



# NAVMSMO



## Meeting Minutes: VV&A TWG Workshop Number 16

The Navy Modeling and Simulation Management Office (NAVMSMO) Verification, Validation, and Accreditation (VV&A) Technical Working Group (TWG) Number 16 was held on Wednesday, 03 March 2004 at the SPAWAR Systems Center (SSC-SD) in San Diego, CA. The complete workshop agenda is presented in Enclosure (1).

The focus of Workshop 16 centered on the presentation of several SPAWAR VV&A activities, as well as a proposal to evolve the VV&A TWG to include issues resolution. All available presentation slides and related documents are posted in the VV&A section of the NAVMSMO site. The URL for the NAVMSMO site is <http://navmsmo.hq.navy.mil>. For point of contact and other detailed information, please contact the VV&A Help Desk at [vva@navmsmo.hq.navy.mil](mailto:vva@navmsmo.hq.navy.mil).

By leveraging the wide array of M&S efforts throughout SSC-SD, VV&A TWG 16 made great success in addressing a wide swath of VV&A efforts and highlighting the variety of ways in which VV&A can be implemented to properly support various programs. Discussions during TWG 16 included recurrent issues in accreditation of specific M&S programs, parallel concerns of SPAWAR VV&A to participants' programs, the applicability of the VV&A Documentation Tool, the potential role of LOE/MOP/MOEs in bridging M&S requirements to VV&A processes, and the potential for TWG evolution to include the analysis and resolution of recurrent/common VV&A issues. In summary, this dynamic workshop not only fostered discussions directly related to the presenters' briefs, but also identified issues in VV&A implementation for specific M&S programs, the analysis and discussion of individual VV&A experiences, and the possibility of evolving the TWG to directly address those recurrent issues which have not been resolved thus far.

### 1.0 NAVMSMO: VV&A Tutorial

The NAVMSMO VV&A Lead presented an high-level tutorial of M&S VV&A processes, roles and responsibilities, and the VV&A Documentation Tool. As VV&A is designed to build credibility and confidence in M&S, M&S and VV&A are inextricably inter-dependent.; In essence VV&A ensures the quality of M&S by reducing the risks of using the M&S, containing costs, supporting reusability, and satisfying policy requirements. Thus, the quality of the VV&A process is dependent on the quality of the M&S process. The presenter advocated the CMMI and CMM for building risk mitigation into VV&A These VV&A processes and their connection to specific M&S processes were broken down step by step, as well as an overview of the roles, responsibilities, and relationships of each VV&A participant. The presentation concluded with the advocacy of the VV&A Documentation Tool (VDT) to aid and streamline the development of planning and VV&A documentation.



# NAVMSMO



Discussions during this presentation included the role of NAVMSMO VV&A and the Accreditation Authority within this context. The presenter clarified that although NAVMSMO VV&A advocates, promulgates, and encourages the VV&A process for M&S, the office does not in any way act as the Accreditation Authority or conduct V&V for programs. As an oversight body for VV&A, the NAVMSMO office works to help M&S organizations understand VV&A and risk mitigation by helping managers and programs tailor their own processes. Additionally, it was clarified that NAVMSMO is not the data Functional Manager for Navy M&S.

## **2.0 NAVMSMO/SPAWAR: The VV&A Documentation Tool (VDT)**

NAVMSMO presented an overview and demonstration of VV&A Documentation Tool (VDT). The VDT was created in order to aid VV&A planners and implementers streamline the planning and execution of VV&A documentation and more easily comply with the DON VV&A Implementation Handbook. The presentation included highlights of the tool's capabilities, the flexibility of the underlying XML-based VVML, including cut-and-paste content and standardized documentation. The briefer emphasized the inherent utility created by the tool's user-friendly interface and collaborative capabilities. The presentation concluded with a demonstration of the VDT. Additionally, the forthcoming CD-version of the tool will allow VDT use on those systems that do not allow .exe loads on the hard drive.

A demonstration copy of the software for this tool is available for interested parties. Please contact the VV&A Help Desk for further POC details.

Discussions following this presentation included: the capability of the CD-driven program to be used on SNT seats and similar systems that do not allow loading on the hard drive; the presenter confirmed that because the only items saved to the hard drive are standard MS Word documents, the program is compatible. In terms of collaboration, the presenter clarified that the program allows teams to create the V&V documentation in combined parts contributed by various participants or by a single person with the other team members' comments. The selection of V&V team members to collaborate using the tool is left to the individual efforts. Additionally, as the tool is simply saved as a project and has great flexibility inherently built in to accommodate various-sized efforts the VDT should be able to support the documentation of multiple simulations within a single program (although this was not explicitly tested). Finally, in terms of federate M&S documentation, the VDT was explained as being capable of accommodating federations, although the user's approach will still drive the appropriateness of the use. Further clarification from DMSO is, however, still needed.

