (PSD), within the Science Mission Directorate (SMD), includes assembling a mission timeline - from ongoing missions to mission concepts sometimes planned for decades ahead -, while accounting for other budgetary items, such as Research & Analysis (R&A), Technology Programs, and Outreach. These future planetary mission architectures and concepts are often at early phases of definition, where traditional grass-root or other detailed cost estimation methods are not applicable. As part of our Planetary Program Support Task for NASA HQ, we developed a Rapid Cost Assessment method using complexity indices, and augmented it with assessments of Figures of Merit (FOM) for both Science and Technology. This new methodology provides a flexible tool to rapidly cost large numbers of mission architectures for any given planetary target, while accounting for a varying number of mission elements. It is estimated that the relative cost fidelity between architectures are about +/-10-20%, while the absolute costs are projected at +/-20-40%. When combined with the Science and Technology FOMs, the methodology could assist mission planners to find the highest science return mission architecture within a given cost cap, and could identify the level of technology investments required to achieve mission objectives. In our paper we will discuss key elements of this methodology, which was successfully used in the recently completed NASA Venus Flagship Mission Study.