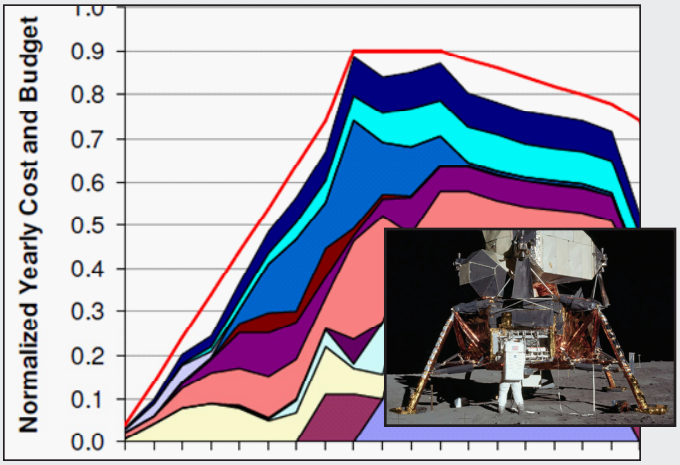
CASE STUDY

Industry: Aerospace & Defense
Product: PHX ModelCenter®

SPACEWORKS ENGINEERING, INC. (SEI), Atlanta, Georgia

SEI's ModelCenter-Driven I-RaCM Platform Simplifies Compliance with Affordability Mandates

Challenge: Synchronous Cost and Risk Assessment Early in the Design of a New System



Sand Chart for Optimized Schedule within Budget Curve

Cost and risk models are seldom integrated with engineering performance models in the conceptual design of a new aerospace system. New affordability demands on public sector budgets now force program managers to view cost, risk, and performance together during conceptual design. Despite the recognized need for this level of integration, challenges exist. One is increasing the size of already large performance models and limits on computational resources. Another is the difficulty of accurately quantifying certain figures of merit, such as affordability, because of a scarcity of application-agnostic models and experience.

Solution: SEI's Integrated Risk and Cost Model (I-RaCM) Using ModelCenter

Using ModelCenter, SpaceWorks Engineering, Inc. (SEI) created an integrated framework—I-RaCM—to address these concerns.[1] I-RaCM consists of diverse software packages, such as NAFCOM (NASA Air Force Cost Model), Galorath's SEER-H, and SEI's FGOA, Reliability_Calc, TCE, Campaign Manager, TIM , Stack 'em, Descartes, NESC, CABAM, ProbWorks and OptWorks. In a study involving a notional NASA lunar exploration program totaling 16 missions, I-RaCM provided a single platform for modeling cost, risk and performance for all major program elements, including CLV, CEV, CaLV, LSAM, a lunar surface habitat, a rover, and space pressure suits. Four sub-studies were performed to exercise various aspects of the model created in I-RaCM using ModelCenter. First, the program schedule was optimized to fit under a presumed budget curve for all active years of the project, using OptWorks within the Stack 'em tool. Second, the impact of adding new technologies to the program was assessed using the TCE and TIM tools. Third, the Campaign Manager was used to input a more-aggressive mission schedule. Fourth, a probabilistic analysis was conducted to evaluate uncertainty in the physical design of program components—with a wide range of charting options to help users fully understand results.

Benefit: A Platform for Early, Accurate Assessments of Aerospace Technology Projects

The I-RaCM platform, enabled by ModelCenter, integrates tools for quick evaluation of project costs and risks—not only with analyses but also through optimization of program expenditures, impact of new technologies, and the effects of variables. It provides capabilities to interact with engineering performance codes and built-in project optimization during the conceptual design process. The modular environment makes it easy to modify and include new functionality. I-RaCM today is an enabler for complying with affordability initiatives mandated by the DoD and other federal agencies.

[1]DePasquale, D., Charania, A.C., "I-RaCM: A Fully Integrated Risk and Life Cycle Cost Model", AIAA-2008 7703, Space 2008 Conference and Exposition, San Diego, CA, Sept 9-11, 2008.

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