



National Defense Industrial Association
11th Annual Systems Engineering Conference
San Diego, California

**Standardized Documentation for
Verification, Validation, and
Accreditation -
An Update to the Systems Engineering
Community**

Mission II
M&S Session 3A5
Wednesday, October 22, 2008
8:00 am - 9:45 am

Presented by
DoD M&S Project
Project Management Team



Outline

- Why VV&A Background
- DoD M&S Project Overview
- Policy, Guidance & Standards
- Discoverable Metadata
- DoD VV&A Documentation Tool (DVDT)
- Data Discovery Mechanisms
- Summary



VV&A - where it all started ...

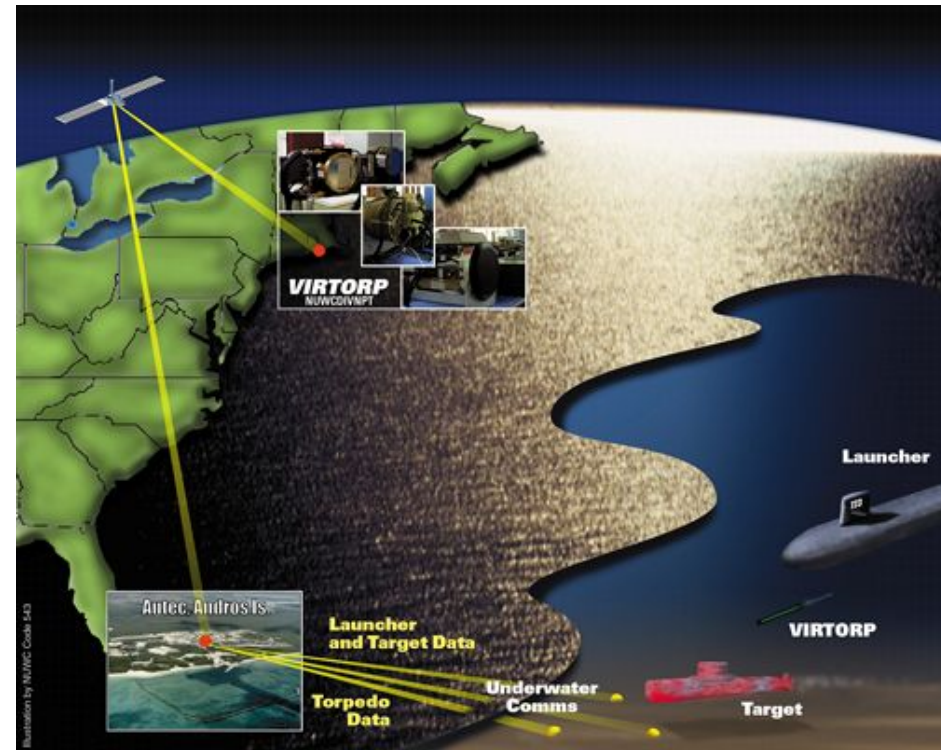
"Those who cannot remember the past are condemned to repeat it."

- 1980 By the Comptroller General Report to the Congress of the United States, *Models, Data, and War: A Critique of the Foundation for Defense Analyses*, March 12, 1980 (PAD-80-21) (<http://archive.gao.gov/f0202/111782.pdf>)
- 1987 United States General Accounting Office Report to the Chairman, Legislation and national Security Subcommittee, Committee on Government Operations, House of Representatives. *DoD Simulations: Improved Assessment Procedures Would Increase the Credibility of Results* (<http://archive.gao.gov/d30t5/134959.pdf>)
- 1990, 1992, 1994, 1999 Military Operational Research Society (MORS) Simulation Validation Mini-Symposiums and Workshops (<http://www.mors.org/reports.htm>)
- 1993 Report of the Defense Science Board Task Force on Simulation, Readiness and Prototyping. *Impact of Advanced Distributed Simulation on Readiness, Training and Prototyping*, January 1993 (<http://www.acq.osd.mil/dsb/reports/srp.pdf>)
- 1994 DoDD 5000.59 *DoD M&S Management*, January 4, 1994
- 1996 DoDI 5000.61 *DoD M&S VV&A*, April 29, 1996



Everything Is Simulation Except Combat*

- Modeling and Simulation (M&S) is a key enabler for systems engineers in the acquisition process
- Using M&S that provide credible results is crucial to fielding defense weapon systems to the warfighter
- Credibility and confidence in the use of M&S results are achieved through implementation of Verification, Validation, and Accreditation (VV&A) processes
- VV&A is critical for ensuring M&S is correct, is used correctly, and can produce results a systems engineer can trust



Naval Undersea Warfare Center Newport
Synthetic Environment Tactical Integration
Virtual Torpedo Project
HLA federation linking live submarines to high-fidelity
torpedo hardware-in-the-loop facility

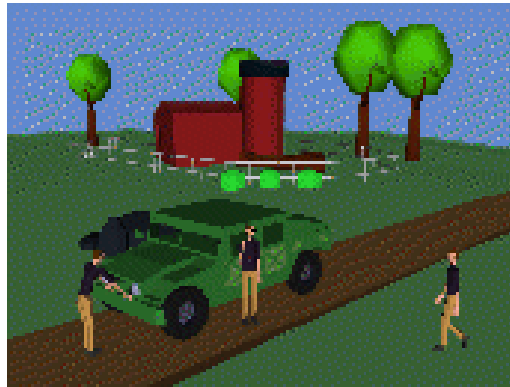


Three Methods of Simulation

*Defense Science Board, January 1993

***Findings - Continued**
DoD investment required in VV&A: *“Techniques routinely used for VV&A of single models or simulations face new challenges in a multi-source, highly interactive, internetted M&S environment where complex software modules are required to interoperate. New techniques of VV&A are likely required.”*

“The important task of verifying, validating, and accrediting battlefield behavior, modeled in some form, should receive greater attention in all DoD M&S programs.”



LIVE

Real people operating real systems in real environments in the air and space, on the ground, on and below the sea

VIRTUAL

Real people operating simulated systems in simulated environments included are wargames, models and analytic tools

