Joint Automated Modeling and Simulation Standards Vetting Tool And Repository

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ABSTRACT

The Air Force (AF) was the only service without a functioning standards program for its Modeling and Simulation (M&S) initiative. This produced an ineffective M&S program which suffered from its inability to effectively integrate live, virtual and constructive simulations within the AF training centers and externally with inter-service, Joint and industrial M&S agencies. To address this operational and technical problem, the Air Force Agency for Modeling & Simulation (AFAMS) envisioned and worked with its sister-Services, the Defense Modeling and Simulation Office (DMSO), and the Joint National Training Capability (JNTC) to implement an integrated, collaborative M&S standards program that dove tailed with all Services, Department of Defense (DoD) and Joint M&S standards activities. AFAMS' design included a cross-cutting common M&S organization structure, an implementation plan, a common vetting process and a web-based collaborative vetting and repository tool. Their program was selected as the common, integrated DoD/Joint M&S standards program. When fully employed, all DoD M&S organizations will use the AF M&S standards program for nominating, evaluating and advocating common and effective M&S standards for community use. The effect will be immediate and significant as the traditional three to five year M&S standards vetting process will be reduced to months resulting in a significant cost savings. Furthermore, the DoD-wide, common integrated approach for vetting M&S standards will significantly enhance information sharing to improve validated standards use, reuse and composability.

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INTRODUCTION

To understand what the Joint Automated M&S Standards Vetting Tool (JVT) and Repository has to offer, first we have to explain its genealogy and pedigree. To begin with, it is not a new web-based decision support tool for vetting M&S standards….it is a better one. First, it is being built on the efforts and lessons learned from the existing Service M&S standards programs. And secondly, it acknowledges and addresses the fact that DoD can no longer support the high cost of stand alone Service programs and limited information sharing. This paper will review the previous efforts, the JVT concept was built upon and discuss at how JVT improves on it.

In April 2004 the Defense Standardization Program Office (DSPO) established the "Modeling and Simulation Standards and Methodologies (MSSM)" standardization area and designated Defense Modeling and Simulation Office (DMSO) as its Lead Standardization Activity (LSA). Previously, Service, Joint and DoD M&S standards activities had been ongoing but without any coordinated effort to leverage similar requirements and activities (DMSO Program Management Plan for M&S Standards, 2005). In fact, DoD, and the Services conduct their respective M&S standards vetting activities and maintain separate repositories in a similar manner:

- First, they review and approve standards documents for use within their respective departments and organizations. The documents include defense standards, non-governmental standards, and policy and guidance issuances.

- Second, they sponsor the development of new documents in response to identified requirements. This may be accomplished through the establishment of drafting teams or through the tasking of an outside activity.

- Third, they can mandate the use of specific documents within their organizations. This can include the requirement to incorporate specific documents into the DoD Architecture Framework for acquisition programs and developments. Authority for this activity is drawn from their organizational relationship to their respective Service Acquisition Executives or Program Managers.

Army Approach

The Army M&S Office (AMSO) uses a consensus based process for their development, vetting and maintaining M&S standards (Army Standards Nomination and Approval Process and the Army Standards Repository System, Users Manual, 1998). Many M&S technologies evolve at blinding speeds.
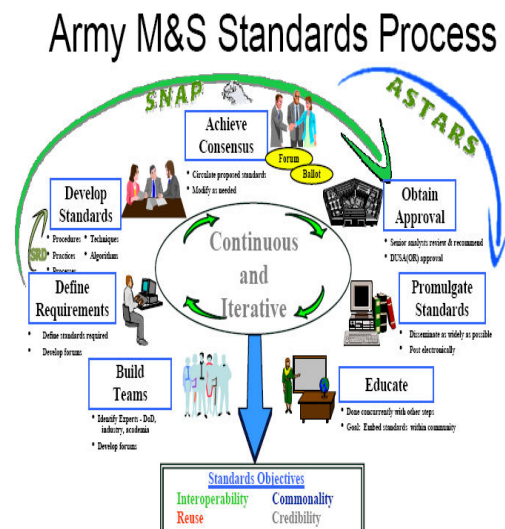

Figure 1. The Army's M&S Standards Nomination & Approval Process (SNAP)

Some technology niches turn over in a matter of months. The Army's intent is to capture intellectual energy and practical achievements of the entire M&S

community to ensure the standards it decides to adopt are affordable, relevant, and in keeping with the direction of the state-of-the-art and practice. By keeping the process consensus-based, real M&S experts shape the decisions. The Army's M&S Standards Development Process is supported by two web-based tools: The Standards Nomination & Approval Process (SNAP), shown in Figure 1, and the Army Standards Repository System (ASTARS).

