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WASHINGTON, D.C. 20350-1000

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SECNAV INSTRUCTION 5200.40

From: Secretary of the Navy

Subj: VERIFICATION, VALIDATION, AND ACCREDITATION (VV&A) OF MODELS AND SIMULATIONS

Encl: (1) VV&A Process
(2) Definitions

Ref: (a) DoD Directive 5000.59 of 4 Jan 94; Subj: DoD Modeling and Simulation (M&S) Management (NOTAL)
(b) DoD Directive 5000.61 of 29 Apr 96; Subj: DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A) (NOTAL)
(c) SECNAVINST 5200.38 of 18 Oct 94; Subj: Department of the Navy Modeling and Simulation Program
(d) SECNAVINST 5000.2B of 6 Dec 96; Subj: Implementation of Mandatory Procedures for Major and Non-Major Defense Acquisition Programs and Major and Non-Major Information Technology Acquisition Programs (NOTAL)
(e) Department of Defense Verification, Validation, and Accreditation (VV&A) Recommended Practices Guide, of Nov 96 (NOTAL)

1. Purpose. To establish policy and procedures and assign responsibilities for modeling and simulation[1] (M&S) verification, validation, and accreditation (VV&A) requirements within the Department of the Navy (DON).

2. Background

a. For many years, M&S techniques and tools have been used to assist developers and decision-makers throughout the weapons

[1] The acronym "M&S" includes modeling and simulation, model and simulation, and models and simulations. Within this instruction, "M&S" will be used interchangeably with these various meanings as applicable.

acquisition, training and deployment planning process. This support from M&S capabilities includes: evaluating requirements; performing trade-off studies; understanding and demonstrating system capabilities and performance; training and educating military and civilian personnel; and development, assessment and feasibility analyses of operational courses of action. M&S tools have provided valuable insights in a number of defense-related issues, both operational and developmental, and have thus been applied in a wide variety of areas to reduce uncertainty and risk. Recent advances in M&S technology facilitate more extensive interactions both within and among service simulations, thus enabling the application of M&S to fully integrated warfare systems, as well as to warfare systems of combined and joint forces within the total battlespace.

b. Confidence in a particular model or simulation must be justified before its results are used to make decisions involving large sums of money or risk to human life. To ensure that confidence in an M&S application is justified, a rigorous process must be followed such that (1) modeling assumptions are well documented, (2) results produced by the M&S are stable, and (3) the correlation between M&S behavior and real world behavior is well understood.

c. References (a) and (b) direct Department of Defense (DoD) components (1) to establish VV&A policies, procedures, and guidelines for M&S applications, standards, and databases managed by the DoD component; and (2) to accredit, as appropriate, M&S applications used to support the major DoD decision-making organizations. Reference (c) directs the issuance of a common VV&A process for use by Navy and Marine Corps activities. Reference (d) issues mandatory procedures for DON implementation of DoD direction in the system acquisition process for major and non-major defense acquisition programs. It further defines processes, oversights, and decision mechanisms, and assigns responsibilities for various aspects of the acquisition process within DON including assigning some M&S accreditation responsibilities to specific DON organizations.

d. VV&A refers to the process used to ensure that the application of M&S results is appropriate for a specific purpose, e.g., supporting a system acquisition decision, training a warfighter, or developing a tactical mission plan. While sometimes referred to as a single process, VV&A consists of many processes that address verification, validation, and accreditation of M&S. Verification and validation (V&V) functions are performed during the M&S development process and are similar in concept to the application of quality control in manufacturing. Accreditation is a decision to use M&S and its results for a particular application. Properly performed and documented V&V are

essential to the accreditation decision process. However, it is equally essential that the accreditation authority understand the scope and limits of specific M&S capabilities before concluding that these are applicable and appropriate for the intended use.

3. Applicability and Scope. This instruction amplifies other existing DoD and DON regulations and instructions governing the design, development, use, and disposition of M&S including related systems and software. This instruction applies to:

a. All new DON models and simulations, i.e., M&S which will be completed after the effective date of this instruction, and which satisfy one or more of the following criteria derived from reference (c):

(1) M&S for which at least five work-years of effort has been, or will be, invested for development, modification, or enhancement.