CONSTRUCTIVE

Simulated people operating simulated systems in simulated environments



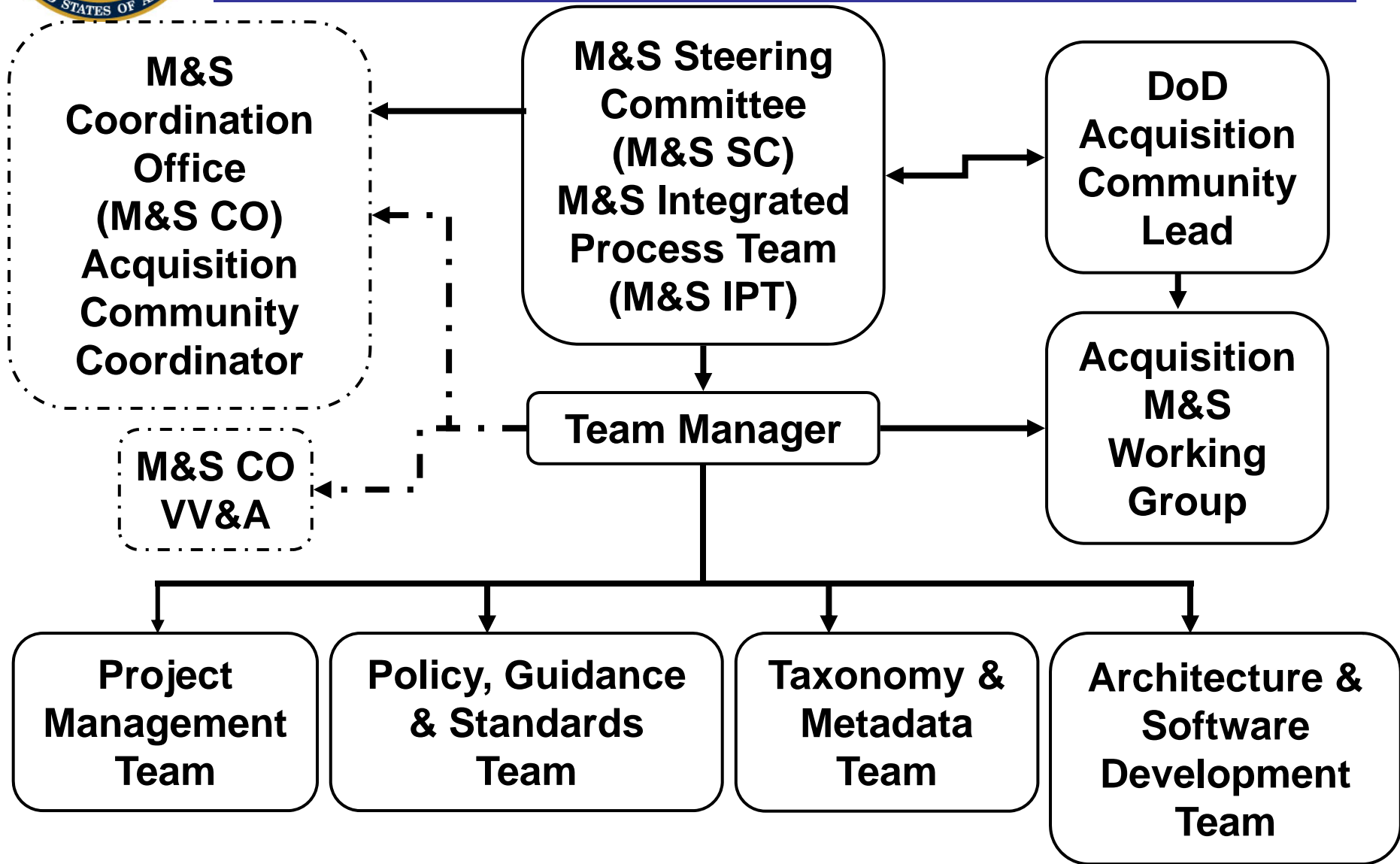
DoD M&S Project

- Project title: Standardized Documentation for VV&A
- Sponsor: Department of Defense (DoD) M&S Steering Committee (M&S SC)
- Oversight: Acquisition Community Lead





Project Organization



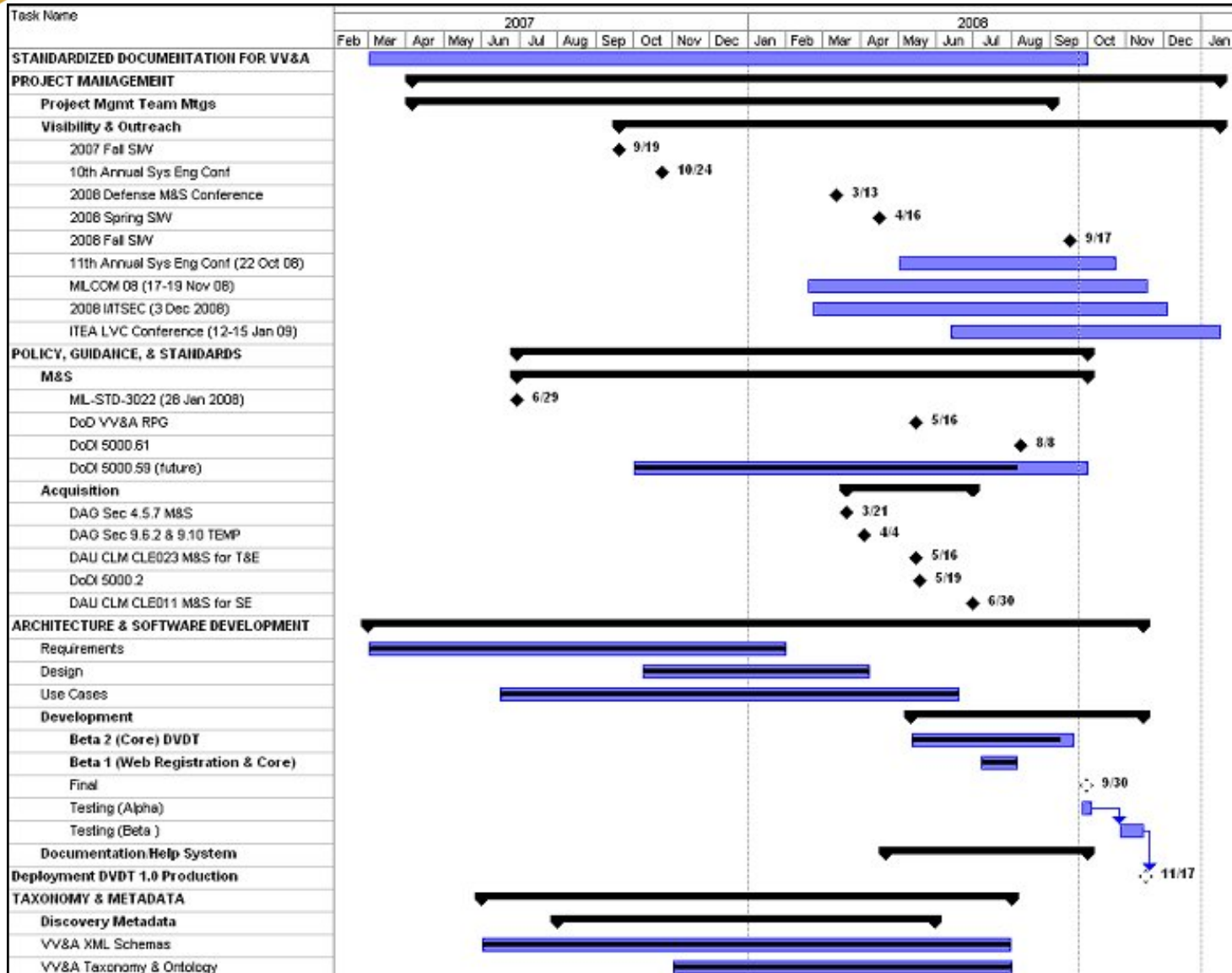


Project Scope

- Three major tasks and associated deliverables:
 - recommend updates to associated policy, guidance, and standards documents
 - design, describe, and register VV&A XML schemas
 - design, develop, test, and deploy the DVDT

