

Foundations '02

Special Topic Session T7

*V&V Policies, Guides,
Handbooks, and Standards*

DoD VV&A

Defense Modeling & Simulation Office



Contact Info

DMSO VV&A Technical Director

Simone Youngblood

syoungblood@dmsso.mil

703-824-3436

Alternate Contact

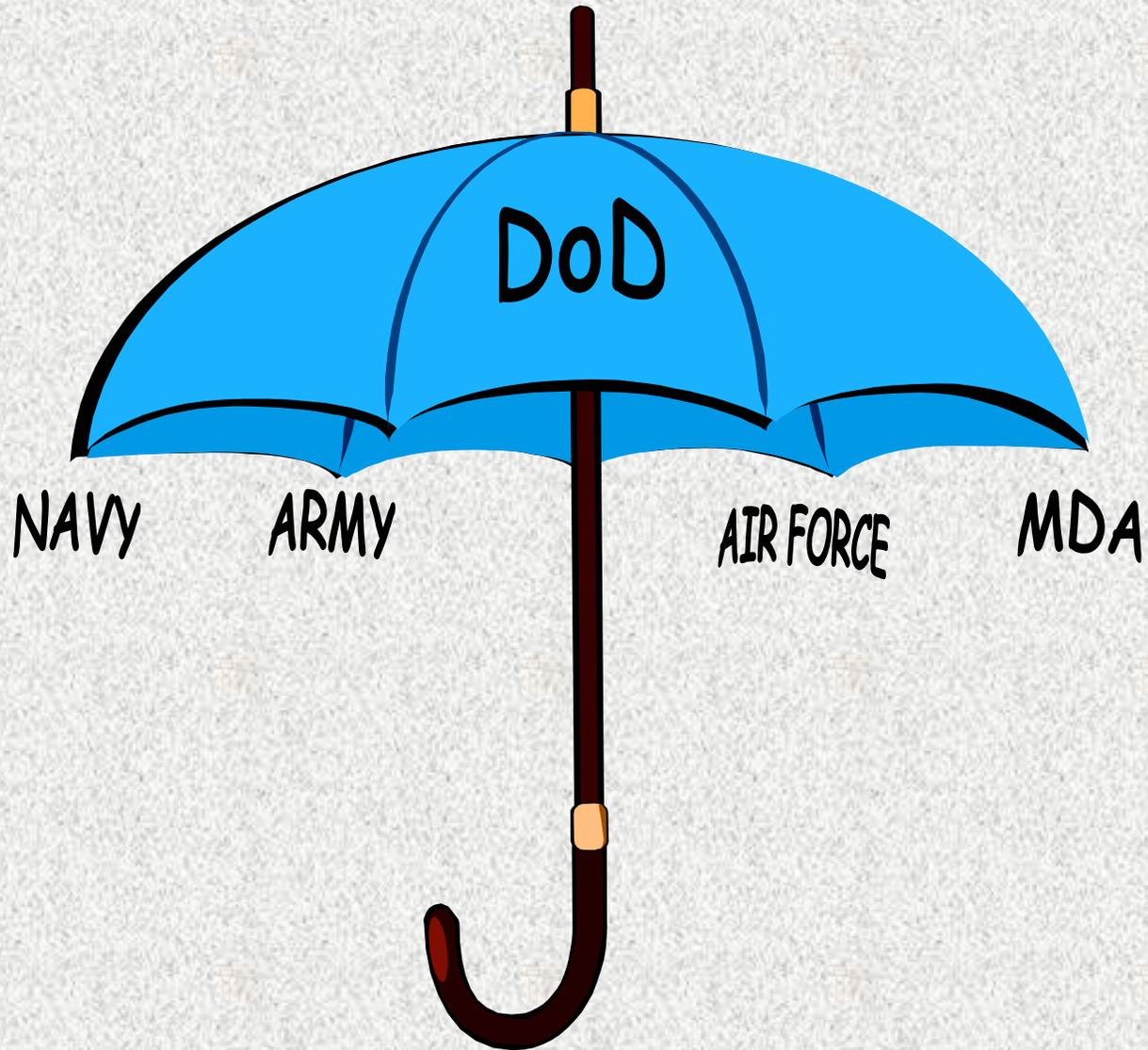
Linda Olson

lolson@actonb.com

703-671-0700-155

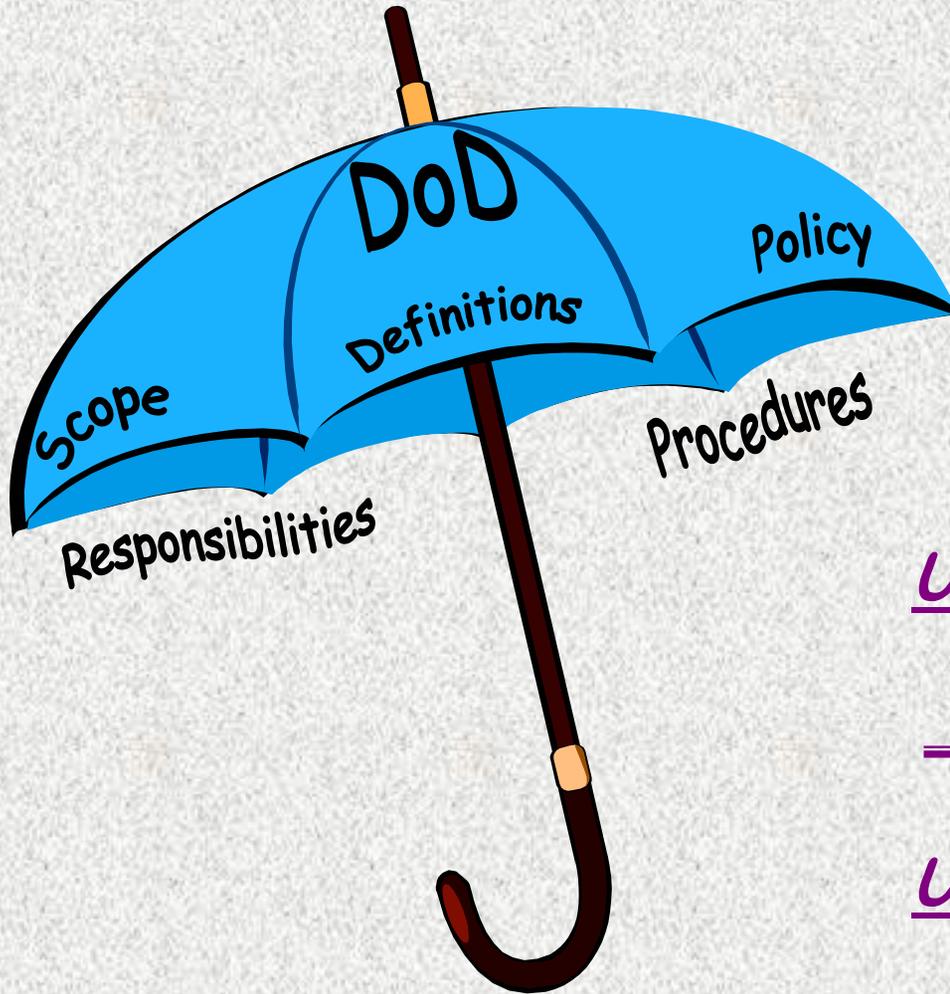
DMSO VV&A Web Site

<https://www.dmsso.mil/public/transition/vva/>





Umbrella Policy & Guidance



Umbrella Policy

DoDI 5000.61

Umbrella Guidance

DoD VV&A Recommended
Practices Guide (RPG)

Establishes common terminology and defines high level roles and responsibilities

- Initial instruction signed in 1996
- 2002 Revision
 - Streamlines instruction by pulling bulk of minor procedures into enclosures.
 - Clarifies policy and procedure statement conflicts.