(2) M&S which are used significantly in supporting the development of either the DON Program Objectives Memorandum (POM) or Analysis of Alternatives (AOA).

(3) M&S which are essential for human or system safety or whose interaction leads to the control and movement of real warfare systems in real-time (e.g., live forces and military hardware in formal systems testing, training exercises, or combat operations).

(4) M&S which the Navy or Marine Corps will release or otherwise make available to other DoD components or contractors, or M&S which will interoperate directly with M&S systems developed outside the DON.

b. Legacy and commercially developed M&S if their use meets one or more of criteria 2 through 4.

c. Legacy M&S which are enhanced or modified, and the enhancement, or the M&S as a result of the enhancement, meets one or more of criteria 1 through 4.

4. Policy

a. The DON VV&A process is established by this instruction.

b. Every DON M&S within the scope of this instruction, whether embedded in weapon systems, implemented as a stand-alone system, or integrated with other M&S systems for distributed simulation, shall be verified and validated, as set forth in this

instruction, prior to its use. Furthermore, each M&S shall be accredited by the appropriate accreditation authority prior to using it for an application that meets one or more of the criteria 2 through 4 in paragraph 3a. M&S being applied to developing systems and capabilities will be designated as "non-accredited" until the appropriate accreditation authority has approved the M&S for the application. Any subsequent use in a new application domain or modification of the M&S will require a reaccredidation process.

c. The DON VV&A process is flexible. The Accreditation Authority may tailor the process (i.e., accredit with limits, when necessary) to meet specific requirements and objectives while working within existing resource constraints.

5. Responsibilities

a. The Assistant Secretary of the Navy (Research, Development and Acquisition) (ASN(RD&A)) is the DON Acquisition Executive (NAE). The NAE is responsible to ensure that all M&S employed throughout the acquisition process, including support for DoD and DON Milestone Decision Authority (MDA) decisions, have undergone appropriate VV&A.

b. The Chief of Naval Operations (CNO) and the Commandant of the Marine Corps (CMC) are responsible for the DON's requirements generation process, operational test and evaluation, readiness, planning and programming to satisfy operational requirements. Program and resource sponsors are responsible for identifying requirements and managing resources. Program Executive Officers (PEOs), commanders of systems commands, Direct Reporting Program Managers (DRPMs), and program managers all administer assigned acquisition programs, reporting to the NAE.

c. To the extent that the above-listed authorities employ M&S tools in their assigned responsibilities, they will accredit these tools in accordance with this instruction.

d. Commander, Operational Test and Evaluation Force (COMOPTEVFOR) and Director, Marine Corps Test and Evaluation Agency (MCOTEA) are responsible for independent operational test and evaluation for the Navy and Marine Corps, respectively. They will accredit all models and simulations used to supplement OT&E.

e. The Director, DON M&S Management Office (DONMSMO) is responsible to provide guidance in the development of a DON VV&A

program. Under this responsibility, Director DONMSMO shall:

(1) Develop a training program for M&S accreditors.

(2) Ensure the archiving of VV&A activities, plans and reports for all DON M&S within the scope and application of this instruction. This archiving may be in a common archive, or within individual Service M&S repositories.

(3) Conduct an annual assessment of VV&A implementation activities within DON and submit an assessment report to the Secretary of the Navy, CNO, and CMC.

f. The Director, DON M&S Technical Support Group (DON M&S TSG) shall:

(1) Support the DON M&S VV&A process including:

(a) Development and issuance of a DON M&S VV&A Implementation Handbook, which specifies detailed considerations, procedures, and formats to be used in the DON M&S VV&A program.

(b) Building common services, tools, and databases for future development.

(c) Coordination of DON M&S VV&A implementation activities with DoD, Joint Staff, and other Components to support the development of common tools, interfaces, services, and capabilities throughout DoD.

(2) Serve as technical advisor and M&S repository manager for VV&A activities, plans, and reports.

(3) Conduct periodic technical exchanges within various DON M&S development and user communities and facilitate ongoing collaboration and coordination among the members of these communities.

g. The M&S Proponent shall:

(1) Develop a V&V Plan and ensure that the Accreditation Authority accredits the M&S prior to its application or use.

