

## Session T4: V&V Issues and Implications for M&S Reuse

Session T4 leaders:

Co-Chairs:

**Jim Weatherly** (Navy Modeling and Simulation)

**John Illgen** (Illgen Simulation Technology)

T4 Materials in Foundations '02 proceedings:

### Papers

*Verification and Validation Issues and Implications for Reuse* (23 pp) [T4\_mcgregor.pdf]

**John McGregor** (Luminary Software/Clemson University)

*Implementing a Reuse Strategy Across Multiple Domains* (11 pp) [T4\_aust.pdf]

**Sarah Aust** (Naval Air Warfare Center/TSD)

Slides (may contain back-up materials and notes)

*Verification and Validation Implications for Modeling and Simulation Reuse* (27 slides)

[T4B\_mcgregor in both pdf and ppt formats]

**John McGregor** (Luminary Software/Clemson University)

*Implementing a Reuse Strategy Across Multiple Domains* (27 slides) [T4B\_aust in both

pdf and ppt formats]

**Sarah Aust** (Naval Air Warfare Center/TSD)

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

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

Two papers were presented. Considerable discussion occurred. Each paper is summarized below with comments from session participants injected.

### **Paper 1: V&V Issues and Implications for Reuse, John McGregor (Clemson Univ.)**

John's paper focused on achieving significant strategic reuse in both producer and test assets from conceptual definition to deployment. John discussed the following compelling issues:

- Model – Is it correct?
- Program – Is it accurate?
- Confidence in the system?

John addressed culture issues as well. These included (selected examples shown here):

- Strategic Reuse (Can we make money?)
- Reuse schemes are often initiated by people without breadth of responsibility to carry them out
- Reuse schemes are often initiated by persons who do not have depth of control
- Many other issues

John's recommendation for Software Product lines is to share common features. Much like Saabtech of Sweden does with their product lines. Reuse practices must employ solid structure reuse, strong and competent management direction and control and appropriate subject matter expertise. Following such practices Raytheon and Cummins Corporation improved product development issues substantially. These included:

1. Raytheon – experienced 10 fold improvement in quality
2. Cummins – experienced 7 fold in productivity (Cummins reduced the building of a product from 1 years time to 1 week)

During this paper and the next paper the audience had concerns about reuse. For example, not all models and simulations can be reused. Common components can be reused with care. Additionally, designers often use the same patterns to promote strategic reuse including personnel resources.

## **Paper 2: Implementing a Reuse Strategy Across Multiple Domains, Sarah Aust (NAWC/TSD)**

Sara presented a “Common Organizational Transformation Model.” This model was presented in a systematic fashion that encompassed enterprise solutions, evolving and changing technology, management, SMEs, education and training, architecture, policy and standards.

The presentation also included a discussion on “Processed Based” M&S.

Reusability focused at the reference model for sharable learning content objectives. Requires an easily accessible place or places to share the model information. Investigating a web based “Business Modeling and Simulation Resource Center.”

Both presentations led to discussions concerning the level of elements that apply to reusability. Depending on the application, it is more at the model/element level than at the simulation level.

Also -- Selected Miscellaneous Comments from Participants' Notes:

Test assets need to be worked across the product - across increasingly complete product. Build implementally - new tests for new iterations - showing functionality changes.

Reuse across products is needed, e.g., test assets that can be used in multiple products. Functionality is a combination of features. Each feature appears in multiple systems.

Greatest impact of 'multiple use' of assets comes at the definition level rather than the operational level.

Perhaps the M&S Community needs to have a new way to look at their integration - because still using the old methodologies. Tracking changes allows for management of changes to the asset (test or product).

The later in the product creation process that V&V begins, the harder it will be to do.

Concept of an interface as a specification means more use in multiple implementations.

Make sure analysis (test results or model results) goes along with the next phase of testing/development - make sure you are not re-doing your work because you left the results behind and only brought data forward.

Talked about patterns that occur - including those that come from one person gaining experience in doing one activity for testing and then doing it that way again and again. Writing it down allows for repeatability beyond that one person.

What is the implication for technique for the military rather than that of something like a major company? Multiple product line? Could have a multiple purpose for the stream of the project. product line approach (like Crusader example of s/w being written for simulation, stimulation and system).

Vendors don't want reuse. Standardize on one tool within one company. Navy needs to change the cultural issues first - to force the vendors to do it the way the government decides.

SBA and new dev of M&S will move towards a virtual product model rather than the old way of one type of software.

Will you really need all the pieces for reuse. make sure that you're thinking of WHAT should be reused throughout the programs rather than just doing everything - which also runs you out of money in the end.

#### **T4 Session Participants (10)**

<b>First Name</b>	<b>Last Name</b>	<b>Organization</b>
Sarah	Aust	NAWCTSD
Michelle	Bevan	MSIAC
Joanna	Boyette	Johns Hopkins University
Scott	Harmon	Zetetix
John	Illgen	Illgen Simulation Technologies, Inc.
Anthony	Marthaler	Johns Hopkins University
John	Mcgregor	Luminary Software/Clemson U.
John	Pearson	Anteon Corporation
Randy	Saunders	JHU/APL
John	Tyler	The MITRE Corporation