## **3.0 SPAWAR Systems Center-SD: FORCEnet VV&A and LOE/MOE/MOPs**

SPAWAR Systems Center San Diego (SSC-SD) Code 2822 presented a brief on the role of LOE, MOE, and MOPs in FORCEnet verification and validation, and the role that these important tests can provide in VV&A. The presenter began with a brief overview of the FORCEnet program, objectives, and impacts on the Navy. The presenter then described the role of Limited Objective Experiments



# NAVMSMO



(LOEs) in testing specific FORCEnet projected capabilities and the methods of measurements, Measures of Effectiveness (MOEs) and Measures of Performance (MOPs). Samples of this process were provided to show a step-by-step process of the experiments' goals and processes. The refinement of the LOE data was shown through Trident Warrior 03, the first large-scale event in the FORCEnet development continuum, and Joint RAPTOR 04-2. Finally, the presenter showed the utility of judiciously selected LOEs, MOEs, and MOPs in connecting the M&S and VV&A efforts through measurable data and concrete testing.

Discussions following this presentation included: a clarification of the pass/fail criteria for MOPs. Comparison with as-is capabilities vs. the improvements brought by FORCEnet capabilities were used as a de facto pass/fail criteria (if the FORCEnet capability added value over the existing capability) and did not require ORD-type descriptions of criteria. Additionally, tying into CONOPS, the presenter was asked whether FORCEnet's added capabilities decrease the number of failovers. The briefer noted that such areas as the effect on CONOPS, TTPS, etc required further investigation.

## **4.0 SPAWAR Systems Center-SD: Integrated Topside Design Program: Validated, Integrated, Physics-based Electromagnetic Radiation Toolset**

SSC-SD Code 2825 presented the process of the DDX VIPER V&V effort. The presenter began with an overview of the VIPER process, goal, and mission statement, and an overview of the VIPER evaluation criteria. The presenter then showed the incorporation of the general VV&A process outline into the VIPER DDX program's roles and responsibilities. Verification for this program was designated as whether the program physically worked while validation revolved around whether there were physical model issues, limitations in the software (which were added into the V&V documentation), and clarification needed from the data source. The program's V&V process was detailed with test design and "lessons learned" from selected test case data. The limitations of open literature as data source were discussed in terms of obtaining sufficient information (geometry, physical structure, materials properties) to accurately model the problem. The briefing concluded with the assessment of the program's V&V effort and the importance of early incorporation of the V&V planning process into the development plan and the utility of consultation with the NAVMSMO M&S VV&A office.

Discussion during and following this brief included the VIPER toolset as a fully V&V'd addition to the NOSC EM models. The briefer noted some limitations of the older NOSC EM model as a spreadsheet that was based on empirical data rather than physics-based formulas. The VIPER tools can be used to accredit models by the DDX office and others (Dahlgren was currently learning to use this toolset) and that the tool could be provided for evaluation. The presenter further articulated that COTS software modified to meet Navy requirements

[http://www.officedepot.com/ddSKU.do?level=SK&id=315879&location\\_info=SG\\_1\\_DV\\_7\\_SC\\_706006\\_FM\\_663\\_SK\\_315879](http://www.officedepot.com/ddSKU.do?level=SK&id=315879&location_info=SG_1_DV_7_SC_706006_FM_663_SK_315879) can be difficult to V&V as we do not necessarily have full access to the source coding. The presenter stated that the modification of the V&V plan



# NAVMSMO



during the actual V&V process is sometimes needed to provide a comprehensive picture. Finally, interaction with the Accreditation Agent during the actual V&V process was stated to be helpful.

## 5.0 NAVMSMO: NAVMSMO VV&A TWG: Reformation and Evolution

NAVMSMO presented a brief on transforming the TWG to include issues-resolutions committees. Over the last several years, the NAVMSMO M&S VV&A office has tracked issues in VV&A implementation from various attendees of past TWGs. As many of these issues are of similar themes and have yet to be resolved, the presenter proposed the transformation of the TWG to include committees to analyze and resolve these recurrent problems. The presenter gave an overview of the TWG effort to this point, including the identification of the M&S VV&A community and issues offered by its attendees. The transformation of the TWG was proposed to include both the continuation of program-specific VV&A briefs as well as the creation of a TWG Oversight Committee that would meet once a year to analyze various issues for commonality and assigning TWG volunteers to analyze the issues and offer potential solutions. The brief ended with a call for community feedback and suggestions for the specific design, schedule, and details of such a committee.

