



# IEEE Recommended Practice for Verification, Validation and Acceptance/Accreditation of a Distributed Simulation: An Overlay to the Distributed Simulation Engineering and Execution Process

IEEE Computer Society

Developed by the  
Simulation Interoperability Standards Activity Committee

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**Simulation Interoperability Standards Activity Committee**  
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**IEEE Computer Society**

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**Abstract:** The Distributed Simulation Engineering and Execution Process (DSEEP) identifies best practices for the development and execution of distributed simulations. This recommended practice provides guidelines for verification, validation, and acceptance or accreditation (VV&A) of a distributed simulation and provides a more detailed view of the VV&A processes implied by and aligned with the DSEEP.

**Keywords:** acceptability criteria, acceptance, accreditation, experimental frame, IEEE 1730.2™, validation, verification

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## Introduction

This introduction is not part of IEEE Std 1730.2-2022, IEEE Recommended Practice for Verification, Validation and Acceptance/Accreditation of a Distributed Simulation: An Overlay to the Distributed Simulation Engineering and Execution Process.

The Distributed Simulation Engineering and Execution Process (DSEEP) identifies best practices for the development and execution of distributed simulations and the various technical and managerial issues associated with the implementation of these practices.

This recommended practice provides the guidelines for the verification, validation, and acceptance or accreditation (VV&A) of a distributed simulation. Its purpose is to provide a more detailed view of the VV&A processes implied by and aligned with the DSEEP.

This recommended practice defines the processes and procedures that should be followed to implement VV&A for distributed simulations being developed using the DSEEP. It is not intended to replace existing VV&A policies, procedures, and guidance, but rather is intended to focus on the unique aspects of VV&A of distributed simulations.

This recommended practice provides implementation-level guidance to VV&A practitioners by interpreting and customizing the more generalized DSEEP activity descriptions. It focuses upon the VV&A processes that apply to distributed simulations and not the VV&A processes associated with individual member applications, but does incorporate the use of the information produced by those processes. Furthermore, the recommended practice does not describe the individual verification or validation techniques that could be employed to execute the VV&A processes for distributed simulations.

This recommended practice has been designed to apply across a wide range of functional applications. Currently, these processes represent the best practices available to the VV&A community. Just like the DSEEP, this recommended practice is not intended to be prescriptive for all VV&A practitioners. Rather, it is a tailorable process and is offered as guidance to all participants in DSEEP VV&A activities.

## Contents

|                                                                                                                                                     |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 1. Overview .....                                                                                                                                   | 10  |
| 1.1 General .....                                                                                                                                   | 10  |
| 1.2 Scope .....                                                                                                                                     | 10  |
| 1.3 Purpose .....                                                                                                                                   | 10  |
| 1.4 Word usage .....                                                                                                                                | 11  |
| 2. Normative references .....                                                                                                                       | 11  |
| 3. Definitions, acronyms, and abbreviations .....                                                                                                   | 12  |
| 3.1 Definitions .....                                                                                                                               | 12  |
| 3.2 Acronyms and abbreviations .....                                                                                                                | 14  |
| 4. VV&A roles and responsibilities .....                                                                                                            | 15  |
| 5. Overlay assumptions and tailoring .....                                                                                                          | 23  |
| 5.1 Assumptions .....                                                                                                                               | 23  |
| 5.2 Tailoring .....                                                                                                                                 | 23  |
| 6. VV&A Overlay model: Top-level view .....                                                                                                         | 24  |
| 7. VV&A overlay model: Detailed view .....                                                                                                          | 26  |
| 7.1 Phase 1: Verify distributed simulation objectives .....                                                                                         | 28  |
| 7.2 Phase 2: Verify and validate distributed simulation conceptual model .....                                                                      | 34  |
| 7.3 Phase 3: Verify distributed simulation design .....                                                                                             | 46  |
| 7.4 Phase 4: Verify distributed simulation development products .....                                                                               | 59  |
| 7.5 Phase 5: Validate distributed simulation .....                                                                                                  | 71  |
| 7.6 Phase 6: Accept distributed simulation and verify output processing .....                                                                       | 83  |
| 7.7 Phase 7: Consolidate distributed simulation VV&A products .....                                                                                 | 89  |
| 8. Conclusion .....                                                                                                                                 | 93  |
| Annex A (normative) An Overlay to the High-Level Architecture (HLA) Distributed Simulation Engineering and Execution Process .....                  | 94  |
| Annex B (normative) An Overlay to the Distributed Interactive Simulation (DIS) Distributed Simulation Engineering and Execution Process .....       | 100 |
| Annex C (normative) An Overlay to the Test and Training Enabling Architecture (TENA) Distributed Simulation Engineering And Execution Process ..... | 106 |
| Annex D (informative) Bibliography .....                                                                                                            | 112 |

# IEEE Recommended Practice for Verification, Validation and Acceptance/Accreditation of a Distributed Simulation: An Overlay to the Distributed Simulation Engineering and Execution Process

## 1. Overview

### 1.1 General

This Verification, Validation, and Acceptance/Accreditation (VV&A) overlay focuses upon the VV&A processes that apply to distributed simulations and not the VV&A processes associated with individual simulations (member applications), but does consider using the information produced by those processes.

### 1.2 Scope

This recommended practice defines the processes and procedures that should be followed to implement Verification, Validation, and Acceptance/Accreditation (VV&A) for distributed simulations being developed using the Distributed Simulation Engineering and Execution Process (DSEEP). This recommended practice is not intended to replace existing VV&A policies, procedures, and guidance, but rather is intended to focus on the unique aspects of the VV&A of distributed simulations. It provides a higher-level framework into which such practices can be integrated and tailored for specific uses. The VV&A overlay provides implementation-level guidance to VV&A practitioners; however, it does not describe the individual techniques that might be employed to execute the VV&A processes for distributed simulations.

Users, developers, and VV&A personnel working with simulations and simulation compositions not based upon the DSEEP can also benefit from the guidance in this document since the activities that this overlay describes can be tailored to support any type of distributed simulation application. Guidance for specific integrating standards [High-Level Architecture (HLA), Distributed Interactive Simulation (DIS), Test and Training Enabling Architecture (TENA), etc.] is provided in the annexes.

### 1.3 Purpose

The VV&A overlay has been designed to apply across a wide range of functional applications. The purpose of this overlay is to provide a more detailed view of the VV&A processes implied by the DSEEP. Currently, these

processes represent the best practices available to the VV&A community. The VV&A Overlay is a tailorable process and is offered as guidance to all participants in DSEEP VV&A activities.

This overlay identifies and describes the recommended VV&A processes that should be followed to assure the acceptability and utility of distributed simulations for particular intended uses. The overlay also identifies and describes the information central to and resulting from those processes as well as the relationships between the DSEEP and the VV&A processes and their respective information products. In addition, this overlay defines those terms uniquely needed to characterize the DSEEP VV&A overlay.

This overlay takes special care to use and build upon existing standards, standard terms, and their definitions whenever possible. One notable exception is the general use of “distributed simulation” to describe an integrated simulation and the supporting hardware and software enabling the integration. Lately, the modeling and simulation (M&S) community has increased their focus on representations of the natural environment resulting in an overloading of the word “environment.” Therefore, throughout this document, the integrated simulation and its supporting hardware and software are referred to as the “distributed simulation.” In addition, the commonly used acronym is defined specifically as “verification, validation, and acceptance/accreditation.” Because accreditation is reserved for an official designation, which is not always required, this document focuses on providing verification and validation (V&V) evidence to support acceptance and use of the distributed simulation. Accreditation is addressed and maintained as a formal action introduced within the tailoring activities.

