Transforming Systems Engineering through Model Centric Eng. (RT118)

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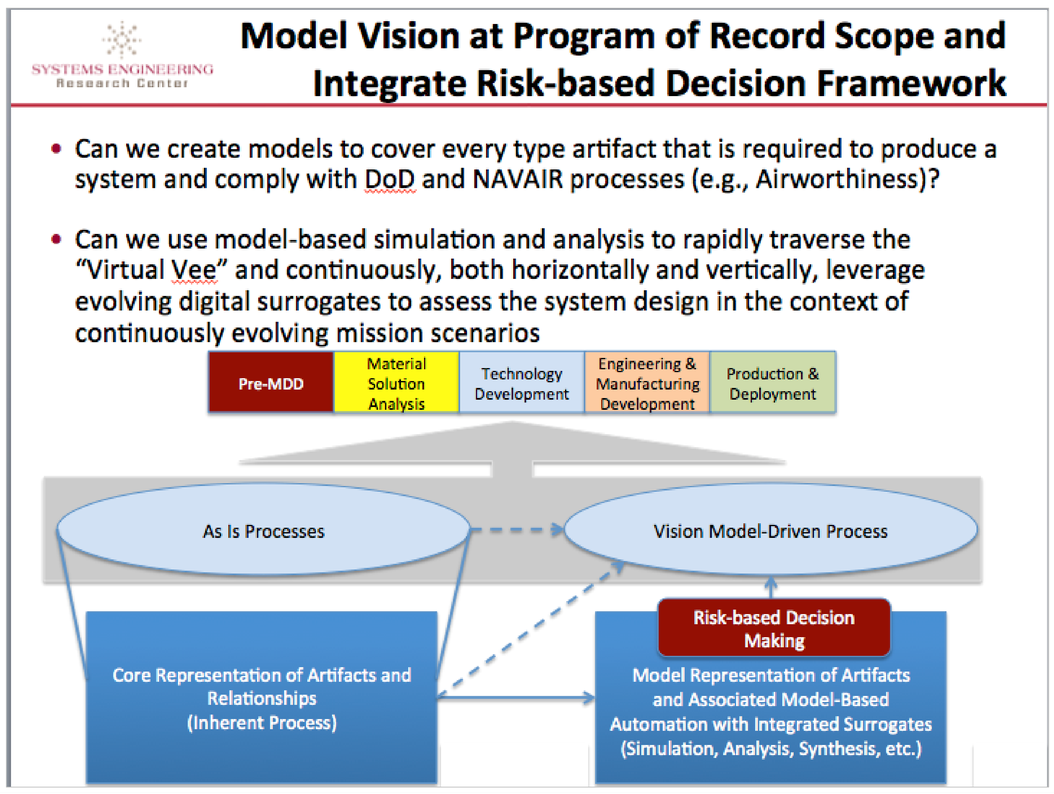
Challenge

- 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, but process is very 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 feasibly to radically change the processes through models

Vision



Goals & Objectives

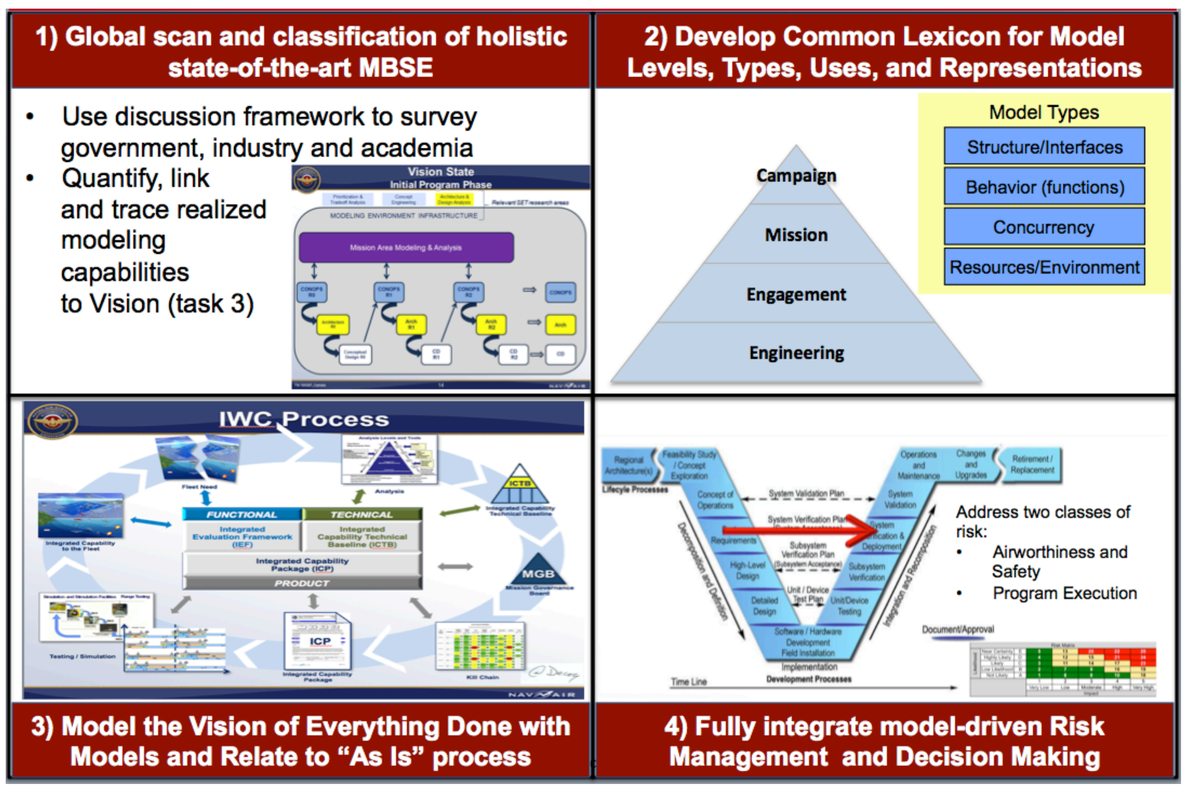
- Is it **Technically Feasible** to radically Transform Systems Engineering through Model-Centric Engineering to rapidly deliver the needed capabilities to the Warfighter for Large-Scale Air Vehicle Systems
- "Blow up" the current "Newtonian" approach and move to a "Quantum" approach that recognizes 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)
- Airworthiness and Safety make the objective more challenging than for other types of systems (of systems)