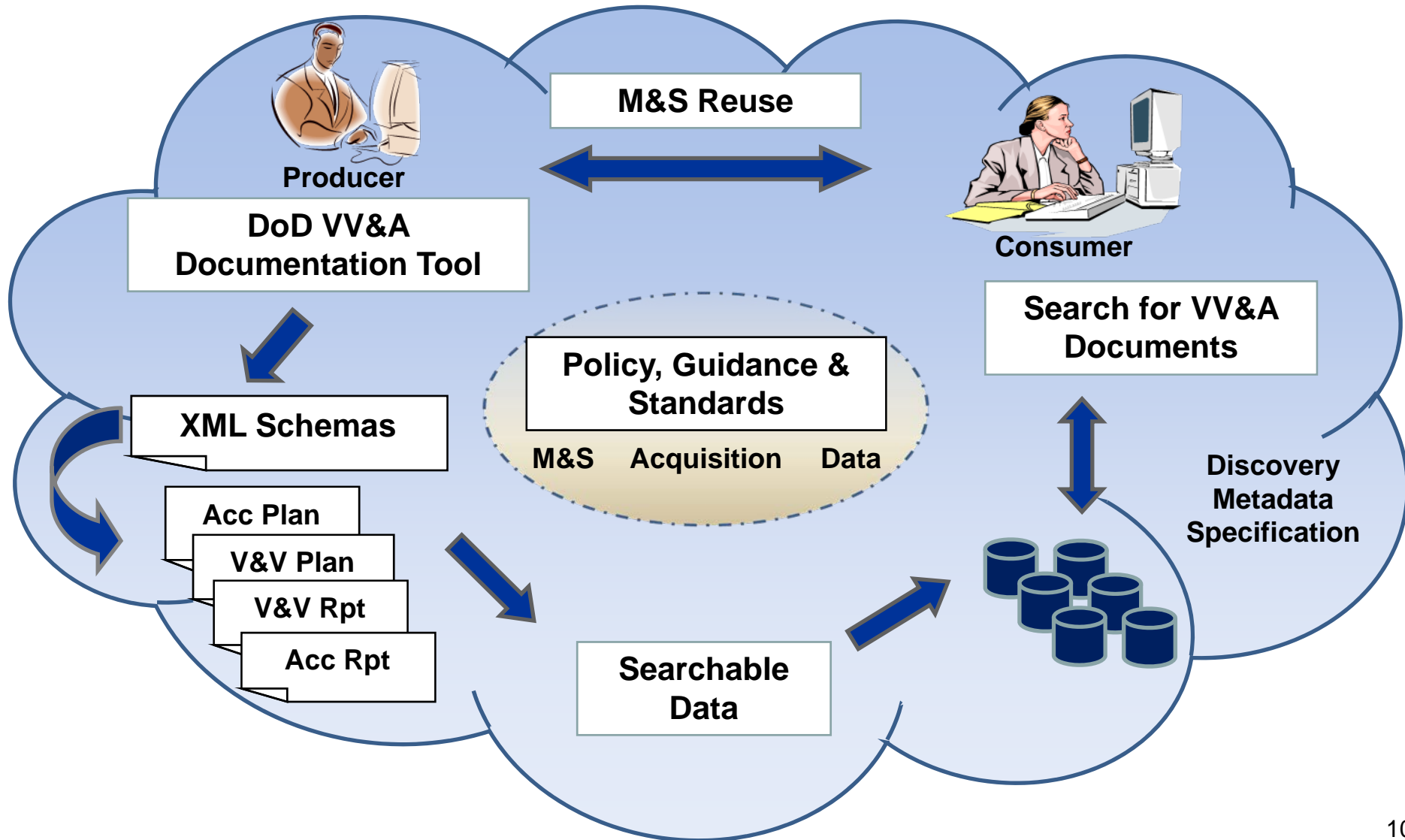


Plan of Action and Milestones



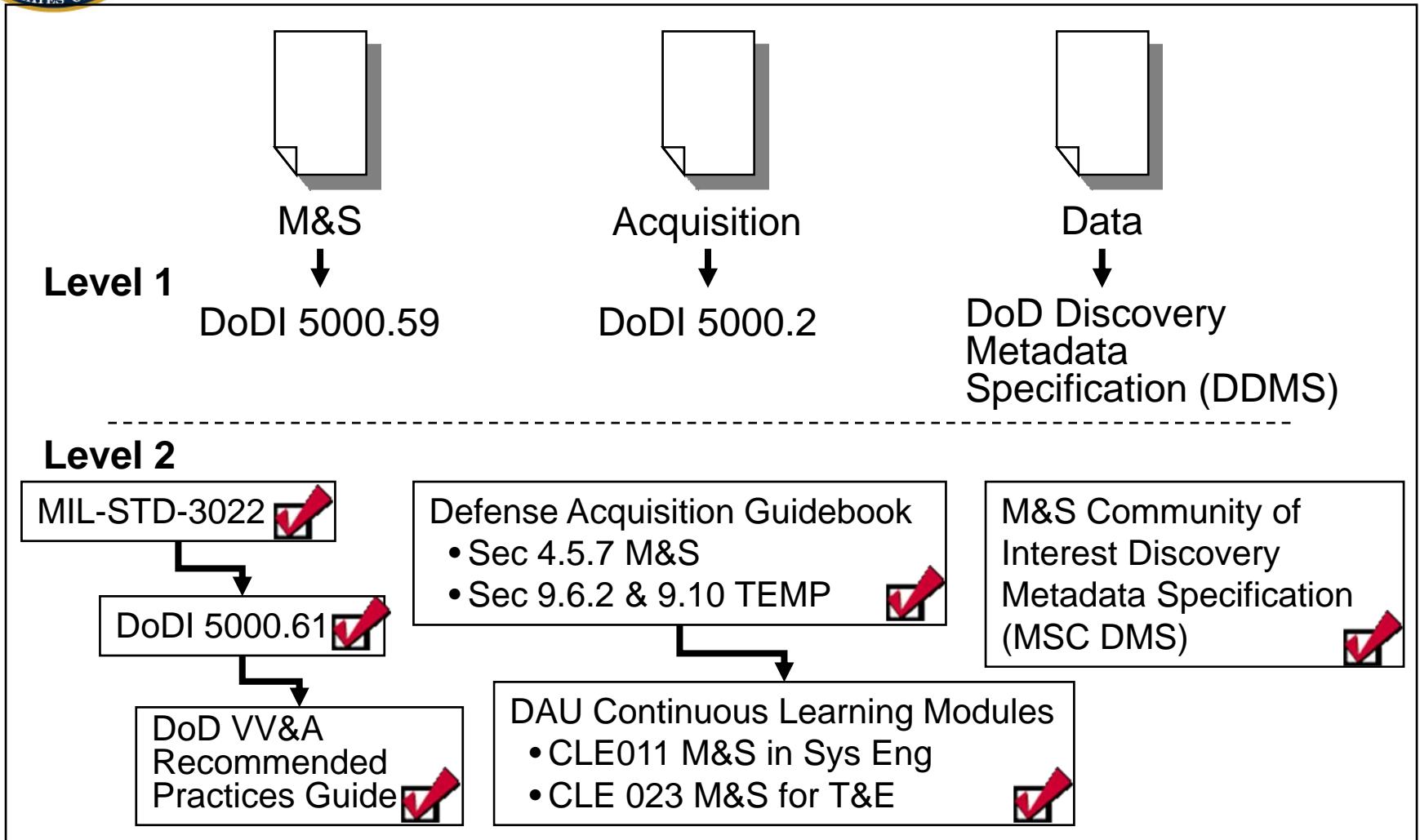


Concept of Operations





Policy, Guidance & Standards

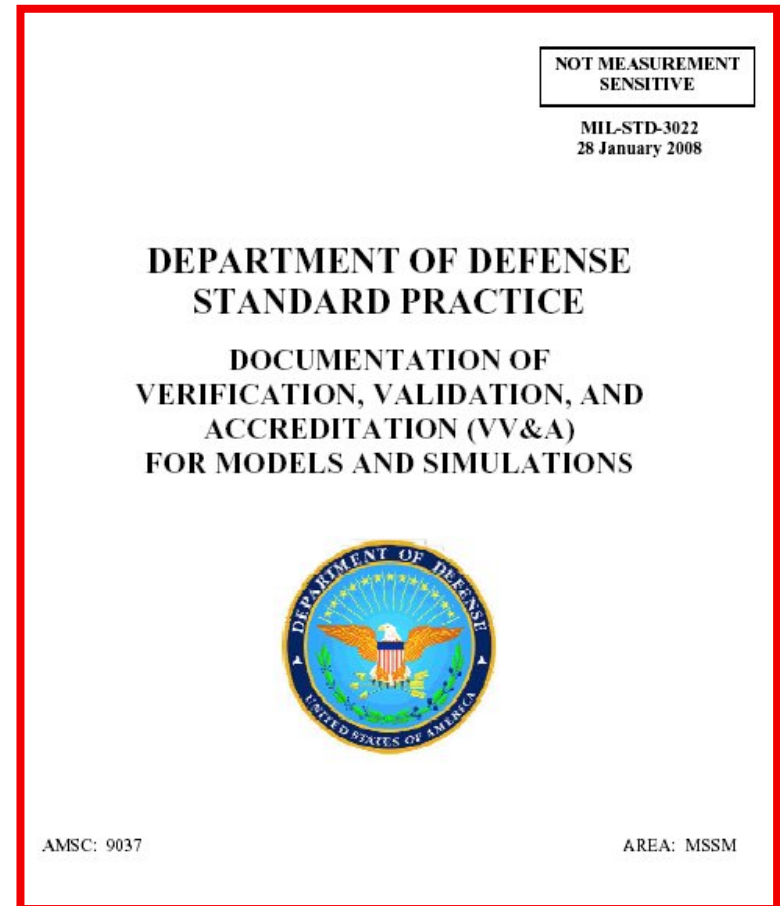




MIL-STD-3022

28 January 2008

- **2008:** Approved as a DoD Standard Practice with four associated Data Item Descriptions (DIDs)
 - DI-MSSM-81750 DoD M&S Accreditation Plan
 - DI-MSSM-81751 DoD M&S V&V Plan
 - DI-MSSM-81752 DoD M&S V&V Report
 - DI-MSSM-81753 DoD M&S Accreditation Report
- MIL-STD-3022 may be cited as a solicitation requirement and DIDs included on Contract Data Requirements List
- Available at Acquisition Streamlining and Standardization Information System (ASSIST) - <http://assist.daps.dla.mil/>