Discussions following this brief included the need for a “carrot” or incentive for participation; the possibility of a technical interchange for V&V techniques; the possibility of expanding the TWGs into two-day events with presentations on the first day and roundtable/peer reviews of issues on the second day. General concern was expressed for justification to program managers to fund participation in this sort of specific structure that is related to general VV&A issues rather than specific V&V efforts. The presenter discussed the need for information sharing between programs and noted that the creation of the VDT and VV&A training tool directly grew out of the concerns expressed by the VV&A community at such events as the TWG.

## 6.0 SSC-SD: Network Warfare Simulation (NETWARS) VV&A Efforts

SSC-SD Code 2822 presented an overview of the Network Warfare Simulation (NETWARS) VV&A effort. The NETWARS program seeks to perform C4ISR communication system performance analyses, using M&S as its most commonly used assessment method. The presenter began with an overview of the NETWARS program and its status as the Military Communications Engineering Board (MCEB)’s Joint Services communications modeling tool of choice. The presentation continued with an overview of the NETWARS architecture, MOPs, and model development. As the quality of NETWARS’s performance analyses are dependent on the quality of the M&S used to construct the system, the presentation then addressed the model acquisition process of those M&S in the NETWARS library. The use of iterative, tiered V&V techniques were discussed for the standardization of models in the library. The briefing concluded with the benefits of V&V for models in the NETWARS library, including “proof” of definition, design, and documentation.



# NAVMSMO



Discussions following this brief included whether the NETWARS V&V requirements for pre-existing models requires a complete re-work of the original V&V with the new intended use. The presenter noted that although the work necessary to meet the model standardization requirements necessary for this broader use can be significant, the process is still significantly less than re-executing from scratch. The presenter sighted the Link 16 model which required minimal changes as the features of the model had been the initial basis for standardization/inclusion. Further development of wireless level fidelity, trade modeling, environmental effects, M&S support within regions and other networks are being currently developed.

## **7.0 The Naval Postgraduate School (NPS): Studying the A in VV&A**

NPS presented a study of accreditation in the VV&A process. The presentation began with the definition, objectives, and goals of accreditation and role it plays in the M&S VV&A process. Although accreditation is specifically designed to help developers identify M&S re-use and limitations, the presenter argued that the prolific number of accreditation authorities and procedures/policies can lead to the weakening of an accreditation's credibility. An overview was given of various Navy organizations' accreditation processes; the presentation then focused its attention on the presenter's current work in studying COMOPTEVFORINST 5000.1. After giving a high-level view of COMOPTEVFORINST's assignment of responsibilities, documentation, observation and review, process flow chart, and formalization, the presenter narrowed in on the research question: whether the requirement of this instruction would improve surface ship T&E acquisition VV&A processes. Along with the research methodology, preliminary results and issues were presented, including organizational design and change issues and the efficacy of COMOPTEVFORINST 5000.1 over other possible solutions. The presentation concluded with next steps and a solicitation for participation.

Discussions following this presentation included the need to look at the larger issues of M&S re-use given that the accreditation authority is far removed from the original M&S development process. Questions posed included what mechanisms and business processes are needed to trust the accreditation. The presenter noted the COMOPTEVFOR's pro-activity in the attempt to resolve this issue and the need to account for funding and resources regardless of the status of the M&S development status. In the same vein, questions were posed on how to ensure the accreditation of new models given the difficulty of accrediting legacy models. The presenter pointed out the benefits of peer review. However, as legacy models continue to be used despite instructions, the quality of instructions was mentioned: Naval centralized management and de-centralized implementation in contrast to Army overall centralization and Air Force overall decentralization.

## **8.0 SSC-SD: Human Factors Engineering Mission-Centered Human-Computer Interfaces (HCI)**

SSC-SD Code 2441 presented a briefing on the HCI V&V process, beginning with an overview of the HCI design process, purpose, impact, and design qualities. The presentation the focused in on the specifics of HCI task navigation in support of specific Navy programs, task visualization, mission-centered design qualities, and the task of producing quality mission products that actually provide greater quality



# NAVMSMO



to the warfighter and the associated range of relevant product automation. The presentation continued with use cases, work flow diagrams, and requirements/specifications for the HCI. From the validation perspective, performance testing, heuristic reviews of design, and exploratory testing of prototypes were detailed, including performance measures and performance metrics.

