# DoD Modeling & Simulation Verification, Validation & Accreditation (VV&A): The Acquisition Perspective

## NDIA Presentation Number 8939

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# DoD Modeling & Simulation (M&S) Governance

**M&S Management Structure Organized by Communities.
Designed to Support & Integrate M&S Activities across the Department.
Led by a Senior Level M&S Steering Committee
(M&S SC) to provide governance.**

| Acquisition AT&L | Analysis CAPE & JS | Experimentation JFCOM | Intelligence USD(I) | Planning JS & Policy | Testing DOT&E & AT&L | Training P&R |
|---|---|---|---|---|---|---|

**M&S Practices**

Corporate & Crosscutting M&S Tools

Corporate & Crosscutting M&S Data

Corporate & Crosscutting M&S Services

(SE FORUM)   (JADM)   (JCDE EC)   (DIMSCG)   (AP EXCOM)   (T2 ESG)

## Components
**OSD, Joint Staff, COCOMs, Services**

**Goal: Establish corporate M&S management to address DoD goals:
Leads/guides/shepherds the $Bs in DoD M&S investments; adds value thru metrics &
ROI-driven priorities; and seeks to provide transparency.**
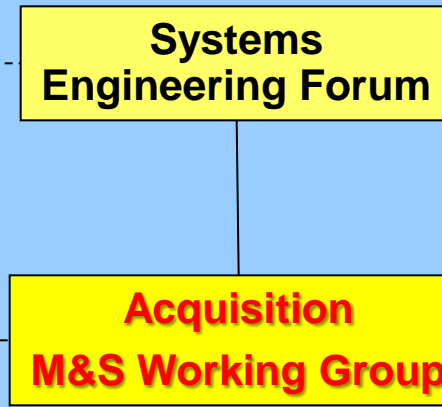
# Acquisition M&S Working Group Relationships

## Industry

**SISO**

**INCOSE**

**NDIA SE Division**

**SLC Forum**

**INCOSE MBSE WG**

**NDIA M&S Committee**
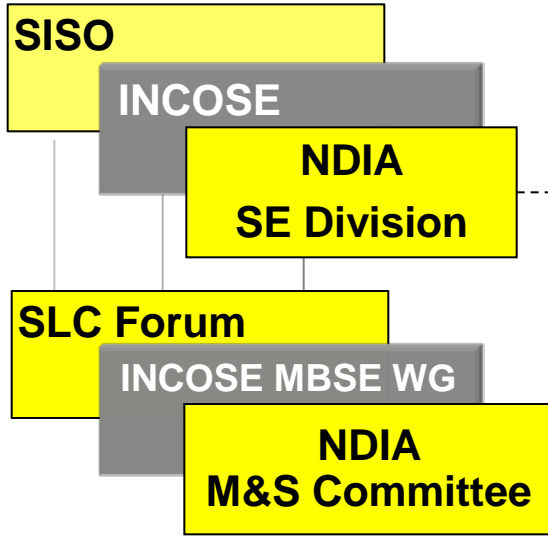
Chair: Jim Coolahan

## DoD Acquisition

Chair: Mr. Stephen Welby
OUSD(AT&L)/DDR&E/SE

**Systems Engineering Forum**

**Acquisition M&S Working Group**

Chair: Col Eileen Bjorkman, USAF
SAF/XCDM

## DoD M&S

Mr. Nicholas Torelli
Acquisition Member:
OUSD(AT&L)/DDR&E/SE/MA

**M&S Steering Committee**

**M&S Integrated Product Team**
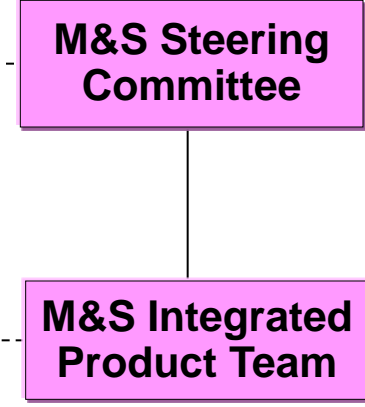
Mr. Mike Truelove (Ctr)
Acquisition Member:
OUSD(AT&L)/DDR&E/SE/MA

AMSWG Charter (SE Forum, 2006)

- Assist PMs and acquisition professionals by improving the utility of M&S . . .
- Address common concerns, improve info flow, align technical initiatives, pursue cross-cutting issue resolution . . .
- Represent the acquisition community in DoD M&S deliberations . . .

