

Session A1: Verification Technology Potential with Different M&S Development & Implementation Paradigms

Session A1 leaders:

Co-Chairs: **Robert O. Lewis** (Boeing) and **Reed Little** (SEI).

Session Recorder: **John Carr, III** (Naval Surface Warfare Center)

A1 Materials in Foundations '02 proceedings:

Paper

Verification Technology Potential with Different Modeling and Simulation Development and Implementation Paradigms (40 pp) [A1.pdf]

Garth R. MacKenzie (University of Maryland)

G. Gordon Schulmeyer (PYXIS Systems)

Levent Yilmaz (Trident Systems)

Slides (may contain back-up materials and notes)

Verification Technology Potential with Different Modeling and Simulation Development and Implementation Paradigms (43 slides) [A1B.pdf & A1B.ppt – same in both formats]

Garth R. MacKenzie (University of Maryland)

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Participants in this session are listed at the end of the Discussion Synopsis.

Discussion Synopsis (to provide perspective on papers & briefings identified above).

1. Traditional V&V techniques need to be adapted to more modern software paradigms and development process models. In particular, advances in the development of M&S applications present a unique challenge.
2. The generic software engineering model presented consists of four parts: life cycle, methodologies, standards, and management practices. From a V&V perspective, the approaches selected must have a good “impedance match.” Incompatible approaches can result in overall processes that fail to meet development objectives.
3. The same techniques used with the now-traditional waterfall, spiral, and incremental models continue to be used with object-oriented, Rapid Application, and Agile methods resulting in poor match between the older techniques and the newer artifacts produced by the more recent models.
4. New challenges include use of Patterns, COTS, and Agile methods that are not easily subjected to traditional V&V practices. Moreover, these more modern techniques tend to conflict with current SW CMM L3 processes, possibly jeopardizing certification. Furthermore, they cannot simply be “scaled” for adoption. In addition, those latest adaptive systems will require a much more rapid and perhaps “continuous” approach to V&V, which is currently not defined in the literature.

5. Another common problem with development process models is their general lack of scalability. Most established developers tend to generate their processes to address medium-to-large scale development efforts, which tend to provide progressively poorer fit as the size of the effort shrinks. Thus, the burden of poorly fitting processes drives cost and schedule in the wrong direction.
6. It was suggested that some developers may want to pursue alternatives to SEI Software CMM L3 or above processes that would be more cost effective for M&S development. SPICE, which is based on ISO 12207 was one alternative suggested. However, another process could adversely affect the CMM certification of the development organization.
7. The importance of V&V of data and its certification was discussed. It was noted that input data sources should identified early in the development effort and data should be made available early enough to allow for adequate V&V and certification prior to its use in development.
8. There was strong agreement that V&V should begin as early as possible in the development process since the greatest benefit leverage comes for the early “pre-code” phases of development. Further, the contractual relationship between V&V and development should spell out the expectations and commitments of both parties especially when sharing development and test resources and tools is involved. This can save finger pointing and accusations, and availability issues through out the duration of the project.
9. Industry-wide techniques for determining net worth of V&V effort need to be developed so that all V&V programs use similar metrics to measure their performance.
10. Some differences in the understanding and definition of the M&S conceptual model continues to present problems to developers and V&V agents as well. There remains confusion concerning the Conceptual Model of the Mission Space (CMMS) and the Conceptual Model defined in the DMSO RPG and Service guidance documents. Perhaps the M&S development community at large should observe greater adherence to the published guidelines for generation of conceptual models.
11. In our opinion, the work begun by DMSO needs to continue as the Authoritative Source of VV&A guidance, research, and technology advancement, especially with the advent of new streamlined, rapid development processes. These breakthroughs need to be understood, effectively managed, and propagated throughout the industry to keep VV&A from losing ground.
12. The materials presented would benefit from examples of formal methods perhaps by phase to the extent that comparisons between tools and techniques could be made to determine cost-effectiveness and utility.

Session Participants (11)

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