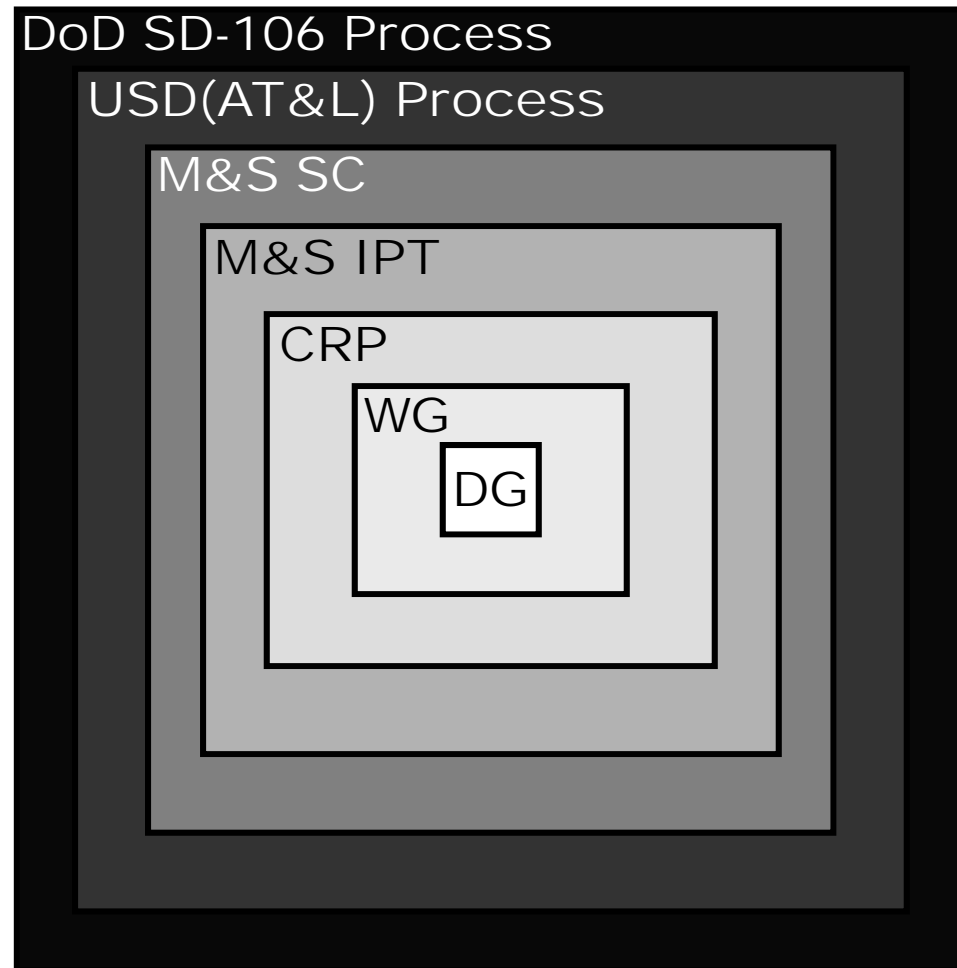
DVDT automates standard templates enabling sharing of VV&A information across Global Information Grid (GIG) enterprise



DoD Instruction 5000.61

M&S VV&A, 13 May 2003

- M&S SC directed a 5-year review in 2008
- Working Group kickoff meeting (21 Feb 2008)
 - Drafting Group formed
- M&S IPT informal review of draft revision (25 Jul-8 Aug 2008)
- Comment Resolution Panel (CRP) (Aug-Sep 2008)
- USD(AT&L) Review Process
 - Not begun
- DoD Directives Program Coordination Process (SD-106)
 - Signature authorities for DoD issuances include Presidentially Appointed, Senate-confirmed (PAS) officials
 - Processing might wait for new administration