(2) For M&S under development or modification, implement the V&V Plan (as an integral part of the M&S Development Plan for M&S development or modification efforts) and forward this V&V Plan, report(s), and accreditation(s) to DONMSMO for incorporation into the DON M&S repository.

(3) Prepare a V&V Report and forward to the Accreditation Authority for evaluation and accreditation with a copy to DONMSMO.

(4) Ensure that effective configuration management of M&S is implemented and maintained during and following the accreditation process.

h. The Accreditation Authority shall:

(1) Determine the appropriateness of the application of a model or simulation for a particular use.

(2) Ensure that adequate V&V procedures have been implemented prior to the use of M&S capabilities.

i. By reference (a), the Under Secretary of Defense (Acquisition and Technology) (USD(A&T)) assigns responsibility for certain common- and general-use M&S applications to DoD M&S Executive Agents (MSEAs). In accordance with reference (b), these MSEAs are responsible to establish appropriate VV&A procedures for the M&S under their purview.

6. VV&A Functional Process. The primary purpose of a VV&A effort is to establish credibility of a model or simulation as a source of data. Depending upon where in the life cycle V&V is initiated, it may also serve a secondary purpose of risk mitigation, supporting the identification of potential problems or errors as early in the life cycle as possible. The VV&A process will be an integral part of the M&S life cycle. The M&S life cycle is initiated with requirements definition and includes conceptualization, design, implementation, application, modification, and maintenance. The M&S life cycle encompasses all M&S as defined in paragraph 3, i.e., newly developed M&S, modified or enhanced M&S, and legacy M&S. Enclosure (1) describes the VV&A process and its integration with the M&S Development Process.

7. Definitions. Definitions of key terms of this instruction are provided in enclosure (2).

8. Reports. The reporting requirements contained in this instruction are exempt from reports control in accordance with SECNAVINST 5214.2B.

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	FN1	(COMNAVSPACECOM)
	FT1	(CNET)
	V12	(CG MCCDC, MCOTEA)
	V28	(CDR MARCORSYSCOM)

VV&A PROCESS

1. Introduction. This enclosure provides a description of the M&S development process with key elements of the VV&A process emphasized throughout. Figure 1 provides a generalized view of

