Test and Training ENabling Architecture (TENA)

TENA BASELINE PROJECT REPORT

Volume IX
Glossary of Terms and Definitions

Review Copy

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September, 1997

Abstract

The Glossary of Terms and Definitions provides detailed definitions of terms related to TENA, the Test and Training communities, and related technical data. It is intended to be used as a reference while reading all TENA volumes, since we do not include a glossary in each individual volume of the report.

Instructions to the Reader

The Test and Training ENabling Architecture (TENA) fiscal year 1997 Baseline Project Report contains 10 volumes and an Executive Summary. This format provides several advantages. For example, you need not read the detailed technical information in the Technical Reference Architecture (Volume IV) unless you wish. We have provided an Executive Summary which should be read by DoD range management executives and others in a decision-making role. It should also be read as a companion volume to technical volumes. The Management Overview contains enough information from the remaining technical volumes to gain a good understanding of the TENA project background, accomplishments to date, and plans for the future. Additionally, Volume IX, Glossary of Terms and Definitions and Volume X, Other Supporting Information, are intended as companion reference volumes for the reader.

Each volume contains an abstract (all are presented in an appendix to the Executive Summary), Table of Contents, Overview, Introduction, and TENA Project Background. The Overview contains information related to the specific volume, identifies the expected readership, and identifies any relationships with other volumes. The TENA Project Background is the same in each volume. Technical volumes are intended to be "stand-alone" documents that will be upgraded as more information becomes available. An acronym and reference listing, (appendices A and B in every volume) is provided, but for detailed definitions and some cited references, the reader should consult Volumes IX and X.

The TENA Project Baseline Report contains the volumes listed below:

Executive Summary
Volume I - Management Overview
Volume II - Product-Line Approach
Volume III - Requirements
Volume IV - Technical Reference Architecture
Volume V - Logical Range Business Process Model
Volume VI - TENA Application Concepts
Volume VII - Integrated Validation and Verification Plan
Volume VIII - Transition Plan
Volume IX - Glossary of Terms and Definitions
Volume X - Other Supporting Information

The opinions, ideas and recommendations presented in the TENA Baseline Project Report are the views of the TENA Project Team and do not necessarily represent those of the Sponsor.

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Overview

The test community has often been criticized for not using a standard lexicon. The TENA Project Team uses the DoD standard reference to terms and definitions, Joint Pub 1-02. Volume IX of the TENA Baseline Project Report is a Glossary of Terms and Definitions. It is based upon Joint Pub 1-02 and the following:

- Simulation Test and Evaluation Process (STEP) Guidelines
- Navy Test and Evaluation Modeling and Simulation (TEMS) Master Plan Glossary
- Joint SIMulation System (JSIMS (ORD)) Architecture Glossary
- High Level Architecture (HLA) Glossary
- Defense Modeling and Simulation (DMSO) Modeling and Simulation Glossary
- Defense Information Infrastructure-Common Operating Environment (DII-COE) Architecture
- "Quality Plan" from the World Wide Web
- "Integrated Information Environment: A Technology for the Next Century" from the World Wide Web
- Department of Defense :Subject: Reliability and Maintainability
- Defense Information Infrastructure Master Plan
- American Heritage Electronic Dictionary
- Joint Technical Architecture
- TENA Project Team

In the glossary we indicate by [ ] where the particular term or definition originates. In some cases terms may be original to the TENA project and those appear without a bracket.

GLOSSARY OF TERMS

3-D Three-dimensional, refers to the visual display that exhibits breadth, height and thickness or depth. Standard 2-D computer images and television displays create a flat image with only height and breadth. [DSMC 2; M&S

6 DOF Six degrees of freedom, refers to the number of simultaneous directions or inputs a sensor can measure. Typically used to describe the combination of spatial positions (X, Y, Z) and orientation (roll, pitch, yaw). [DSMC 2; M&S]

Abstraction Abstraction denotes the essential characteristics of an object that distinguish it from all other kinds of objects [M&S] and thus provide crisply defined conceptual boundaries, relative to the perspective of the user. [DMSO 93 SAFOR Survey; M&S]

Accessibility The ease of approaching, entering, or obtaining. [DoD 8320.1-M-3; M&S]

Account Group A template for establishing a runtime environment context for individual operators. Account groups are typically used to do a high-level segregation of operators into system administrators, security administrators, database administrators, or mission-specific operators. [DII-COE]

Accreditation The official certification that a model or simulation is acceptable for use for a specific purpose. [JSIMS (ORD)]

Accreditation The official certification that a sensor model or simulation is acceptable for use for a specific purpose. [DoDD 5000.59; JCS Pub 1-02; DODI 5000.XX; DIS; MSMP; M&S]