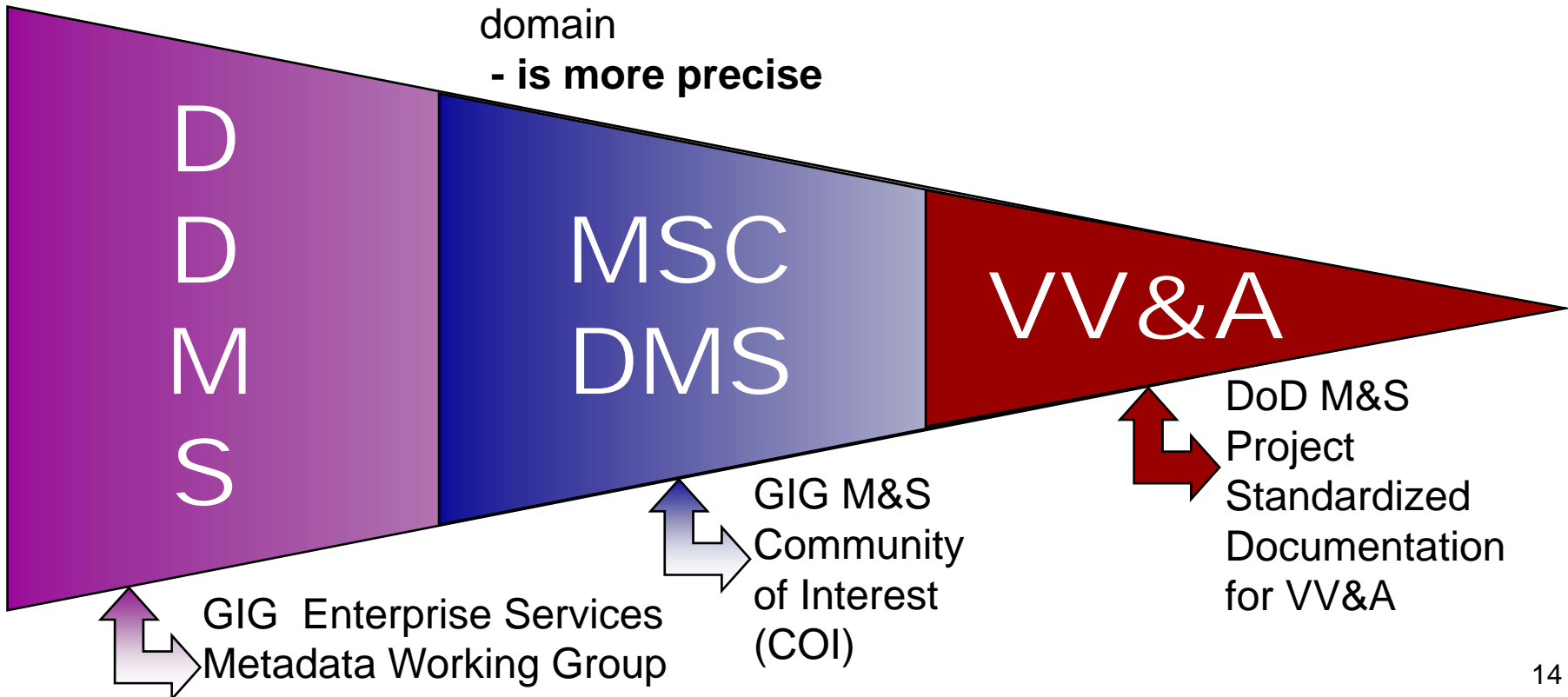


Discovery Metadata

DoD Discovery Metadata Specification (DDMS) describes DoD resources
- is very broad

M&S Community of Interest Discovery Metadata Specification (MSC DMS) provides more detail to describe resources in the M&S domain
- is more precise

VV&A metadata describes VV&A resources
- is most precise





DoD Metadata Registry

**VV&A
Project
Metadata
XML
Schema**

**VV&A
Document
Base
Types
XML
Schema**

**Accreditation
Plan
XML
Schema**

**Accreditation
Report
XML
Schema**

**V&V
Plan
XML
Schema**

**V&V
Report
XML
Schema**

The DoD Metadata Registry and metadata registration process together collect, store, and disseminate structural metadata information resources, e.g.:

- schemas
- data elements
- attributes
- document type definitions
- style-sheets
- data structures

The project's XML products will be registered and available for use by industry and government.



<http://metadata.dod.mil>



DVDT

- Automates production of VV&A documentation in compliance with MIL-STD-3022
- Enables search and discovery of VV&A document information via the GIG enterprise
- Produces documents that enable DoD data sharing in compliance with:
 - DoD Directive 8320.02, Data Sharing in a Net-Centric DoD
 - DoD Discovery Metadata Specification
 - M&S Community of Interest Discovery Metadata Specification
- Helps organizations
 - produce documents more efficiently and consistently
 - organize information
 - output documents in a common format
 - share discovery metadata about VV&A documents across GIG enterprise