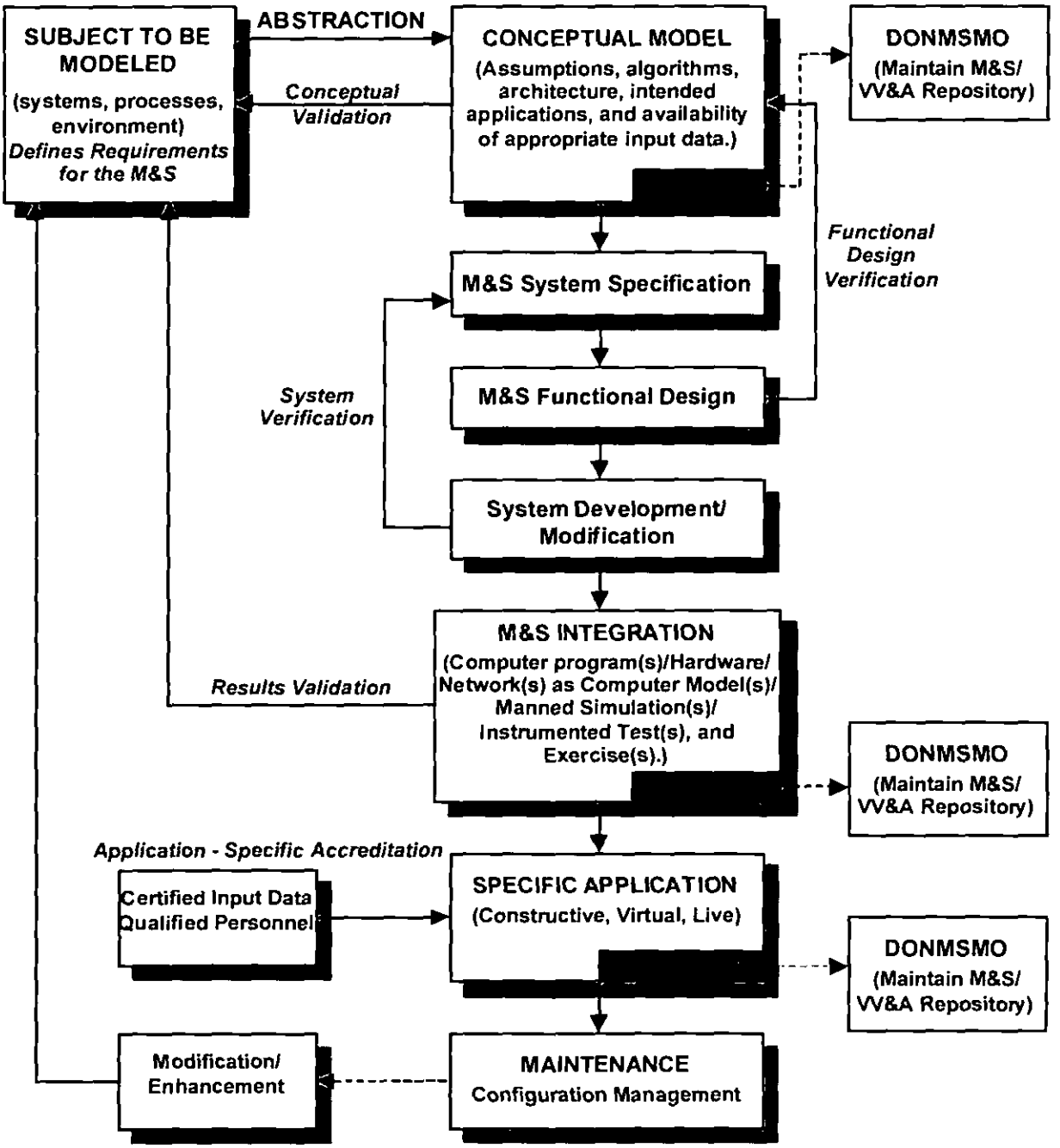

Figure 1. VV&A Process Integration with Modeling and Simulation Lifecycle

the M&S Development Life Cycle upon which the VV&A process has been overlaid. These processes are consistent with the generic M&S life cycle and associated generic VV&A process defined in reference (e). While the process as depicted in Figure 1 serves as a foundation for any VV&A effort, each individual VV&A effort must strike a balance between cost-effectiveness, responsiveness, and sufficiency to succeed. To maintain that balance between application requirements and real-world resource constraints, the VV&A process must be tailored to fit four sets of considerations including the intended application(s), the Accreditation Authority's requirements, resource constraints, and the type(s) of M&S involved, whether new development, modified, or legacy.

2. Process Description. The primary purpose of VV&A is to establish credibility of the M&S capability. Depending upon where in the M&S development life cycle V&V is initiated, V&V may also serve to mitigate risk, supporting the identification of potential problems or errors as early in the life cycle as possible. The VV&A process should be planned and implemented as an integral part of the M&S development life cycle. The M&S life cycle is initiated with requirements definition and includes conceptualization, design, implementation, application, modification, and maintenance.

a. Verification and Validation. V&V, distinct from the A of accreditation, are performed by the M&S PROPONENT. In cases where an independent, third party evaluation is required, an independent V&V or IV&V function may be added. V&V can be decomposed into four documented functional events (conceptual validation, functional design verification, system verification, and results validation). The V&V functional process needs to be fully integrated by the M&S PROPONENT into the larger context of M&S planning, development, management, and utilization for coherence and efficiency. The process must be formalized such that documented results of activities are readily accessible for use by subsequent M&S efforts. A V&V report of the documented results will be sent to the Accreditation Authority for review and confirmation of compliance with the plan, this instruction, and other applicable instructions. V&V plans and reports will be forwarded to DONMSMO for incorporation into the M&S repository.

b. V&V Process Phases. The phases associated with the V&V process are described below:

(1) Phase 1: Preliminary Activity--Specify and Analyze Requirements. Fully understanding the M&S development requirements is essential for the VV&A effort. These requirements define the functionality and capability which the user requires of the model or simulation system. They also serve as the foundation against which the simulation will be verified and validated. VV&A requirements are derived from the M&S development requirements and are focused on ensuring that the M&S development satisfies its defined requirements. A set of user-defined acceptability criteria will help bound and shape the V&V effort.

