IEEE Std 1278.4-1997
(Issued July 1998 for trial use)

IEEE Trial-Use Recommended Practice for Distributed Interactive Simulation—Verification, Validation, and Accreditation

IEEE Computer Society

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IEEE Trial-Use Recommended Practice for Distributed Interactive Simulation—Verification, Validation, and Accreditation

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Distributed Interactive Simulation Committee
of the
IEEE Computer Society

Approved 9 December 1997

IEEE Standards Board

Abstract: Guidelines are established for the verification, validation, and accreditation (VV&A) of distributed interactive simulation (DIS) exercises. “How-to” procedures for planning and conducting DIS exercise VV&A are provided. Intended for use in conjunction with IEEE Std 1278.3-1996, this recommended practice presents data flow and connectivity for all proposed verification and validation activities and provides rationale and justification for each step. VV&A guidance is provided to exercise users/sponsors and developers.
Keywords: accreditation; certification; Distributed Interactive Simulation; simulation; validation; verification; warfare simulation; wargames

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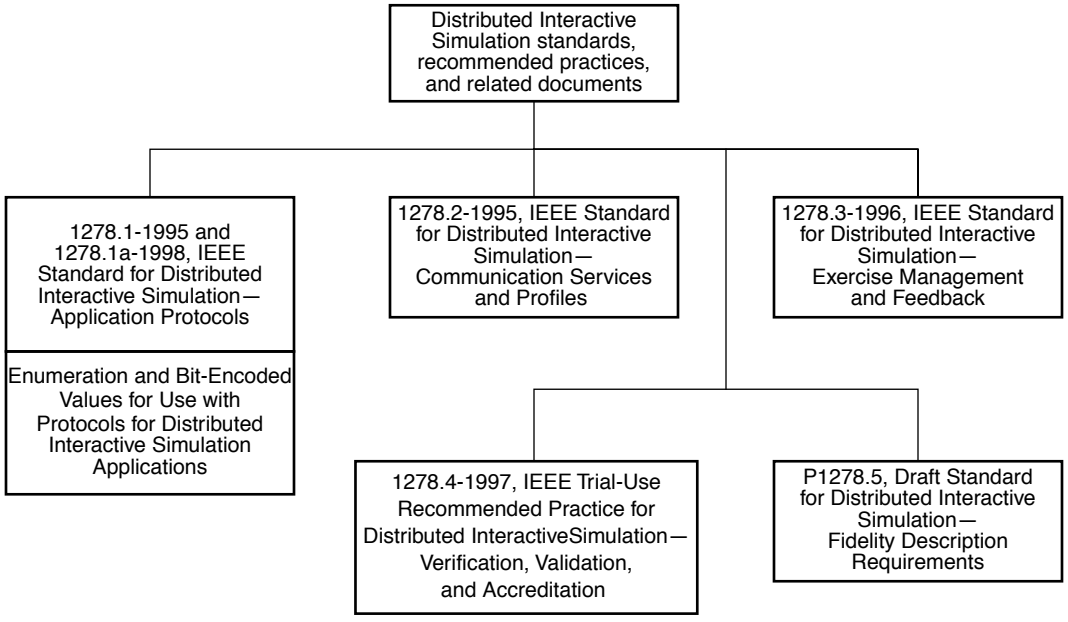
Introduction

(This introduction is not part of IEEE Std 1278.4-1997, IEEE Trial-Use Recommended Practice for Distributed Interactive Simulation—Verification, Validation, and Accreditation.)

Distributed Interactive Simulation (DIS) is a government/industry initiative to define an infrastructure for linking simulations of various types at multiple locations to create realistic, complex, virtual "worlds" for the simulation of highly interactive activities. This infrastructure brings together systems built for separate purposes, technologies from different eras, products from various vendors, and platforms from various services and permits them to interoperate. DIS exercises are intended to support a mixture of virtual entities with computer-controlled behavior (computer-generated forces), virtual entities with live operators (human in-the-loop simulators), live entities (operational platforms and test and evaluation systems), and constructive entities (wargames and other automated simulations). DIS draws heavily on experience derived from the Simulator Networking (SIMNET) program developed by the Advanced Research Projects Agency (ARPA), adopting many of SIMNET's basic concepts and heeding lessons learned.

In order for DIS to take advantage of currently installed and future simulations developed by different organizations, a means had to be found for assuring interoperability between dissimilar simulations. These means were developed in the form of industry consensus standards. The open forum (including government, industry, and academia) chosen for developing these standards was a series of semi-annual workshops on standards for the interoperability of distributed simulations, which began in 1989. The results of the workshops have been several IEEE standards along with supporting documentation. These standards provide application protocol and communication services and profile standards to support DIS interoperability. In addition, an IEEE recommended practice for exercise management and feedback provides user guidelines for setting up and conducting a DIS exercise.

The relationship between the component documents constituting the set of IEEE DIS documents is shown in the figure below. Used together, these standards and recommended practices will help to ensure an interoperable simulated environment.



