

VV&A Templates and Resources

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Abstract

Verification, validation, and accreditation (VV&A) is a collection of processes that apply incremental reviews, analyses, evaluations, and tests to M&S products for the purpose of establishing M&S credibility and reducing risk to the user. Under current Department of Defense (DoD) policy, all models and simulations used within the DoD must undergo VV&A. These processes provide many benefits to the M&S community including enhanced user confidence, improved system performance and reliability, and more predictable and accurate M&S behavior. When executed properly, VV&A enhances the many benefits of M&S including cost savings, risk reduction, and schedule acceleration.

VV&A templates are written/automated standardized formats/cookbooks that can be used to organize, record, and present material relevant to the VV&A process. Templates provide standardized formats for documenting plans, reports, and letters; guidance on developing plans; guidance on gathering and organizing the necessary documentation; guidance on developing reports; guidance on making the accreditation decision; and/or outline structures for formatting accreditation plan contents.

VV&A resources are repositories, websites, reflectors, organizations, conferences, conference proceedings, papers/reports, bibliographies, training courses, and subject matter experts that contain (or are knowledgeable concerning) references, toolsets, policies, and information documenting approaches to and experience in performing the VV&A process.

By applying templates and resources, the M&S community can reduce the time, effort, and cost associated with performing VV&A.

This paper provides a review of VV&A templates and resources for the Foundations '02 session on VV&A tools, templates, and other resources. The paper presents the needs for these templates and resources. The paper also offers a breakout of their types and preliminary listings for VV&A templates and ten different types of VV&A resources. The goal of this paper is to "set the stage" and provide discussion topics for the audience at the conclusion of the session.

1. Introduction

The fundamental goal of VV&A is to reduce this risk in the use of models and simulations by improving the credibility of their results. But many users perceive VV&A as taking too long, costing too much, and not being credible in itself. Further, acquisition program managers often view VV&A as yet another mandated drain on their limited resources while complaining that there is no “tried and true approach” to applying VV&A and that there is no way to know “how much is enough.” These perceptions must be balanced by the real need to guarantee that a program is (1) using correct models and simulations, and (2) using correct models and simulations correctly. The appropriate compromise is to perform effective VV&A more quickly and at less cost.

Developing and applying templates and resources is one method for reducing VV&A cost and schedule.

Templates are written/automated standardized formats/cookbooks that can be used to organize, record, and present material relevant to the VV&A process. Templates provide standardized formats for documenting plans, reports, and letters; guidance on developing plans; guidance on gathering and organizing the necessary documentation; guidance on developing reports; guidance on making the accreditation decision; and/or outline structures for formatting accreditation plan contents.

Resources are repositories, websites, reflectors, organizations, conferences, conference proceedings, papers/reports, bibliographies, training courses, and subject matter experts that contain (or are knowledgeable concerning) references, toolsets, policies, and information documenting approaches to and experience in performing the VV&A process.

2. Templates and Resources

2.1 The Need for VV&A Templates and Resources

VV&A templates and resources can be used or appreciated by three different types of people who interact with simulations. These are the decision makers, the M&S users, and the M&S developers. All three types need to worry about making more credible decisions based on models and simulations. They also need to support quicker decisions at reduced cost. VV&A templates and resources are designed precisely to provide partial solutions to these problems; templates and resources reduce risk.

Some of the advantages provided by VV&A templates and resources for M&S include:

- allowing us to do a better job,
- allowing us to do more in less time,
- allowing us to do our jobs at less expense,
- reducing risk in performing VV&A,
- allowing better cost estimating and planning,
- allowing better scheduling estimating and planning,

- eliminating “reinventing the wheel,” and
- making our jobs easier.

These advantages are often linked. For example, reducing schedule usually leads to lowering cost!

2.2 VV&A Templates

2.2.1 Categories of VV&A Templates

Categories of VV&A templates include:

- verification plan templates
- verification report templates
- validation plan templates
- validation report templates
- credibility templates
- data quality templates
- accreditation plan templates
- accreditation package templates
- accreditation report templates
- accreditation decision letter template

These categories are neither exclusive nor inclusive. One of the goals of Foundations '02 is to identify additional categories of templates.

The table of templates provided below is incomplete. The authors hope to augment the table's contents with inputs provided at the Foundations '02 Conference. The VV&A community as a whole will need to contribute to this effort to produce a quality product. Ultimately, the single table for templates should evolve into separate tables corresponding to the individual categories of templates noted above.

2.2.2 Listing of VV&A Templates

An initial list of VV&A templates is provided in the accompanying Table 2.2.2-1:

Table 2.2.2-1: VV&A Templates	
Name	Comments
DMSO VV&A RPG	
Navy VV&A Implementation Handbook	
DMSO VV&A RPG Tiger Team Data Quality Template	
Office of Aerospace Studies Model and Data Accreditation Report	http://www.oas.kirtland.af.mil/vva.pdf
Joint National Integration Center (JNIC) Verification and Validation Methodology Guide, Volume 2	
Guidelines for Sandia ASCI Verification and Validation Plans, Content and Format: Version 2	
...	