(2) Phase 2: Conceptual Validation. The conceptual model serves as a bridge between the defined requirements and the M&S design, providing the developer's interpretation of the requirements to which the model or simulation will be built. The conceptual model is a statement of assumptions, algorithms, and architecture that relates the elements of the model to one another (and to other models or simulations in federated simulation environments) for the intended applications of the models or simulations. Development of the conceptual model is an iterative process. As functional or fidelity requirements are not or cannot be met, the requirements and/or the conceptual model are reexamined and modified if required. Because of the intricate relation between a simulation and the data which it requires, the conceptual model should also address availability of data to be used by the simulation.

Both the conceptual model and its validation must be documented. The documentation explains why (or why not) the assumptions, algorithms, modeling concepts, anticipated data availability, and architecture of the conceptual model are expected to provide an acceptable representation of the subject modeled for intended application of the model or simulation. Any interactions expected with other models or simulations (as in a federation) must be taken into account. Conceptual model validation should occur before further M&S development, to avoid the potential pitfall of inaccurately representing the system and not meeting the proposed requirements. Errors caught at this early stage of development are far easier and less expensive to fix than errors detected and corrected later.

(3) Phase 3: V&V Plan. The focus of the V&V plan is to satisfy the VV&A requirements. In support of this goal, the planning stage identifies the tasks required in a manner that matches and complements the M&S development plan, requirements, resources, and timelines. Each iteration of the plan is adapted

to address the requirements and constraints of the M&S application and covers critical issues, while allowing flexibility for adjustment and refinement.

Formal guidance and requirements are collected and reviewed to determine the constraints under which the M&S V&V, data verification, validation and certification (VV&C), and accreditation efforts will operate. Appropriate evaluation techniques and measures are identified. Necessary tools and resources are further identified and specific activities scheduled. Tailoring the selection of V&V techniques and processes, based on requirements and resource availability, is done as part of the VV&A planning process.

For new development efforts, the plan will address management (tasks, schedule, and resources) and analysis actions (scope, limitations, constraints, methodology, sources of data, methods of collection, testing, acceptability criteria, scenarios, and environments) for V&V during development.

A V&V plan for M&S modifications or enhancements will address the above listed elements as well as the development and enhancement history, summary of past application(s), and past V&V status.

A V&V plan for legacy M&S will focus on past development and enhancement histories, summary of past application(s), and past V&V status. Reengineering issues will be addressed as needed.

Initially, a V&V plan is developed as a draft or working document that evolves as the application takes shape. When new information is available or changes occur, the plan is reviewed and updated as appropriate.

(4) Phase 4: Functional Design Verification. The M&S functional design describes the developer's blueprint for the development of the M&S. The functional design is based on the M&S system specification, which defines the hardware, software, and personnel that comprise the M&S. The design process has two primary components: the architectural system design, which addresses the hardware and software architecture, data structures, and interfaces; and the detailed software design, which addresses key elements of the software such as critical algorithms and data issues. Software elements should be developed in accordance with standard software development procedures. Design features emphasize functionality, information flow, ordering of processes, and data accessibility.

The M&S functional design is verified against the conceptual model to ensure that it accurately reflects the validated concept and associated requirements. The M&S design has an associated portion of the V&V plan, which addresses management actions (tasks, schedule, and resources) and analysis actions (scope, limitations, constraints, methodology, sources of data, testing, and acceptability criteria) for V&V during M&S development.

(5) Phase 5: System Verification. System verification is the formal (i.e., documented) test/review process by the M&S proponent responsible for determining that the M&S accurately represents the functional design and has traceability to the conceptual model and the system requirements. System verification examines timing and protocol constraints on M&S processing, and accommodates for unanticipated (out of specification) input values for a model or simulation which must interact with hardware, operators, or other M&S in a distributed simulation.

For new development/modification efforts, all software elements should be written in accordance with contemporary software engineering and DoD standards of structure, documentation, testing, and quality assurance. Modern software development technology (i.e., automation) should be used to enhance M&S documentation, configuration management, etc.