 - Broadens the scope to include data as well as algorithms when performing VV&A
 - More specifically describes MSEA responsibilities

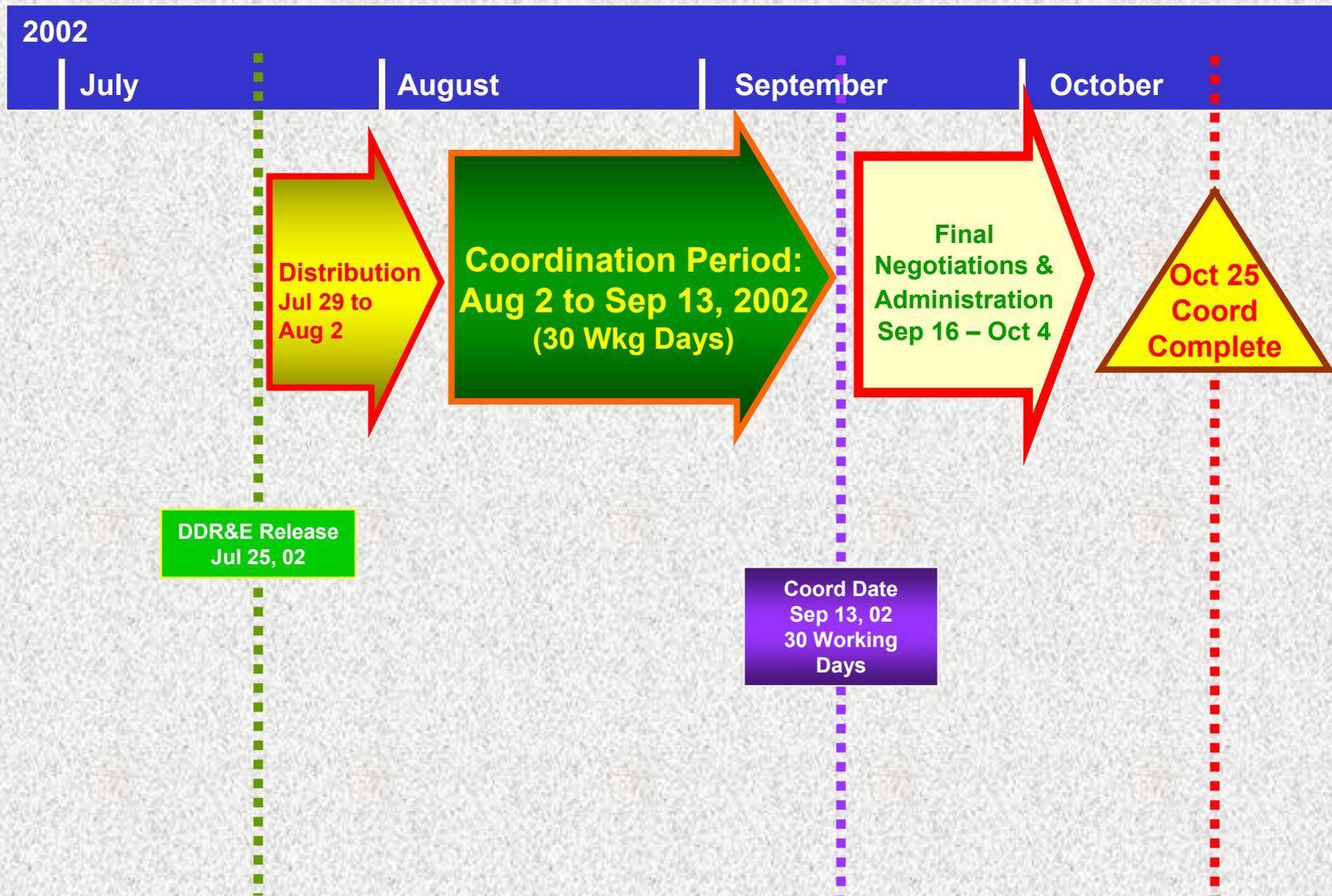


Coordination Process

- Required Coordination: With the Heads of the DoD Components "who have mutual or related responsibilities for review and concurrence or comments.
- Mandatory Coordination: All DoD Issuances must be coordinated with:
 - OSD Director for Administration & Management (DA&M)
 - General Counsel, Department of Defense (GC, DoD)
 - Inspector General, Department of Defense (IG, DoD)
- Re-coordination is required when:
 - 6 months have elapsed since coordination took place (waiverable) or
 - There is a new PSA since the original coordination
- Non-concurrences: Resolved through separate coordination with the nonconcurring DoD Component
- Assumed Concurrence: "No response; concurrence assumed" is normally not accepted for DoD issuances.



