

SPACE SYSTEMS SYMPOSIUM (D1)  
System Engineering - Methods, Processes and Tools (1) (3)

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SPACE MISSIONS DEVELOPMENT: A STREAMLINED APPROACH

**Abstract**

This paper proposes an approach to reducing and controlling the development cost of space missions. The motivation is a changing business environment where budgets are highly constrained, and launch vehicle and other fixed costs are increasing. We define the guiding principles of a NASA/Goddard-led Class D project initiative that delivers projects on schedule and within budget without compromising technical integrity by removing or modifying the high overhead processes and procedures that are associated with more complex and/or higher visibility projects. This approach covers a range of efforts, from instrument development to complete mission implementation for Principal Investigator (PI)-led science or technology investigations with a life cycle cost of less than \$250M (called class D at Goddard). We describe how to establish clear and simple lines of responsibility and team ownership, how to simplify the management of the mission, and how to trade requirements against cost without increasing risk. The key to this approach is to tightly negotiate and then manage requirements - and to develop a Preliminary Project Implementation Plan (PPIP) - well before submission of a proposal—that contains sufficient detail to enable reasonable and credible resource, cost, and schedule estimates. The Class D initiative proposes the following activities: Greater attention upfront to the credibility of proposals and a clear performance floor embodied in a PPIP started early in the flow; Clear and focused lines of accountability within the team with technical and programmatic authority residing, whenever feasible, at the Project and all other authority residing at the lowest level feasible; Short reporting and communication channels within the Project and between the Project and Center decision makers to support timely decisions, with an urgency to protect the schedule using a design-to cost and build-to-cost approach; Ownership by the team of a product-oriented approach, streamlined processes, minimum distractions, and low overhead; Expert advice and stewardship to be identified and made available to advise management and the project on the approaches to design- and execution-to-cost; The approach described here is expected to increase the probability of success through the enhanced focus of resources on project tasks and requirements rather than on processes. This allows us to execute more missions and obtain more science for the same budget.