Acquisition Modeling and Simulation Working Group (AMSWG) Status Brief

Phil Zimmerman
Office of the Deputy Assistant Secretary of Defense for Systems Engineering (ODASD(SE))

NDIA Modeling & Simulation Committee
21 February 2012
Agenda

- DASD(SE) Overview
- Modeling and Simulation Call for Action
- AMSWG Objectives, Core members
- AMSWG and Acquisition Process
- AMSWG Information Sharing
- Acquisition Modeling and Simulation Key Areas of Emphasis for 2012
DASD, Systems Engineering

Stephen Welby
Principal Deputy
Kristen Baldwin

Systems Analysis
Kristen Baldwin (Acting)

- Addressing Emerging Challenges on the Frontiers of Systems Engineering
- Analysis of Complex Systems/Systems of Systems
- Program Protection/Acquisition Cyber Security
- University and Industry Engineering Research
- Modeling and Simulation
- Systems Engineering FFRDC Oversight

Major Program Support
James Thompson

- Supporting USD(AT&L) Decisions with Independent Engineering Expertise
- Engineering Assessment / Mentoring of Major Defense Programs
- Program Support Reviews
- OIPT / DAB / ITAB Support
- Systems Engineering Plans
- Systemic Root Cause Analysis

Mission Assurance
Nicholas Torelli

- Leading Systems Engineering Practice in DoD and Industry
- Systems Engineering Policy & Guidance Development Planning/Early SE
- Specialty Engineering (System Safety, Reliability and Maintainability Engineering, Quality, Manufacturing, Producibility, Human Systems Integration (HSI))
- Technical Workforce Development
- Standardization

Providing technical support and systems engineering leadership and oversight to USD(AT&L) in support of planned and ongoing acquisition programs
DASD(SE) Top-Level FY12 Goals

Strengthen our program engagement, across full product spectrum, using expert technical teams to support informed, affordable decisions

– Increase early engagement in AoA’s and RFPs
– Increase use of quantitative data (new SEP format) in program oversight
– Meet commitment to USD(AT&L) to comprehensively support PDR and CDR
– Maintain program support review tempo and quality while using less resources

Implement comprehensive program protection planning

– As a part of the trusted defense systems strategy

Implement clear, effective reliability and manufacturing policy

– Establish and promulgate guidance and support for these specialty disciplines

Conduct detailed review/update of SPRDE curriculum

– Dovetail into DAU statutory requirement to review Acquisition Curriculum

Assess and Strengthen Workforce Systems Engineering Competencies

Measure and improve Department-wide Systems Engineering performance

– Establish collection of performance metrics, benchmarking

Lead S&T priority to “Engineered Resilient Systems”

– Ensure a successful Systems 2020 program start in FY13
DoD Modeling and Simulation Governance

M&S Management Structure Organized by Communities. Designed to Support & Integrate M&S Activities across the Department. Led by a 1 to 2 Star M&S Steering Committee (M&S SC) to provide governance.

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.
Observations: Call for Action

• Modeling and Simulation is not consistently applied in the acquisition lifecycle
  – It is not consistently recognized as a component or enabler of Systems Engineering
  – It is not consistently productive for the program management team
  – It is inconsistently applied in phases of the acquisition lifecycle

• It is never used as a continuum of tools, or as a supplier in a continuum of rationale and justification for analysis, evaluations, and assessments across the acquisition lifecycle
  – It is not consistently represented in Service and component organizations
  – It is not, as a community, organized to answer questions, fill SE gaps, or share best practices

• It has a long-standing strategy, but it does not have a current roadmap for improvement investment
  – Acquisition modeling and simulation needs, capabilities, messages from PEO, PM not reaching OSD; and vice versa

• Contemporary example: Mr. Kendall’s remarks at CSIS, 6 Feb 2012
“[T]he optimistic predictions, when we started the production of the F-35—that we now had good enough design tools and good enough simulations and modeling that we wouldn’t have to worry about finding problems in the test—was wrong. And now we’re paying the price for being wrong about that…

[W]e’re finding problems with all three of the variants that are the types of things that are historically in a state-of-the-art, next generation, fighter aircraft you’re going to find…where our design tools are not perfect and we didn’t model everything as precisely as we thought we had. So we’re working our way through that.”