# Acquisition M&S Master Plan Structure

**Department of Defense**

**Acquisition Modeling and Simulation Master Plan**

Issued by the

**DoD Systems Engineering Forum**

**April 17, 2006**

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- **Foreword**
- **Introduction**
    - **Purpose**
    - **Vision**
    - **Scope**
- **Objectives (5)**
- **Actions (40)**
    - **Action**
    - **Rationale** (why it's needed)
    - **Discussion** (implementation guidance)
    - **Lead & supporting organizations**
    - **Products** (what is expected)
    - **Completion goal (year)**
- **Execution Management**

# AMSMP: Five Objectives, 40 Actions

| Objective 1 | Objective 2 | Objective 3 | Objective 4 | Objective 5 |
|---|---|---|---|---|
| **Provide necessary policy and guidance** | **Enhance the technical framework for M&S** | **Improve model and simulation capabilities** | **Improve model and simulation use** | **Shape the workforce** |

**Objective 1**

**1-1 M&S management**

1-2 Model-based systems engineering & collaborative environments

1-3 M&S in testing

1-4 M&S planning documentation

**1-5 RFP & contract language**

**1-6 Security certification**

**Objective 2**

2-1 Product development metamodel

2-2 Commercial SE standards

**2-3 Distributed simulation standards**

2-4 DoDAF utility
a) DoDAF 2.0 Systems Engineering Overlay
b) Standards for depiction & interchange

**2-5 Metadata template for reusable resources**

**Objective 3**

3-1 Acquisition inputs to DoD M&S priorities

**3-2 Best practices for model/sim development**

**3-3 Distributed LVC environments**
a) Standards
b) Sim/lab/range compliance
c) Event services

**3-4 Central funding of high-priority, broadly-needed models & sims**
a) Prioritize needs
b) Pilot projects
c) Expansion as warranted

**Objective 4**

4-1 Help defining M&S strategy

**4-2 M&S planning & employment best practices**

**4-3 Foster reuse**
a) Business model
b) Responsibilities
c) Resource discovery

**4-4 Info availability**
a) Scenarios
b) Systems
c) Threats
d) Environment

**4-5 VV&A**
a) Documentation
b) Risk-based
c) Examination

4-6 COTS SE tools

**4-7 M&S utility in Acqn metrics**

**Objective 5**

**5-1 Definition of required M&S competencies**

5-2 Harvesting of commercial M&S lessons

**5-3 Assemble Body of Knowledge for Acqn M&S**

**5-4 M&S education & training**
a) DAU, DAG & on-line CLMs
b) Conferences, workshops & assist visits

**5-5 MSIAC utility**

<u>Key</u>

**Broader than Acqn**

# Acquisition M&S Community Recognizes Importance of VV&A

- **VV&A of M&S is important because it:**
  - Provides an understanding of the assumptions, capabilities, and limitations of the models and simulations
  - Provides a means for knowing how trustworthy the M&S results are
  - Promotes reuse of M&S by allowing others to understand how the M&S has been used

- **Three specific actions for VV&A are in the Acquisition M&S Master Plan (AMSMP):**
  - Action 4-5 (a): Require DoD-wide standardized documentation of VV&A
  - Action 4-5 (b): Develop a risk-based methodology & associated guidelines for VV&A expenditures
  - Action 4-5 (c):  Examine the relevant VV&A when M&S informs major acquisition decisions.  Unambiguously state the purpose, key assumptions, and significant limitations of each model or simulation when results are presented

# Acquisition Community Commitment to VV&A

- **The Acquisition M&S Community has followed through by taking multiple actions to promote and encourage VV&A:**
  - Sponsored funding to:
    - Finalize the MIL-STD-3022 DoD Standard Practice Documentation of VV&A for Models and Simulations
    - Finalize the DoD VV&A Documentation Tool
    - Establish a risk based approach for VV&A
    - Develop a CMMI-like VV&A maturity model
  - Provided guidance on VV&A in the Defense Acquisition Guidebook
  - Under the Acquisition M&S Working Group, established a VV&A Subcommittee
  - Recommended improvements to the new DoDI 5000.61
  - Volunteered to participate in NATO VV&A activities