## 1.4 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).<sup>6,7</sup>

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

## 2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE 1278.4<sup>TM</sup>-1997, IEEE Recommended Practice for Distributed Interactive Simulation—Verification, Validation, and Accreditation.<sup>8,9</sup>

SISO-GUIDE-001.1-2012, Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Volume 1: Introduction and Overview.

<sup>6</sup>The use of the word *must* is deprecated and cannot be used when stating mandatory requirements; *must* is used only to describe unavoidable situations.

<sup>7</sup>The use of *will* is deprecated and cannot be used when stating mandatory requirements; *will* is only used in statements of fact.

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SISO-GUIDE-001.2-2013, Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Volume 2: Implementation Guide.

### 3. Definitions, acronyms, and abbreviations

#### 3.1 Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.<sup>10</sup>

These terms may have been defined in *IEEE Standards Dictionary Online*, but have been defined differently or the definitions have been slightly modified to promote better understanding for the purposes of this recommended practice.

**acceptability criteria:** The criteria that the model, simulation, or distributed simulation needs to meet to be acceptable for its intended use.

**acceptance:** The process that ascertains whether an M&S system is fit for intended use.

**accreditation:** The official certification that a model, simulation, or distributed simulation is acceptable for use for a specific purpose (see DoDI 5000.61 [B1]).<sup>11</sup>

**activity:** A set of tasks that consumes time and resources and whose performance is necessary for the execution of the distributed simulation engineering and execution process.

**argumentation structure:** A notional construct that captures and provides rationale for the derivation of acceptability criteria from the acceptance goals, and the derivation of the V&V experimental frame specification from the acceptability criteria. It integrates the anticipated V&V results into items of evidence, and provides argumentation for making acceptability claims to support an acceptance recommendation. (See SISO-GUIDE-001.1-2012.)<sup>12</sup>

**conceptual model:** An abstraction of what is intended to be represented within a distributed simulation, which serves as a frame of reference for communicating simulation-neutral views of important entities and their key actions and interactions. The conceptual model describes what the distributed simulation will represent, the assumptions limiting those representations, and other capabilities needed to satisfy the user's requirements. Conceptual models are bridges between the real world, requirements, and design.

**credibility:** The estimate that a model, simulation, or distributed simulation can serve an intended use.

**distributed simulation:** A named set of member applications along with a common simulation data exchange model (SDEM) and set of agreements that are used as a whole to achieve some specific objective.

**error characteristics:** Those characteristics that describe the nature of the errors in the output from a model, simulation, or distributed simulation. For each output variable that can assume metric values, the minimum and maximum error bounds are measured from the values established by the referent under the same conditions together with the probability that all errors of the output values for that variable will fall within those error bounds.

**experimental frame:** A set of experiments, tests, and conditions used to observe and experiment with the M&S system to obtain V&V results (SISO-GUIDE-001.1-2012).

<sup>10</sup>IEEE Standards Dictionary Online is available at: <http://dictionary.ieee.org>. An IEEE Account is required for access to the dictionary, and one can be created at no charge on the dictionary sign-in page.

<sup>11</sup>The numbers in brackets correspond to those of the bibliography in Annex D.

<sup>12</sup>Information on references can be found in Clause 2.

**fidelity:** The description of a model, simulation, or distributed simulation and its associated data representational capabilities (e.g., resolution, error, precision, and sensitivity).

**interoperability:** The ability of a member application to provide services to and/or accept services from other member applications and to use the services so exchanged to enable the member applications to operate effectively together.

**logical interoperability:** A state of a distributed simulation characterized by understanding of the member applications of the context within which information is being exchanged (adapted from Tolk et. al, 2006 [B11]).

**member application:** An application that is serving some defined role within a distributed simulation. This can include live, virtual, or constructive simulation assets, or can be supporting utility programs such as data loggers or visualization tools.

**objective:** The desired goals and results of the activity to be conducted in the distributed simulation expressed in terms relevant to the organization(s) involved.

**referent:** A codified body of knowledge about a thing being simulated (see VV&A Recommended Practices Guide [B12]).<sup>13</sup>

**repository:** A central place where M&S and VV&A information resources may be cataloged, stored and accessed.

**requirement:** A statement identifying an unambiguous and testable characteristic, constraint, process, or product of an intended distributed simulation.

**results sampling strategy:** The approach for collecting the output from a model, simulation, or distributed simulation.

**risk:** A measure of the probability and severity of undesired effects often taken as a simple product of probability and consequence.

**scenario:** (a) Description of an exercise. It is part of the session database that configures the units and platforms and places them in specific locations with specific missions. (b) An initial set of conditions and time line of significant events imposed on trainees or systems to achieve exercise objectives.

**SDEM:** A specification defining the information exchanged at runtime to achieve a given set of simulation objectives. This includes class relationships, data structures, parameters, and other relevant information.

**semantic interoperability:** A state of a distributed simulation characterized by use of a common information exchange model (see VV&A Recommended Practices Guide [B12]).

**substantive interoperability:** A state of a distributed simulation characterized by understanding of the state changes in the assumptions and constraints of each member application and the ability of the member applications to react to those changes (adapted from Tolk et. al, 2006 [B11]).

**syntactic interoperability:** A state of a distributed simulation characterized by implementation of a common structure to exchange information (adapted from Tolk et. al, 2006 [B11]).

<sup>13</sup>The VV&A Recommended Practices Guide can be retrieved at <https://vva.msco.mil/>.

**technical interoperability:** A state of a distributed simulation characterized by implementation of a communication protocol for exchanging data between member applications (adapted from Tolk et. al, 2006 [B11]).

**uncertainty:** A quantity or quantities that indicate the degree of doubt associated with the value of a simulated or referent property; for enumerated values, the probability that the actual enumerated value corresponds with the simulated or referent value under the same conditions; for metric values, the error characteristics associated with the simulated or referent value.

**validation:** The process of evaluating a model, simulation, or distributed simulation throughout the development and execution process to determine how well it satisfies the acceptability criteria within the context of the referent.

**validity:** The property of a model, simulation, or distributed simulation representations being complete and correct enough for the intended use.

**verification:** The process of evaluating a model, simulation, or distributed simulation and its intermediate products to determine whether the products from a given development phase satisfy the conditions imposed at the start of that phase and, ultimately, determining that an implementation of a model, simulation, or distributed simulation correctly and completely represents the developer's conceptual description and specifications.

### 3.2 Acronyms and abbreviations

|       |                                                          |
|-------|----------------------------------------------------------|
| AP    | approve                                                  |
| AST   | assist                                                   |
| DIS   | distributed interactive simulation                       |
| DoDI  | department of defense instruction                        |
| DSEEP | distributed simulation engineering and execution process |
| GM-VV | generic methodology for verification and validation      |
| HLA   | high level architecture                                  |
| IPR   | intellectual property rights                             |
| L     | lead                                                     |
| M     | monitor                                                  |
| M&S   | modeling and simulation                                  |
| MOE   | measures of effectiveness                                |
| MOP   | measures of performance                                  |
| MSG   | modeling and simulation group                            |
| P     | perform                                                  |
| R     | review                                                   |
| SDEM  | simulation data exchange model                           |
| SME   | subject matter expert                                    |
| TENA  | test and training enabling architecture                  |
| V&V   | verification and validation                              |
| VV&A  | verification validation and acceptance/accreditation     |

## 4. VV&A roles and responsibilities

This clause introduces the various roles and responsibilities that are required to perform the activities identified in the verification validation and acceptance/accreditation (VV&A) overlay. The person or persons who perform in the roles needed to accomplish the activities in this overlay comprise the VV&A team. This clause also describes the rationale used to identify and classify these roles and responsibilities.