New templates are being developed constantly. For example, in September 2002, the Navy M&S Standards Steering Group proposed a “Validation Report Format for Navy Air Defense and Related Threat Simulators, Simulations, Models, and Actuals” that provides a standard validation report format and format guidance in the support of independent validation of air defense and air defense-related threat simulators used for test and evaluation (T&E) of weapon systems and training of Navy air crews. These include threat representative systems in the form of simulations, simulators, models, missile seekers, EO, IR, UV and actual threat weapons systems.

2.3 VV&A Resources

2.3.1 Categories of VV&A Resources

Categories of resources include:

- repositories – such as the DMSO Modeling and Simulation Resource Repository (MSRR), the individual service MSRRs, the MDA MSRR
- websites – such as the DMSO VV&A Recommended Practices Guide (RPG) website [1]
- reflectors – such as the SISO VV&A Forum reflector
- organizations – such as the DMSO VV&A RPG Team, JASA, NAVMSMO, AMSO, AFAMS, MSIAC
- conferences – such as SIMVAL99, the JASA-sponsored Reno conferences (“Assuring M&S Credibility for Defense Acquisition and T&E Survivability, Lethality, and System Effectiveness”, ...), the Simulation Interoperability Workshops VV&A Forum, Summer Computer Simulation Conference and Advanced Simulation Technology Conference tracks
- conference proceedings – such as provided in hardcopy and/or CD-ROM by the above conferences

- papers/reports – such as the Navy Handbook on VV&A [2] and the references in this paper and others at Foundations '02
- bibliographies – such as provided in the preliminary material for Foundations '02
- training courses – such as supplied by commercial concerns
- subject matter experts – such as the attendees at this conference.

These categories are neither exclusive nor inclusive. In fact, there is a great deal of overlap between categories such as reflectors and websites, for example. And, one of the goals of Foundations '02 is to determine additional categories of resources with examples.

The tables of resources provided below are incomplete. The authors hope to augment the tables' contents with inputs provided at the Foundations '02 Conference. The VV&A community as a whole will need to contribute to this effort to produce a quality product.

2.3.2 Listing of VV&A Resources

An initial list of VV&A repositories is provided in the accompanying Table 2.3.2-1:

Table 2.3.2-1: VV&A Repositories	
Name	Comments
DMSO MSRR	
Air Force MSRR	
Army MSRR	
Navy MSRR	
Missile Defense Agency MSRR	
...	

An initial list of VV&A websites is provided in the accompanying Table 2.3.2-2:

Table 2.3.2-2: VV&A Websites	
Name	URL
DMSO VV&A RPG	http://www.msiac.dmsomil/vva
MSIAC	http://www.msiac.dmsomil/
JASA	http://www.nawcwpns.navy.mil/~jasa/
...	

An initial list of VV&A reflectors is provided in the accompanying Table 2.3.2-3:

Table 2.3.2-3: VV&A Reflectors	
Name	URL
SISO VV&A Forum	http://confs.itcenter.org/listprocedu/ViewAllMail.cfm?Reflector_ID=69&client=SISO
...	

An initial list of VV&A organizations is provided in the accompanying Table 2.3.2-4:

Table 2.3.2-4: VV&A Organizations	
Name	Contact
DMSO VV&A RPG Team	www.msiac.dmsomil/vva
JASA	www.nawcwpns.navy.mil/~jasa/
NAVMSMO	http://navmsmo.hq.navy.mil/
AMSO	www.amso.army.mil
AFAMS	www.afams.af.mil/
MSIAC	www.msiac.dmsomil/
...	

An initial list of VV&A conferences is provided in the accompanying Table 2.3.2-5:

Table 2.3.2-5: VV&A Conferences	
Name	Sponsor
SIMVAL99	MORS
Reno Conferences	JASA
SIW	SISO
SCSC	SCSI
ASTC	SCSI
...	

An initial list of VV&A conference proceedings is provided in the accompanying Table 2.3.2-6:

Table 2.3.2-6: VV&A Conference Proceedings	
Name	Source
SIW Fall 96	SISO
SIW Spring 2002	SISO
SCSC 1999	SCSI
ASTC 2001	SCSI
SIMVAL99	MORS
...	

An initial list of VV&A papers/reports is provided in the accompanying Table 2.3.2-7:

Table 2.3.2-7: VV&A Papers/Reports	
Name	Author/Source
DMSO VV&A RPG	DMSO
Navy Handbook on VV&A	NAVMSMO
...	

An initial list of VV&A bibliographies is provided in the accompanying Table 2.3.2-8:

Table 2.3.2-8: VV&A Bibliographies	
Name	Source
Foundations '02	
...	

