

## System Definition-Enabled Acquisition (SDEA)

A Systems Approach to Defining the Next Generation of SE Support to Acquisition

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## System Definition-Enabled Acquisition

- Problem Definition
- Where at we at, today?
- What is SDEA?
- How can we best apply SDEA?
- Why not apply SDEA today?
- How do we get there?

# SDEA at NAVAIR PROBLEM DEFINITION

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- Systems Engineering (SE)
  - The DoD SE community and process is current unable to fully support acquisition in the development of complex systems
- Support for SEs
  - System Engineers need a innovative system to help them
- Definition
  - SEs need define that system







#### Where are we (DoD) Going? - DoD and SoS/LSI (Gansler)

- SoS acquisition and engineering is the norm in DoD
- SoS design, integration and qualification (I&Q) is highly complex
- DoD engineering workforce not well aligned to LSI responsibilities



- Government oversight of LSI has been complicated with contractual ambiguities
- Delineation of "inherently governmental functions" for LSI needs more clarity
- Private LSIs have inherent conflicts of interests without specific controls
- SoS integration requires a strong, centralized LSI



- Acquisition timeliness
- System complexity
- **TOC**
- I&I risks
- Workforce support
- Acquisition process



- Document-driven
- Oversight-oriented
- Acquisition too long
- Poor TOC control
- Poor quantification (what-ifs / trades...)
- Lack of repeatability (too "greybeard" dependent)
- No longevity of baselines for P3I
- Inability to cope w/complexity, SoS, LSI
- Integration not coupled early enough
- Interoperability not well quantified or predictable
- I&Q risks too high



#### **SDEA Context**





- What are SDEA requirements?
- What are SDEA components, elements, tools, etc.
- What are available today?
- Where do they fall short?
- How might SDEA affect org roles and responsibilities?
  - JCIDS, WSARA, ...
  - Pentagon-vice-SysComs
- What are SDEA solicitation strategy key elements?

#### SDEA Where at we at, today?



# **System Acquisition in a Nutshell**



Concept Development & Validation Design Development & Validation Produce &Qualify

**Deploy & Improve** 



#### **Document / Expert – Centric Acquisition**



#### SDEA what is sdea (MBSE + MBSI)?



#### SDEA = MBSE + MBSI



#### SE Activities Should Produce System Definition/Model







#### SDEA System Supports Acquisition Engineering Activities





Acceptance

Retirement

Integration



#### Can We Create a System for Acquisition SEs?



Capability Goals, Objectives, Assumptions, Constraints



#### **SDEA Transformation**





#### **Example: Interface Design and Analysis**





## **Example: Operational Analysis**





#### **Example: Architecture Design and Analysis**





#### **SDEA Enables Acquisition SE**



#### SDEA How can we best apply SDEA?

# **SDEA is Impactful to Complex Systems**

#### Strong impact

- "Complex" systems
- Mission systems
- High levels of integration
- System of Systems
- Weapons system integration
- Emerging acquisitions (UCAS, UAS, JSF, etc.)

#### Supporting impact

- "Complicated" systems
- Airframe
- Propulsion
- P3I parts

#### SDEA Why not apply SDEA today?



#### **Tool and HSI Consistency in SE**



#### **Organizational processes**





### **Analysis of alternatives**





Team training on SDEA analytical methods

### **Management integration**



Not well integrated into PM/SE management methods

# **Modeling and Simulation**



Now well integrated into system/ops M&S methods/tools





#### **Executable models**



Non-executable models



#### **DoD Acquisition**



Not completely tailored to DoD 5000 / WSARA

#### SDEA How do we get there?



Way ahead?

- Select exemplar program
- Build system description
- Demonstrate application of SDEA
- Demonstrate/analyze value
- Consensus check
- Goal:
  - Develop a SysCom SDEA(MBSE/I):
    - Needs
    - Goals and objectives
    - Assumptions and constraints

Solicitation(s) Prototypes Research Studies Trials

#### SDEA SUMMARY



- Systems grow more complex
- Systems of systems (SoS) and LSI will be the norm
- Experience base is shrinking
- Disciplined, repeatable, and quantifiable SE practices needed
- SDEA technology is partially available
- Navy SysCom requirements for SDEA need to be defined for SDEA methods, practices, and tool acquisition

# **QUESTIONS / DISCUSSIONS**

# BACKUPS