The following key roles are used throughout the document:

- User/sponsor: The person, agency, or organization who determines the need and scope of a distributed simulation exercise or event, and establishes the funding and other required resources. The user/sponsor also approves the participants, objectives, requirements, and specifications. The user/sponsor appoints the distributed simulation manager and VV&A agent(s).
- Distributed simulation manager: The person responsible for creating the distributed simulation, executing the event(s) in the distributed simulation, and conducting the post-event activities. The distributed simulation manager coordinates with the VV&A agent(s) during these tasks and then reports the results of the event(s) to the user/sponsor.
- Simulation development team: The team developing a simulation, either a distributed simulation or a member application as appropriate to the context of the activity. In the case of a distributed simulation, the simulation development team has the responsibility to integrate member applications and systems, plan for all aspects of the process, and ensure simulations are compliant with distributed simulation agreements. This team supports the VV&A agent(s) and ensure that the original needs are properly analyzed and interpreted and that the resulting objectives completely capture the nuances of the intended use.
- Verification and validation (V&V) agent(s): The person, agency, or organization responsible for verifying and validating member applications or distributed simulation. Also referred to as the V&V team. If an accreditation agent is not required by the user, then the roles and responsibilities enumerated for the accreditation agent in [Table 1](#) through [Table 7](#), would be assumed by the V&V agent.
- Accreditation agent(s): The person, agency, or organization that accredits member applications or distributed simulations for use and reuse for specific purposes or categories of purposes; responsible for certifying that a distributed simulation has been verified and validated and authorizes the use of the distributed simulation for its intended use.
- VV&A team: The team responsible for conducting VV&A for either a distributed simulation or a member application as appropriate to the context. Unless specified, VV&A team should be interpreted as referring to the distributed simulation VV&A team in this document. The team is responsible to analyze user/sponsor needs, emphasizing needs that have implications for the simulation's representations. The team also assesses simulation feasibility and risk, documents simulation objectives, defines and documents the verification and validation (V&V) plan, and identifies any tools being used for simulation development that also support VV&A activities. This team also determines their impact upon the test, configuration management, security, and quality assurance plans, and provides input to those plans to reflect those impacts.
- Subject matter expert(s) (SME): The person(s), agency, or organization responsible for providing expertise or insight relative to a particular technical or operational discipline, system, or process, and who has been selected or appointed to participate in development, evaluation (i.e., VV&A), or use of a model or simulation.

The roles and responsibilities are defined only in generic terms. There are cases where one individual or organization may have several of the roles. The delegation of these responsibilities depends upon the available resources. The resources required to support each of these roles depends on the user/sponsor requirements and the complexity of both the member applications and the distributed simulation. If these resources are not available, then some prioritization and tailoring of the tasks and their assignment to the roles will be necessary.

Table 1 through Table 7 identifies the roles and responsibilities relevant to VV&A for each activity in this overlay. They are intended only as general guidelines. Interpreting these tables requires understanding the actions attributed to the roles and the heuristics used to assign the actions to the roles.

The following actions are used in Table 1 through Table 7 and in the heuristics used to construct the table. They can apply to either an organization or an individual.

|                     |                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Lead (L)</b>     | Responsible for the activity including assignment of actions to others and scheduling.                          |
| <b>Perform (P)</b>  | Responsible for performing an activity or task under the direction of the leader of the activity.               |
| <b>Assist (AST)</b> | Help a performer or a leader complete an activity or task.                                                      |
| <b>Review (R)</b>   | Called upon to review the work of others and to make suggestions for improvement where appropriate.             |
| <b>Monitor (M)</b>  | Will watch the activities being performed or receive the products so that they can be aware of the VV&A status. |
| <b>Approve (AP)</b> | Responsible for approving the products from the VV&A activities.                                                |

The following heuristics were used to develop Table 1 through Table 7:

- Activities related to the development of the distributed simulation are led or performed by the distributed simulation manager or the distributed simulation development team.
- Verification activities may be led or performed by the simulation development team and assisted by the V&V agent; or led and performed by the V&V agent, if needed.
- Validation activities are led or performed by the V&V agent.
- Accreditation activities are led or performed by the accreditation agent.
- For “support” activities, the V&V agent or the accreditation agent generally monitor or assist.
- For “contribute to” activities, the V&V agent or the accreditation agent may either assist or perform.

**Table 1—VV&A activity roles and responsibilities:  
Phase 1—Verify distributed simulation objectives**

| VV&A overlay phases and activities<br>L = Lead, P = Perform, AST = Assist, R = Review, M = Monitor, AP = Approve |                                                                                               | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|-----|
| Activity 1.1                                                                                                     | Support identifying user/sponsor needs                                                        | AST, AP          | L, P                                 | AST                               | M            | AST                    | AST |
| Activity 1.2                                                                                                     | Support developing distributed simulation objectives                                          | R, AP            | L, P                                 | AST                               | AST          | AST                    | AST |
| Activity 1.3                                                                                                     | Contribute to verifying distributed simulation objectives                                     | AP               | L                                    | AST                               | AST          | P                      | AST |
| Activity 1.4                                                                                                     | Develop V&V context information including initial assessment of use risk                      | R                | M                                    |                                   | L, P         | M                      | AST |
| Activity 1.5                                                                                                     | Define distributed simulation acceptance/acceptability goals and associated confidence levels | AP               | M                                    | M                                 | AST          | L                      | AST |

**Table 2—VV&A activity roles and responsibilities:  
Phase 2—V&V distributed simulation conceptual model**

| VV&A overlay phases and activities<br>L = Lead, P = Perform,<br>AST = Assist, R = Review,<br>M = Monitor,<br>AP = Approve |                                                                 | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME    |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|--------|
| Activity 2.1                                                                                                              | Support developing distributed simulation test scenarios        | AP               | L                                    | P                                 | AST          | M                      | P, AST |
| Activity 2.2                                                                                                              | Contribute to verifying distributed simulation test scenarios   |                  | M                                    | L, P                              | AST          | M                      | P, AST |
| Activity 2.3                                                                                                              | Define the referent sources                                     | AST, AP          | M                                    | M                                 | P, AST       | L, P                   | P, AST |
| Activity 2.4                                                                                                              | Support developing distributed simulation conceptual model      | AP               | L                                    | P                                 | AST          | M                      | P, AST |
| Activity 2.5                                                                                                              | Contribute to verifying distributed simulation conceptual model |                  | M                                    | L, P                              | AST          | M                      | P, AST |
| Activity 2.6                                                                                                              | Validate distributed simulation conceptual model                | AP               | M                                    | AST                               | L, P         | M                      | P, AST |
| Activity 2.7                                                                                                              | Support developing distributed simulation requirements          | AST, AP          | L, P                                 | AST                               | AST          | M                      | AST    |
| Activity 2.8                                                                                                              | Contribute to verifying distributed simulation requirements     | AP               | L                                    | P                                 | AST          | M                      | AST    |
| Activity 2.9                                                                                                              | Develop acceptance/acceptability criteria                       | AST, AP          | M                                    | AST                               | AST          | L, P                   | P, AST |
| Activity 2.10                                                                                                             | Develop V&V argumentation structure                             | AST, AP          | M                                    | AST                               | AST          | L, P                   | P, AST |