2002 Re-Coordination Timeline





Coordination Update

ORGANIZATION	COORDINATION STATUS	DATE	REMARKS
OUSD(Acq, Technology & Logistics)	In Process		USD(AT&L) is final approval authority for DoD Ins 5000.61
OUSD(Policy)	In Process		
OUSD(Program, Analysis & Eval)	In Process		comments resolved; awaiting signature
OUSD(Personnel & Readiness)	Concur	Sep 02	with comments
OUSD(Comptroller)	Concur	Sep 20, 02	no comments
OASD(Cmd, Control, Comm & Intel)	In Process		signed and on way back to DMSO
General Counsel, DoD	Concur	Aug 9, 02	no comments
Inspector General, DoD	Concur	Aug 23, 02	no comments
Dir, Operational Test & Evaluation	Concur	Sep 12, 02	with comments
Dir, Admin & Management, OSD	In Process		awaiting signature
Secretary of the Army	Concur	Sep 3, 02	with comments
Secretary of the Navy	Concur	Sep 19, 02	no comments
Secretary of the Air Force	Concur		with non-critical comments
Chairman, Joint Chiefs of Staff	Concur		with comments
Dir, Nat'l Imagery & Mapping Agency	In Process		in process
Dir, Nat'l Sec Agency/Ch Cent Sec Svc	In Process		in process
Unified Combatant Commands (UCCs)	Concur		with comments (through JCS)

Defines underlying philosophy, principles,
and methodologies recommended for use in
DoD VV&A efforts

First distributed in 1996 (paper)

- Well-received
 - adopted by numerous programs (e.g., JADS, JWARS, JSIMS)
 - accepted by Services -- used as foundation for Service VV&A policies

➤ **GREAT TUTORIAL**

➤ **RECOMMENDATIONS**

1. Provide more technical detail
2. Address a broader audience
3. Make it easier to find information

➤ **Update and Enhance VV&A Recommended Practices Guide (RPG)**

To address user feedback and issues associated with use of prior RPG

- **Account for diversity of audience**
 - Tailor explanations
 - Provide role-specific guidance
- **Account for diversity of situations**
 - Tailor procedures
 - Provide context-specific guidance
- **Focus on practical vs theoretical**

The RPG should be a multi-tiered, multi-dimensional document

➤ **Non-linear**

- *VV&A is not "one size fits all"*
- *Address differences due to type of M&S involved*
- *Provide different levels of detail to satisfy readers' needs*

➤ **Reader-based**

- *Allow reader to see self in document*
- *Address differences due to reader's role in VV&A process*
- *Provide different levels of detail to satisfy readers' needs*



- **Produce a web-based document**
 - Prepare information according to roles/functions
 - User, PM, Developer, V&V Agent, Accreditation Agent
 - Prepare information according to simulation types
 - Legacy stand-alone, New stand-alone, Federation
 - Prepare information in multiple levels of detail
- **Structure using multiple layers and paths**
 - Main level for key concepts, general information
 - Core documents for each Role-Simulation combo
 - Pop-up windows, hypertext links for additional technical information
- **Advantages**
 - Allows greater breadth and depth
 - Facilitates addition of information over time
 - Empowers the reader





Best of the Best

Dr. Averill M. Law

- well-known expert and published author on simulation modeling (Modeling & Simulation by Law and Kelton)
- has presented more than 290 simulation short courses in 17 countries

Dr. Jack Morrison

- project leader at Los Alamos National Laboratory
- more than 20 years of practical experience (government, industry, and academic) in modeling and analysis in the defense domain

Dr. Dale Pace

- Principal Professional Staff of the Johns Hopkins University Applied Physics Laboratory (JHU/APL)
- instrumental in developing interim policy guidance for Navy VV&A and was an early leader in development of VV&A processes for distributed simulation
- author of chapter on V&V in Applied Modeling and Simulation: An Integrated Approach to Development and Operation

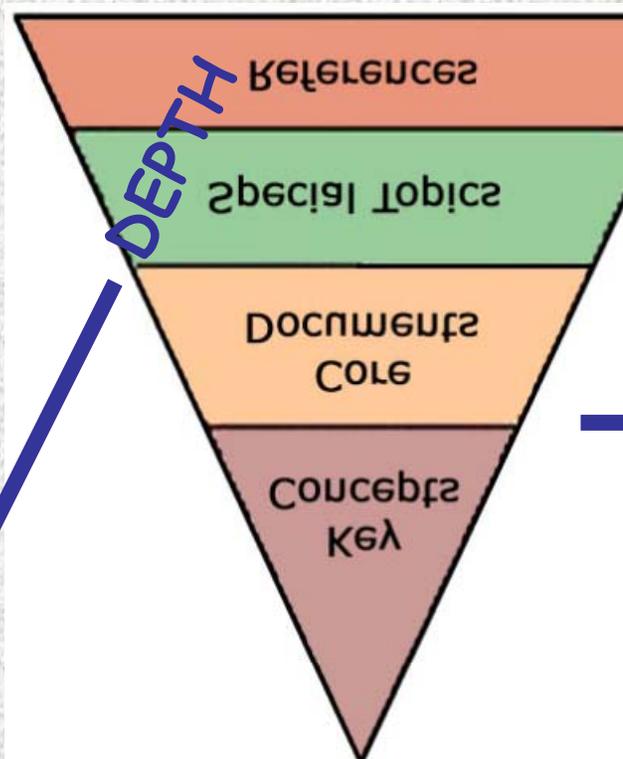
Robert O. Lewis

- more than 35 years experience in verification and validation (V&V) programs, systems engineering, software development, hardware integration, and simulation and modeling
- published textbooks on Software Quality Management and on IV&V