Accreditation Agent The organization designated by the accreditation sponsor to conduct an accreditation assessment for a M&S application. [DoDI 5000.XX; M&S]

Accreditation Authority An individual occupying a position with the appropriate rank, grade, responsibility and/or authority to accredit a model, simulation, or federation of models and/or simulations for a particular purpose or purposes. [DoD I5000.XX; M&S]

Accreditation Process The procedure followed by the M&S application sponsor that culminates in the accreditation determination. [DA PAM 5- 11; M&S]

Accreditation Sponsor The DoD Component or other organization with the responsibility for accrediting a model, simulation, or federation of models and/or

simulations for a specific use or series of uses (e.g., for joint training or a Defense Acquisition Board milestone review). [DoDI 5000.XX; M&S]

Accuracy The degree of exactness of a model or simulation, high accuracy implying low error. [DIS; M&S]

Action Plans A plan for addressing one of the sub-objectives identified in the main body of the DoD M&S Master Plan. Each Action Plan outlines the needs associated with its subj-objective, states a vision or target state to be reached to address those needs, and a road map that outlines current, planned, or suggested activities that must be performed to reach the target state. [MSMP; M&S]

Activity Models Models of the processes that make up the functional activity showing inputs, outputs, controls, and mechanisms through which the processes of the functional activity are (or will be) conducted. [DoD 8320.1-M; M&S]

Advanced Interoperability A level of interoperability characterized by shared data between applications, including shared data displays, and information exchange through a common data model. This level provides for sharing of information in a distributed, but localized environment, and for sharing of applications. [DII-COE]

Aggregation The ability to group entities while preserving the effects of entity behavior and interaction while grouped. See also: disaggregation. [MSMP; M&S]

Algorithm A prescribed set of well-defined, unambiguous rules or processes for the solution of a problem in a finite number of steps. [AFI 16-102; DSMC 1; M&S]

Algorithm Checks A rigorous verification of the mathematics of an algorithm to ensure freedom from any errors in the expression (e.g., incorrect signs, incorrect variables applied in the equations, derivation errors) and to ensure that the algorithms are consistent with their stated intents. [DIS; M&S]

Application A self-contained executable piece of software that can run on its own in its own process. [JSIMS (ARCH)]

Application Programmer Interface (API) A programmer's guide that describes the data structures, function calls, and services provided by the COE, and how to write software modules that interface with and use COE services. The definition of what actions an API performs is programming-language neutral and may includes traditional function (C/C++) or procedure (Ada) interfaces as well as command-line interfaces. The exact syntax of an API is language-specific. Data structures are included in the definition as are the definition of objects for services that are written in an object-oriented model. [DII-COE]

Approved Software Software that has been tested as compatible with the COE. An approved products list might contain Oracle, Sybase, WordPerfect, Kermit, etc. In this context, approved software implies only that the software has been tested and confirmed to work within the DII COE. It does not imply that the software has been approved or authorized by any government agency for any specific system. [DII-COE]

Architecture The structure of components, their relationships, and the principles and guidelines governing their design and evolution over time (IEEE STD 610.12). Three types of architectures are defined operational, technical, and systems. [DII-COE]

Assets See Resources.

Association A type of static relationship between two or more object classes, apart from class-subclass or part-whole relationships. [HLA]

Associative Entity An entity that inherits its primary key from two or more other entities (those that are associated). An associative entity is used to represent many-to-many relationships. [JDBE; M&S]

Asynchronous Transfer Mode (ATM) A multiplexing protocol based on a small 53-byte fixed-length cell designed to efficiently transfer several sources of data over a single carrier at high speeds. [IDA ADS Paper; M&S]

Asynchronous Transmission Transmission in which each information character is individually synchronized (usually by the use of start elements and stop elements). [MSETT - Intro to Netwkng, Pub 9; M&S]

Atmosphere A kind of mission space entity. The mass of air surrounding the earth and the features embedded within it, including clouds, smoke, and fog. [DMSO-ERTWG; M&S]

Attribute A named portion of an object state. [HLA] A property or characteristic of one or more entities; for example, COLOR, WEIGHT, SEX. Also, a property inherent in an entity or associated with that entity for database purposes. [DoD 8320.1-M; DoD 8320.1-M-1; FIPS Pub11-3M&S]

Authoritative Data Source A data source whose products have undergone producer data VV&C activities. [Army-TRADOC; M&S]

