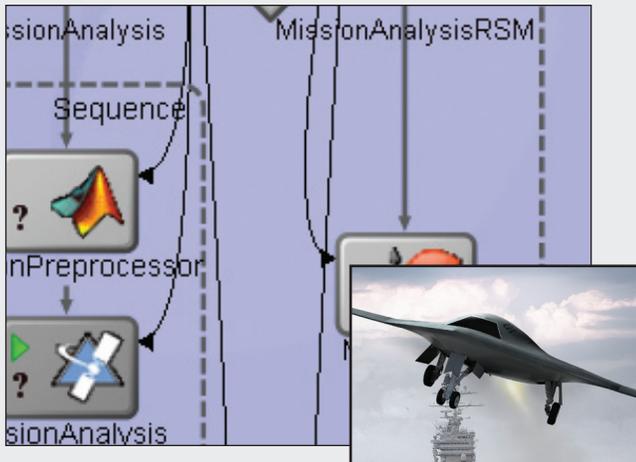


Cost/Performance Trade Studies Improve DoD Affordability Compliance

Challenge: Understand Acquisition Program Costs in Context of DoD Affordability Mandate



Integrated UAV STK and Cost Model

A DoD Affordability Mandate issued in 2010 by Under Secretary of Defense Ashton Carter to make DoD acquisition more efficient for taxpayers requires that milestones on acquisition projects be tied to cost. Complying with the mandate requires that costs be integrated with mission analysis and systems design tools early in the design process, so operational objectives can be achieved more affordably. Current design processes do not achieve this goal as well as needed.

Solution: Integrate Cost Modeling with Mission Analysis for Cost/Performance Studies

As a proof of concept, PHX ModelCenter was used to integrate STK modeling software from Analytical Graphics, Inc. with TruePlanning cost estimating software from Price Systems for an Unmanned Aerial Vehicle (UAV) mission. The system was driven from a user-friendly Excel component with a database of various types of UAV aircraft, electronic payloads, and ground transmitters. The user can select from a dropdown box any combination of these components. The Excel database fed information to a MATLAB preprocessor to perform calculations on the route and mission of the UAV. This information was then fed to an STK scenario for analysis. Excel also fed TruePlanning information about the aircraft and payload so it could be priced correctly. Combinations were exercised by a design of experiments (DOE) from within the ModelCenter framework. The results were then fit to a response surface to evaluate more alternatives in minimal time. Two RSM models were generated, one for the MATLAB/STK process and another for the TruePlanning component. Using ModelCenter's process modeling mode, the RSM components could be added to the

model alongside "real" components but in a separate analysis path. By specifying a Boolean switch, the real path or the RSM path could be chosen to run. A DOE then generated 5,040 runs in approximately 30 minutes. This was used to build graphical tradeoff charts with cost on the x-axis and various performance metrics (e.g. image quality) on the y-axis. The tool allows the user to select a new objective function and constraints by using slider bars. As expected, all performance metrics clearly increased with cost along the Pareto frontier.

Benefit: A Realistic Understanding of Tradeoffs throughout the Acquisition Process

This solution proved that Pareto charts can be quickly created within ModelCenter to understand the tradeoffs between costs and various performance metrics at any point in the acquisition process. Decision makers can use such an analysis to know how much performance to purchase within budgetary constraints or, how to minimize costs to achieve a required performance objective.