Mike Metz

- Technical Director of the JWARS Verification and Validation (V&V) program; senior advisor to the STORM VV&A program; program manager for the PORTSIM VV&A program
- more than 30 years of DoD experience, more than 20 years of DoD analysis experience, and over 15 years of DoD M&S development and V&V experience

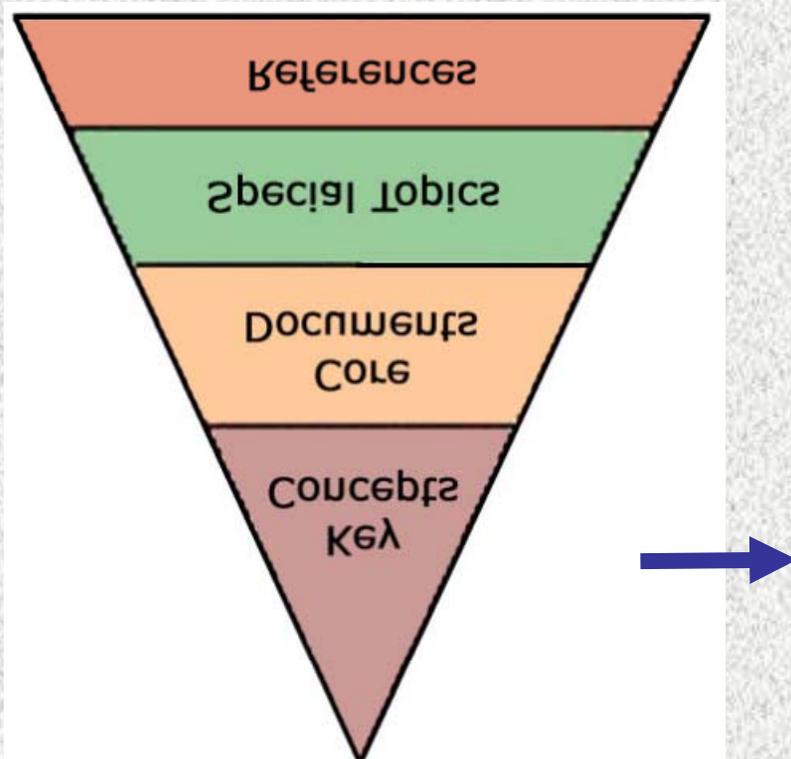
The Millennium Edition is a highly flexible, multi-tiered, multi-dimensional document which provides the state of the practice for VV&A.



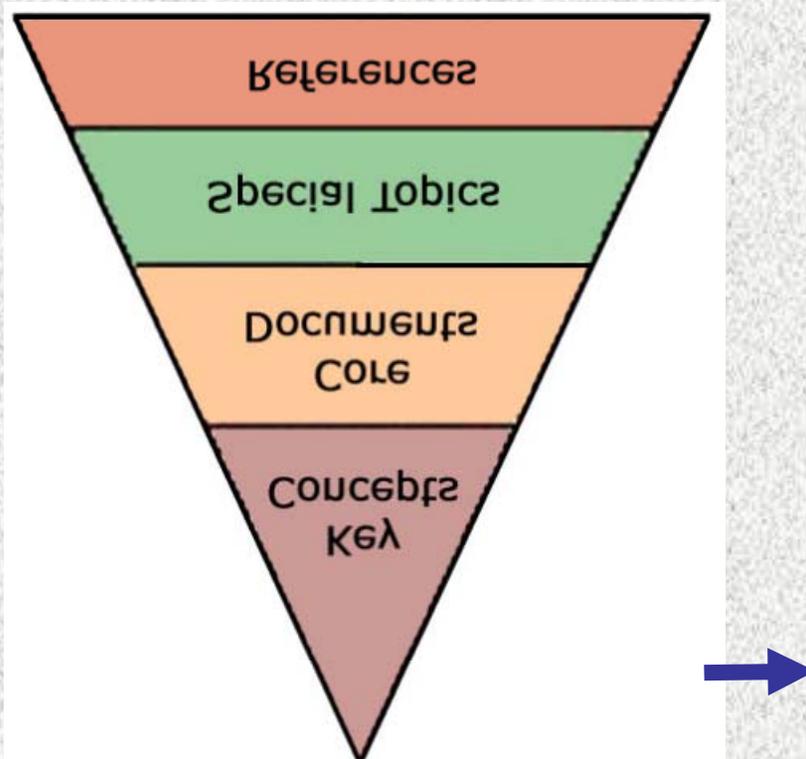
Role Selection			
	Legacy	New	Federation
User	Select	Select	Select
Developer	Select	Select	Select
PM	Select	Select	Select
V&V Agent	Select	Select	Select
Accreditation Agent	Select	Select	Select

BREADTH





- Conceptual Model Development and Validation
- Data V&V for New Simulations
- Data V&V for Legacy Simulations
- Fidelity
- Human Behavior Representation Validation
- Paradigms for M&S Development
- Problem Analysis
- Requirements
- Risk and Its Impact on VV&A
- Subject Matter Experts and VV&A
- Validation



- DoD Data VV&C Tiger Team White Paper
- HLA Home Page
- Human Behavior Representation (HBR) Literature Review
- M&S Data Concepts and Terms
- A Practitioner's Perspective on Simulation Validation
- SIW Fidelity Report
- T&E/V&V Checklist
- T&E and V&V Integration
- V&V Techniques
- V&V Tools
- A Discussion of Data Quality for VV&A of Data to be Used in Modeling



Development Process

Build 1 - Alpha Version (Verification)

- Reviewers geographically dispersed and technologically diverse
- Review Criteria
 - Connectivity
 - Ease of use
 - Layout
 - Timing