(6) Phase 6: Results Validation. Results validation is the formal (i.e., documented) test/review process that compares the responses of the M&S with known or expected behavior from the subject it represents, in order to ascertain that the M&S responses are sufficiently accurate for intended uses. A model with stochastic processes is expected to provide guidance regarding the number of iterations required for statistically significant results, addressing the practical considerations of simulation run time and of reduction in size of confidence level intervals as a function of the number of iterations. Output stability concerns must also be addressed.

c. Application Specific Accreditation Process. Accreditation processes must address both new and legacy models in the full spectrum of M&S classes (live, virtual, constructive), functional application areas (training, acquisition, and assessment), and implementations (unitary, distributed) in a coherent and formal way so that synergism among VV&A efforts can occur. Accreditation must be specific for the application. Figure 2 provides an

overview of the DON M&S VV&A Process. Elements of that process are described below.

(1) Accreditation Package Development. The M&S proponent will compile an accreditation package commensurate with the purpose for which accreditation is being sought. The development of this package should be integrated into the M&S project as early as practical and, where feasible, from the point of conception of the project. The accreditation package will be submitted to the Accreditation Authority. References to materials in the accreditation package, e.g. V&V plans, V&V reports, and earlier accreditations, should be included in the DONMSMO repository.

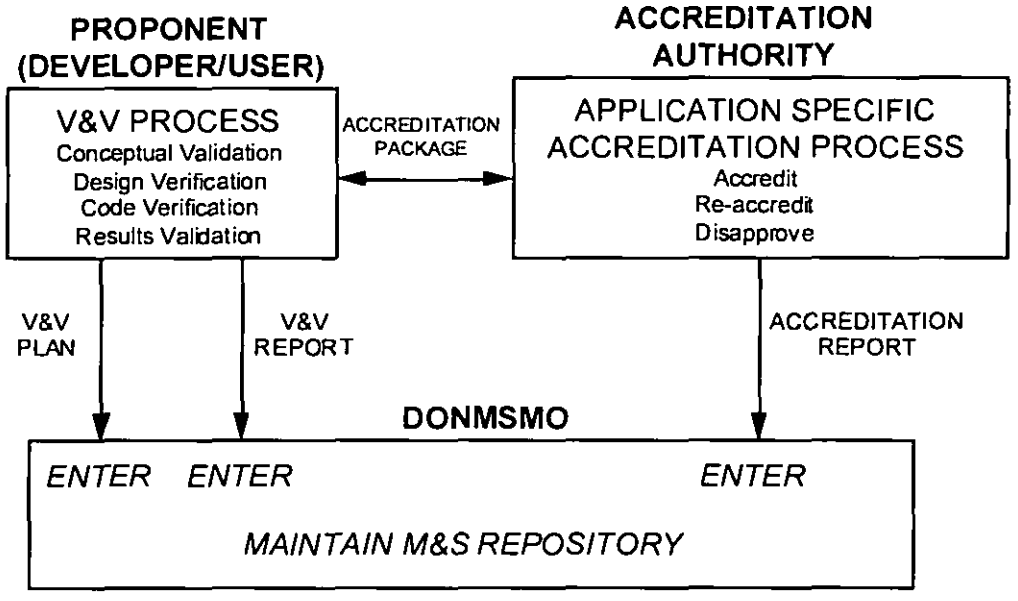

Figure 2. Navy M&S VV&A Process Overview

(2) Accreditation Package Review. When the Accreditation Authority receives an accreditation package, the Accreditation Authority may request additional accreditation review support from either an accreditation support agent, DONMSMO, or both. This additional support will consist of a technical review of the submitted accreditation package to verify that it satisfies the requirements for the accreditation being sought. (The Accreditation Authority may also require that independent tests be conducted on the M&S.) The supporting organization may draw upon senior technical advisors, subject matter experts (SMEs), and members from both the development personnel and representatives of

the Accreditation Authority to assist in these reviews. Acting as accreditation support agents, reviewers should have the expertise to make informed judgments about the model or simulation capabilities and limitations. Once the review is completed, a report will be submitted to the Accreditation Authority. (Note that, in cases where the M&S is subjected to multiple accreditations by different authorities, each Accreditation Authority has full responsibility to ensure satisfactory VV&A; hence, each may require these independent tests as appropriate.)

