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Meeting Minutes: VV&A TWG Workshop Number 14

Navy Modeling and Simulation Management Office (NAVMSMO) Verification, Validation, and Accreditation (VV&A) Program Technical Working Group (TWG) Workshop Number 14 was held at the Naval Post Graduate School, Monterey, CA on 4 August 2003.

The workshop agenda is presented in enclosure 1. The focus of Workshop 14 centered on VV&A activities by both students and staff at the Naval Post Graduate School, Defense Modeling and Simulation Office, and Naval Warfare Center in Point Mugu. Other workshop presentations discussed the NAVMSMO tutorial on VV&A and roundtable discussions. 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, including costs and outcomes. Overall, a successful workshop with robust discussions on issues which need to be addressed in other forums.

1.0 NPS VV&A RPHM Efforts

A student who had recently completed his thesis provided the first presentation. The title of the presentation was “Validating a Computational Model of Vigilance”. The motivation for the brief was the need to perform threat analysis simulation models. The premise was for the models to be capable of generating or revealing surprises, unintended consequences, and blind spots. The hypothesis of the presentation was that reduced human performance resulting from a vigilance task can be modeled as a complex adaptive model (CAS) and the resulting computational model can be shown to approximate empirical human performance data under similar conditions. The presentation included the efforts to validate the conceptual model and validate the data to include the operational validation. Two psychological models were used for the design and implementation of the Reduced Human Performance Models (RHPM). Discussions during the presentation included the issue of contradicting schools of thought concerning the psychological models used for design and implementation into the RHPM.

2.0 NPS Validation for Human Behavioral Evaluation Techniques

The second presentation was titled “Validation of Human Behavioral Models for Combat Simulations”. The theme of this presentation was validation for behavioral representation is not well defined nor is the current process extensible to meet the requirements for validating complex cognitive models in use or under development in DOD. The presenter limited his discussion to the following: SME Bias; inadequate measures for validating cognitive models; and the nonlinear mature of human cognitive processes. The presenter discussed numerous issues using cognitive models. The highlights discussed were issues concerning DMSO validating, lack of referent data, model representation, using SMEs and cost. Validation of cognitive models is a difficult process that is neither well defined nor uniformly complied with

3.0 DMSO Levels of Validation

DMSO presented a briefing currently being presented to the community to structure simulation validation in order to increase the quality. The theme was to present validation maturity levels similar to the Software Engineering Institute Capability Maturity Model Integrated (SEI CMMI) for software/system development. However the process differs in some ways. The validation process produces information upon which decisions depend but does not result in a functioning product. Furthermore this is supported by the premise that increased investment and efforts in validation show a clearer return on that investment. Similarly moving away from subjective validation decisions to objective validation decisions happens in well-defined steps by sequentially addressing the high payoff areas of validation technology.

The levels of validation require a more precise Conceptual Model. The conceptual model supplies the first development product that has sufficient information to validate. The subsequent levels presented showed systematically, the role of the conceptual model. Finally, the subject of risk and cost were discussed but the lack of referent costs is a big assumption on part of the validation efforts. Discussions within the workshop addressed the significance of attempting to determine actual costs and time and the role of SMEs.

4. NAWC WD Point Mugu VV&A Efforts

The Naval Air Warfare Center Weapons Division (NAWC WD) Point Mugu's Electronic Combat Simulation and Evaluation Laboratory (ECSEL) presented the VV&A process that is currently evolving to provide better coordinated efforts among the organizations to provide systematic and efficient method of verifying and validating the models. The request came from the sponsoring organization due to consistent test results and conflicting reports. In this process, they discovered areas of process improvements as well as better identification of funds. The highlight of the brief was the newly created VV&A procedures initiated by the command in support of TACAIR Electronic Warfare (EW) threats for the upcoming calendar year. NAWC WD instituted a policy to ensure VV&A is performed IAW NAVMSMO standing instructions and Handbook. The lessons learned indicated to have a successful program both Management and developer team buy in is essential for success. Similarly, the attempt to budget for VV&A was severely underestimated. According to the presenter the budget was under funded by about 300%. This raised issues from the group of the difficulty in assessing the costs of performing VV&A. It was determined that additional information from the group was needed to accurately assess the true costs of doing VV&A.