# Acquisition Commitment to VV&A: Sponsored Funding

- ## MIL-STD 3022:

  - The effort was initiated by the Navy and the Acquisition Community saw value that benefited the M&S enterprise & sponsored its completion

  - The purpose of the standard is to provide a common framework for sharing information throughout the VV&A processes

  - The common method of documentation benefits participants in the VV&A processes by eliminating unnecessary redundancy and facilitating reuse of information when accrediting an M&S for an intended use

  - Was published in January 2008 & has received positive feedback from users

  - Enables the efficient reuse of VV&A information to include discoverability, accessibility, & usability

  - Provides a common way of documenting information about VV&A of M&S

  - Allows information about VV&A projects to be machine searchable thereby promoting reuse

# Acquisition Commitment to VV&A: Sponsored Funding (cont.)

- ## To finalize the DoD VV&A Documentation Tool:

  - Leveraged efforts started by the Navy

  - Automated production of the MIL-STD 3022 templates

  - Currently 20 customers are using the tool

  - The DoD VV&A Documentation Tool can be accessed through the M&S Coordination Office website:

    http://www.msco.mil/vva_ doc_tool.html

  - Currently requires a Common Access Card (CAC) or External Certification Authority (ECA)

  - We see a commercial documentation standard under SISO as a logical next step

- **To establish a risk-based approach for VV&A**
  - Since there is a cost for verifying & validating models & simulations, the effort is intended to help a M&S user determine how to focus the V&V to get the information needed to accredit the M&S for use.
  - The importance of VV&A is directly related to the criticality of the decision being informed by M&S.
  - This effort started in the spring of 2009 and is scheduled to be completed in the spring of 2011
  - A commercial standard under SISO may follow

- **To develop a Capability Maturity Model Integration (CMMI)-like VV&A maturity model**
  - The primary focus of this task will be the establishment of a CMMI-like maturity model to support a clearer articulation of the level of VV&A that an organization can or should achieve.
  - Task includes the development of a VV&A roadmap that defines the gaps that inhibit efficient and effective VV&A implementation
  - M&S Steering Committee approved funding for FY-10 & FY-11
  - A statement of work has been submitted with an anticipated work start by December 2009

# VV&A Guidance Efforts

- **Strengthened the Defense Acquisition Program Support (DAPS) Methodology for Program Support Reviews (PSRs) by identifying VV&A as a key aspect of a program's M&S strategy.**

- **Developed and provided a M&S tutorial to Assessments and Support that emphasized the importance of VV&A documentation.**

- **Addressed VV&A in multiple college-level courses developed under the "M&S Education for the Workforce" Project**

- **Addressed VV&A in two Defense Acquisition University Continuous Learning Modules:**
  - M&S for Systems Engineering
  - M&S for Test & Evaluation

- **Addressed VV&A in the "M&S Guidance for the Acquisition Workforce" and the Defense Acquisition Guidebook (DAG) Chapter 4.5.8 or go to:**

  **http://www.acq.osd.mil/sse/docs/M-S-Guidance-Acquisition-Workforce.pdf**

# AMSWG VV&A Subcommittee

- **The Chair of the Acquisition M&S Working Group (AMSWG) proposed and established the VV&A Subcommittee in July 2009.**
  - Acquisition is the biggest producer and consumer of VV&A products
  - Congress has expressed interest in metrics with respect to the number of models and simulations with documented VV&A
  - Periodic VV&A technical interchange meetings are needed to:
    - promote the importance of VV&A
    - exchange VV&A information
    - make VV&A information available
    - provide a virtual VV&A brain trust-capability for the Acquisition Community
    - respond to requests for VV&A information
  - Supports Action 4-5 in the AMSMP and Goal 3 of the M&S Steering Committee's Strategic Vision for DoD M&S

# Background on DoDI 5000.61

- **DoDI 5000.61 DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A) is the Department's instruction that implements policy, assigns responsibilities, & prescribes procedures for the verification, validation, & accreditation (VV&A) of DoD models, simulations, & associated data.**