**Table 3—VV&A activity roles and responsibilities:  
Phase 3—Verify distributed simulation design**

| VV&A overlay phases and activities<br>L = Lead, P = Perform,<br>AST = Assist, R = Review,<br>M = Monitor,<br>AP = Approve |                                                                                                                    | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|-----|
| Activity 3.1                                                                                                              | Support selecting distributed simulation member applications                                                       | AP               | L                                    | P                                 | AST          | M                      | AST |
| Activity 3.2                                                                                                              | Develop the V&V experimental frame                                                                                 | R                | M                                    | M                                 | L, P         | AST                    | AST |
| Activity 3.3                                                                                                              | Support designing distributed simulation                                                                           | AP               | L                                    | P                                 | R            | M                      | AST |
| Activity 3.4                                                                                                              | Contribute to verifying distributed simulation design                                                              |                  | M                                    | L,P                               | AST          | M                      | AST |
| Activity 3.5                                                                                                              | Apply relevant historical information for member applications (standalone and as part of a distributed simulation) | R                | M                                    | AST                               | L, P         | AST                    | AST |
| Activity 3.6                                                                                                              | Support designing distributed simulation member applications                                                       |                  | L                                    |                                   | R            |                        | AST |
| Activity 3.7                                                                                                              | Contribute to verifying distributed simulation member application designs                                          |                  |                                      |                                   | AST          |                        | AST |
| Activity 3.8                                                                                                              | Plan supplemental verification and validation for member applications as indicted by use risk assessment           |                  | R                                    | L                                 | P            |                        | AST |

*Table continues*

**Table 3—VV&A activity roles and responsibilities:  
Phase 3—Verify distributed simulation design (*continued*)**

| VV&A overlay phases and activities<br>L = Lead, P = Perform,<br>AST = Assist, R = Review,<br>M = Monitor,<br>AP = Approve |                                                                         | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME |
|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|-----|
| Activity 3.9                                                                                                              | Support preparing distributed simulation development and execution plan | AP               | L                                    | P                                 | AST          | AST                    | AST |
| Activity 3.10                                                                                                             | Assess distributed simulation use risk                                  | R                | M                                    | AST                               | L, P         | AST                    | AST |
| Activity 3.11                                                                                                             | Produce the V&V plan tailored to appropriate scope and prioritization   |                  |                                      | AST                               | L, P         | R                      | AST |

**Table 4—VV&A activity roles and responsibilities:  
Phase 4—Verify distributed simulation development products**

| VV&A overlay phases and activities<br>L = Lead, P = Perform,<br>AST = Assist, R = Review,<br>M = Monitor,<br>AP = Approve |                                                            | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME |
|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|-----|
| Activity 4.1                                                                                                              | Support developing simulation data exchange model          |                  | L, AP                                | P                                 | AST          | M                      | AST |
| Activity 4.2                                                                                                              | Contribute to verifying simulation data exchange model     |                  | AST                                  | L, P                              | AST          | M                      | AST |
| Activity 4.3                                                                                                              | Support establishing distributed simulation agreements     |                  | L, P                                 | AST                               | AST          | M                      | AST |
| Activity 4.4                                                                                                              | Contribute to verifying distributed simulation agreements  |                  | L                                    | P                                 | AST          | M                      | AST |
| Activity 4.5                                                                                                              | Support implementing distributed simulation infrastructure | AST              | L                                    | P                                 | AST          | M                      |     |

*Table continues*

**Table 4—VV&A activity roles and responsibilities: Phase 4—Verify distributed simulation development products (continued)**

| VV&A overlay phases and activities<br>L = Lead, P = Perform, AST = Assist, R = Review, M = Monitor, AP = Approve |                                                                                          | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME |
|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|-----|
| Activity 4.6                                                                                                     | Tailor and prioritize verification and validation activities                             | R                | M                                    | L, P                              | P, AST       | M                      | AST |
| Activity 4.7                                                                                                     | Verify and validate data sets                                                            | R                | M                                    | P                                 | L, P         | M                      | AST |
| Activity 4.8                                                                                                     | Verify technical interoperability                                                        |                  | L                                    | P                                 |              | M                      | AST |
| Activity 4.9                                                                                                     | Verify semantic and syntactic interoperability of infrastructure and member applications |                  | M                                    | M                                 | L, P         | AST                    | AST |

**Table 5—VV&A activity roles and responsibilities: Phase 5—Validate distributed simulation**

| VV&A overlay phases and activities<br>L = Lead, P = Perform, AST = Assist, R = Review, M = Monitor, AP = Approve |                                                                                     | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|-----|
| Activity 5.1                                                                                                     | Support planning distributed simulation execution                                   | AST              | L, P                                 | AST                               | AST          | M                      | AST |
| Activity 5.2                                                                                                     | Support integrating distributed simulation                                          |                  | L                                    | P                                 | AST          | M                      | AST |
| Activity 5.3                                                                                                     | Verify semantic and syntactic interoperability of integrated distributed simulation |                  | M                                    | L, P                              | AST          | M                      | AST |
| Activity 5.4                                                                                                     | Support testing distributed simulation                                              | M                | L                                    | P                                 | AST          | M                      | AST |
| Activity 5.5                                                                                                     | Verify logical interoperability of distributed simulation                           |                  | M                                    | L, P                              | AST          | M                      | AST |
| Activity 5.6                                                                                                     | Assemble the referent                                                               | AST, AP          | M                                    | AST, P                            | AST          | L, P                   | AST |

Table continues

**Table 5—VV&A activity roles and responsibilities:  
Phase 5—Validate distributed simulation (*continued*)**

| VV&A overlay phases and activities<br>L = Lead, P = Perform, AST = Assist, R = Review, M = Monitor, AP = Approve |                                                                       | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME    |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|--------|
| Activity 5.7                                                                                                     | Validate substantive interoperability of distributed simulation       |                  | M                                    | AST                               | L, P         | M                      | P, AST |
| Activity 5.8                                                                                                     | Analyze V&V evidence and establish arguments                          | R                | M                                    | M                                 | L, P         | AST                    | P, AST |
| Activity 5.9                                                                                                     | Integrate V&V evidence and provide acceptability claims and arguments | R                | M                                    | M                                 | AST          | L, P                   | P, AST |
| Activity 5.10                                                                                                    | Evaluate use risk based on V&V evidence                               | R                | M                                    | AST                               | L, P         | AST                    | P, AST |
| Activity 5.11                                                                                                    | Assert acceptance claims and provide acceptance recommendations       | R, AP            | R                                    | M                                 | AST          | L, P                   | P, AST |

**Table 6—VV&A activity roles and responsibilities:  
Phase 6—Accept distributed simulation and verify output processing**

| VV&A overlay phases and activities<br>L = Lead, P = Perform, AST = Assist, R = Review, M = Monitor, AP = Approve |                                                        | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME    |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|--------|
| Activity 6.1                                                                                                     | Accept distributed simulation                          | P                | M                                    | M                                 | M            | M                      | AST    |
| Activity 6.2                                                                                                     | Validate distributed simulation output post-processing | M                | M                                    | AST                               | L, P         | M                      | P, AST |

*Table continues*

**Table 6—VV&A activity roles and responsibilities:  
Phase 6—Accept distributed simulation and verify output processing(continued)**

| VV&A overlay phases and activities<br>L = Lead, P = Perform, AST = Assist, R = Review, M = Monitor, AP = Approve |                                                       | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME    |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|--------|
| Activity 6.3                                                                                                     | Support executing distributed simulation              | P, M             | L                                    | P, AST                            | AST          | M                      | P, AST |
| Activity 6.4                                                                                                     | Support preparing distributed simulation outputs      | P, M             | L                                    | P, AST                            | M            | M                      | P, AST |
| Activity 6.5                                                                                                     | Contribute to verifying distributed simulation output | P, M             | L                                    | P, AST                            | AST          | M                      | P, AST |