Mr. Kendall remarks at CSIS event “The Acquisition Implications of the DoD Strategic Guidance and the FY13 Budget” (6 Feb 2012)
AMSWG Objectives

• To ensure more effective support to the warfighter, reduce risk while minimizing total system life cycle cost through effective application of models, and Simulations.

• “Foster a robust discussion within the acquisition community (all stakeholders, not just the Modeling, and Simulation community) to create a robust vision what future modeling, and simulation based acquisition would look like”
  – Include additional considerations, e.g. JCIDS, PPBE

• Be user/provider group made up of people doing/using the work
  – A main mission is communication
    – Among ourselves and our constituents, to share information, lessons learned, good ideas and concerns with peers to educate each other
    – To Identify issues that would benefit from collaboration
    – To identify enterprise items for modeling and simulation
    – Externally, to make sure our needs get pushed ‘up the chain,’ to influence Acquisition Policy and Guidance, and resource decisions
  – Perform studies, contribute to an annual Modeling, and Simulation status report, identify near and far term shortfalls (tools, standards, interfaces, interoperability, etc.)
Core Members

**PRIMARY:**
- USAF: Col John Simeoni
- USMC: Mike O’Neal
- USN: Dennis Reed
- USA: Monica Farah-Stapleton
- MDA: Sandra Veautour

**ALTERNATE:**
- Ernesto “Ernie” Gonzalez
- LtCol Walt Yates
- Mike LaMarche
- LTC Jon Ellis
- Doug Parsons

Additional Core members may be added at a later date

NDIA: Jim Coolahan/Jeff Bergenthal
INCOSE: Kevin Weinstein/Sandy Friedenthal

As of 1 Feb 2012
One Year of Focus on the Acquisition Lifecycle

- May 2011
- July 2011
- September 2011
- November 2011
- January 2012
- March 2012
- May 2012
- Development Planning
- Materiel Solution Analysis
- Technology Development
- Eng, Mfg, and Dev
- Production and Deployment
- Operations and Sustainment
- Closeout and Review

End of Cycle report will be generated with accomplishments and findings.
Operations and Sustainment

- Change from the usual AMSWG Core topic selection to focus on follow-on topics from first Cost Mini-Workshop (USA, USMC, OSD)

- Suggested areas of concentration for modeling and simulation activity and discovery:
  - Building credible cost estimation databases and models over time
  - Improving government capability to predict O&S costs for new systems Pre-Milestone A
  - Incentivizing PM and Industry for cost reductions over the system lifecycle
  - Roles and responsibilities for participation in Cost Estimation.

- Meeting Date: March 22, 2012
Information Sharing

• All meeting announcements will be directly sent to the AMSWG Invitation List, with encouragement to distribute widely within your organizations
  – To receive a direct invitation to the next AMSWG, please send a request to: AMSWGSecretariat@osd.mil

• For those who can’t attend in person, a dial-in number will be used and briefs will be viewable in real-time on Defense Connect Online (DCO)
The AMSWG Charter, and most briefings from AMSWG meetings, are located on the AT&L Portal (requires a CAC).

Contact the AMSWG Secretariat to: gain access to the AT&L portal; request briefs (if you do not have a CAC); request any other information.

