Integrating Model Based Engineering and Trade Space Exploration into Naval Acquisitions

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Abstract

The Navy Acquisition force is faced with designing, procuring, and managing some of the most complex systems and technologies ever imagined. Balancing a shrinking and fickle budget environment with a program that has dynamic requirements and scheduling pressures only complicates this already difficult job. While developing these increasingly complex systems, the acquisition process is often faced with major program decisions without a sufficient analysis on a performance-versus-cost tradeoff. To surmount these challenges, the Navy must look at how industries excelled in similar environments.

The concept of Model Based Engineering (MBE) is introduced as a tool that could move Navy Acquisition from document-centric to model-centric, enabling efficiency and confidence in design, as demonstrated by some industries. Model Based Engineering is the practice of bridging models together from requirements to functions, for analysis, design, and verification of a system throughout the lifecycle. A tenet of MBE is model and design validation throughout development to ensure system requirements are met at delivery. Ultimately, the ability to understand and know the effects of changes in a subsystem on the overall performance can vastly improve a system's development. Through the practice of MBE, more confident design and acquisition decisions can be made earlier in the lifecycle. MBE's involves pushing coordination and integration of subsystems as early in development as possible. Applying MBE is demanding but, done successfully brings major benefits, such as reducing expensive rework late in the lifecycle.

Lastly, MBE must start with mathematical and physics-based trade study models. The importance of a thorough, quantitative, and objective trade study is often overlooked or minimized. A robust quantitative trade study allows management to make better performance-versus-cost acquisition decisions when they have the most control over design. Starting with trade space models further embeds MBE into an organization, allowing more model reuse and a greater return on investment.

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