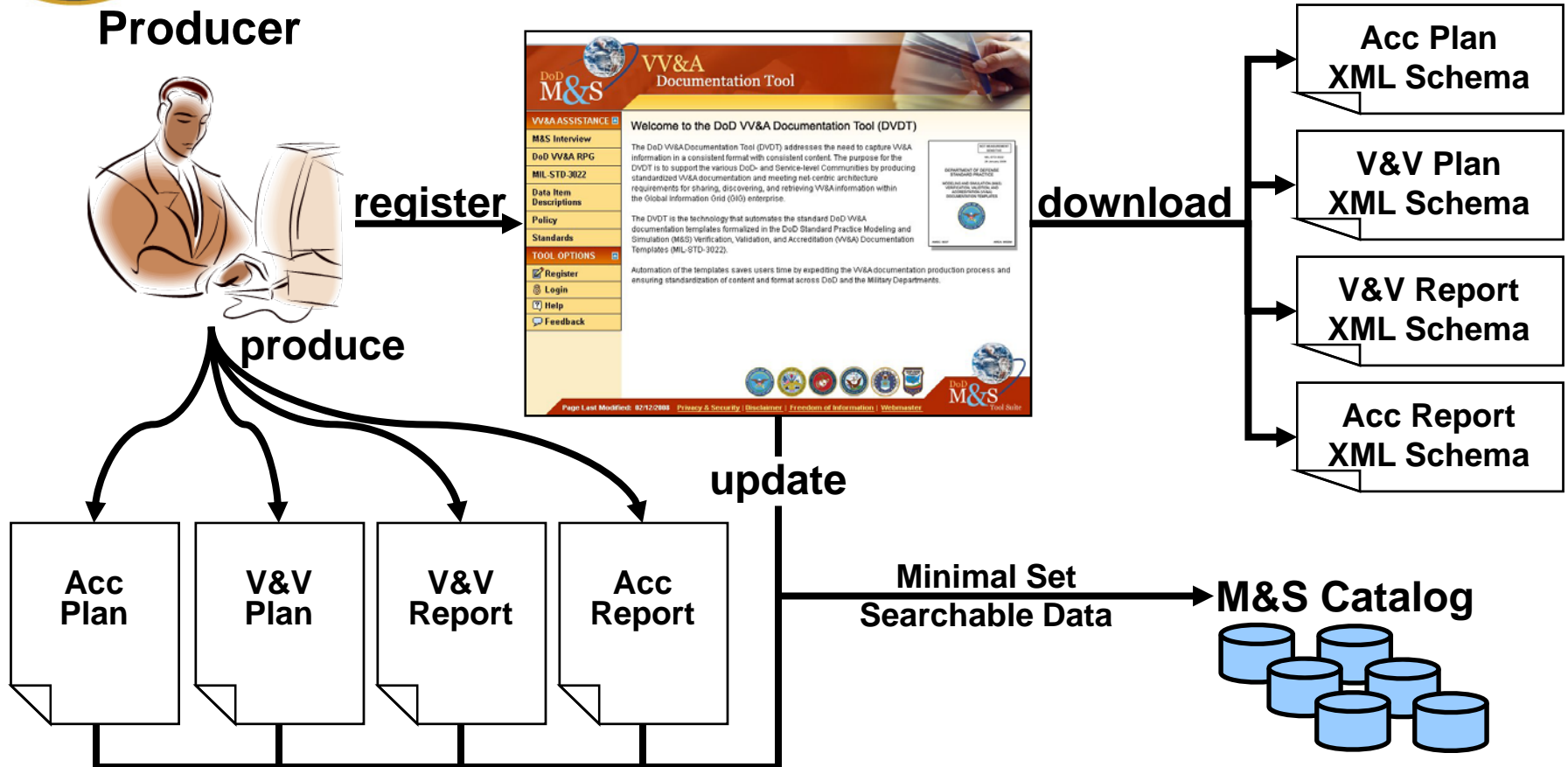


Architecture Focus

- In January 2008 focus turned
 - to an architecture that would allow offline document production and storage
 - from one that would provide an online capability to produce documents
- Offline production and storage capability assists producer in managing information common to all four documents identified in MIL-STD-3022
- DVDT populates the four documents with the common information when documents are stored together
- Coordination on production of each individual document by disparate organizations will occur through means used by those organizations
 - e.g., integrated digital environment, engineering environment, knowledge sharing environment, or sharing files through email
- Decisions where to retain the documents under control left to producers



DVDT Architecture





DVDT Screenshots

{Placeholder for tool demonstration or screenshots}



My Projects

My Projects - DoD VV&A Documentation Tool (DVDT)

DoD M&S VV&A Documentation Tool

VV&A ASSISTANCE

- M&S Interview
- DoD VV&A RPG
- MIL-STD-3022
- Data Item Descriptions
- Policy
- Standards

TOOL OPTIONS

- My Profile
- My Projects
- Submit a Project
- Search
- Log Out
- Help
- Feedback

MY PROJECTS

Name	Version	Date Submitted
MODSIM	1.3	8/8/2008 10:45:46 AM

After submitting VV&A project information a list of projects with versioning information is provided.

Last Modified: 9/30/2008 11:10:13 AM

DoD M&S Tool Suite



Project Information

The screenshot displays the VV&A Documentation Tool interface. The top navigation bar includes the DoD M&S logo and the title "VV&A Documentation Tool". A left sidebar lists various tool options such as "My Profile", "My Projects", "Submit a Project", "Search", "Log Out", "Help", and "Feedback". The main content area is titled "MODIFY A PROJECT" and contains a "Download Templates" button. A warning message states: "You must complete all fields marked with a [R] in ALL TABS before submitting." Below this, a dropdown menu is set to "M&S Entity on Which VV&A Is Being Performed". The form includes several required fields: "[R] Name:" with the value "MODSIM", "[R] Version:" with the value "1.3", "[R] Description:" with a text area containing details about the "MODSIM World 2008" conference, and "[R] Intended Use:" with a text area describing a workshop on system dynamics modeling. At the bottom, there is an "Organization:" field and a "Name:" field with the value "David H. Bunker".

Project information provides configuration management as well as discoverable Metadata



Download Offline Tool and/or Templates



The screenshot shows a web browser window displaying the VV&A Documentation Tool website. The header features the DoD M&S logo and the text 'VV&A Documentation Tool'. A navigation menu on the left includes 'VV&A ASSISTANCE', 'TOOL OPTIONS', and 'My Profile'. The main content area is titled 'DOWNLOAD PROJECT TEMPLATES' and provides instructions for downloading templates and the documentation tool. A button labeled 'Download Project Templates Only' is visible. Below this, the 'TOOL OPTIONS' section includes 'My Profile', 'My Projects', 'Submit a Project', 'Search', 'Log Out', 'Help', and 'Feedback'. The 'DOWNLOAD VV&A DOCUMENTATION TOOL' section provides instructions for installing the tool and includes a button labeled 'Download VV&A Documentation Tool and Project Templates'. The 'STEP 2: INSTALL VV&A DOCUMENTATION TOOL' section provides instructions for installing the tool and includes a button labeled 'Download VV&A Documentation Tool and Project Templates'. The 'STEP 3: START USING THE PROJECT TEMPLATES' section provides instructions for using the templates.

DoD M&S **VV&A Documentation Tool**

VV&A ASSISTANCE

- M&S Interview
- DoD VV&A RPG
- MIL-STD-3022
- Data Item Descriptions
- Policy
- Standards

TOOL OPTIONS

- My Profile
- My Projects
- Submit a Project
- Search
- Log Out
- Help
- Feedback

DOWNLOAD PROJECT TEMPLATES

If you have misplaced the project templates for "MODSIM", you can download them again. Each of these document templates will only be populated with data you provided during your registration for this specific project.

[Download Project Templates Only](#)

DOWNLOAD VV&A DOCUMENTATION TOOL

If you need to reinstall the VV&A Documentation Tool, you can do so by downloading the tool below and following the instructions provided.

STEP 1: DOWNLOAD VV&A DOCUMENTATION TOOL

If you need to reinstall the VV&A Documentation Tool, you can do so by downloading the tool below and following the instructions provided.

[Download VV&A Documentation Tool and Project Templates](#)

STEP 2: INSTALL VV&A DOCUMENTATION TOOL

After download, unzip/extract wadoctool.zip to a folder on your computer. Locate SETUP.EXE within the folder you extracted to and double-click it to run the program.

Upon install a word template file (.dot) from the VVA Documentation Tool will be copied to your computer and if not already installed, Visual Studio Tools for Office (VSTO) will be added. The VSTO simply supports the customized task pane used amongst the documents.

STEP 3: START USING THE PROJECT TEMPLATES

After installation, locate the folder DODMS-VVA-2008-3 within the area you extracted the wadoctool.zip to and move it to an area on your computer that you will work on the VVA project at (such as My Documents).



XML via MS Word Interface

The screenshot shows the Microsoft Word interface for an XML document titled "AccreditationPlan.doc (Read-Only)". The document is displayed in a Read-Only view. The left-hand side features a "Document Actions" pane with a tree view of the document structure. The main editing area shows the document content, which includes a table of contents and several sections. The table of contents is as follows:

Section	Page
1.1 Intended Use	1
1.2 M&S Overview	2
1.3 M&S Application	3
1.4 Accreditation Scope	4
2 M&S REQUIREMENTS AND ACCEPTABILITY CRITERIA	5

The document content includes several placeholder boxes for tables and figures, such as "[enter table or figure here]". The document structure is as follows:

- Accreditation Plan
 - Title Page
 - Record of Changes
 - Executive Summary
 - 1. Problem Statement
 - 1.1 Intended Use
 - 1.2 M&S Overview
 - 1.3 M&S Application
 - 1.4 Accreditation Scope
 - 2. M&S Requirements and Acceptability
 - 3. M&S Assumptions, Capabilities, Limit
 - 4. Accreditation Methodology
 - 5. Accreditation Issues
 - 6. Key Participants
 - 7. Planned Accreditation Resources
 - Appendix A. M&S Description
 - Appendix B. M&S Requirements Trace
 - Appendix C. Basis of Comparison
 - Appendix D. References
 - Appendix E. Acronyms
 - Appendix F. Glossary

The "Guidance" section provides an overview of the M&S for which this document is written and discusses the level of configuration control that currently exists for the M&S.