Navy and Marine Corps Approach

The Navy and Marine Corps M&S standards programs are handled by their Navy M&S Office (NMSO) and Marine Corps M&S Management Office (MCMSMO), respectively. They are the single points of M&S standards contact for their services. NMSO provides the centralized management to coordinate M&S efforts across their service functional areas, and develop policies and procedures necessary for M&S standardization (Navy Modeling and Simulation Management Office: SNEACRS User's Manual, 2005). The Navy M&S Standards Steering Group (MS3G) developed and uses a process based on the concept and focus of three key phases to Nominate, Evaluate and Advocate. This concept, depicted in Figure 2, shows that the Government and Industry contribute as both producers and consumers of M&S.
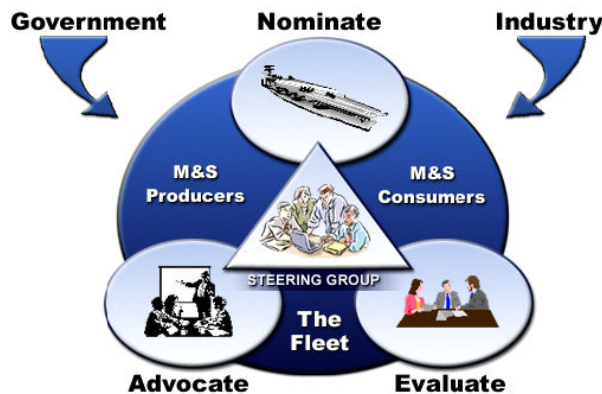

Figure 2. Navy M&S Standards Concept

Though Army and Navy M&S standards programs adequately support each Service's needs, both processes work independently of each other and do not easily promote reuse, integration and interoperability of standards in a collaborative distributed environment. Furthermore, because each Service M&S program works independently of the other, the time needed to staff an M&S standard across DoD increases exponentially which, in turn, increases the cost of

getting standards approved and ultimately slows down the delivery of capability to the Warfighter.

Air Force Approach

Leveraging the efforts and lessons learned from the Army and Navy M&S programs, AFAMS developed an automated web-based M&S vetting and repository tool called SERUS. The vetting process is shown in Figure 3. The tool hosts a set of supporting functions which include:

- a set of AF M&S standard's informational web pages including hyperlinks to other service, DoD, Joint and Industry M&S standards;
- a dynamic online decision support vetting application tool; and,
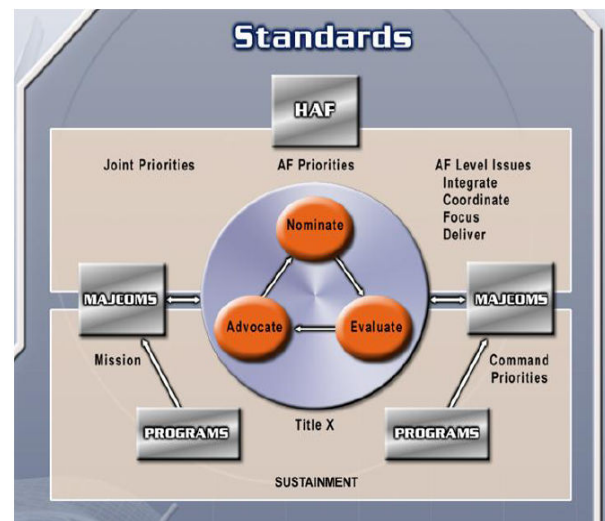- a repository system for storing and searching nominated and approved AF M&S standards.

Figure 3 AF M&S Standards Methodology

SERUS also provides the AF the capability to internally track nominated standards through its nomination, approval and advocacy process, as well as, providing a storage facility to host approved standards and associated documentation.

Building on the success of SERUS to automate staffing processes and improve information exchange, DMSO, working with its Joint and Service M&S partners, commissioned the AF to enhance SERUS as a joint M&S standards vetting and repository tool. Now that you have the JVT pedigree, we'll discuss how JVT is expected to operate as a web-enabled, automatic, common, integrated DoD M&S standards vetting and repository tool.

CONCEPT

Simply put, the JVT will build on and leverage the efforts and lessons learned from the three Service M&S programs and tools:

- It incorporates the Navy Nominate, Evaluate and Advocate methodology;
- It uses the vetting process developed by the Army and refined by the Navy;
- It incorporates the automated decision support functions of the AF SERUS;
- It uses the Service repositories; and
- It enables them to talk….to share data and make decisions, on line, in real time, from any location.

As stated earlier, the JVT M&S standards vetting process focuses on three key phases: Nominate, Evaluate and Advocate M&S standards encompassing a common seven stage process.

Nominate

The nomination phase provides the DoD M&S Community the opportunity to define and identify the need and justification for M&S standards and best practices.