Documentation relationships

The interoperability components addressed by these standards and recommended practices are as follows:

a) Application protocols;
b) Communication services and profiles;
c) Exercise management and feedback;
d) Validation, verification, and accreditation; and
e) Fidelity description requirements.

IEEE Std 1278.1-1995, *IEEE Standard for Distributed Interactive Simulation—Applications Protocols*, and IEEE Std 1278.1a-1998 (Supplement to IEEE Std 1278.1-1995) define the format and semantics of data messages, also known as protocol data units (PDUs), that are exchanged between simulation applications and simulation management. The PDUs provide information concerning simulated entity states, the type of entity interactions that take place in a DIS exercise, and data for management and control of a DIS exercise, simulated environment states, aggregation of entities, and the transfer of control entities. IEEE Std 1278.1a-1998 also specifies the communciation services to be used with each of the PDUs.

An additional, non-IEEE document is required for use with IEEE Std 1278.1-1995 and IEEE Std 1278.1a-1998. This document is entitled *Enumeration and Bit-Encoded Values for Use with Protocols for Distributed Interactive Simulation Applications* and is available from the Defense Modeling, Simulation and Tactical Technology Information Analysis Center.[1]

IEEE Std 1278.2-1995, *IEEE Standard for Distributed Interactive Simulation—Communication Services and Profiles*, defines the communication services required to support the message exchange described in IEEE Std 1278.1-1995 and IEEE Std 1278.1a-1998. In addition, IEEE Std 1278.2-1995 provides several communication profiles that meet the specified communications requirements.

Taken together, IEEE Std 1278.1-1995, IEEE Std 1278.1a-1998, and IEEE Std 1278.2-1995 provide the necessary information exchange for the communications element of DIS.

IEEE Std 1278.3-1996, *IEEE Recommended Practice for Distributed Interactive Simulation—Exercise Management and Feedback*, provides guidelines for establishing a DIS exercise, managing the exercise, and providing proper feedback. This recommended practice is used in conjunction with IEEE Std 1278.1-1995, IEEE Std 1278.1a-1998, and IEEE Std 1278.2-1995.

IEEE Std 1278.4-1997, *IEEE Trial-Use Recommended Practice for Distributed Interactive Simulation—Verification, Validation, and Accreditation*, provides guidelines for verifying, validating, and accrediting a DIS exercise. This recommended practice, used in conjunction with IEEE Std 1278.3-1996, presents data flow and connectivity for all proposed verification and validation activities and provides rationale and justification for each step.

IEEE P1278.5, *Draft Standard for Distributed Interactive Simulation—Fidelity Description Requirements*, provides a taxonomy of fidelity characteristics with a consistent and uniform language to describe fidelity at six levels: resource, fidelity domain, capability, implementation, characteristic, and descriptor.

Publication of this trial-use recommended practice for comment and criticism has been approved by the Institute of Electrical and Electronics Engineers. Trial-use standards are effective for 24 months from the date of publication. Comments for revision will be accepted for 18 months after publication. Suggestions for revision should be directed to the Secretary, IEEE Standards Board, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331 USA, and should be received no later than 20 January 2000. It is expected that following the 24-month period, this trial-use recommended practice, revised as necessary, shall be submitted to the IEEE Standards Board for approval as a full-use recommended practice.

[1]For information about the Defense Modeling, Simulation and Tactical Technology Information Analysis Center, see their Web site at http://dmsttiac.hq.iitri.com/.

Participants

During the development cycle of this recommended practice, the DIS Verification, Validation, and Accreditation Subgroup had the following membership:

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Contents

IEEE Trial-Use Recommended Practice for Distributed Interactive Simulation—Verification, Validation, and Accreditation

1. Overview

1.1 Scope

This recommended practice establishes guidelines for the verification, validation, and accreditation (VV&A) of Distributed Interactive Simulation (DIS) exercises. It provides "how-to" procedures for planning and conducting DIS exercise VV&A.

1.2 Application

This recommended practice is intended for use by persons responsible for or participating in DIS exercise VV&A activities (e.g., VV&A agents, VV&A teams, exercise managers, exercise architects). It provides VV&A guidance to exercise users/sponsors and developers. It does not specify who can or cannot participate in a DIS exercise or in the VV&A process.

DIS exercises are conducted for a variety of reasons (e.g., technical demonstration, training, requirements definition, concept definition, acquisition, analysis, test, and evaluation). Because each objective has different requirements, this recommended practice offers latitude in defining and applying the principles of DIS exercise VV&A to suit the needs of the exercise user/sponsor and the accreditation agent. Depending upon the exercise objectives and the allocated time and assets, the procedures involved and the degree to which they should be followed can vary significantly.

2. References

This recommended practice shall be used in conjunction with the following publications. When the following standards are superseded by an approved revision, the revision should apply.

IEEE Std 1278.1-1995, IEEE Standard for Distributed Interactive Simulation—Application Protocols.[1]

[1]IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.