5.0 NPS SVWG

The ECE Department presented an overview of Simulator Validation Working Group (SVWG) supported by OPNAV N0912. . The effort of the SVWG is to design threat emitters for anti ship cruise missiles. The intent is to create the characteristics of anti-ship cruise missiles when detected by self-protection systems gives the appearance of an actual threat missile system with a prescribed degree of authenticity. The brief encompassed the processes performed at both the laboratory and field-testing processes used to conduct the testing. Currently the vision is to perform in-flight testing in combination with land based testing to present a realistic combat situation during the live field test. The presentation included the need for validated M&S to help perform simulation in the laboratory in order to present the most realistic scenarios for cruise missile defense. The current method with live filed testing is that it is unable to accurately deploy and fly cruise missile profiles with aircraft. Flight limitations and safety of flight is paramount that precludes actually representing a cruise missile. Discussions amongst the group was to introduce NPS to Lockheed Martin M&S

entities who are involved in M&S for the Aegis weapon systems deployed on naval combatants. Lockheed Martin focuses on validating models to represent missile profiles flown against the Aegis weapon system.

6.0 NAVMSMO VV&A Tutorial

NAVMSMO presented a tutorial brief on NAVMSMO VV&A processes as required by SECNAVINST 5200.40. The intent of the tutorial was to educate and bring about awareness of VV&A process that is closely tied to M&S process. s. The presentation walked through the VV&A process in step with the M&S development process. The NAVMSMO VV&A tutorial was an excellent discussion point and provided those who are implementing VV&A a method to consider. The floor then was opened for discussions on any areas of VV&A including the tutorial, implementation guidance, policy, or other areas of organizational concerns. Below paragraphs denotes the issues and concerns

7.0 Issues/Concerns

Following the tutorial, an open roundtable discussion was held in order to determine the VV&A issues affecting organizations both within the Navy and DOD. Highlighting the issues raised during the workshop, include the following:

Validation of Cognitive Models

There were data points presented at the workshop delineating that validation of cognitive models is unclear and not well defined and the requirements for validating complex cognitive models are not mature enough to satisfy the requirements. Similarly, discussions included the biases and limited ability of SMEs to objectively validate models. A recommendation was presented that in the forums of future VV&A i.e., FOUNDATIONS, that discussions focus on establishing standards and training for SMEs in validating models.

Validating Predictive Models

The discussion revealed the lack of validated predictive models to accurately portray actual weapon conditions. Some members described the lack of referent data to support ongoing efforts and the lack of models to support new and upcoming military micro technologies. Other discussions focused on lack of management focus and support on the applicability of doing VV&A. Although VV&A is recommended and understood but barely used because of a number of factors. One being funding! The reliance on legacy data as a component is interpreted as qualified data but never verified. Members of the weapon community discussed efforts to improve this and there has been some progress but further discussions on the issue of trusted referents being used to validate predictive models.

Funding Issues for VV&A

During the open discussions, the issue of costs to do VV&A was raised. An earlier presentation discussed the implementation of a VV&A funding effort but it was still significantly under funded. Discussions included the lack of management support to provide the funding or continuously offering an amount that will not able to perform the proper testing of the models. The issue of funding was prevalent throughout the workshop. NAVMSMO requested that all participants should attempt to accurately account for the cost of doing VV&A. The issue that VV&A saves programs money has been promulgated, as a benefit however there is little data available to support this premise. Similarly, the actual cost of doing VV&A as part of the development process remains elusive and needs to be finalized.

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Lack of Referent Data

Discussions about the lack of referent data or inaccurate data being used as referent data were discussed. Throughout the day from discussions and presentations the issue of accurate referent data used as metadata for models as a variable is missing. A representative from the Joint Synthetic Battle Space Program Office discussed the lack of configuration management for V&V on legacy systems were raised and the impact on new programs will be affected.