**Table 7—VV&A activity roles and responsibilities:  
Phase 7—Consolidate distributed simulation VV&A products**

| VV&A overlay phases and activities<br>L = Lead, P = Perform, AST = Assist, R = Review, M = Monitor, AP = Approve |                                                                          | User/<br>sponsor | Distributed<br>simulation<br>manager | Simulation<br>development<br>team | V&V<br>agent | Accreditation<br>agent | SME    |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|------------------|--------------------------------------|-----------------------------------|--------------|------------------------|--------|
| Activity 7.1                                                                                                     | Support analyzing data                                                   | L, P             | AST                                  | AST                               | AST          | M                      | P, AST |
| Activity 7.2                                                                                                     | Consolidate V&V evidence to support results interpretation               |                  | M                                    | M                                 | L, P         | AST                    | AST    |
| Activity 7.3                                                                                                     | Evaluate use risk based on results and distributed simulation V&V report | R                | M                                    | M                                 | P            | L                      | P, AST |
| Activity 7.4                                                                                                     | Prepare distributed simulation VV&A products for reuse                   | AP               | M                                    | AST                               | P            | L, P                   |        |

## 5. Overlay assumptions and tailoring

### 5.1 Assumptions

The following assumptions were made during development of the VV&A overlay to scope the responsibilities of the VV&A team; they have been arranged loosely in logical, not priority, order:

- The distributed simulation development team will follow the Distributed Simulation Engineering and Execution Process (DSEEP) in their development and execution of their distributed simulation.
- Coordination and cooperation occurs between the VV&A team and the distributed simulation development team as an essential part of VV&A implementation.
- The distributed simulation development team leads and performs distributed simulation verification activities.
- The VV&A team leads and performs simulation validation activities.
- The VV&A team will consider distributed simulation V&V information and use histories in the distributed simulation VV&A processes.
- The VV&A team is not responsible for validating or verifying the individual member applications, although they do rely upon the products of these activities and may request or perform V&V to gain the information they need for VV&A of the distributed simulation.
- The VV&A team will have timely access to the information they require.
- The user/sponsor will agree that a finite set of observable or measurable acceptability criteria will be used to judge simulation acceptability for an intended use.
- The VV&A processes may be executed iteratively throughout the distributed simulation development and execution process.
- All distributed simulations will be subject to an acceptance process that may or may not include accreditation. Member applications will be accepted within the context of their use as part of the distributed simulation.
- If needed, accreditation of the distributed simulation can occur anywhere from Activity 5.11 through Activity 7.4 as defined in this standard.
- The distributed simulation VV&A processes described in this overlay will be tailored to meet the needs of the specific applications.

### 5.2 Tailoring

The VV&A activities described in this standard, while being generally applicable to most distributed simulations, are intended to be tailored to meet the needs of each specific application. Every distributed simulation is unique. The extent to which these VV&A processes can be performed for a given distributed simulation application will depend on a number of factors, including the quality of the requirements information and the resources allocated to the VV&A team. The recommended practices provided in this standard should be used as a starting point for developing the specific approach to distributed simulation VV&A needed to support the intended use.

The following are some perspectives on tailoring the VV&A processes to fit the circumstances of each individual member application best:

- Tailoring is driven by risk and resource constraints (e.g., available information, budget, skills, and time).

- Quantifying risk and the tolerance for those risks are factors that drive tailoring decisions.
- The correctness and completeness of the distributed simulation VV&A products can reduce the risk incurred by using the simulation results referred to as the use risk in the remainder of the document.
- The absence of certain information input to the VV&A processes will limit the quality of the content of the VV&A products.
- Tailoring decisions have an impact upon use risk and the resources required, and this impact should be understood and documented.
- The VV&A processes should influence test plans, leverage testing and data collection tasks, and describe this in the distributed simulation V&V plans.
- Tailoring should adhere to policies, standards, or guidelines that may be relevant to the intended use.
- Tailoring may be done at any time in the distributed simulation VV&A processes.

More information and guidance with respect to tailoring VV&A process is given in SISO-GUIDE-001.1-2012 and SISO-GUIDE-001.2-2013.

## 6. VV&A Overlay model: Top-level view

As in the DSEEP, one of the design goals identified during the development of this VV&A overlay was to define a highly flexible process. This facilitates tailoring the VV&A activities defined in this overlay as the user needs and resource constraints demand. The actual application of VV&A techniques to support the development of a distributed simulation could vary significantly within or across different intended uses. However, the VV&A phases that correspond to the DSEEP steps establish a foundation for applying VV&A within the DSEEP. [Figure 1](#) illustrates each of the DSEEP steps together with the corresponding VV&A overlay phases. [Figure 1](#) includes two critical aspects of successful VV&A: a central, accessible repository and a cohesive VV&A methodology (see SISO-GUIDE-001.2-2013) to which the overlay activities are aligned and defined to support.

More definitive guidance with respect to establishing the agreements for VV&A information requirements and establishing an information and knowledge repository are detailed in Section 7 of SISO-GUIDE-001.2-2013.

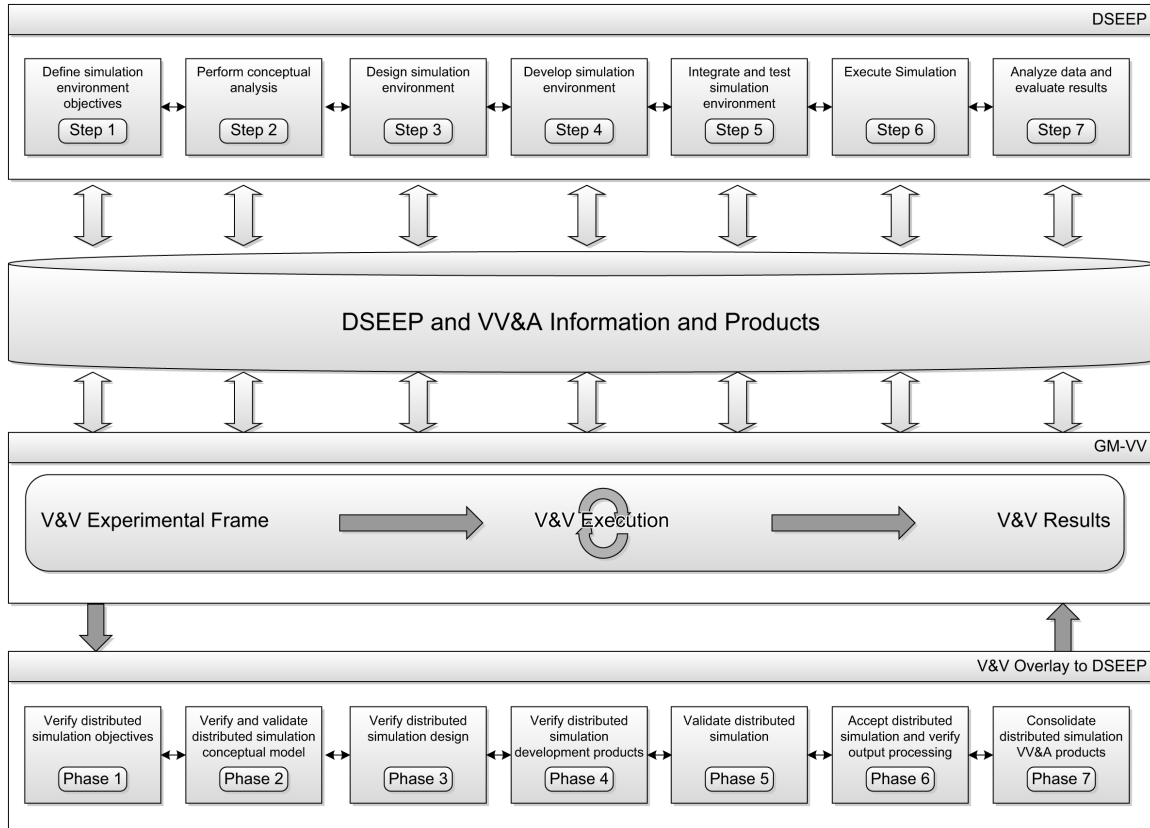


Figure 1—Top-level view of the VV&A overlay to the DSEEP

The purpose of each of the overlay phases is summarized as follows:

- *Phase 1: Verify distributed simulation objectives.* The VV&A team works as part of the distributed simulation development team to define a set of distributed simulation objectives and verify their completeness, consistency, and correctness with the user/sponsor. The VV&A team also completes an initial use risk assessment based on the objectives and their relative priority.
- *Phase 2: Verify and validate distributed simulation conceptual model.* The VV&A team works as part of the distributed simulation development team in developing the test scenarios, the conceptual model, and the distributed simulation requirements. They also contribute to verifying these products and are responsible for validating them. In addition, they define the sources from which referent data will be assembled and use all the information to construct the V&V argumentation structure.
- *Phase 3: Verify distributed simulation design.* The VV&A team supports selecting the member applications and/or designing them and the integrated distributed simulation, and producing the development and execution plan. They also contribute to verifying the distributed simulation design. Knowing the intended designs and/or selections, the VV&A team gathers historical V&V information about them and uses that information to develop the V&V plan, which expresses the V&V experimental frame. The V&V plan includes supplemental V&V for the member applications and incorporates the results of the updated use risk assessment.
- *Phase 4: Verify distributed simulation development products.* The VV&A team supports development of the SDEM and the distributed simulation agreements. They contribute to the verification of those products and support their implementation in both the member applications and the distributed simulation infrastructure. As the simulation development teams test the member applications

independently and with the infrastructure, the VV&A team assists them in establishing and verifying technical, semantic, and syntactic interoperability. They prioritize the V&V activities and V&V the data sets supporting the integrated V&V testing.

- *Phase 5: Validate distributed simulation.* The VV&A team supports integrating and testing the distributed simulation and the preparation of the execution plan. The test results are used to establish logical interoperability and after assembling the referent, the VV&A team completes the V&V analysis and establishes substantive interoperability through the evidence defined in the V&V argumentation structure resulting in acceptability claims and recommendations for acceptance.
- *Phase 6: Accept distributed simulation and verify output processing.* The user/sponsor accepts the simulation based on the Phase 5 products and supports the use of the distributed simulation. The VV&A team turns their attention toward the processing of output data, verifying the post-processes and contributing to the preparation of the output for analysis.
- *Phase 7: Consolidate distributed simulation VV&A products.* The VV&A team supports analyzing the distributed simulation output data. They consolidate the VV&A evidence to support the final use risk assessment and prepare the VV&A products for re-use in the future.

The seven phases in this overlay parallel the seven steps in the DSEEP. As in the DSEEP, this overlay decomposes each of the VV&A phases into a set of interrelated lower-level activities and supporting information resources.

## 7. VV&A overlay model: Detailed view

The VV&A overlay describes a high-level framework for verifying, validating, and accepting/accrediting Distributed Simulations. The intent of the VV&A overlay is to specify a recommended practice that details the VV&A phases that correspond to, support, and augment the DSEEP steps. Distributed simulation stakeholders can leverage this overlay to achieve the specific needs associated with their intended use.

Figure 2 provides a detailed view of the VV&A overlay and its interactions with the DSEEP at equivalent levels of abstraction. This view illustrates the flow of VV&A activities, information, and products across the seven VV&A overlay process phases identified in Figure 1. Figure 2 depicts the DSEEP steps, the VV&A phases, and the VV&A information shared between these steps and phases.

Subclauses 7.1 through 7.7 describe the lower-level activities associated with each of the seven VV&A Overlay phases associated with the DSEEP's seven steps. Figure 3 identifies the individual activities that compose each of these VV&A phases. Each activity description includes the information required, the component functions (tasks), and the information produced by that activity. Information produced should be captured in evidence products and submitted to the knowledge/information repository in support of downstream product development. Products should be developed in accordance with the user/sponsor requirements. As in the DSEEP, this overlay assumes that once a product is created, it will be available for all subsequent activities even though the product might not be identified as an input in the activity description.

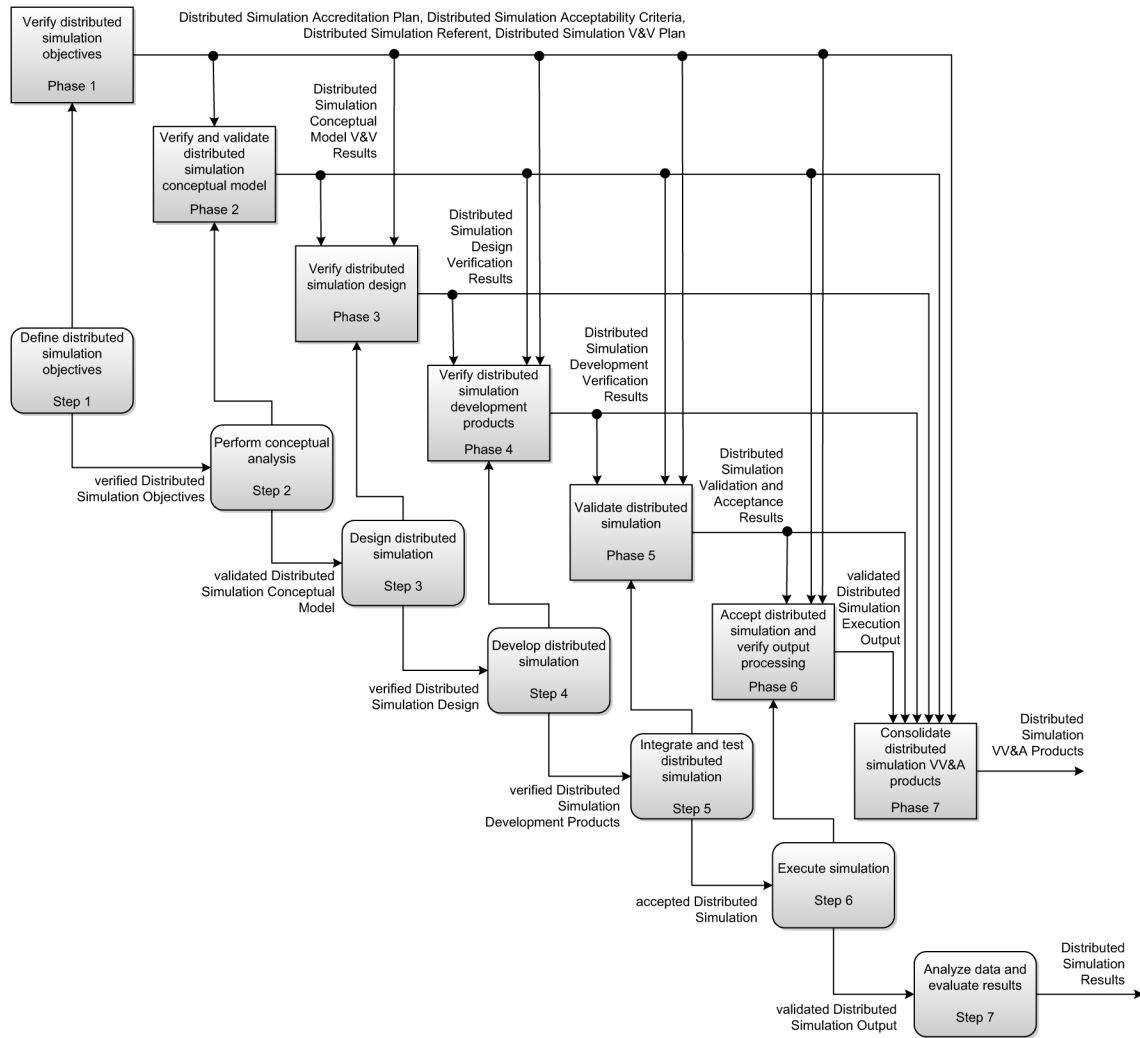


Figure 2—Detailed view of the VV&A overlay to the DSEEP

Although many of the activities represented in Figure 3 appear highly sequential, the intention is not to suggest a strict waterfall approach to VV&A. Rather, this process illustration is simply intended to highlight the major VV&A activities that occur during distributed simulation development and execution and the logical relationship between the start of these activities, completion of other VV&A activities, and the state of activities within the DSEEP steps. The activities described in this recommended practice should be used as a starting point for developing the specific approach to VV&A associated with distributed simulation development and execution for the intended use.