The HCI program also provided a poster session of their processes during the break. Display handouts are available from this presentation upon request.

Discussions following this presentation included the advocacy of HCI by MILSTEAD as an incorporated standard. Given the current lack of cognitive analysis standards, the presenter highlighted its current work in guidelines for DDX in task-centered designs rather than the current function-centered configurations and the need for these sorts of requirements to be included in acquisition statements. Additionally, questions regarding the potential for conflict between VV&A and maintenance and perfection of a Multi-Modal Watch Station console. The presenter noted that although little to no maintenance is required for the manned console equipment, this factor should be considered.

## 9.0 Roundtable Discussions and Outstanding Issues

An open roundtable discussion followed the TWG 16 briefs in order to determine the VV&A ongoing issues affecting organizations both within the Navy and DOD and possible solutions to these problems. Vigorous and lively discussion raised the following areas of concern:

### 9.0.1 Discrete Model Simulation of Small to Medium-Sized M&S

**Q:** The continued lack of verification, validation, and/or accreditation across the services, despite DOD VV&A mandates was raised.

**A:** NAVMSMO responded to this important question by showing the need for the services to shift the overall perception of VV&A from an additional process to simply another tool used in the evolution of the general M&S process. Rather than the formalization of the presented VV&A process, it is the general fear factor which requires more work to overcome. However, some level of VV&A is an intuitive process and the “overwhelming” perception must simply be removed. NAVMSMO called for participation and input in ways to make the VV&A process more palatable to the M&S community.

### 9.0.2 Requirements for Accreditation of Low-Level M&S

**Q:** Low-level M&S in the context of larger programs are often viewed not to require the depth of VV&A as the overall program; often times, this “VV&A” is informal. The program manager’s decision to use the model with program-specific modifications is seen to serve as the “accreditation” for his level/use. In terms of acquisition, the Accreditation Authority is spelled out. However, do low-level M&S need to be accredited at all times, or only when the M&S presents a major/high-level risk or is specified in ORD requirements? If these



# NAVMSMO



decisions are made along the way and the model developer and user work through with V&V, is it correct to say that the decision to use left to the director of this stage?

**A:** The fact remains that Navy M&S VV&A is conducted differently for each program. This decentralization along program lines, in fact, continues to be one of the largest problems for VV&A standardization and clarification. As a contrasting example, the Army has strong advocates for VV&A and the program line-item problem is removed (VV&A centralization). For the Navy, this decentralized environment has led to difficulties in creating standards and enforcement. Further, problems continue securing funding resources for SMEs, ensuring that V&V reports follow procedure and policy, and securing sign-offs from the Navy community. At heart, this problem continues to lie with resources. In summary, the current system faces issues in requirements based on individual programs, the lack of peer reviews, the lack of mechanisms (hammers) for accreditation, and the lack of requirements to provide feedback from programs for analysis and improvements to current VV&A procedures.



# NAVMSMO

## Enclosure 1: Agenda

Navy Modeling and Simulation Management Office  
 Verification, Validation & Accreditation  
**Technical Working Group Workshop 16**  
**Agenda**  
 Wednesday, March 03 2004

Time	Topic	Speaker
0800- 0830	Check-In	
0830- 0845	Administrative Remarks/Welcome/Introduction	NAVMSMO/ SPAWAR
0845- 0915	NAVMSMO VV&A Tutorial	SPAWAR/ NAVMSMO
0915- 0945	NAVMSMO VV&A Documentation Tool (VDT)	SPAWAR/NAVMSMO
0945-1000	Break	
1000- 1045	FORCEnet VV&A	SPAWAR
1045- 1130	DDX VIPER Integrated Topside Design Program: SPAWAR Validated, Integrated, Physics-based Electromagnetics Radiation Toolset	SPAWAR
1130- 1230	Lunch	
1230- 1315	NAVMSMO VV&A TWG: Reformation and Evolution	NAVMSMO
1315- 1400	Network Warfare Simulation (NETWARS) VV&A Efforts	SPAWAR
1400- 1415	Studying the A in VV&A	Naval Postgraduate School
1415- 1500	Human Factors Engineering: Mission-Centered Human-Computer Interfaces (HCI)	SPAWAR
1500- 1545	Break/HCI Display	SPAWAR
1545-1630	Round table Discussions	NAVMSMO
1630-1645	Closing remarks/ Action Items	NAVMSMO