"Cross the Virtual V"

- **Success criteria: 25% reduction in time**

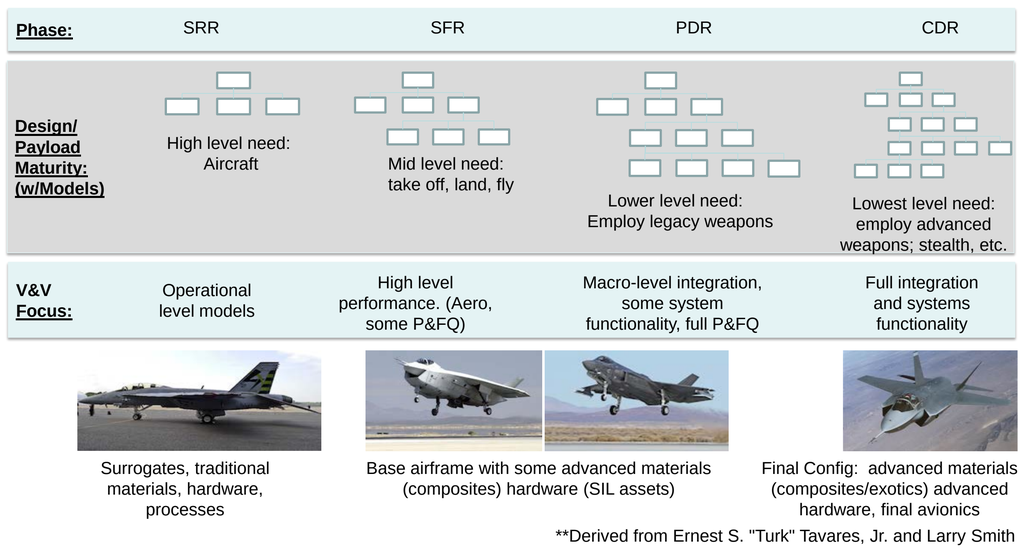
Is it feasible to do "Everything with Models?" (Everything Digital)

Four Tasks to Assess Technical Feasibility of "Doing Everything with Models"



Task Details and Status

- **Task 1: Surveying Industry, Government and Academia to understand the state-of-the-art of a holistic approach to MBSE**
  - Conducted 28 discussions, 21 on site - goals was not to single out specific companies, rather in the aggregate answer the key question about technical feasibility
  - Model-centric engineering better characterizes the goal of integrating different model types with simulations, surrogates, systems and components at different levels of abstraction and fidelity across discipline throughout the lifecycle



  - There is an exposition of model and leaders are embracing change and adapting to use digital strategies faster than others using model-centric environments for customer engagements, but also for design engineering analysis and reviews
  - There are gaps and challenges
- **Task 2: Develop a common lexicon for things related to "models," including model types, levels, uses, representation, etc. (delivered)**
- **Task 3: Model the "Vision," but also relate it to the "As Is" process**
  - Leverage and link characteristic of capabilities found in **Task 1** discussion 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
  - Insights from Quantification of Margins under Uncertainty

Research Team & Contact Information

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