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Meeting Minutes: VV&A TWG Workshop Number 12

Navy Modeling and Simulation Management Office (NAVMSMO) Verification, Validation, and Accreditation (VV&A) Program Technical Working Group (TWG) Workshop Number 12 was held at NSWCDD-CSS on 30 October 2002.

The workshop agenda is presented in enclosure 2. The focus of Workshop 12 centered on VV&A activities within Naval Surface Warfare Center, Navy Experimental Diving Unit, Joint Air to Surface Standoff Missile (JASSM) program, V&V Tool Kit for Millennium Challenge 02 (MC02), and Statistical Usage testing in Software from the University of Tennessee. Other workshop presentations discussed USMC VV&A efforts and the NAVMSMO tutorial on VV&A. All available presentation slides have been included as separate attachments.

While some of the efforts have been mentioned before, the workshop again established that key aspects for successful VV&A implementation include developing clear and detailed user M&S requirements, forming collaborative and open working relationships between sponsoring/accrediting and proponent/development organizations, and having a formal, centralized, and maintainable process for documenting and tracking VV&A activities and outcomes.

1.0 JASSM VV&A Efforts

Eglin AFB ACC presented the Joint USN/USAF Joint Air to Surface Standoff Missile (JASSM) V&V program brief to the audience. The JASSM program reflects a successful V&V program and processes and highlighted the program success. The theme of the brief was the program's philosophy of giving the contractor total system Responsibility, that includes "Cradle to Grave" responsibility, while emphasizing System Performance Specification on operational requirements. The intent was to have the government's role as "Insight versus Oversight". Similarly the program developed a System Verification Plan (SVP) that delineated system requirements and deliverables. This allowed the government to review and approve designs at the earliest time in the process. The presenter discussed the programs V&V strategy that highlighted the program's office policy concerning M&S. The program office gave the prime contractor the responsibility for all M&S requirements to develop. Deliver, warrant, and support. In other words, the program office does not control or maintain the M&S for the JASSM.



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The briefings elicited comments from the audience who felt that this philosophy of total control by the contractor would hinder the program office's ability to assess the models being used. It was reported that this was not an issue, and the reasoning for this was to reduce costs and time of developing the weapon on time and within costs.

2.0 V&V Tool Kit- BMH

The subject of the brief discussed a BMH developed tool used during Millennium Challenge 02 (MC 02). The first part of the brief given by BMH was an overview with emphasis on methodology and terms and other issues that affect V&V and then an overview of the tool itself. The BMH representative discussed in detail the tool itself and being a COTS product (MS ACCESS) being able to provide a central point for traceability, requirements analysis, and testing procedures. Additionally, the tool offers the ability to allow SMEs and developers to categorize each aspect of the simulation and their interactions. NAVMSMO commented that the tool should be registered to allow for use by other programs, i.e., JWID and JTFEX. BMH stated they will look into it.

3.0 Design for Testing- University of Tennessee

The University of Tennessee presented his method of designing for testability. The presentation divided the method into two segments: Development and Testing. In the development segment, Sequence Based Specification was discussed as a means to develop the defined system boundary. Similarly, this is used to enumerate the stimulus sequences and to define the specification functions. It was stated that initial requirements are incomplete and inconsistent and domain experts are needed to review clarified requirements for correctness. Finally, individual requirements are tagged for traceability and all this is done to complete the specification

During testing, the Markov Chain Usage model is performed to define certification plan and build and validate the usage model. From this you can generate test cases to evaluate and execute the model. A security alarm model structure was used to describe the process. These can be used to validate the models based on the validation of requirements defined prior to testing.

4.0 USMC MCMSMO Efforts



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USMSMO presented an overview of the USMC VV&A organization and ongoing efforts. The USMC current effort is focused on training systems. The systems currently envisioned are using both training devices and simulation tools such as common synthetic natural environment to augment lab-based devices to augment field training.

5.0 NEDU Diving Decompression

The Navy Experimental Diving Unit (NEDU) presented a VV&A briefing on Diving Decompression Tables for USN divers. The briefing overview discussed the problems facing the community as it seeks to refine decompression procedures to accommodate more diverse and complex types of diving profiles, while incorporating ever increasing empirical information and improved theoretical understanding. The NEDU representative discussed the Decompression Sickness (DCS) paradigm that forms the conceptual basis for development of the models used to compute decompression schedules. The highlight of the brief was that verification of these models has thus far proven impossible. Despite this shortcoming, statistical techniques are used to ensure that any given model provides its best possible accounting of observable reality as manifest in large databases of empirical information about well-documented dives and their outcomes. While these techniques bridge the gap between theory and reality, the validation of models and procedures computed using them is complicated by the low incidences of DCS that successful procedures produce, and by time and fiscal constraints that limit the precision of comparisons between predicted and observed outcomes in man-tests of the procedures. It was also explained that additional factors arising from diver expectations must be considered for successful promulgation of new decompression procedures. As an example, models for air diving indicate that certain long shallow dives require decompression stops in order to keep the risks of DCS within acceptable limits. However, divers themselves claim to routinely undertake such dives without decompression stops and without unacceptable incidences of DCS. It was noted that all of these issues will continue to challenge his community as it seeks to provide US Navy divers with the flexibility they need to confidently balance risks of DCS with those from a varying array of other diving hazards.

6.0 NAVMSMO VV&A Tutorial

NAVMSMO presented a tutorial brief on NAVMSMO VV&A processes. The intent was to bring about awareness of VV&A process and to open discussion of common elements of VV&A. It was also presented to have audience review the process and recommend



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changes/modifications to existing processes. Participants were guided through the VV&A process in step with the M&S development process. There were discussions from the audience to modify the diagram to include the final accreditation documents at the end of the VV&A process and to include configuration management as a process that is included in the entire development process. This issue was noted and would be taken under consideration to modify the process. The NAVMSMO VV&A tutorial was an excellent discussion point and provided those who are implementing VV&A a method to consider.

6.0 Issues/Concerns

Overall, a successful workshop with robust discussions on issues which need to be addressed in other forums. Highlights of issues raised during the workshop included the following:

VV&A Requirements Delineation

There were two data points (JASSM and MC-02) presented at the workshop which delineated that VV&A in the program requirements to include deliverables was the foundation for a successful VV&A effort. This is different from previous workshops that discussed the need to inject accreditation criteria into the requirements in order to allow for a successful program.

Bio-Physical Paradigms for Modeling

The discussion revealed the lack of validated models to accurately portray actual environmental conditions. This is further aggravated due to the large amount of empirical data available that in some cases disagrees with using the current paradigm based model. Similarly, the difficulty is further degraded in determining accuracy when variables such as operational conditions/commitments/demands combined with different individuals further complicate the model.

V&V of Legacy Systems



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Discussions about performing V&V on legacy systems without documentation were raised. The issue was who pays for this V&V. Some stated this should not be a V&V cost at all and should be funded by other means as a development cost. Others stated this is the requirement of V&V and should be accounted as such.

Listing of “Good and Bad” VV&A Programs

Some attendees wanted examples of "good" and "bad" implementation of VV&A programs to justify to their management as to whether to conduct or not to conduct VV&A. One of the concerns is the Top Management's buy-in to VV&A Implementation.

VV&A Council

The discussion was ended with a request for participation in a VV&A Council. The intent was to identify, quantify, and prioritize VV&A requirements for Navy. The initial participation is to formulate the group, develop viable mechanism, and establish it as NAVMSMO infrastructure.