AMSWGSecretariat@osd.mil

https://portal.acq.osd.mil/portal/server.pt/community/acquisition_modeling_and_simulation_working_group_%28amswg%29/
Key Areas of Emphasis for 2012

- Acquisition Modeling and Simulation Fundamentals
- Significant engagement with major ACAT programs, DAPS and DAG updates
- DoD Acquisition Community Action / Implementation Plan
- State of Acquisition Modeling and Simulation (SAMS)
- Plans for upcoming AMSWGs will depend on end of cycle report, and emphasis areas of OSD, and the AMSWG Core
The purpose of the Modeling and Simulation Fundamentals is to provide a high-level and concise, but comprehensive set of characteristics against which a program manager can assess the balance, coherence, and completeness of the stewardship & credibility of this area of technical activity within a given program. The ultimate objective of such a set of technical activities is to ensure that Modeling, Simulation, & Analysis activities needed by the Department is both available & sufficient when needed to support acquisition and other investment decisions.

Key Topic Areas:
- Responsibility & Requirements for success
- Relationship to Systems Engineering & other functions / disciplines
- Practical Uses of Modeling & Simulation
- Expectations for investments in people, processes & products
Program Engagement

• Major ACAT Programs:
  – SE Cognizance of 250 programs (1C, 1D, 1AM, Special Interest)
  – In 2011, SE engagement with over 100 programs, and Congressional reporting on over 40
    – Modeling and Simulation engagement with programs increasing through involvement with SE technical leads (PSTLs) and their review teams

• DAPS Methodology developed to support assessment
  – Ensures consistent and tailorable criteria for both comprehensive, and quick look reviews
    – [http://www.acq.osd.mil/se/docs/DAPS_V2.0_Methodology.pdf](http://www.acq.osd.mil/se/docs/DAPS_V2.0_Methodology.pdf)
  – Addresses programmatic and technical areas; applicable to all program types
    – Performing a matrixed review for consistency of modeling and simulation within areas (across all phases), and within a phase (across all areas)

• Defense Acquisition Guidebook
  – The Defense Acquisition Guidebook is designed to complement DoDD 5000.01 and DoDI 5000.02 by providing the acquisition workforce with discretionary best practice that should be tailored to the needs of each program.
  – Acquisition professionals should use this Guidebook as a reference source supporting their management responsibilities.
    – Modeling and simulation currently in chapter 11, and sporadically throughout other areas. It will be properly infused in System Engineering (Chapter 4), and elsewhere as time permits, and best practices are identified
Key objectives

• Prepare a draft of an Acquisition Community Modeling and Simulation Action Plan for use by DUSD (AT&L)/SE in satisfying the Business Planning guidance resulting from the DOD Modeling and Simulation Steering Committee (SC),
• Incorporate findings from 2010 Summer Study on Acquisition Modeling and Simulation, and community feedback
  – Include recent industry (NDIA and INCOSE) studies and projects related to Model Based Systems Engineering (MBSE)
  – Include findings from the AMSWG as appropriate
• Work collaboratively with the AMSWG Core stakeholders to build a community consensus on path forward

Current Status

• AMSWG Core stakeholder comments under review now
The Objective

Ensure that Modeling, Simulation & Analysis capability needed by the Department is both available & sufficient to support acquisition and other investment decisions.

The Strategy – Partitioning the Problem & Capabilities Centered

- Services & Missile Defense Agency AMSWG reps agree to assist and divide the work; Exploit open & available info
- Employ top-down “Strategy to Task to Need to Technology”
- Employ the Acquisition Key Events / Milestones to support decision events that drive “Expression of Capability Needs”
- Employ existing Major Program Support “bins” to group domain types (e.g. fixed wing air) and capability needs
- Work to influence requirements for M&S Enterprise knowledge discovery tools so these investments can be leveraged in practice by multiple users, including users outside the traditional modeling and simulation community
Questions?