(3) Accreditation Decision. The Accreditation Authority will review the accreditation package and any recommendations made by those supporting the accreditation review and respond in any of the following manners:

(a) accredit the M&S for the specific applications,

(b) require additional tests or information to gain accreditation, or

(c) disapprove accreditation.

(4) Re-accreditation. The accreditation package must be maintained and updated whenever changes and enhancements are made to the M&S. When a new version of the M&S is finalized, a new accreditation package must be submitted by the M&S proponent to the Accreditation Authority. Included in this accreditation package must be a descriptive list of all changes made to the software since this M&S was last accredited, and the rationale/ data supporting re-accreditation.

(5) Accreditation Status Statement. All documents which contain results from an M&S application should contain a statement as to the accreditation status of the M&S application utilized. This should include a list of accredited versions, with dates of accreditation. It should also identify which version of the M&S application was used in the results being documented. For each new version of the model, a description of the complete VV&A documentation with recommended accreditation results will be sent to the Accreditation Authority with a copy to DONMSMO for inclusion in the M&S repository. If the M&S capability has not completed the VV&A process, it will be marked "Not accredited" until accreditation has been accomplished.

3. Documentation. Documentation required for accreditation consists of verification and validation documents, model

development documents, and a configuration management plan. Copies of such documentation shall be furnished to the Director, DONMSMO, for retention as part of the M&S repository.

a. Verification and Validation Planning. V&V planning starts with the initiation of M&S activity and shall be performed concurrently with M&S development, or major upgrade of an existing M&S. V&V planning shall include programming V&V resources. Appropriate DoD M&S Executive Agents (MSEAs) (as defined in reference (a)) shall be consulted during plan development if the M&S involves representations within the MSEAs' domain(s).

b. Verification. Minimum M&S documentation requirements for verification include:

(1) V&V Plan. The V&V Plan should include a written plan or statement detailing procedures for verification of the M&S application. Specific sections of the code to be verified and processes by which verification is to take place must be detailed.

(2) Verification reports. Verification reports must include:

(a) Identification of the verification agent (if applicable);

(b) Description of model or simulation version or release, and developing organization;

(c) Complete identification and description of verification methodologies and activities, organizations, and individuals involved in the verification;

(d) Documented actions taken as a result of verification tests conducted; and

(e) Results of verification effort, including explicit identification of known limitations and restrictions.

(3) Independent verification reviews and tests. These reviews and tests are optional, unless they are directed by the M&S proponent, accrediting authority, or higher authority. To assure higher confidence in accreditation, these reviews or tests are led by parties independent of the M&S developer, although participation by members of the M&S development team have been

found to be effective and save resources. If conducted, these reviews should be documented in a verification report.

c. Validation: Minimum M&S documentation requirements for validation include:

(1) V&V Plan. The V&V Plan should include a written plan or statement detailing all validation efforts planned during the operational testing of the M&S application. This plan should include identification of output to be measured and correlated with other data sources, identification of outside data sources and methods of collection to be used in validation, and issues involved in the comparison.

(2) Validation reports. Validation reports must include:

(a) Identification of the validation agent (if applicable);

(b) Description of model or simulation version or release, and developing organization;

(c) Complete identification and description of validation methodologies, tests, and activities, organizations, and individuals involved in the validation;

(d) Documented actions taken as a result of validation tests conducted;

(e) Results of validation effort, including explicit identification of known limitations and restrictions;

(f) Documented results and actions taken as a result of validation tests conducted;

(g) Results of all validation tests with the explicit identification of known limitations and restrictions; and,

(h) A report identifying experts who participated in the validation effort and a summary of their findings.

(3) Independent validation reviews and tests. These reviews and tests are optional, directed by the M&S proponent or higher authority. To assure higher confidence in accreditation, these reviews or tests are conducted by parties independent of the

M&S developer. If conducted, these reviews should be documented in the validation report.

d. Accreditation: Development of an accreditation package is the responsibility of the M&S proponent. Minimum M&S documentation requirements for accreditation include:

(1) Accreditation reports. These reports must include:

(a) Identification of the accreditation agent (if applicable);

(b) Description of model, simulation, or federation of models and simulations;

(c) Intended purpose of M&S application;

(d) Assumptions: scenarios; representations of concepts, tactics, techniques, and procedures; forces, processes, and doctrine from both friendly and opposing force perspectives as used in the M&S;

(e) Description of accreditation methodology, including V&V activities, plans and reports that support accreditation; information relating to M&S data used in accreditation; and accreditation criteria;

(f) Accreditation agent's evaluation, to include capabilities and limitations as they affect the appropriateness of the model, simulation, or federation of models and simulations for the intended purpose;

(g) Accreditation authority's decision on whether or not to accredit the particular specific model, simulation, or federation of models and simulations for the intended purpose.