Build 1 - Beta Version (Validation)

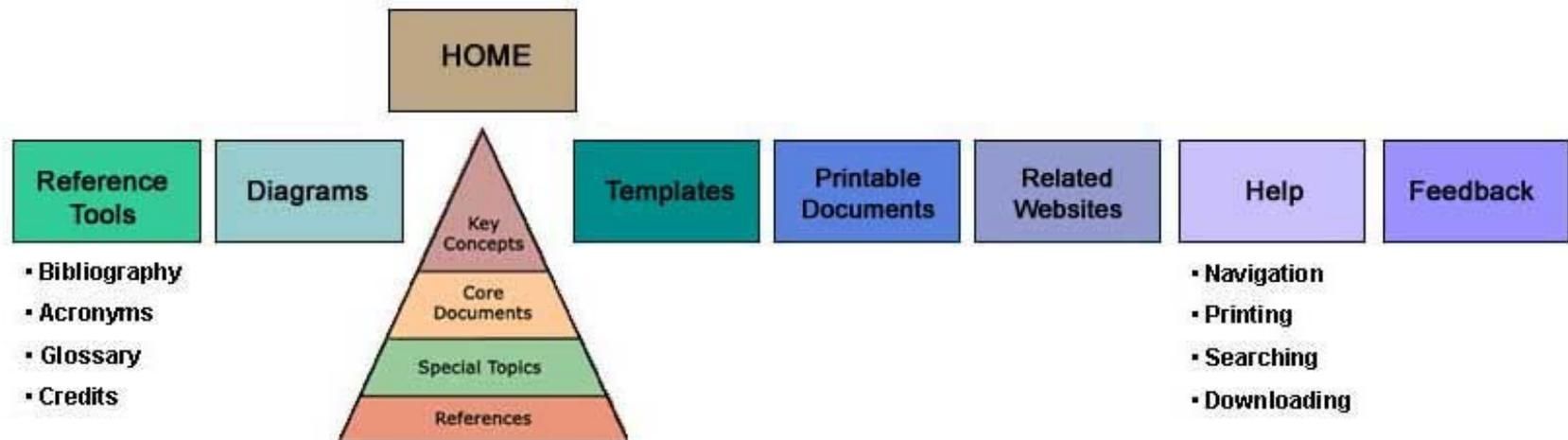
- Documents reviewed by 2 dozen experts in Services, government, and academia
- Review Criteria
 - Consistency across documents
 - Holes in information

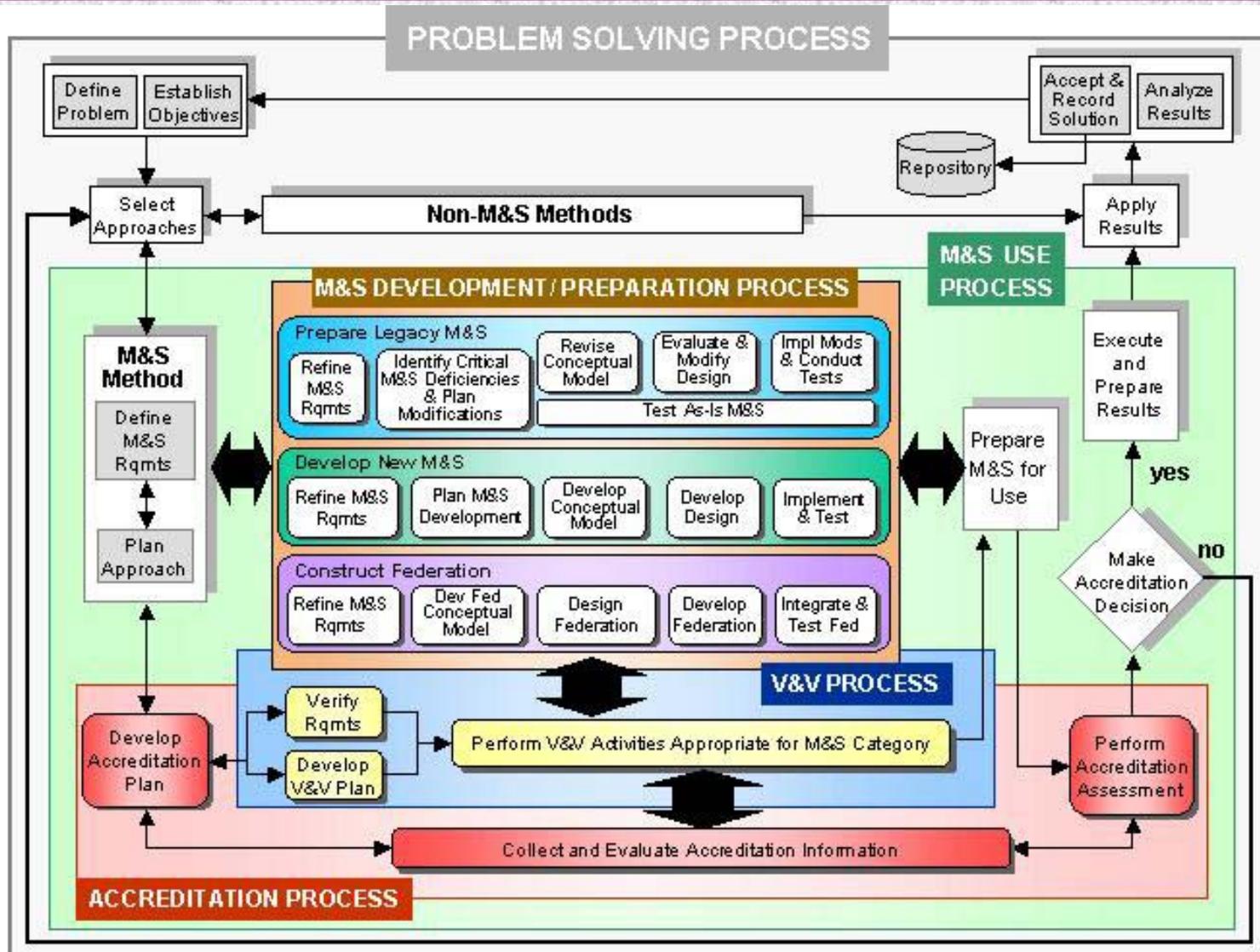
All documents reviewed by community before being uploaded to an RPG Build

