Department of Defense
INSTRUCTION

SUBJECT: DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A)

References: (a)   DoD Instruction 5000.61, "DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A)," May 13, 2003 (hereby canceled)
(b)   DoD Directive 5134.01, "Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L))," December 9, 2005
(c)   DoD Directive 5000.59, "DoD Modeling and Simulation (M&S) Management," August 8, 2007
(d)   DoD Directive 8320.02, "Data Sharing in a Net-Centric Department of Defense," December 2, 2004
(e)   DoD 8910.1-M, "Department of Defense Procedures for Management of Information Requirements," June 30, 1998
(f)   Military Standard 3022, "Documentation of Verification, Validation, and Accreditation (VV&A) for Models and Simulations," January 28, 2008

1. <u>PURPOSE</u>. This Instruction:

a. Reissues Reference (a) according to the authority in Reference (b) and the guidance in Reference (c).

b. Establishes policy, assigns responsibilities, and prescribes procedures for the VV&A of models, simulations, distributed simulations, and their associated data.

2. <u>APPLICABILITY</u>. This Instruction applies to:

a. OSD, the Military Departments, the Office of the Chairman of the Joint Chiefs of Staff and the Joint Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as the "DoD Components").

b. Models and simulations and associated data developed, used, made available, or managed by the DoD Components, to include those used by non-DoD organizations to support DoD processes, products, or procedures.

3. <u>DEFINITIONS</u>. See Glossary.

4. <u>POLICY</u>. It is DoD policy that:

a. Models, simulations, and associated data used to support DoD processes, products, and decisions shall undergo verification and validation (V&V) throughout their lifecycles.

b. Models, simulations, and associated data used to support DoD processes, products, and decisions shall be accredited for an intended use.

c. VV&A results shall be documented and made accessible to the DoD Components, other Government agencies, and non-governmental activities, as applicable and in accordance with DoD Directive 8320.02 (Reference (d)).

d. Each DoD Component shall be the final authority for validation of representations of its forces and capabilities in models, simulations, and associated data, and shall be responsive to other DoD Components to ensure those forces and capabilities are appropriately represented.

e. Heads of the DoD Components and OSD Presidentially Appointed, Senate-confirmed (PAS) officials are authorized to provide, within their areas of responsibility, VV&A procedures and guidance as appropriate and in accordance with this Instruction. This additional information shall be based on the intended use and risk of use of the models, simulations, and their associated data.

5. <u>RESPONSIBILITIES</u>. See Enclosure 1.

6. <u>PROCEDURES</u>. See Enclosure 2.

7. <u>INFORMATION REQUIREMENTS</u>. The data collection activities described in this Instruction are exempt from licensing, according to subparagraphs C4.4.3 and C4.4.4 of DoD 8910.1-M (Reference (e)).

8. <u>RELEASABILITY</u>. UNLIMITED. This Instruction is approved for public release and is available on the Internet from the DoD Issuances Web Site at http://www.dtic.mil/whs/directives.

9. <u>EFFECTIVE DATE</u>. This Instruction is effective immediately.

Ashton B. Carter
Under Secretary of Defense
for Acquisition, Technology, and Logistics

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ENCLOSURE 1

RESPONSIBILITIES

1. UNDER SECRETARY OF DEFENSE FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS (USD(AT&L)). The USD(AT&L) shall:

a. Through the Defense, Director for Research and Engineering, ensure the M&S Coordination Office serves as the primary focal point for data and information on DoD and non-DoD activities as well as on DoD VV&A policies, procedures and practices, V&V results, and accreditation documentation.

b. In coordination with the DoD Components, develop policies, plans, procedures, and DoD issuances for the implementation and management of VV&A for DoD models, simulations, and their associated data.

c. Through the M&S Steering Committee:

(1) Encourage communication and coordination on VV&A activities among and between organizations and agencies using DoD models, simulations, and their associated data.

(2) Promote cooperative research, development, investment, and application of VV&A technologies.

(3) Establish standards for implementing VV&A for DoD models, simulations, and their associated data to promote DoD VV&A procedural commonality and foster model and simulation interoperability. Established standards shall be reviewed periodically to ensure currency.

2. DIRECTOR OF OPERATIONAL TEST AND EVALUATION (DOT&E). The DOT&E shall prescribe policies and procedures, and provide guidance on VV&A for DoD models, simulations, and their associated data used for operational test and evaluation and live fire test and evaluation.

3. HEADS OF THE DoD COMPONENTS AND OSD PAS OFFICIALS. The Heads of the DoD Components and the OSD PAS Officials shall:

a. Develop guidance for VV&A practices for models, simulations, and associated data, within their areas of responsibility.

b. Document the results of VV&A for models, simulations, and associated data. Make VV&A documentation accessible to other DoD Components as applicable and in accordance with Reference (d).

c. Serve as the final validation authority for representations of the DoD Component's forces and capabilities in common and general use models, simulations, and associated data, within their areas of responsibility.

d. Resolve validation issues for representations of the DoD Component's forces and capabilities as requested.

e. Be responsive to other DoD Components to ensure the DoD Component's forces and capabilities are appropriately represented as requested.

f. When designated as a functional Executive Agent or M&S Coordination Agent, operating as approved by AT&L and with advice from the M&S Steering Committee:

(1) Upon request, provide domain information and expertise in support of VV&A activities.