(2) In addition to the above report, accreditation documentation shall include Software Design Documents, a User's Guide, and a Programmer's Manual. These may be combined or published separately.

4. Configuration Management (CM). A strong CM plan is one of the critical ingredients in ensuring the continued credibility of models and simulations. Demonstrated effective M&S CM management is the responsibility of the M&S proponent, and is required for any M&S undergoing accreditation. Version identification, track-

ing, and archiving are essential for any accreditation process. Source code, executable code, documentation, input data sources, descriptions of any special hardware associated with the model or simulation, and all other application materials will be marked with the appropriate version number and archived. A CM plan will document all procedures, participants, and responsibilities in the configuration control of the M&S application.

5. Data. Data used in M&S applications affects the M&S accuracy and credibility of results. Efforts are underway to establish certified databases for much of the input information used in DON and other DoD M&S. Such data often must be interpreted and translated into appropriately-related parameters and values for use in a particular M&S. In an application-specific accreditation review, which examines data to be used in the M&S, the data examination must consider both correctness of the data and its interpretation/translation into M&S parameters. Application-specific accreditation review teams must be familiar with both (a) the appropriate data sources for the intended application and (b) the interpretation and translation which must be made to that data to allow for use with the M&S.

DEFINITIONS

The following definitions are applicable in this instruction.

a. Accreditation. Accreditation is an official determination that a model or simulation is acceptable to use for a specific purpose.

b. Accreditation Agent. The organization designated by the Accreditation Authority to conduct an accreditation assessment for a specific M&S application. (Use of accreditation agents is optional; the Accreditation Authority may choose to conduct this assessment without use of such agents. If accreditation agents are employed, they should possess the expertise to make informed judgments about the matters under consideration.)

c. Accreditation Authority. The Accreditation Authority is the senior management or command-level directly responsible to approve the use of an M&S capability for a particular application or set of applications. This should be the authority responsible for decisions supported by the M&S capability, e.g., the Milestone Decision Authority for systems acquisition and the Operational Commander for training systems.

d. Independent Verification and/or Validation. Independent V&V is the process of performing V&V by an agent who is independent of the M&S developer. This independent agent may be sponsored by the M&S proponent, the Accreditation Authority, or other appropriate authority and are intended to add credibility to the VV&A process.

e. Legacy Models or Simulations. Legacy M&S are existing M&S which were developed and implemented prior to the issuance of this instruction.

f. M&S Executive Agent. The DoD component and organization assigned management responsibility and authority for the development and maintenance of a specific area of M&S application, including relevant standards and databases, used by or common to many M&S capabilities. M&S Executive Agents have been designated for Terrain, Atmospheric and Space Environments, Intelligence, and Oceanographic Environments.

g. M&S Proponent. The M&S Proponent is the agency or organization, e.g., program manager, laboratory commander, systems commander, etc., who has the primary responsibility for the development, V&V, and configuration management of a particular M&S capability as well as its application in specific areas of interest.

h. Validation. Validation is the process of determining the degree to which a model or simulation is an accurate representation of the real world from the perspective of the intended uses.

i. Validation Agent. The organization designated by the M&S Proponent to perform validation for a model, simulation or federation of models and/or simulations. (Use of validation agents is optional; the proponent may choose to conduct this assessment without use of such agents. If validation agents are employed, they should possess the expertise to make informed judgments about the matters under consideration.)

j. Verification. Verification is the process of determining that a model or simulation implementation accurately represents the developer's conceptual description and specifications.

k. Verification Agent. The organization designated by the M&S Proponent to perform verification for a model, simulation or federation of models and/or simulations. (Use of verification agents is optional; the proponent may choose to conduct this assessment without use of such agents. If verification agents are employed, they should possess the expertise to make informed judgments about the matters under consideration.)