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for Systems Engineering

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703.681.6544
Value Proposition to Members

**Briefings:**
- Briefings will address issues, capabilities, needs, lessons learned, and more …
- Core members should expect to receive more briefings than they are asked to provide

**Opportunities:**
- Participants will have the opportunity to raise issues, highlight needs, and promote good ideas and best practices as part of an effort to influence Acquisition Policy and Guidance and demonstrate the value-added of AMSWG
- Core members should expect to have the final word on AMSWG agendas and policy/guidance recommendations

**Status Reports to SE Forum:**
- AMSWG Chair will create and brief, if possible, status reports to SE Forum
- Core Members should expect to contribute to these briefings and may benefit from using them to summarize their activities to their chain of command

**Annual Modeling and Simulation Activities Report:**
- AMSWG Chair will develop and disseminate an annual Modeling and Simulation Activities Report to the Acquisition Modeling and Simulation Community, covering the Acquisition Lifecycle
- Core members should expect to contribute to these reports, which can be used to inform their Service Acquisition Modeling and Simulation Community
## Thematic Agendas: AMSWG Battle Rhythm

<table>
<thead>
<tr>
<th>AMSWG Meeting</th>
<th>Acquisition Phase Focus Area</th>
<th>Related Milestones</th>
<th>Potential Discussion Areas (Metrics, Models &amp; Simulations)</th>
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<tbody>
<tr>
<td>26 May 2011</td>
<td>(Pre-MDD) Development Planning</td>
<td>MDD</td>
<td>• Prototyping</td>
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<td>• Capability Based Assessment (CBA)</td>
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<td>• Analysis of Alternatives (AoA)</td>
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<td>• Model Management</td>
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<td>• RFPs &amp; Contracting Language</td>
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<td>• Total Ownership Cost Modeling</td>
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<td>• Life Cycle and Sustainment Data Collection Strategy/Plan</td>
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<td>21 Jul 2011</td>
<td>Matériel Solution Analysis / Concept Refinement (DP)</td>
<td>MS A</td>
<td>• Design</td>
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<td>• Material Solution Analysis (MSA)</td>
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<td>• Oversight and Review / Contracting</td>
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<td>• Concept of Operations Modeling</td>
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<td>• SoS Modeling</td>
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<td>• M&amp;S Support Plan</td>
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<td>• Interoperability &amp; Warfighter Integration</td>
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<td>15 Sep 2011</td>
<td>Technology Development</td>
<td>MS B</td>
<td>• Development</td>
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<td>• Systems Modeling</td>
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<td>• System Threat Assessment</td>
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<td>• Manpower Estimation (System manning)</td>
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<td>• M&amp;S Support Plan</td>
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<td>• Hot Bench, WRAP Around Simulation</td>
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<td>• DAPS Methodology Improvement</td>
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<td>• Model Based Requirements</td>
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<td>• Trade Study, Cost versus Capabilities</td>
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<td>• Requirements Modeling</td>
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<td>• Economic Analysis Affordability Assessment</td>
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<td>• Environmental Safety and Occupational Health (ESOH) Metrics and Models</td>
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</table>
| **10 Nov 2011** | Engineering, Manufacturing & Development | **MS C** | • Developmental Test and Evaluation (DT&E)  
• Model Based Test Planning  
• Systems Security Engineering  
• Manufacturing Readiness Levels  
• Live-Fire T&E Waivers (Save money?)  
• Threat Representation  
• Interface with CAD/CAM  
• Product Support Modeling / Logistics  
• Affordability Assessment  
• M&S Feedback, Sustainment, and ECP Assessment  
• Improve Feedback of Test Data into Models (VVA)  
• (Modeling, and Simulation) Reuse and/or Modeling of SW Reuse |
| **26 Jan 2012** | Production & Deployment | **FRP** | • Operational Test & Evaluation (OT&Es)  
• Model Based Test Planning  
• Supportability Assessment  
• Product Support Modeling / Logistics  
• Risk Modeling  
• Manufacturing and Logistics Modeling  
• M&S Feedback, Support Plan, Statement, and ECP Assessment  
• Ground Testing (combined with real-time simulated interfaces saves money)  
• Improve Feedback of Test Data into Models (VVA) |
| **22 Mar 2012** | Operations & Support | **LCS** | • Transition  
• Sustainment and Cost Modeling  
• Logistics, Sustainment & Supportability  
• Modernization  
• Cost estimating and other issues  
• Training  
• Contract closeout |