Feedback mechanism in RPG to allow for continual community input

<http://www.msiac.dmso.mil/vva>

RPG Site Map





The Overall Problem Solving Process



Foundations '02
22-23 October 2002

Technical Session T7
Missile Defense Agency
Core Models & Simulation (M&S)
Verification, Validation, and
Accreditation (VV&A) Management





MDA Core Model VV&A

- VV&A centrally managed across all MDA core models and simulations
- Spiral development planned for each model or simulation with continuous VV&A activities
 - Upgrades support the Ballistic Missile Defense System (BMDS) block builds and capability based acquisition
 - Conceptual models developed and validated for each simulation's builds
 - Validations take full advantage of data from flight tests, MDA Data Centers, and other events
 - Accreditations support key BMDS events and assessments
- VV&A documentation placed in MDA repository for user access

Some Final Thoughts



VV&A Definitions

TERM	DoDI 5000.61 Jul 02 coordination draft	RPG Build 2	Army DA Pam 5-11 Sep 1999	Navy SECNAVINST 5200.40 Apr 1999	Air Force AFI 16-1001, Jun 1996
Verification	The process of determining that a model implementation and its associated data accurately represents the developer's conceptual description and specifications (reference (a)).	The process of determining that a model implementation and its associated data accurately represent the developer's conceptual description and specifications	The process of determining that an M&S accurately represents the developer's conceptual description and specifications. Verification evaluates the extent to which the M&S has been developed using sound and established software engineering techniques.	Verification is the process of determining that a model or simulation implementation accurately represents the developer's conceptual description and specifications.	Verification is the process of determining that M&S accurately represent the developer's conceptual description and specifications.
Validation	The process of determining the degree to which a model and its associated data is an accurate representation of the real-world from the perspective of the intended uses of the model (reference (a)).	The process of determining the degree to which a model and its associated data are an accurate representation of the real world from the perspective of the intended uses of the model.	The process of determining the extent to which an M&S is an accurate representation of the real world from the perspective of the intended use of the M&S. Validation methods include expert consensus, comparison with historical results, comparison with test data, peer review, and independent review.	Validation is the process of determining the degree to which a model or simulation is an accurate representation of the real world from the perspective of the intended uses.	Validation is rigorous and structured process of determining the extent to which M&S accurately represents the intended "real world" phenomena from the perspective of the intended M&S use.
Accreditation	The official certification that a model, simulation, or federation of models and simulations and its associated data is acceptable for use for a specific purpose (reference (a)).	The official certification that a model, simulation, or federation of models and simulations and its associated data are acceptable for use for a specific purpose.	The official determination that a model, simulation, or federation of M&S is acceptable for use for a specific purpose.	Accreditation is an official determination that a model or simulation is acceptable to use for a specific purpose.	Accreditation is the official determination by the Accreditation Authority that the M&S is acceptable for a specific purpose.



Role Definitions

USER - responsible for the overall application. The User needs to solve a problem or make a decision and wants to use simulation to do so. The User defines the requirements, establishes the criteria by which simulation fitness will be assessed, determines what method or methods to use, makes the accreditation decision, and ultimately accepts the results.

M&S PM - responsible for planning and managing resources for simulation development or modification, directing the overall simulation effort, and overseeing configuration management and maintenance of the simulation.

Developer - responsible for actually constructing or modifying the simulation, preparing the data for use in the simulation, and providing technical expertise regarding simulation capabilities as needed by the other roles.

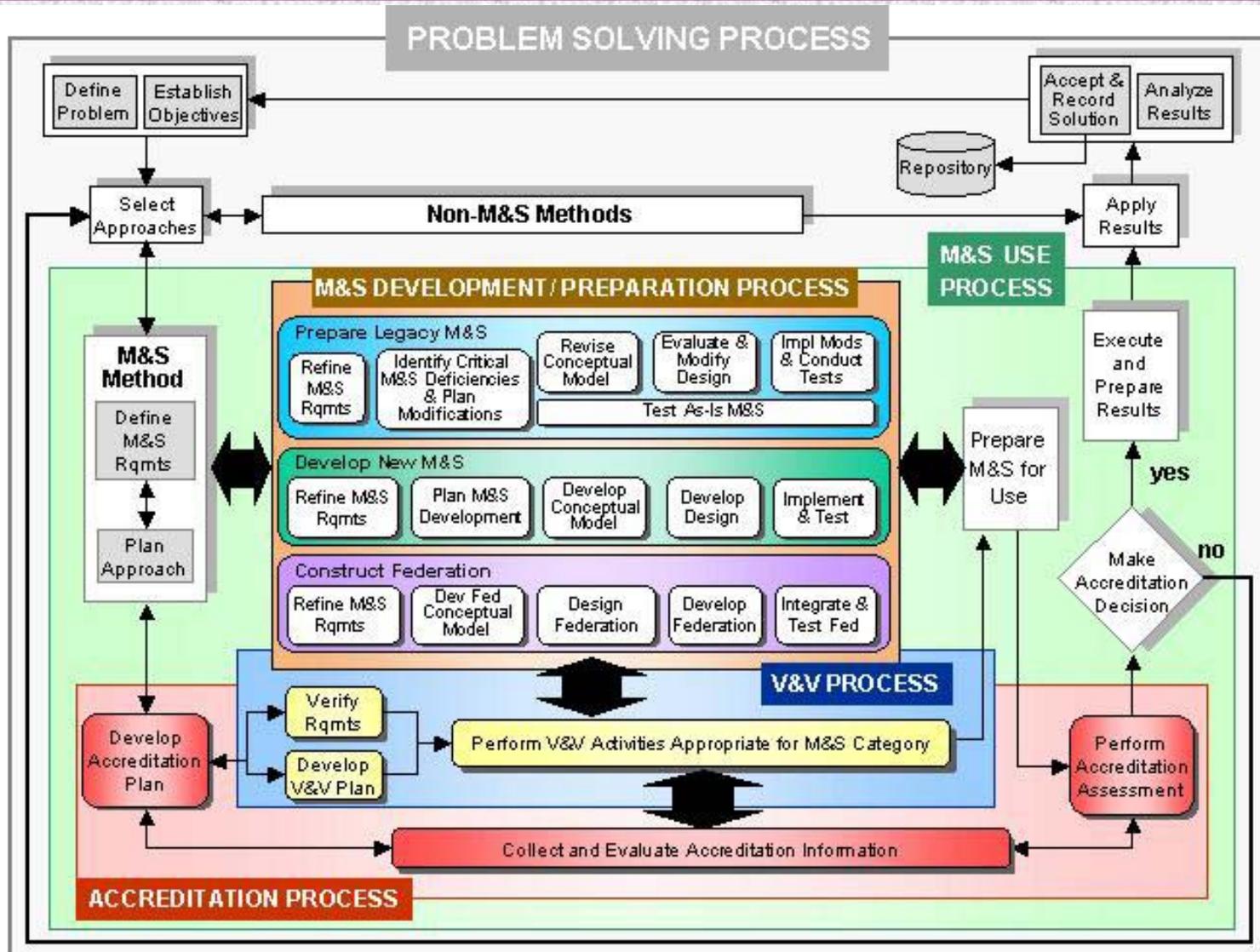
V&V Agent - responsible for providing evidence of the simulation's fitness for the intended use by ensuring that all the V&V tasks are properly carried out.