At the bottom of the document, there are two tables for data entry:

Priority	REQ#	M&S Requirement
[Add]	[Remove]	

REQ#	AC#	Acceptability Criterion
[Add]	[Remove]	

AC#	M/M#	Metric/Measure
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Standardized Outputs

AccreditationPlan.doc (Read-Only) - Microsoft Word

Document Actions

DoD VV&A Doc Tool Website RPG

Acc. Plan V&V Plan V&V Report Acc. Report

- Accreditation Plan
 - Title Page
 - Record of Changes
 - Executive Summary
 - 1. Problem Statement
 - 1.1 Intended Use
 - 1.2 M&S Overview
 - 1.3 M&S Application
 - 1.4 Accreditation Scope
 - 2. M&S Requirements and Acceptability
 - 3. M&S Assumptions, Capabilities, Limitations
 - 4. Accreditation Methodology
 - 5. Accreditation Issues
 - 6. Key Participants
 - 7. Planned Accreditation Resources
 - Appendix A. M&S Description
 - Appendix B. M&S Requirements Trace
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Guidance

Provides an overview of the M&S for which this document is written and discusses the level of configuration control that currently exists for the M&S.

1.1 Intended Use

1.2 M&S Overview

1.3 M&S Application

1.4 Accreditation Scope

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2 M&S Requirements and Acceptability

3 M&S Assumptions, Capabilities, Limitations

4 Accreditation Methodology

5 Accreditation Issues

6 Key Participants

7 Planned Accreditation Resources

Appendix A. M&S Description

Appendix B. M&S Requirements Trace

Appendix C. Basis of Comparison

Appendix D. References

Appendix E. Acronyms

Appendix F. Glossary

Print On Demand

Priority

REQ#

AC#

Page 1 Sec 2 7/15 At 3.6" Ln 12 Col 1 [REC] [TRK] [EXT] [OVR]

Standards driven user interface

Produces MS Word documents
(view in print-preview)

And discoverable metadata

AccreditationPlan.xml

```
1 <ns1:AccreditationPlan xmlns:ns1="http://metadata.dod.mil/mdr/ns/VVADocumentation/1.0"
2 <ns1:ProjectReferenceID>DODMS-VVA-2008-3</ns1:ProjectReferenceID>
3 <ns1:DocumentReferenceID>DODMS-VVA-2008-3-9</ns1:DocumentReferenceID>
4 <ns1:AccreditationPlanTitlePage>
5 <ns1:ProgramIdentification>
6 </ns1:ProgramIdentification>
7 <ns1:SponsoringOrganizationOrPM>
8 </ns1:SponsoringOrganizationOrPM>
9 <ns1:MSName>MODSIM
10 </ns1:MSName>
11 <ns1:MSVersion>1.3
12 </ns1:MSVersion>
13 <ns1:DocumentType userEnteredDocumentType="&#xA; " >Accreditation Plan</ns1:
14 <ns1:DocumentTitle>MODSIM Accreditation Plan
```



Consumer Side - M&S Catalog

VV&A Documentation Tool

MODIFY A PROJECT

Download Templates

You must complete all fields marked with a [R] in ALL TABS before submitting.

M&S Entity on Which VV&A Is Being Performed

[R] Name: MODSIM

[R] Version: 1.3

VV&A Project information is discoverable as MSC-DMS compliant XML. The VV&A XML schema is an extension of the DDMS.

Search result with Metadata from DVDT Alpha .01

Description:

This year, the conference focus is on Decision-Making. Speakers, educational tracks, presentations, and practical modeling and simulation tools and practices in operating environments. attendees will learn about not only an opportunity to network with other industry professional exhibitors and attendees to attend the pre-conference educational tracks. An exciting cross-cutting Gaming the education tracks and will offer the most up-to-date MODSIM World 2008 will be held at the Virginia Beach, Virginia.

[R] Intended Use:

In this workshop, attendees will be introduced to using Earth science as a system. Drs. S. Raj Chaudhury (Langley) will demonstrate how to utilize these tools in a modeling environment. They will also demonstrate simulation modeling technique that can be used to produce dynamic and learning earth science as a system. The basic package called Stella will be introduced and modeling software will be undertaken in the workshop. No prior experience is necessary, however, participants are required to bring a laptop.

Simple Search

Search

Results 1 - 4 of 4 for MODSIM

Search... Modeling & Simulation Catalog

MODSIM Search

Title References

Type POC

Description Keywords

Dates Acronym

Version Media

Rights Security

MODSIM Accreditation Plan

Title: MODSIM Accreditation Plan. ... Sponsoring Organization or PM: MODSIM. Project Reference ID: DODMS-VVA-2008-3. Document Reference ID: DODMS-VVA-2008-3-9. version: 1.3
xdodwadootool.crata.ucf.edu/ - 2k - - cached

- Title: MODSIM Accreditation Plan
- Description: In this workshop, attendees will be introduced to using simulations and Stella to teach Earth science. Chaudhury (CNU) and Lin H. Chambers (NASA Langley) will demonstrate how to utilize these tools in a classroom, modeling environment. They will also demonstrate
- Version: 1.3

Naval Mine Warfare Simulation

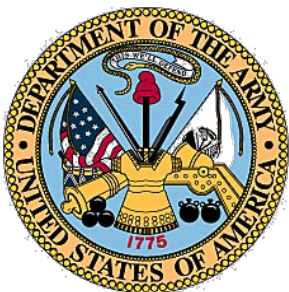
... Input: Systems performance characteristics, environmental data, and operation plans and scenarios. Source Code: MODSIM III, Visual Basic, C. ...
nmsso.navy.mil/index.cfm%3Frid%3DMNS_N_1010064 - 5k - - cached

- Title: Naval Mine Warfare Simulation
- Description: NMWS was developed by PEO (MIW) to support MS II Analysis of Alternatives in the acquisition process. An event-driven simulation was developed using the Shlaer/Mellor object-oriented methodology.
- Sponsor: NAVSEASYSCOM
- Acronym: NMWS
- Releaseability: This resource is UNCLASSIFIED



Beta Testing

- Alpha testing (internal) conducted 29 Sep-3 Oct 2008
- Beta testing (external) scheduled to start 3-7 Nov 2008