- CPD, SEP, TEMP, PPP
- Verification
- Program Protection Models
- ESOH Metrics and Models
- Ground Testing + Modeling
- Risk Modeling
- Logical Data Models
- Training
- Certifications
- PPP
- Validation
- Other Plans
- Training
- Reuse Metrics and Modeling
- Model Management
- Disposal
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>0800</td>
<td>Sign-in, Confirm Lunch, Coffee, Meet and Greet</td>
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<tr>
<td>0830</td>
<td>Introductions (Go around the room and Teleconference participants)</td>
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<td>0845</td>
<td>Opening Remarks</td>
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<td>First Item</td>
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<td>Second Item</td>
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<td>1115</td>
<td>Third Item</td>
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<td>1215</td>
<td>Lunch (continuing discussions)</td>
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<td>1300</td>
<td>Fourth Item</td>
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<td>1400</td>
<td>AMSWG Special Item of Interest, or Fifth Item</td>
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<tr>
<td>1500</td>
<td>Break</td>
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<tr>
<td>1515</td>
<td>Introduce Next Meeting’s Acquisition Phase &amp; Potential Discussion Areas</td>
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<tr>
<td>1525</td>
<td>Roundtable Discussions (All Attendees)</td>
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<tr>
<td>1545</td>
<td>Select Next AMSWG Top 6-8 Subtopics</td>
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<tr>
<td>1555</td>
<td>Final Comments / Close Meeting</td>
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<td>Time</td>
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<td>0845 – 0900</td>
<td>AMSWG Opening Remarks (Chair)</td>
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<tr>
<td>0900 – 1000</td>
<td>What Are the Primary Modeling &amp; Simulation Needs and Gaps in This Phase and How Can They Be Closed in a Prioritized Fashion? (Mr. Bergenthal)</td>
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<td>1000 – 1015</td>
<td>Break</td>
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<tr>
<td>1015 – 1115</td>
<td>How Can/Should Modeling &amp; Simulation Support Combined DT&amp;E/OT/LFT&amp;E? (Mr. Wauer)</td>
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<tr>
<td>1115 – 1215</td>
<td>How Can Acquisition Leverage Modeling &amp; Simulation Development For Training the Same System (and, vice versa)? (Mr. Vibert/Ms. Frumkin)</td>
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<tr>
<td>1215 – 1300</td>
<td>Lunch (continuing discussions)</td>
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<td>1300 – 1400</td>
<td>A-10 Modification: How and When Does the Acquisition Modeling and Simulation Community Inform the Sustainment Community of Their Planning Costs Assumptions? (Mr. Coates)</td>
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<td>1400 – 1430</td>
<td>Defense Acquisition Guidebook Update</td>
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<td>1430 – 1500</td>
<td>M&amp;S Costing Workshop Discussion</td>
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<td>1500 – 1515</td>
<td>Break</td>
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<tr>
<td>1515 – 1550</td>
<td>TOPIC SELECTION FOR NEXT AMSWG</td>
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<tr>
<td>1550 – 1600</td>
<td>Final Comments / Close Meeting (Chair)</td>
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</tbody>
</table>
The AMSWG Charter, and most briefings from AMSWG meetings, are located on the AT&L Portal (requires a CAC).

Historical AMSWG documents are stored on a Defense Acquisition University (DAU) site where an AMSWG Workspace exists, but is not maintained (requires login, but not CAC).

Contact the AMSWG Secretariat to gain access to the AT&L portal or to ask questions about either site.

