• Current time to get through the acquisition process for major weapon systems takes too long, especially in the face of continuously evolving threats
• Current process is rigorous and delivers systems that provide appropriate levels of airworthiness and safety, however, the process is very much monolithic, serialized, document-driven, and must be transformed
• NAVAIR is partially constrained by their own process that they have worked hard to put in place over the years (SE Technical Review-SETR), which is “lashed” to the SE “V” (lifecycle Vee)
• NAVAIR, like many other organizations, is evolving their efforts supported by the increased use of model, simulation, and analysis, but they are looking for much more significant advances and evidence that it is technically feasible to radically change the processes through models

Goals & Objectives

• Investigate the technical feasibility to radically transform systems engineering through Model Based Systems Engineering
• “Blow up” the current “Newtonian” approach and move to a “Quantum” approach that recognizes and capitalizes on current and emerging trends and enabling technologies
• Rapidly traverse the virtual “Vee” using “virtual fly-fix-fly” early and continuously with required integrity (dependability/trust)
  “Cross the Virtual V”
• Success criteria: 25% reduction in time

Is it feasible to do “Everything with Models?”

Four Tasks to Assess Technical Feasibility of “Doing Everything with Models”

1) Global scan and classification of holistic state-of-the-art MBSE
   • Use discussion framework to survey government, industry and academia
   • Quantity, ink and trace realized modeling capabilities to vision (task 3)

2) Develop Common Lexicon for Model Levels, Types, Uses, and Representations
   • Model types
   • Structure/Interface
   • Mission/Engagement
   • Behavior/Function
   • Concurrent
   • Resource/Environment

3) Model the Vision of Everything Done with Models and Relate to “As Is” process

4) Fully integrate model-driven Risk Management and Decision Making

Task Details and Status

• Task 1: Surveying Industry, Government and Academia to understand the state-of-the-art of a holistic approach to MBSE
  • Created and refined a discussion collection instrument, associated measurement mechanism, & usage guidelines through an initial set of discussions with industry, government, and academia
  • Discussion instrument identifies those key indicators of capabilities that are the most state-of-the-art, which align with NAVAIR’s vision of “Crossing the virtual V” while assessing risks such as airworthiness and safety

• Task 2: Develop a common lexicon for MBSE, including model types, levels, uses, representation, etc.
  • Created a lexicon and generator to a web-based multi-representation hyperlink lexicon of model-based terminology

• Task 3: Model the “Vision,” but also relate it to the “As Is” process
  • Leverage and link characteristics of capabilities we hear about in these discussions to the “Vision” model

• Task 4: Integrate a Risk Management approach with the Vision
  • Identify strategies being researched by other organizations and identify key challenges with the “Vision” concept of “model everything” (e.g., difficult to model: human cognitive properties)
  • Planning to use predictive analytic risk models to support risk identification, risk management, and risk-informed decision making