

## ***Session A4: Subject Matter Expert (SME)/Peer Use in M&S V&V***

Session A4 leaders:

Co-Chairs: **Bill Dunn** (IITRI) and **Bill Waite** (Aegis Technology Group)

Session Recorder: **Bob Senko** (DMSO)

A4 Materials in Foundations '02 Proceedings:

### Paper

*Subject Matter Expert (SME)/Peer Use in M&S V&V* (34 pp)

**Dale Pace** (JHU/APL)

**Jack Sheehan** (DMSO & DOTE C3I & Strategic Systems Directorate)

Slides (may contain back-up materials and notes)

*Subject Matter Expert (SME)/Peer Use in M&S V&V* (44 slides) [A4B – both pdf & ppt formats]

**Dale Pace** (JHU/APL)

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A4 Participants are identified at the end of this document

**Discussion Synopsis** (this material is to provide perspective on papers and briefings mentioned above – it should not be used without that context)

This discussion is organized in four main categories, the ideas related to which are mainly simply listed in bullet form: comments about the presentation of the paper, general endorsement of the paper's ideas, reservations about points addressed in the paper, and additional concerns.

### **Thoughts from the Presentation which was well-received by those in the session:**

- Many different kinds of SMEs are needed for completion of the various steps in the M&S application process:
  - V&V
    - Requirements Validation
    - Verification
    - Validation (Conceptual Model, Results Validation)
  - Non-V&V
    - Domain
    - Simulation Development
    - Simulation Application
- There can be problems with lumping these much-different kinds of expertise/disciplines together.

- Requirements SMEs have the greatest potential to help, but are the least used.
  - Needed up-front for risk analysis
    - Help to create viable requirements and identify trade-offs
    - Identify what to focus on – the critical requirements.
  - Keep track of the requirements thread through the entire life-cycle.
  - Build intended use cases.
- SMEs are essential to V&V, in fact indispensable. They can provide significant information about the referent. But they should be trained, documented, and used wisely.
  - There are compelling reasons to use SMEs (lack of empirical data, knowledge about the domain, etc).
  - A checklist of when to use them, who to use, how to use them should be devised as part of the SME management process.
  - The more critical the outcome of the simulation is, the more important it is to get the SME involved with the simulation to understand what/how the simulation outputs.
  - Information about using SMEs to mitigate risk up front in the program, and the value of that contribution versus cost is needed.

#### **Group Endorsements to the Paper:**

- There is clear need for special expertise – especially in the requirements area.
  - Various V&V (information) shortfalls can be met by the use of SMEs.
  - Subject matter expertise can provide referent information.
  - Subject matter expertise can influence all aspects of V&V.
- Experts should be:
  - Knowledgeable
  - Impartial / fair
  - Effective
- Management of SME is a critical issue.
  - Location, selection, and training.
  - Qualifications should be documented and tracked
  - Select specific expertise for various domains/processes.
  - Bring in early and keep them on throughout the lifecycle.
  - Manage them carefully throughout the process.

#### **Group reservations to the Paper:**

- SME categorization based on vested interest appeared inappropriate.
- Sensitivity to context: Clear identification of relevant ‘subject matter’ is crucial to identification of SME and administration of their use
- SME identification and availability
  - Sources of SMEs – availability of credible talent. Fact that SME status is not a real professional specialization prevents easy identification of specific SMEs.

- Lack of codification of expertise. Medical profession a good example of codification of expertise specialization. Perhaps justification used in contractual protocol can suffice for identification of SME status. Therefore, do SMEs need to be accredited i.e., some sort of accreditation certification? Difficulty is that value of SME is strongly context sensitive.
- The army has designated the FA-57 officer career field for simulation personnel, and an equivalent civilian career field, that can be starting point for finding acceptable SME.
- Requirements SMEs have the greatest potential to help, but are the least used.
  - Need risk analysis, to see what to focus on – the critical requirements.
  - Look at the requirements thread through the entire life-cycle.
  - Build intended use cases. Describe viable requirements and trade offs.

#### **Other Group Concerns about SME use:**

- Hostility to concept of SME use. Probably a developer issue - opening program to outside interests.
- Typically developer and user have little choice who the SMA is or control over their behavior
- Even with due diligence, there can be unexpected and undesired outcomes as a result of variance of determinations among SMEs. SME employment needs to be appropriately administered.
- Future computer capabilities, simulation representation techniques, real world phenomenology, and employment complexities may out-distance the SME's ability to keep current; thus limiting expert opinion.
- Realizing SME Value:
  - SME can fail to deliver their expertise - expert opinion is not the same thing as performance. May think one way (SME), but communicate a different way (perform).
  - SME may deem his/her expertise itself as more important than applying that expertise to the problem; thus potentially creating an unproductive environment.
  - Therefore, instructing SMEs in the process to be used, particularly in areas where his judgment is qualitative and potentially variable is likely necessary.

#### **There are Options to Deal with Reservations and Concerns Expressed Above:**

- SME reviews require that many different SME areas are covered. Maybe by a panel of SMEs: such a panel may be an integrated product team (IPT) related to the simulation.
- Have detractors involved in reviews.
- SMEs can be a scarce resource; they should be closely managed/scheduled to take advantage of their capability and minimize disruptions.
- Lock SMEs in the room till the report comes out.

#### **In Fact, Some Successes:**

- Systematic SME usage process is not unheard-of, and some are documented (BMDO use of SMEs for face validation of their M&S, JWARS V&V Program, MDA Core Model Face Assessment, MDA MDWAR VV&A, etc.).

- Several sites have compilations of personnel who are listed as SMEs in various domains. Some may be relevant, but there is no reasonably satisfactory venue to identify SMEs with appropriate qualifications.

## RECOMMENDATIONS:

- Include SME usage in all aspects of best practices, process elucidation, and management improvements derived during the follow-on work from V&V Foundations '02.
- Better understanding and management of SMEs during all phases of VV&A is needed to fully use this scarce and valuable resource. Continue investigation into SME Use in the following areas.
  - What truly characterizes an expert?
  - Adopting VV&A rules for SME use, similar to Federal Judiciary Rules.
  - Better cost estimation processes for M&S SME reviews in VV&A.
  - Visualization capabilities to enhance SME reviews.
  - Connecting statistical processes & SME validation reviews.
  - Computer support for SME use in VV&A, especially for validation and accreditation reviews.
  - Those from the Knowledge Engineering discipline need to work techniques to improve knowledge elicitation, representation, & integration.
  - Better processes to improve consistency in SME assessments.
  - Better processes to ensure correct capture of expert knowledge.
  - Sharing of all aspects of SME VV&A use experience via workshops, papers, and other publications.
  - Educating SMEs on future computer capabilities, simulation representation techniques, real world phenomenology, and employment complexities to allow them to keep current, e.g., workshops, papers, and other publications.

## A4 Session Participants (20)

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