DAU AMSWG Workspace

https://acc.dau.mil/CommunityBrowser.aspx

AT&L portal

https://portal.acq.osd.mil/portal/server.pt/community/acquisition_modeling_and_simulation_working_group_%28amswg%29/
DoD M&S Enterprise Strategic Planning Process

- **Vision / Intent** (Step 1)
- **Capability Identification** (Step 2)
- **Capability Prioritization** (Step 3)
- **Capability Development** (Step 4)

Flowchart:

2. M&S Enterprise Strategy
   - Tools
   - Data
   - Svcs
3. M&S Enterprise Strategic Plans
4. M&S Community Strategic Plans
5. M&S Enterprise Implementation Plan
   - Tools
   - Data
   - Svcs
6. HLT & M&S Core Process
7. Community / Component Managed Projects
8. Updates
9. Feedback
• Decision-makers understand that the tools that are employed to support their information needs need to be sufficiently credible for their purpose.
• Previous efforts in this area were focused on development and coordination of thoughtful policy DoDI 5000.61) to encourage this need.
• VV&A Deep Dive recommended balanced focus on theory & demonstrated practice & feedback to inform/educate.
• VV&A Recommended Practices Guide (RPG) update reflected advances in theory (e.g. Risk-Based Accreditation), standards, and contemporary practice.
• Three practical use cases involve M&S-related credibility areas on high priority joint program issues (e.g. ground vehicle vulnerability M&S; M&S of net-centric weapons concepts & joint integration; M&S of emerging technology capabilities transitioning to weapon concepts).
High Level Task I-C-4
Environmental Data Cube Support System (EDCSS)

- **Capabilities:** Allows DoD M&S to more accurately represent the natural environment
  - Enables coupling of environmental representations across multiple domains (Air, Ocean, Terrain)
  - Allows for distribution of environmental data and effects at runtime
  - Enables users to maintain control over scenarios at runtime
  - Distributes data and effects over established standard protocols

- **Cross-Community Support:**
  - Fleet Synthetic Training (FST) - Pre-Deployment
  - COCOM level Training events:
  - Army Intelligence School:
  - Combat Air Force Distributed Mission Operations (CAF DMO)
  - Joint Live Virtual Constructive Federation (JLVC)

- **Cross-Government:**
  - NextGen Air Traffic Control System
AMSWG Interests in Cost Modeling

- **Operations and Sustainment Phase**
  - “Execute support program that meets materiel readiness and operational support performance requirements and sustains system in most cost-effective manner. Overlaps Production and Deployment Phase.”
  - Extends from Full-Rate Production/Deployment to Disposal
  - Contains IOC and FOC milestones while enabling “Affordability” and “Will Cost” vs. “Should Cost” metrics, tracking, and compliance

- **First Mini-Cost Workshop was held Nov 8, 2011, at CAA, Ft. Belvoir [A Joint Army and Marine Corps Initiative]**
  - Open discussion and dialogue between military, industry and academia
  - Initial assessment of O&S cost estimating data, tools and methodology
  - Initial assessment of challenges in estimating O&S costs earlier while changing our culture.

- **Several possible future topics came out of the Workshop:**
  - Actions required to ensure O&S Costs are always considered as part of Source selection criteria with documented methodology to support “Should Cost” vs. “Will Cost” performance tracking over the life cycle.
  - The development of credible O&S cost data – with assured Government access (as required)
  - Directory of cost data sources or data to support cost estimates (like the Common Data Production Environment (CDPE) – but for “cost” data).
Proposed Focus Questions

• **Build credible cost estimation databases and models over time**
  – What cost estimation databases do you use, or are you lacking to support predictive cost analysis?
  – How do you ensure government access and/or control over cost data?

• **Improve government capability to predict O&S costs for new systems Pre-Milestone A**
  – What cost estimation methodology/models do you use, or are you lacking to support predictive cost analysis?
  – Describe the relationship between you and the organization responsible for Cost Estimation for you Component?

• **Incentivize PM and Industry for cost reductions over the systems life-cycle**
  – What methods and/or models (data, algorithms, products) are you using when you participate in engineering tradeoff discussions and activities related to Cost (operations and sustainment), Schedule, Performance?

• **Describe your participation in cost estimation:**
  – e.g., what do you receive,
  – e.g., what do you contribute,
  – e.g., how do you participate,
  – e.g., how do you get notified