Battlefield Entity A simulation entity which corresponds to actual equipment, supplies, and personnel that can be seen or sensed on a real battlefield. Platform level battlefield entities include aircraft ships, armor vehicles, dismounted infantry soldiers, guided missiles, command posts, trucks, etc. Unit level entities, such as platoons, companies, etc. can be considered as battlefield

entities, but they will not be DIS compliant until the standards are broadened to incorporate them. A battlefield entity incorporates a direct soldier/machine interface which replicates the soldier/machine interface of the actual battlefield entity. [MSETT; M&S]

Battlespace Battlespace refers both to the physical environment in which the simulated warfare will take place and the forces that will conduct the simulated warfare. All elements which support the front line forces (e.g., logistics, intelligence) are included in this definition of battlespace. [JSIMS (ORD)]

Behavior For a given object, how attribute value changes effect (or are effected by) the object attribute value changes of the same or other objects. [DMSO-HLA; M&S]

Best Effort Service A communication service in which transmitted data is not acknowledged. Such data typically arrives in order, complete and without errors. However, if an error occurs, or a packet is not delivered, nothing is done to correct it (e.g., there is no retransmission). [IEEE 1278.1; M&S]

Broadcast A transmission model in which a single message is sent to all network destinations, i.e., one-to-all. Broadcast is a special case of multicast. Contrast with: multicast; unicast. [DIS; IEEE 1278.2; M&S]

Broker An intermediary that coordinates and manages the requests between clients and servers. Brokers are generally discussed in the context of CORBA (Common Object Request Broker Architecture) or other object-oriented approaches, but the usage need not be so restrictive. An example of a broker operation is to connect a client requesting some service to an available server located at some arbitrary location on the LAN. [DII-COE]

Browsing Opportunity for users to freely examine and peruse through the contents of a database. [DMSO; M&S]

Bundling The process of packing separate Protocol Data Units (PDU) into composite or aggregated PDU. Contrast with: unbundling. [DIS; M&S]

Business Process A formal representation of the operations of a business. It includes a definition of the activities and the flow of critical information. This consists of inputs, outputs, controls and mechanisms that influence the process in order to yield specific desired results.

C++ (C-Plus-Plus) A high order computer language used extensively in commercial software. C++ is an object oriented extension to the C language. [DSMC 1; M&S]

Class A description of a group of objects with similar properties, common behavior, common relationships, and common semantics. [HLA]

Class Hierarchy A specification of a class-subclass, or "is-a" relationship between object classes in a given domain. [HLA]

Class Word A word in the name of a data element describing the category to which the data element belongs; e.g., "date", "name", "code." The word establishes the general structure and domain of a standard data element. [DoD 8320.1-M-1; DoD 8320.1-M-X; NBS Special Pub 500-149; M&S]

Client A computer program, such as a mission application, that requires a service. Clients are consumers of data while servers are producers of data. [DII-COE]

Client/Server A particular kind of computing architectural model in which consumers (clients) and producers (servers) cooperate to create an application. Clients request services from servers, while servers may service one or more clients simultaneously. A typical example of a server is a database server. An example of a client is a software component that allows an operator to prepare a query, pass the query to the database, and then display the results to the operator. [DII-COE]

Closeout During this activity all performance and data/cost issues are resolved, the customer data package is delivered and financial matters are closed.

Code Verification A rigorous audit of all compilable code to ensure that the representations of verified logic have been properly implemented in the computer code. [DA PAM 5-11; DSMC; [M&S]

Cohesion Cohesion refers to the degree to which the contents of a module are logically related. [DMSO 93 SAFOR Survey; M&S]

Collect Customer Feedback During this activity the LR manager in conjunction with the facilities involved in the execution of the plan will query the customer for comments regarding the quality, accuracy and overall management of the test/training exercise.

Combatant Command(s) One of the unified or specified combatant commands established by the President of the United States. (Combatant Commands currently include: US Atlantic Command (USACOM); US Central Command (USCENTCOM); US European Command (USEUCOM); US Pacific Command (USPACOM); US Southern Command (USSOUTHCOM); US Space Command (USSPACOM); US Special Operations Command (USSOCOM); US Strategic Command (USSTRATCOM); and, US Transportation Command (USTRANSCOM)). [JSIMS (ORD)]

Command and Control Warfare (C2W) The integrated use of operations security (OPSEC), military deception, psychological operations (PSYOP), electronic warfare (EW), and physical destruction, mutually supported by intelligence, to deny information to, influence, degrade, or destroy adversary C2 capabilities, while protecting friendly C2 capabilities against such actions. [MSMP; M&S]

Commercial Off-The-Shelf Software (COTS) Software that is available commercially. Examples include versions of UNIX, X Windows, or Motif, as well as standard products such as Oracle, Sybase, and Informix. [DII-COE]

Compile LR Plan Organization and assembly of all required information for the test/training exercise execution plan.