The entrance point to the system is a simple, web-based submission form available to anyone having access to the JVT website. Once submitted, this electronic Standards Requirements Document (SRD) activates an evaluation process. The SRD moves through the system to various organizations and people, and is dynamically routed depending on the subject category it affects. Several options are available during the process that includes recategorizing the nominated standard, withdrawing it entirely, or allowing the proposed standard to proceed to the next stage in the process. The nomination process stage is:

- Stage 1: Initial Submission

Evaluate

The evaluation phase begins when a candidate standard or best practice is validated and accepted as a possible candidate for inclusion into a Service, Joint or DoD reference model. The evaluation process includes the following stages:

- Stage 2: Technical Evaluation
- Stage 3: Internal Review

- Stage 4: External Review
- Stage 5: Ballot and Decision Authority Approval

Advocate

In addition to publishing the approved standard on the JVT website, the DoD Standards Program provides follow-up support that includes M&S Community outreach. This outreach includes education in support of standards and collaboration with other standards programs. The advocate phase includes the following stages:

- Stage 6: Promulgate and Advocate
- Stage 7: Periodic Review

Vetting Process

Essential to the key concepts of Nominate, Evaluate, and Advocate are: automated web tools; collaboration and facilitated support to address and resolve issues; and, M&S experts to review, leverage and refine the appropriate standards. The vetting process will also be synchronized with the DoD IT Standards Registry (DISR) change request (CR) cycles. The seven stages of the common vetting process are listed below:

Stage 1: Initial Submission
An SRD is submitted to either recommend the adoption of an existing M&S standard or to describe a need that is not yet met. The SRD captures initial information regarding the nomination and is initially evaluated for completeness and category validity. Immediately upon submission, the SRD is assigned a system-generated number for tracking purposes. The format for the tracking number is DoD, Joint, AF, AR, NA or USMC-XXX-YYY, where XXX is a 3-digit sequential number and YYY is a 3-character designation for the standard's owning military service. The SRD follows the standard throughout the entire vetting process capturing its status, progress, and history.

Stage 2: Technical Evaluation
The second stage of the vetting process involves the assigned subgroup evaluating the SRD against defined criteria. A technical team evaluates the standard and completes a SRD Review Form. The SRD Review Form contains evaluation criteria specific to each Subgroup area. The results of the SRD Review Forms are tallied and displayed on a Quad Chart. The vetting tool ranks a standard based on the SRD Review Forms and recommends approval to the next stage or withdrawal.
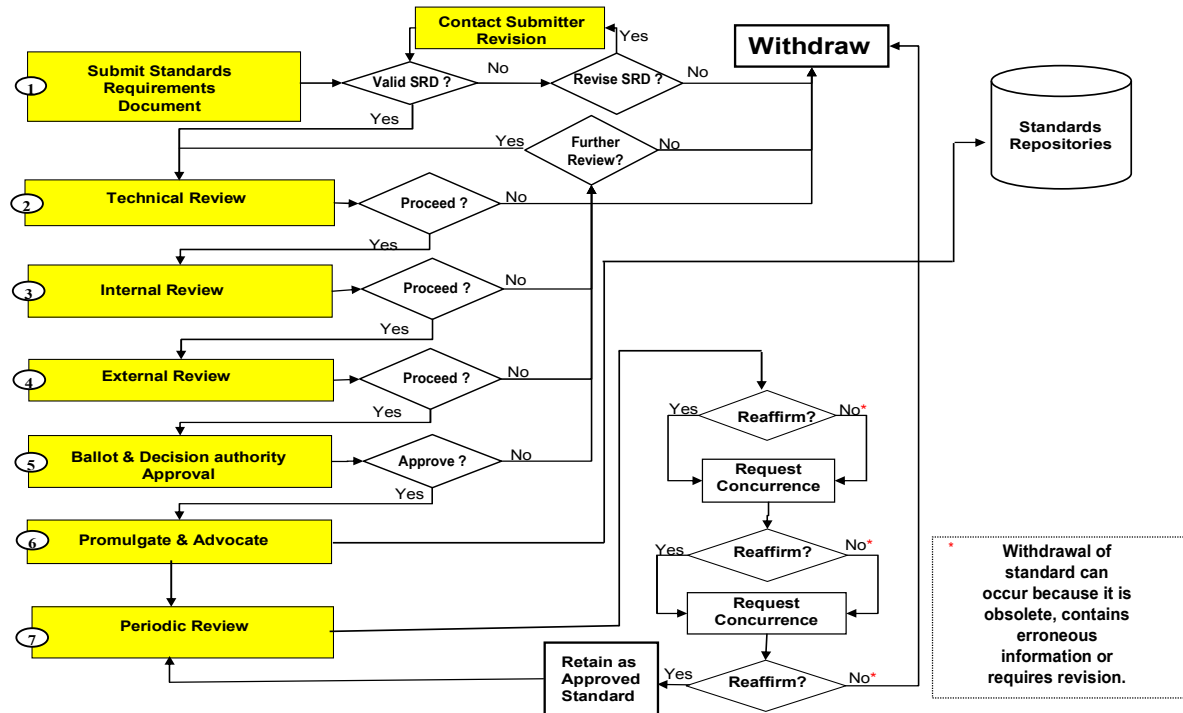
Figure 4 M&S Standards Process Flow Diagram