An initial list of VV&A training courses is provided in the accompanying Table 2.3.2-9:

Table 2.3.2-9: VV&A Training Courses	
Provider	Contact
AEgis Technologies	Bob Gravitz
...	

An initial list of VV&A subject matter experts (SMEs) is provided in the accompanying Table 2.3.2-10:

Table 2.3.2-10: VV&A Subject Matter Experts	
Name	Organization, Phone Number, eMail
Dale Pace	JHU/APL
Simone Youngblood	DMSO
Steve Stevenson	Clemson University
Debra Ridgeway	AMSO
Robert Easterling	Sandia National Laboratory
Jennifer Park	NAVMSMO
...	

3. Analysis of VV&A Templates and Resources

3.1 Templates

VV&A templates are “cookbooks with recipes” for practitioners to follow. Like recipe books, some templates target beginners, and others target an audience with an assumed high level of expertise. For the latter, obvious steps and procedures are often omitted, as are explanations of the “kitchen tools.” Consequently, a user must first determine the level of sophistication needed to complete the templates and then possibly hire the template developer to finish the project.

Many templates for VV&A have been developed by private contractors as proprietary implementations of the general guidance provided by DoD organizations such as DMSO and the Navy VV&A group. In many cases, these implementations are considered company “crown jewels” of intellectual property, and thus are not willingly shared!! Their existence may be promoted as parts of proposals, but not their actual contents. The best that can be hoped for in support of this Foundations conference is to collect the “meta-data” for the templates. That is, we can read advertisements for the cookbooks, but we can’t open them and read the actual recipes!

The best of the VV&A templates contain the “distilled wisdom” of old-line practitioners. These templates guide us around pitfalls and smooth out the rough parts of the VV&A path. Unfortunately, like other distilled products, the use of templates can become addictive! We must ensure that the templates are still useful for the specific project at hand. Perhaps we need “standards” and “accreditors” for our templates!

3.2 Resources

There are many VV&A resources as noted in the tables in section 2.3.2 of this report. Unfortunately, these resources can be:

- difficult to identify,
- difficult to access, and
- difficult to use.

Consequently, the M&S and VV&A communities need a “meta-resource” that delineates:

- the types of resources,
- their contents, and
- their access methods.

Further, this meta-resource needs to be maintained, updated frequently, and made accessible via the internet.

Clearly, this session of Foundations ’02 is an important first start towards identifying the contents of this meta-resource.

4. Conclusions

Our general conclusion is that the use of VV&A templates and resources should be expanded to:

- expedite the VV&A process,
- increase confidence in the outcome of the VV&A process, and
- reduce cost and/or cost uncertainty of the VV&A process.

More specific conclusions include:

- The M&S community needs a meta-resource (repository) to store and disseminate information about VV&A templates and resources. This meta-resource should be accessible to all practitioners of VV&A.

The ultimate goal, of course, is to reduce the risk in using models and simulations, provide more credible models and simulations, and support better decisions.

5. Acknowledgments

We would also like to thank Mr. William Marshall and Mr. Phil Abold for providing MSIAC support in the preparation of this paper and for Foundations '02 in general. The MSIAC is sponsored by the Defense Modeling and Simulation Office (DMSO), and Defense Technical Information Center (DTIC), and is directed by Mr. William Marshall.

6. Bibliography

- [1] DoD Modeling and Simulation Office (DMSO), Department of Defense Verification, Validation and Accreditation Recommended Practices Guide, 2000, on <http://www.msiac.dmsomil/vva>
- [2] Department of the Navy Verification, Validation, and Accreditation Implementation Handbook. November 2000. Draft

7. Authors' Biographies

Dr. Jerry M. Feinberg has over twenty five years of experience in managing and conducting studies and analyses of military systems and in strategic science and technology planning. He is a co-author of the two-part MSIAC state of the art report titled "Automated Support Tools for VV&A." He is the Chief Scientist and Knowledge Manager for the Modeling and Simulation Information Analysis Center (MSIAC). His expertise is in technology planning; distributed modeling and simulation; simulation based acquisition (SBA); verification, validation, and accreditation (VV&A); analysis of alternatives, and intelligent agent technology. He has been awarded two patents in the applications of intelligent agents to models and simulations and to distributed information technology systems.

Dr. Patrick W. Goalwin has fifteen years of experience in DoD-related physics-based modeling and simulation. He is a co-author of the two-part MSIAC state of the art report titled “Automated Support Tools for VV&A.” He has developed, used and modified distributed interactive simulations of sonar systems, and has developed, used, and modified simulations of radars for remote sensing and missile defense, and passive microwave radiometers for remote sensing. He has participated in four separate technology reviews. At the MSIAC, Dr. Goalwin has been involved with state of the art report production and the analysis of technology for Human and Organizational Behavior Modeling.