- **The latest version of the DoDI 5000.61 was last dated May 13, 2003**

- **At the July 2007 M&S Steering Committee Offsite, the M&S SC directed a review and update if needed to the DoDI 5000.61**

- **Office of the Secretary of Defense Program Analysis & Evaluation (PA&E), a member of the Modeling & Simulation Steering Committee, volunteered to lead the effort to revise the instruction in 3 months.**

- **Their effort ended when the revised instruction began formal staffing for approval in June 2009**

# DoDI 5000.61: Current Status

- **The instruction entered formal SD 106 staffing on June 4, 2009**

- **Suspense for formal comments was August 11, 2009**

- **The M&S Coordination Office is led the adjudication process**

- **Adjudication is nearly complete**

- **USD (AT&L) Signature is expected by the end of this calendar year**

# NATO Participation

- **NATO has requested more U.S. participation in M&S activities**

- **The Modeling & Simulation Coordination Office has requested more participation from the Communities and Services**

- **The Acquisition Community has volunteered to participate in NATO VV&A activities and others**

- **Coordination with the M&S CO is underway**

# Summary

- **The Acquisition M&S Community is committed to VV&A**

- **The Acquisition M&S Community wants to further mature the practice of VV&A**

- **We solicit your support and participation**

- **Let us know your concerns and suggestions**

- **We will incorporate and champion good ideas**

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# Q & A

# Acronyms

- **AMSMP**: Acquisition Modeling & Simulation Master Plan
- **AMSWG**: Acquisition Modeling & Simulation Working Group
- **AP EXCOM**: Adaptive Planning Executive Committee
- **AT&L**: Acquisition, Technology and Logistics
- **CAC**: Common Access Card
- **CAPE & JS**: Cost Assessment Program Evaluation & Joint Staff
- **CMMI**: Capability Maturity Model Integration
- **COCOMS**: Combatant Commands
- **DAPS**: Defense Acquisition Program Support
- **DDR&E**: Director, Defense Research and Engineering
- **DIMSCG**: Defense Intelligence M&S Collaboration Group
- **DoD**: Department of Defense
- **DoDI**: Department of Defense Instruction
- **DOT&E**: Director Operational Test and Evaluation
- **ECA**: External Certification Authority
- **INCOSE**: International Council on Systems Engineering
- **JADM**: Joint Analytic Data Management
- **JCDE EC**: Joint Concept Development & Experimentation Executive Committee

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# Acronyms (cont.)

- **JFCOM**:  Joint Forces Command
- **M&S**:  Modeling and Simulation
- **MA**:  Mission Assurance
- **MBSE**:  Model Based Systems Engineering
- **MIL-STD**:  Military Standard
- **NDIA**:  National Defense Industrial Association
- **ODDR&E**:  Office of the Director, Defense Research and Engineerint
- **OSD**:  Office of the Secretary of Defense
- **OUSD**:  Office of the Under Secretary of Defense
- **P&R**:  Personnel and Readiness
- **PSR**:  Program Support Review
- **SE**:  Systems Engineering
- **SISO**:  Simulation Interoperability Standards Organization
- **SLC**:  System Life Cycle
- **T2 ESG**:  Training / Transformation Executive Steering Group
- **USD(I)**:  Under Secretary of Defense for Intelligence
- **VV&A**:  Verification, Validation and Accreditation
- **WG**:  Working Group

# Standards Needs Identified in the Acquisition M&S Master Plan

- **Action 1-5 Contracting Guidelines / Best Practices**
- **Action 2-2 Commercial Systems Engineering (SE) Standards**
- **Action 2-3 Distributed Simulation Standards**
- **Action 2-4 DoD Architecture Framework (DoDAF)**
- **Action 2-5 Metadata Template for Reusable Resources**
- **Action 3-2 Best Practices for M&S Development**
- **Action 3-3 Distributed Live, Virtual, Constructive (LVC) Environments**
- **Action 4-2 M&S Planning Best Practices**
- **Action 4-5 VV&A**
- **Action 5-1 Required M&S Competencies**
- **Action 5-3 M&S Body of Knowledge**