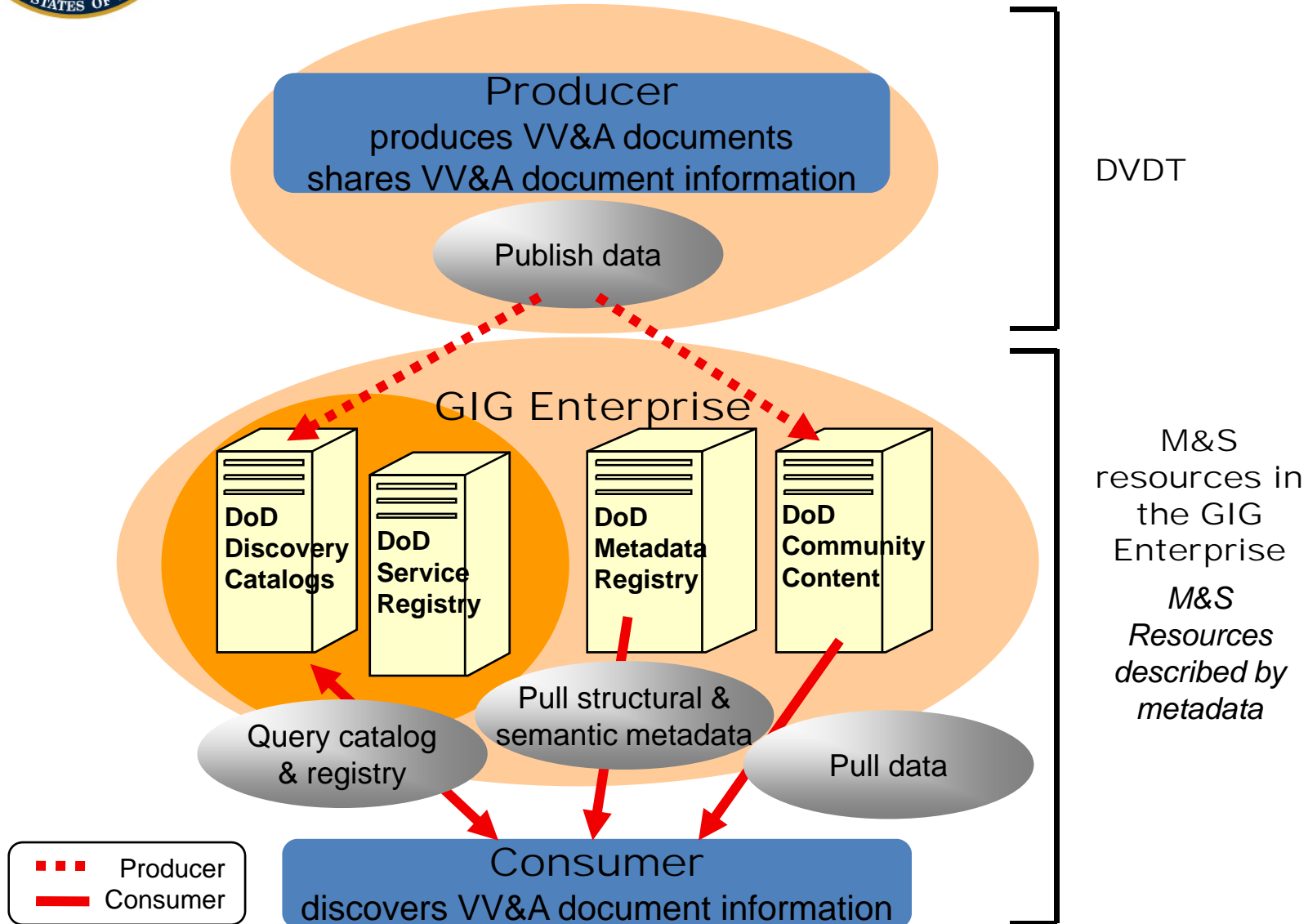
Why is VV&A Information Important?

- VV&A information tells consumers about
 - M&S assumptions (simplifications and potential failure points)
 - M&S capabilities (what the M&S can be used to do)
 - M&S limitations (what it should not be used to do)
- Consistently documenting VV&A information across DoD yields many returns
 - Discoverable VV&A information saves time and money finding an M&S to satisfy a need
 - VV&A documents provide evidence to determine credibility of M&S results to support an intended use
 - Credible M&S results can be defended and used with confidence





Discoverable VV&A Document Metadata





M&S Search Tool

Need VV&A information?

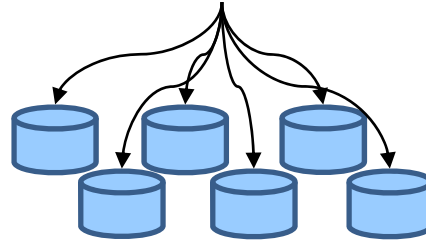


+

search

=

**VV&A
information**



**Using the power of search and discovery capability
to conduct focused federated searches for
information about VV&A documents**



Summary

- Updated the Systems Engineering Community on the DoD M&S Project, *Standardized Documentation for VV&A*
- Provided information about related policy, guidance, and standards
- Discussed Discovery Metadata and discovery mechanisms
- Described and demonstrated DVDT

Using the DVDT to document implementation of VV&A processes enables systems engineers to use M&S results with confidence



Point of Contact

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843-218-5372

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Published Papers

- Broyles, D. H., Blais, C., and Stutzman, M.: "Automating Standardized Information for the Verification, Validation, and Accreditation Process: An Acquisition Community Sponsored M&S Project," Paper 07F-SIW-068, Proceedings of the Fall Simulation Interoperability Workshop, Simulation Interoperability Standards Organization, Orlando, Florida, September 2007.
- Charlow, K., Broyles, D. H., Blais, C., and Stutzman, M.: "Acquisition M&S Community Sponsored M&S Project: Standardized Documentation for Verification, Validation, and Accreditation - A Status Report to the Systems Engineering Community," Paper 5431, Proceedings of the 10th Annual Systems Engineering Conference, National Defense Industrial Association, San Diego, California, October 2007.
- Project Management Team: "DoD M&S Project: Standardized Documentation for Verification, Validation, and Accreditation," Proceedings of the 2008 Department of Defense Modeling and Simulation Conference, Orlando, Florida, March 2008.
- Charlow, K., Broyles, D. H., Blais, C., Daehler-Wilking, R., and Stutzman, M.: "Standardized Documentation for Verification, Validation, and Accreditation," Paper 08S-SIW-003, Proceedings of the 2008 Spring Simulation Interoperability Workshop, Simulation Interoperability Standards Organization, Providence, Rhode Island, April 2008.
- Charlow, K., Blais, C., Daehler-Wilking, R., and Stutzman, M.: "Standardized Documentation for Verification, Validation, and Accreditation," Paper 08F-SIW-003, Proceedings of the 2008 Fall Simulation Interoperability Workshop, Simulation Interoperability Standards Organization, Orlando, Florida, September 2008.
- Charlow, K., Broyles, D., Blais, C., and Stutzman, M.: "Standardized Documentation For Verification, Validation, And Accreditation (VV&A) — Helping Assure Mission Success," Paper 330, Proceedings of MILCOM 2008, San Diego, California, November 2008.



Acronyms

CRP	Comment Resolution Panel
DDMS	DoD Discovery Metadata Specification
DG	Drafting Group
DID	Date Item Description
DMSP	DoD M&S Project
DoD	Department of Defense
DVDT	DoD VV&A Documentation Tool
GIG	Global Information Grid
M&S	Modeling and Simulation, model(s) and simulation(s)
M&S CO	M&S Coordination Office
M&S IPT	M&S Integrated Product Team
M&S SC	M&S Steering Committee
MIL-STD	Military Standard
MORS	Military Operational Research Society
MSC DMS	M&S Community of Interest Discovery Metadata Specification
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology and Logistics
VV&A	Verification, Validation, and Accreditation
WG	Working Group
XML	Extensible Markup Language