Accreditation Agent - responsible for conducting the accreditation assessment. The Accreditation Agent provides guidance to the V&V Agent to ensure that all the necessary evidence regarding simulation fitness for use is obtained; collects and assesses the evidence; and, provides the results to the User, the role with the responsibility of making the accreditation decision (i.e., accreditation authority).



Roles

DoD 5000.61	VV&A RPG	Army	Navy	Air Force	MDA
Accreditation Authority	User	Application Sponsor	Accreditation Authority	Accreditation Authority	Accreditation Authority
M&S Application Sponsor	User	Application Sponsor	Accreditation Authority	Accreditation Authority	Accreditation Authority *
M&S User	User	Application Sponsor	User	User	Accreditation Authority *
none specified	Developer	Developer	Developer	Model Developer	
M&S Proponent	M&S Program Manager	M&S Proponent	Proponent	Model Manager	M&S Proponent
Verification Agent	V&V Agent	V&V Agent	V&V Agent	V&V Agent	V&V Agent
Validation Agent	V&V Agent	V&V Agent	V&V Agent	V&V Agent	V&V Agent
Accreditation Agent	Accreditation Agent	Accreditation Agent	Accreditation Agent	Accreditation Agent	Accreditation Agent
none specified	Subject Matter Expert	Subject Matter Expert	Subject Matter Expert	Subject Matter Expert	



The Overall Problem Solving Process



Key for Comparisons

DoD

DoD VV&A Recommended Practices Guide (RPG)