(2) Ensure that data quality information is available and accessible to support the other DoD Component's VV&A activities.

g. Assign responsibilities to ensure that:

(1) Models, simulations, and their associated data that are developed or modified on behalf of the DoD Component are verified and validated throughout their lifecycle.

(2) Models, simulations, and their associated data that are used by the DoD Component are accredited for the intended use.

(3) VV&A resources are provided by the Component developing, modifying, or using the models, simulations, and the associated M&S data.

4. <u>DIRECTOR, DEFENSE INTELLIGENCE AGENCY (DIA)</u>. The Director, DIA, under the authority, direction, and control of the Under Secretary of Defense for Intelligence, shall:

a. For representations of non-U.S. forces and capabilities:

(1) Serve as the final validation authority.

(2) Be responsive to DoD Components to ensure that non-U.S. forces and capabilities are appropriately represented.

b. For U.S. national and joint intelligence processes and capabilities:

(1) Serve as the final validation authority.

(2) Be responsive to DoD Components to ensure that U.S. national and joint intelligence processes are appropriately represented.

ENCLOSURE 1

ENCLOSURE 2

DOCUMENTATION PROCEDURES

1. This enclosure defines the minimum set of items to document as part of VV&A.

    a. <u>Common Documentation Requirements</u>

        (1) Identification of the date performed and the person or organization performing the verification, validation, or accreditation activities.

        (2) Identification of the version and/or release of the model, simulation, or associated data being verified, validated, or accredited.

        (3) Identification of the intended use of the model, simulation, or associated data being verified, validated, or accredited.

        (4) List of or reference to the M&S requirements and associated accreditation criteria for the model, simulation, or associated data being verified, validated, or accredited.

        (5) List of, and description of, the verification and/or validation and/or accreditation assessment activities.

    b. <u>Additional Documentation Requirements for V&V.</u> Summary of results, including the M&S limitations risks, potential impacts, and assumptions of the models, simulations and/or the associated data undergoing V&V.

    c. <u>Additional Documentation Requirements for Accreditation Activities</u>

        (1) Summary of the results of the accreditation assessment.

        (2) Identification of the user and/or accreditation authority and record of the accreditation decision.

2. Military Standard 3022 (Reference (f)) provides suggested templates for documenting VV&A that are tailored to the application. The use of these standardized templates will help enable the efficient reuse of M&S data and tools.

GLOSSARY

PART I. ABBREVIATIONS AND ACRONYMS

DIA   Defense Intelligence Agency
DOT&E   Director of Operational Test and Evaluation

M&S   modeling and simulation

PAS   Presidentially Appointed, Senate-confirmed

USD(AT&L)   Under Secretary of Defense for Acquisition, Technology, and Logistics

VV&A   verification, validation, and accreditation
V&V   verification and validation

PART II. DEFINITIONS

Unless otherwise noted, these terms and their definitions are for the purpose of this Instruction.

accreditation. The official certification that a model or simulation and its associated data are acceptable for use for a specific purpose.

accreditation authority. The organization or individual responsible to approve the use of models, simulations, and their associated data for a particular application.

accreditation criteria. A set of standards that a particular model, simulation, or federation must meet to be accredited for a specific purpose.

common use. Services, materiel, or facilities provided by a DoD agency or a Military Department on a common basis for two or more DoD agencies, elements, or other organizations as directed.

data verification and validation. The process of verifying the internal consistency and correctness of data and validating that it represents real-world entities appropriate for its intended purpose or an expected range of purposes.

general use M&S. Specific representations used by, or common to, many models and simulations (e.g., physical environment or environmental effects such as terrain, atmospheric, or hydrographic effects).

<u>model</u>. A physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process. (Non-comprehensive examples: a mathematical formula, a mock-up, a logically rigorous representation of a system or a systems behavior, and a human behavior representation).

<u>M&S</u>. The discipline that comprises the development and/or use of models and simulations.

<u>M&S coordination agent</u>. A DoD Component designated by USD(AT&L) to coordinate prescribed aspects of DoD M&S for a designated M&S area.

<u>simulation</u>. A method for implementing a model over time. (Non-comprehensive examples: federation, distributed interactive simulation, combinations of simulations).

<u>validation</u>. The process of determining the degree to which a model or simulation and its associated data are an accurate representation of the real world from the perspective of the intended uses of the model.

<u>verification</u>. The process of determining that a model or simulation implementation and its associated data accurately represent the developer's conceptual description and specifications.