Stage 3: Internal Review
In the third stage of the process, the respective Service, Joint or DoD M&S standards committee reviews the Quad Chart and recommendations from the Technical Review Team and determines if it is appropriate to send the proposed standard to the general Service, Joint or DoD M&S Community. When the status of the SRD is updated, the SRD is ready for a Community review.

Stage 4: External Review
The fourth stage of the process involves a review of the proposed standard by the M&S Community. Opening and closing dates are set for comment submission. Comments, via emails, are collected and saved and a report is generated that summarizes the comments.

Stage 5: Ballot and Decision Authority Approval
The fifth stage of the process involves final deliberation and the voting process. The respective M&S committee formally reviews all comments/recommendations and completes an online ballot to accept or reject the standard. The committee then sends the recommended M&S standard to their approval authority for approval.

Stage 6: Promulgate and Advocate
In the sixth stage of the process the SRD is ready for implementation and is posted on respective Service and Joint M&S websites or in the DISR. A General Reflector email is then sent to the respective M&S Communities advising them of the new approved standard. A periodic review date is also set.

Stage 7: Periodic Review
The seventh stage of the process ensures all approved standards remain current and applicable. The technical review team recommends the periodicity of the reviews in Stage 2 during the Technical Evaluation. Thirty days prior to a periodic review, an auto-generated email notification is sent of the upcoming review.

On the review date, an auto-generated email is sent to respective Service, Joint and DoD M&S committees and Subgroup Leaders to review the standard. If the standard is re-approved, the SRD status is updated to "Reaffirmed" and the approval date is updated.

SCOPE

The JVT and its repository will be designed to ensure appropriate M&S standards are available, when needed, for M&S development, acquisition, deployment, and life-cycle support. JVT and its will be listed on their respective websites. Those approved by DoD will be listed in the DoD Information Technology Standards Registry (DISR) and will be categorized as new mandated, new emerging or contained legacy.

The JVT web site will be a secure site and access will be restricted to registered users. New users will complete an online registration form that includes contact information, reason for access, and the name of a sponsor. Users will then be assigned a temporary password and access rights based on their role within the vetting process. Users will also have the capability to change their password the first time they log in or if they forget their password.

The goals of approved Service, Joint and DoD M&S standards are:
- Interoperability: To enable simulations and stimulations to provide and accept data, algorithmic results, objects or services from one another.
- Reuse and Commonality: To establish a baseline for reusing AF models, simulations and stimulations, and associated data as well as associated protocols, techniques, and processes.
- Credibility: To improve acceptance of M&S representations, and
- Consistency: To ensure consistent understanding of data and functional descriptions for use in simulated and stimulated operations.

ARCHITECTURAL DESIGN

The architecture for JVT will consist of a SQL Server 2000 database and applications written in C++ JavaScript, and ASP.NET. A relational database will be created for the repository. The database schema will consist of several relational tables that are normalized for expandability and maintainability. Stored procedures will communicate between the software application and database.

ROLES AND RESPONSIBILITIES

As described in the seven stage process above, there are critical milestones that move an SRD along its path from the time it is submitted to the time it is approved and

repository will initially be hosted on an unclassified web server. Classified standards will use the same vetting tool and repository but will be located on SIPRNET. Unclassified standards endorsed by this process and approved by the Services and Joint

published. User roles and responsibilities are defined at each stage of the process to ensure the SRD moves from stage to stage.

DISTRIBUTED SOLICITATION

JVT will support the interaction and communication that must take place between players during each of the seven stages with a series of automatic email messages that are triggered and sent out throughout the process.

FUTURE VISION FOR A JOINT VETTING TOOL

The requirement for a joint vetting tool and repository is well documented by the DoD, Joint and Service M&S Communities. Their requirements and costs to support DoD Training Transformation can no longer be supported by stand alone Service programs and limited information sharing. Developing and executing affordable and agile Joint training requires a common, integrated approach for vetting M&S standards. The JVT and repository, once fielded, will significantly drive down costs, enhance M&S information sharing, and improve reuse and composability to rapidly deliver capability to the Warfighter.

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