Army

DA Pam 25-11

Air Force

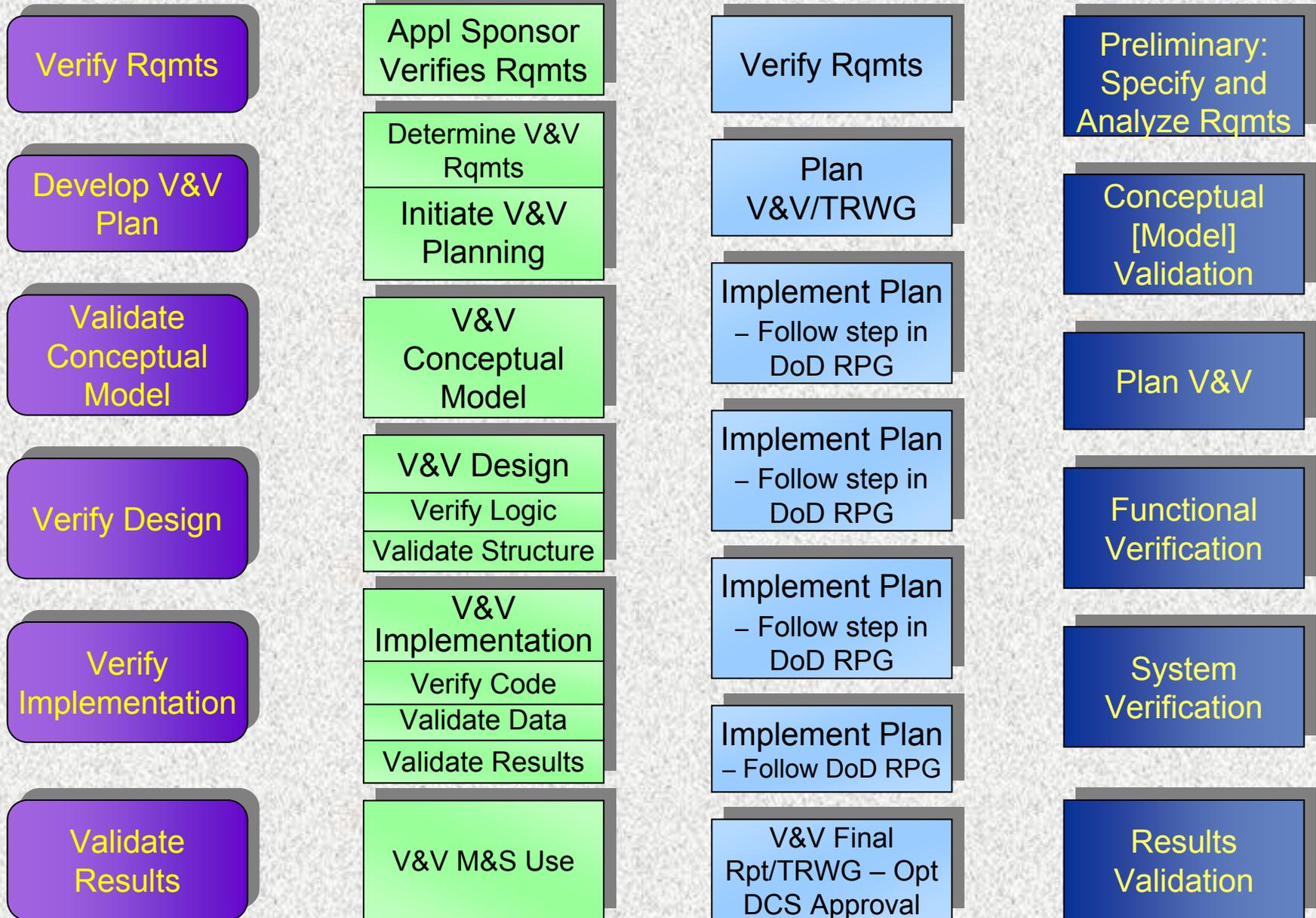
AFI 16-1001

Navy

SECNAVINST 5200.40 & VV&A Handbook

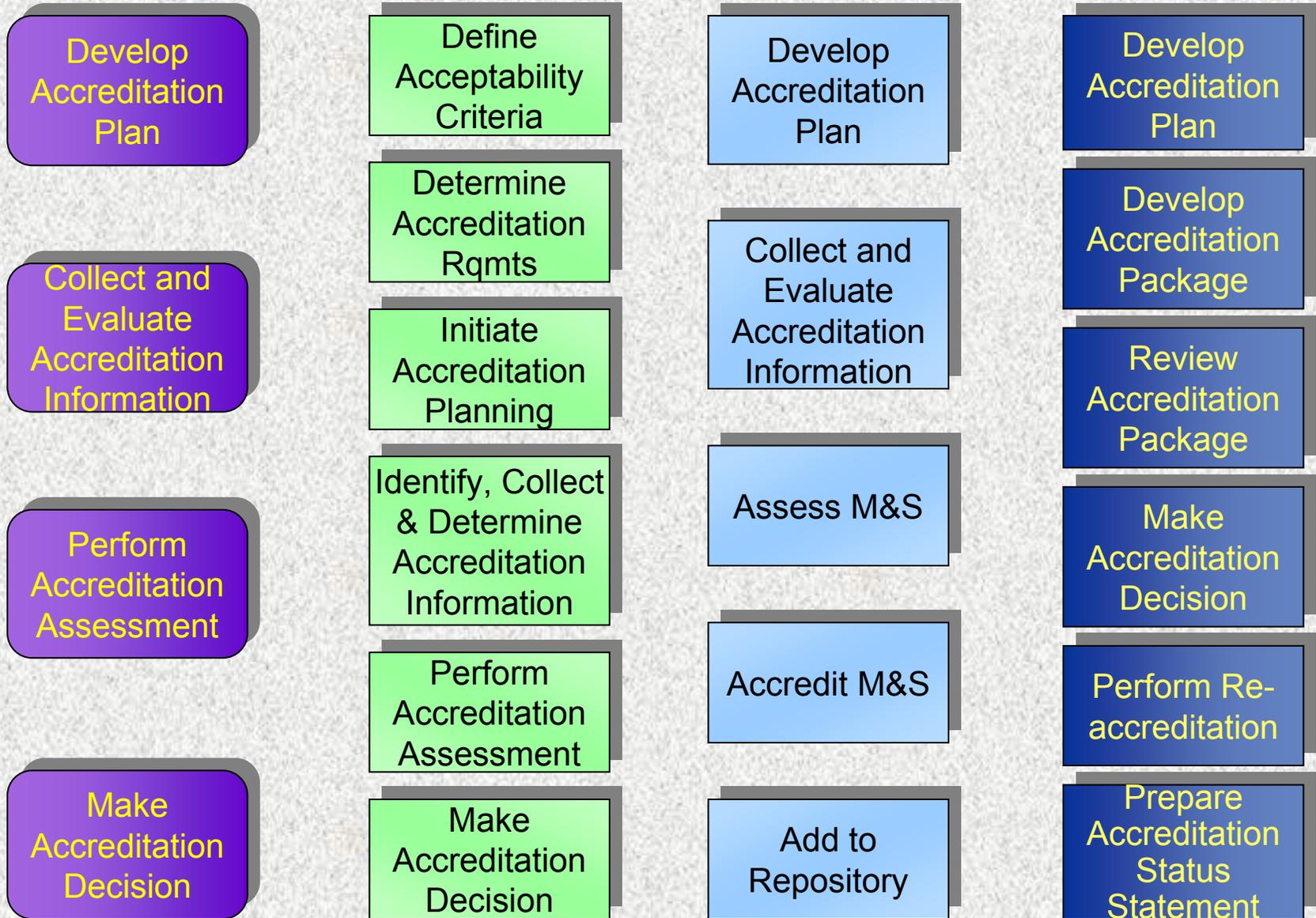


V&V Process Comparisons





Accreditation Comparisons





Navy Handbook & RPG

Navy Handbook : RPG AS

SECNAVINST 5200.40 : DoDI 5000.61





RPG/Handbook Comparison

- In general, RPG contains greater breadth; handbook more streamlined
- All examples in Handbook are oriented toward Navy M&S and programs
- RPG Glossary more extensive
- For most detailed V&V methodologies, Handbook refers reader to RPG



POC Information

DoD Simone Youngblood (703-824-3436)
syoungblood@dmsso.mil

Navy Jennifer Park (619-553-2848)
jenpark@spawar.navy.mil

Army Susan Solick (913-684-8082)
solicks@trac.army.mil

Air Force Sam Johnson (703-588-5061)
sam.johnson@pentagon.af.mil

MDA Heather Clark