Additionally, the different shapes represent specific VV&A activities. The rectangular shape identifies the primary activities for each phase and step. The rounded-edged shapes correlate to support activities, and the trapezoid shape indicates activities that contribute to verification of each VV&A phase.

Colors are used for readability to highlight the distinctions between phases but have no inherent meaning.



Figure 3—Activities associated with each VV&A overlay phase

## 7.1 Phase 1: Verify distributed simulation objectives

The purpose of Phase 1 of the VV&A overlay is to define the scope of the VV&A effort and establish a stable foundation for establishing a distributed simulation's validity. This requires the VV&A team to understand the distributed simulation objectives, the risk that the user/sponsor can tolerate in their intended use of the distributed simulation output, the information needed to define realistic and observable acceptance/acceptability criteria, and the resources required to support the subsequent VV&A activities. This phase should

result in a set of verified distributed simulation objectives and a set of distributed simulation acceptance/acceptability goals and their related confidence levels that adequately represent those objectives.

Figure 4 illustrates the key activities in this phase of the overlay. These activities support the distributed simulation development team in identifying, clearly describing, and documenting the problem that the distributed simulation addresses. Understanding what the user/sponsor really needs the distributed simulation to accomplish is essential to the development and VV&A of the distributed simulation. A clear, consistent, and complete, yet concise, user/sponsor needs statement will aid the VV&A team in understanding and assessing the distributed simulation objectives, requirements, development plans, and other products resulting from exercising the DSEEP. For example, the user/sponsor needs statement should include such information as high-level descriptions of the critical systems of interest, initial estimates of fidelity requirements, key scenario events, and output data requirements. These insights are important for early VV&A planning.

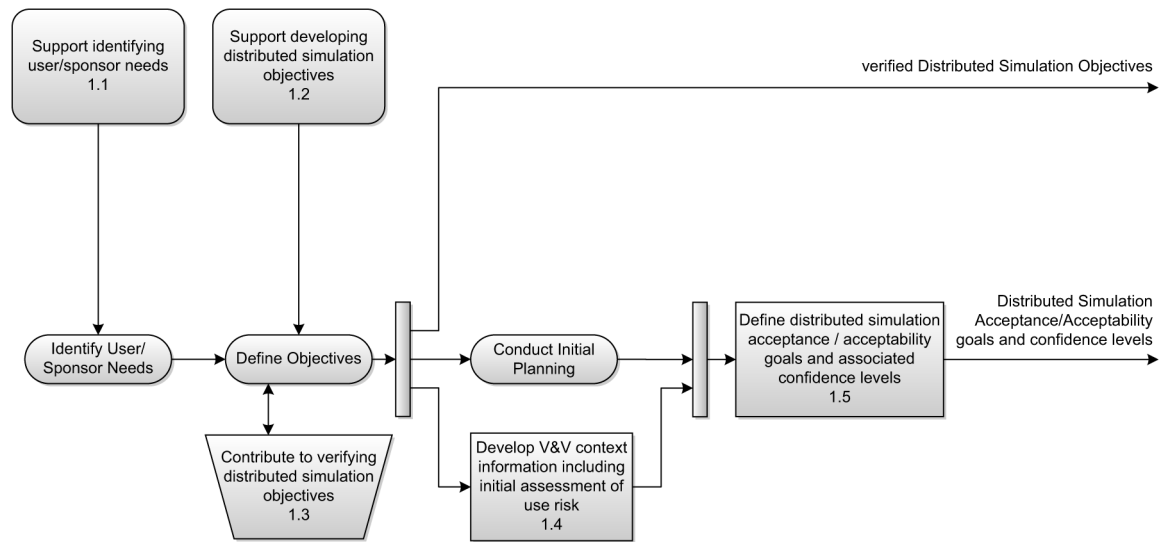


Figure 4—Verify distributed simulation objectives (Phase 1) activity diagram

### 7.1.1 Activity 1.1—Support identifying user/sponsor needs

This activity assists the distributed simulation development team in identifying, clearly describing, and documenting the problem that the distributed simulation addresses. Understanding what the user/sponsor really wants the distributed simulation to accomplish is essential to the development and acceptance and/or accreditation of the distributed simulation.

The distributed simulation development team should confirm that the user's representational needs (i.e., what the distributed simulation needs to represent and how correct those representations need to be) are captured and understood in the course of this activity. In addition, the impact of distributed simulation use should be assessed, and the user/sponsor tolerance to risk should be estimated. As part of this assessment, the VV&A team develops the information that defines the V&V context enabling the initial assessment of the use risk.

The process of identifying user/sponsor needs provides insight into how correct the distributed simulation needs to be enabling the VV&A team to define acceptance/acceptability goals and their associated confidence levels in terms of the measures of effectiveness (MOE) of the represented system (also referred to as the system to be modeled).

#### 7.1.1.1 Information required

The information recommended for this activity includes the following:

- a) Overall plans (from the user/sponsor's perspective).
- b) Descriptions and specifications of the system(s) to be modeled.
- c) Information on available resources.
- d) Identify, quantify using consistent units, where possible, and rank the user/sponsor perceptions of the impact of using the distributed simulation.
- e) Determine the user/sponsor tolerances for risk of incurring the impacts of the distributed simulation producing incorrect results for their intended uses.

#### 7.1.1.2 Functions (tasks)

The functions recommended for this activity include the following:

- a) Support analysis of the program objectives to identify the specific purpose and objective(s) that motivate development and execution of a distributed simulation.
- b) Support identifying the available resources and known development and execution constraints, as appropriate.
- c) Assess the user/sponsor's estimate of the correctness and completeness of the existing descriptions of the systems to be modeled and identify areas that are lacking.

#### 7.1.1.3 Information produced

The recommended information produced from this activity includes the following:

- a) Input to the user/sponsor needs (e.g., analysis results and revision suggestions)
- b) Input to the available resources and known development and execution constraints
- c) Assessment of the correctness and completeness of the descriptions of the systems to be modeled

#### 7.1.2 Activity 1.2—Support developing distributed simulation objectives

This activity supports developing the distributed simulation objectives. The distributed simulation objectives serve as a foundation for generating distributed simulation requirements (i.e., translating high-level user/sponsor expectations into more concrete, measurable, distributed simulation goals).

This activity requires close collaboration between the distributed simulation user/sponsor and the distributed simulation development team, including the VV&A team, to ensure that the original needs are properly analyzed and correctly interpreted and that the resulting objectives completely capture the nuances of the intended use.

The VV&A team actively supports the following DSEEP tasks:

- a) Analyzing sponsor needs with an emphasis upon those needs that have implications for the distributed simulation's representations.
- b) Documenting the distributed simulation objectives.
- c) Defining and documenting the initial distributed simulation engineering plan.

