

# National Defense Industrial Association Systems Engineering Division Modeling and Simulation Committee

MBE Subcommittee

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## Grow engineering capabilities to address emerging challenges (con't)



Identify opportunities to leverage Model-based engineering practices to improve systems engineering productivity and completeness

- Do existing policies, guidance and contracting mechanisms hinder model-based collaboration?

Reinvigorate exploration and exploitation of Modeling and Simulation Systems Engineering enablers to assess and mitigate acquisition program risks

- **Modeling & Simulation Committee to lead the initial investigation**
- **Coordinate work schedule with new Committee chair**

# Model-Based Engineering Subcommittee Charter

- Assess and promote Model Based Engineering (MBE) practices in support of the DOD capability acquisition life cycle\*
  - Define Model Based Engineering (MBE)
  - Define how MBE is related to M&S
  - Identify the potential benefits of MBE
  - Identify the potential limitations of MBE
  - Identify how MBE practices can be used in capability acquisition with a primary focus on Systems Engineering
  - Identify MBE approaches to assess and mitigate risks throughout the capability acquisition life cycle
  - Identify the issues and challenges with using MBE practices across the capability acquisition life cycle
  - Identify where/how existing policy, guidance and contracting mechanisms support/hinder Model Based collaboration across program/capability boundaries
  - Provide recommendations:
    - For changes in policy, guidance, and contracting mechanisms that could further support Model Based collaboration
    - For near-term opportunities to leverage MBE in capability acquisition
    - For areas of MBE research & development that may have high potential pay-off

\* - Acquisition Life Cycle: All phases of the capabilities life cycle including research, development, Test & Evaluation, production, deployment, operations and support, as well as evolution of deployed systems in response to changes in their environment over time.

# MBE Definition

- Model-based engineering (MBE): An approach to engineering that uses models as an integral part of the technical baseline that includes the requirements, analysis, design, implementation, and verification of a capability, system, and/or product throughout the acquisition life cycle.
- Preferred MBE Practices :
  - Models are scoped to purpose/objectives
  - Models are appropriate to the context (e.g. application domain, life cycle phase)
  - The models represent the technical baseline that is delivered to customers, suppliers, and partners
  - Models are integrated or interoperable across domains and across the lifecycle
  - Core to MBE is the integration of descriptive/design models with the computational models .

# Characteristics of Models Used in MBE

- Models applicable to a wide range of domains (systems, software, electrical, mechanical, human behavioral, logistics, manufacturing, business, socio-economic, regulatory)
- Computer-interpretable computational model
  - Time varying (e.g. performance simulations, structural dynamic analysis)
  - Static (e.g. reliability prediction model)
  - Deterministic or stochastic (e.g. Monte Carlo)
  - May interact with hardware, software, human, and physical environment
- Human-interpretable descriptive models (e.g., architecture/design such as UML, SysML, UPDM, IDEF, electrical schematic, 3D CAD geometry, DODAF 2.0)
  - Symbolic representation with defined syntax and semantics
  - Repository based (i.e., the model is stored in structured computer format)
- MBE can also include the use of physical models (e.g. scale models for wind tunnels or wave tanks), but this is not the central focus.

# Subcommittee Schedule

- Working session this afternoon
- Scheduled tag-ups every two weeks
- Working sessions on 16 and 17 August
- Working session during NDIA SE Conference
  - Date TBD
  - Preliminary report to be presented during Conference
- Final report to be delivered in December