Using Analytical Tools to Manage Today's Complex Space Programs

Space launch vehicle design is a highly complex process that requires the balancing of future capabilities against constrained budgets and schedules.

MISSION *

Marshall Space Flight Center's Space Launch System (SLS) Program is developing a launch vehicle—the largest ever built—that will carry astronauts beyond low-earth orbit for the first time since the Apollo Program. To enhance SLS's ongoing program execution and meet their upcoming Key Decision Point C (KDP-C) Joint Confidence Level (JCL) requirement, NASA Marshall requires assessments and recommendations in the areas of cost estimating analysis, budget planning analysis, and program risk analysis. Resources, schedule, and risk integration is essential to perform the rapid analysis required to manage a program of this size and complexity. Integrating these functions using NASA's JCL methodology, and Booz Allen Hamilton's Polaris™ tool, provided NASA management with the insights needed to manage this technically complex program within today's fiscally constrained environment.

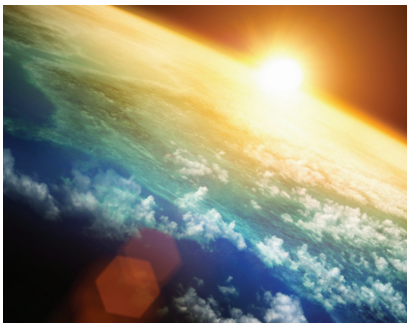
Pinpointing the Core Issues

Space launch vehicle design is a highly complex process that requires the balancing of future capabilities against constrained budgets and schedules. Advancing the state of the art in launch vehicles in today's fiscally constrained environment necessitates utilizing existing hardware while developing next-generation technologies. The complexity this type of development introduces into SLS necessitates precise planning and evaluation to ensure a successful and sustainable program fulfilling NASA's vision.

On large programs like SLS, challenges in integration of engineering, cost estimating/budgeting, scheduling, and risk management activities can inhibit managers from quickly determining the best course of action as technical risks are realized, schedules slip, and budgets change. SLS is looking into new ways to achieve this integration function using JCL analysis and the Polaris™ software developed by Booz Allen.

Finding the Right Tool

The Booz Allen team utilized Polaris™ to integrate the SLS cost, schedule, and risk data into a single analytical model for performing assessments to meet NASA's KDP-C requirements. Booz Allen worked to collect existing SLS data, establish the scope of the analysis and ground rules/assumptions, perform the analysis, and present the results and model to SLS management. This effort allowed NASA management



SLS is looking into new ways to achieve this integration function using JCL analysis and the Polaris™ software developed by Booz Allen.

The Booz Allen team utilized Polaris™ to integrate the SLS cost, schedule, and risk data into a single analytical model for performing assessments to meet NASA's KDP-C requirements.

For more information contact:

Eric Druker
Senior Associate
druker_eric@bah.com
314-368-5850

Graham Gilmer
Senior Associate
gilmer_graham@bah.com
202-898-3385

Tom Dauber
Principal
dauber_tom@bah.com
703-984-1800

to perform rapid what-if analysis to integrate decision-making using Polaris™ Monte Carlo simulation methodology. By integrating the cost, schedule, and risk data of each SLS Element, NASA management was able to better understand the dynamics of each risk as it impacted cost and schedule, and predict the program's cost and risk posture at various confidence intervals.

Helping NASA Program Managers Conduct Comprehensive Predictive Analysis

The SLS JCL analysis team was able to successfully integrate SLS's schedule, cost estimates/budget, and risk register into a single analytical model using Polaris™. The project's Polaris™ model will be utilized for the SLS KDP-C milestone by allowing analyses such as:

+ Predicting the probability SLS met the program milestone of the EM-1 launch while staying within the budget and schedule constraints
+ Showing the predicted cost and schedule outcomes at various percent confidence levels
+ Identifying SLS's lead sources of cost and schedule risk—some of which were previously not realized as top drivers to the program
+ Showing the risk-informed critical path
+ Conducting real-time trade-off and what-if analyses
+ Allowing decision makers to take actions to reduce cost and schedule risk and to see the impact these actions had on the program's risk posture

As a result, SLS made the decision to maintain the analysis beyond the horizon of the KDP-C milestone despite it not being required by NASA policy. This use of recurring analysis is enabling better stewardship of NASA funding, and increasing the chance of SLS delivering the next-generation of human spaceflight, on time and on budget.

About Booz Allen

Booz Allen Hamilton is a leading provider of management consulting, technology, and engineering services to the US government in defense, intelligence, and civil markets, and to major corporations, institutions, and not-for-profit organizations. Booz Allen is headquartered in McLean, Virginia, employs more than 23,000 people, and had revenue of $5.76 billion for the 12 months ended March 31, 2013. To learn more, visit **www.boozallen.com**. (NYSE: BAH)