In addition, the VV&A team should determine their impact upon the test, configuration management, security, and quality assurance plans, and provide input to those plans to reflect those impacts. For example, the V&V activities should collaborate closely with the testing efforts in order to leverage the testing activities for results validation. The VV&A team should work with the testing team to help ensure that the distributed simulation testing will generate the data necessary to support V&V activities. Similar cooperation is needed between the VV&A efforts and those for configuration management and quality assurance. Measures to assure the security of the distributed simulation and its information can impact the representational capabilities of the distributed simulation. The VV&A team should review the security plans to identify and inform the distributed simulation development team of any representational impact of the planned security measures.

#### **7.1.2.1 Information required**

The information recommended for this activity includes the following:

- a) Needs statement
- b) Descriptions and documentation relevant to the system to be modeled
- c) Security plans

#### **7.1.2.2 Functions (tasks)**

The functions recommended for this activity include the following:

- a) Identify any relevant development documentation for the system to be modeled (e.g., specifications, conceptual models, program plans, and test data).
- b) Support analyzing the user sponsor needs and deriving the distributed simulation objectives from those needs, particularly the representational objectives.
- c) Support defining, prioritizing, and documenting the distributed simulation objectives.
- d) Support the user/sponsor review of the distributed simulation objectives and reconciling the differences.
- e) Review the security plans to identify and inform the distributed simulation development team of any representational impact of the planned security measures.

#### **7.1.2.3 Information produced**

The recommended information produced from this activity includes the following:

- a) Input to the distributed simulation objectives

### **7.1.3 Activity 1.3—Contribute to verifying distributed simulation objectives**

This activity determines that the distributed simulation objectives correctly and adequately represent the user/sponsor needs and may indicate the need for corrections or additions. An incomplete statement of distributed simulation objectives impacts the ability to meet the user/sponsor needs, while overly broad distributed simulation objectives could unnecessarily tax the available resources.

Verifying the completeness and consistency of the distributed simulation objectives, addressing both their content and form, is essential to ensure that they provide a clear, solid, and unmistakable foundation for further distributed simulation development and use. Further, documenting the traceability between the distributed simulation objectives and the user/sponsor needs is essential to diagnosing any problems and making design and development tradeoff decisions.

The VV&A team should approach verifying the distributed simulation objectives as an integral part of the distributed simulation development team. The distributed simulation development team members can successfully share the burden of verification in many different ways depending upon the specifics of the organizations involved, the distribution or responsibilities within that team, and the nature of the distributed simulation objectives.

Regardless of who performs specific verification tasks, the tasks in this activity assume that the VV&A team has complete access to the results from all verification tasks as well as the distributed simulation objectives and the user/sponsor needs, and can obtain clarifications from the user/sponsor upon request.

#### **7.1.3.1 Information required**

The information recommended for this activity includes the following:

- a) User/sponsor needs
- b) Distributed simulation objectives

#### **7.1.3.2 Functions (tasks)**

The functions recommended for this activity include the following:

- a) Check the distributed simulation objectives for internal consistency and completeness.
- b) Verify the distributed simulation objectives against the user/sponsor needs and provide feedback on the result of that consistency and traceability check.
- c) Contribute to documenting the distributed simulation objectives verification results.
- d) Contribute to documenting the traceability between the distributed simulation objectives and user/sponsor needs.

#### **7.1.3.3 Information produced**

The recommended information produced from this activity includes the following:

- a) Distributed simulation objectives verification results
- b) Information describing the traceability between the distributed simulation objectives and the user/sponsor needs

### **7.1.4 Activity 1.4—Develop V&V context information including initial assessment of use risk**

This activity identifies, collects, and consolidates all relevant context information needed prior to or during the V&V process. The V&V context information captures information regarding the M&S problem solving lifecycle and process such as the M&S system requirements, intended use, and risk.

#### **7.1.4.1 Information required**

The information recommended for this activity includes the following:

- a) Development documentation for the system to be modeled (e.g., specifications, conceptual models, program plans, test data)
- b) Distributed simulation objectives

#### 7.1.4.2 Functions (tasks)

The functions recommended for this activity include the following:

- a) Identify the distributed simulation (sub) systems that are within the scope of the V&V project.
- b) Identify the distributed simulation intended use.
- c) Identify the distributed simulation constraints (e.g., on distributed simulation system, M&S lifecycle process, M&S project, and M&S organization) from the user/sponsor.
- d) Identify any relevant SMEs that can provide information regarding the system to be modeled and related M&S of its systems or subsystems.
- e) Identify existing relevant V&V products (e.g., acceptance plans, V&V plans, or V&V results).
- f) Identify the distributed simulation use risks.
- g) Develop input to the distributed simulation integration plan with a focus on aligning methodologies and technologies to support V&V testing.
- h) Select necessary management and support tools to include functionality to integrate V&V processes and products and align with distributed simulation project management and support tools.

#### 7.1.4.3 Information produced

The recommended information produced from this activity includes the following:

- a) V&V context information
- b) Initial use risk assessment

#### 7.1.5 Activity 1.5—Define distributed simulation acceptance/acceptability goals and associated confidence levels

Acceptance goals for the distributed simulation are derived from the V&V context, specifically the intended use, the user/sponsor's perception of the impact of using the distributed simulation, and the user/sponsor risk tolerance. The acceptance goals scope the V&V effort and serve as the basis for developing the V&V argumentation structure. The acceptance/acceptability goals should be set in close collaboration between the user/sponsor, the simulation development teams, and the VV&A team, and they must be approved by the user/sponsor.

##### 7.1.5.1 Information required

The information recommended for this activity includes the following:

- a) Relevant system to be modeled MOEs and measures of performance (MOP)
- b) Verified distributed simulation objectives
- c) User/sponsor needs
- d) User/sponsor assessment of impact of distributed simulation use

### 7.1.5.2 Functions (tasks)

The functions recommended for this activity include the following:

- a) Derive and verify appropriate acceptance/acceptability goals from the user/sponsor needs, the distributed simulation objectives, and the relevant MOE and MOP.
- b) Verify the internal consistency and completeness of the acceptance/acceptability goals.
- c) Verify the consistency and completeness of the acceptance/acceptability goals with the user/sponsor needs and the distributed simulation objectives.
- d) Contribute to documenting the traceability between the distributed simulation acceptance/acceptability goals and the distributed simulation objectives.
- e) Document the distributed simulation acceptance/acceptability goals.

### 7.1.5.3 Information produced

The recommended information produced from this activity includes the following:

- a) Information describing the traceability between the distributed simulation acceptance/acceptability goals and the distributed simulation objectives.
- b) Distributed simulation acceptance/acceptability goals verification analysis results.

## 7.2 Phase 2: Verify and validate distributed simulation conceptual model

The primary purpose of Phase 2 of the VV&A overlay is to verify and validate the distributed simulation conceptual model. The VV&A team also supports developing and contributes to verifying the distributed simulation scenarios, the distributed simulation conceptual model, and the distributed simulation requirements. These activities contribute to ensuring that a distributed simulation built to meet the distributed simulation requirements can fully realize the representational capabilities described in the validated distributed simulation conceptual model and enables it to execute the distributed simulation scenarios.

Development and verification of the distributed simulation scenarios and the simulation conceptual model may be done in parallel and iteratively. Once this iteration process has produced a stable distributed simulation conceptual model, the VV&A team can validate it. At the same time, the VV&A team will work with the system test and evaluation team and the simulation development teams to identify sources of referent information. The validated distributed simulation conceptual model enables the development of the distributed simulation requirements for which acceptance/acceptability criteria are developed. These criteria are aligned with the referent sources to develop the V&V argumentation structure. [Figure 5](#) illustrates the key activities in this phase of the VV&A overlay. [Subclause 7.2.1](#) through [7.2.10](#) describes each of these activities.