Complex Data Data that cannot be characterized as a single concept, atomic data element as defined in DoD 8320.1-M-1. Complex data includes most scientific and technical data. It has been recently categorized by the Complex Data Task Force into: (a) highly derived data (e.g., probability hit/kill); (b) objects utilizing the concepts of multiple inheritance (e.g., student-assistant is subclass of student class and employee class), multiple root hierarchies (e.g., a tank is a vehicle and a tank is a weapon where "vehicle" and "weapon" are each roots), and polymorphic attributes (e.g., "capacity" for different types of aircraft may mean number of people, pounds of cargo, or gallons of fuel); (c) compositions such as command hierarchies, road networks, images (binary large objects (BLOBS), compound documents; and (d) artifacts of legacy systems and physical constraints (e.g., aircraft category and mission in one data element, intelligence facility code where the first few bytes define how the rest of the field is used. [MSMP; M&S]

Compliance An integer value, called the compliance level, which measures (a) the degree to which a segment or system achieves conformance with the rules, standards, and specifications described by TENA, (b) the degree to which the segment or system is suitable for integration with the TENA reference implementation, and (c) the degree to which the segment or system makes use of TENA services. It is important to note that compliance is a matter of degree. It is usually not an “all or nothing” proposition, but it is possible to fail to meet any TENA objectives and hence be declared totally non-compliant. [DII-COE]

Component Asset Group Develops assets within specific areas of range expertise for use in range products. The asset group also defines and evolves product-line architectures with the Architecture Group

Composability The ability to rapidly configure, initialize, and execute a test or training exercise by assembling an exercise from a pool of available resources.

Composite Attribute A single attribute that is composed of a specific set of identifiable pieces of information; e.g., an address made up of a street number, city, state, and zip code. [JDBE; M&S]

Compression Any of several techniques that reduce the number of bits required to represent information in data transmission or storage, therefore conserving bandwidth and/or memory, wherein the original form of the information can be reconstructed; also called compaction. [MSETT - Intro to Netwkng, Pub 11; M&S]

Computer Assets Represents the data processing capability which executes the operations on all of the objects in the Logical Range.

Computer Resources The totality of computer hardware, firmware, software, personnel, documentation, supplies, services, and support services applied to a given effort. [DoDI 5000.2; M&S]

Computer Simulation A dynamic representation of a model, often involving some combination of executing code, control/display interface hardware, and interfaces to real-world equipment. [DMSO; M&S]

Computer Software (or Software) A combination of associated computer instructions and computer data definitions required to enable the computer hardware to perform computational or control functions. [DoDI 5000.2; M&S]

Computer Software Configuration Item (CSCI) A software item which is identified for configuration management. [JSIMS (ARCH)]

Computer Software Documentation Technical data or information, including computer listings and printouts, which documents the requirements, design, or details of computer software, explains the capabilities and limitations of the software, or provides operation instructions for using or supporting computer software during the software's operational life. [DoDI 5000.2; M&S]

Conditional Event A sequentially dependent event that will occur only if some other event has already taken place. See also: time-dependent event. [IEEE; DIS; M&S]

Conduct a Logical Range Test/Training Exercise This activity describes process to conduct a test/training exercise in the Logical Range environment. It illustrates the major inputs, outputs, controls, tools and mechanisms required for the process.

Configuration A collection of an item's descriptive and governing characteristics, which can be expressed a) in functional terms, i.e., what

performance the item is expected to achieve; and (b) in physical terms, i.e., what the item should look like and consist of when it is built. [DoDI 5000.2; M&S]

Consistency Data is maintained so that it is free from variation or contradiction. [DoD 8320.1-M; DoD 8320.1-M-3; M&S]

Constant A quantity or data item whose value cannot change. [IEEE; M&S]

Coordinate Linear or angular quantities which designate the position that a point occupies in a given reference frame or system. Also used as a general term to designate the particular kind of reference frame or system, such as Cartesian coordinates or spherical coordinates. [MSETT - Intro to Netwkng, Pub 12; M&S]

Coordinate Secondary & Support Requirements The organization of facility or range specific support resources and services required by the LR test/training exercise for execution.

Cost Estimate Initial cost based on preliminary review of the scenarios and cost information provided by the supporting ranges.

Cultural Features Features of the environment that have been constructed by man. Included are such items as roads, buildings, canals, marker buoys; boundary lines, and, in a broad sense, all names and legends on a map. [DMSO-ERTWG, M&S]

Customer Person, command, or organization that has a need to sponsor an exercise. The customer controls the phases of the test or training exercise, and also collaborates with ranges/facilities management in the planning, scheduling, executing, and reviewing activities.

Customer Data Package The final product of a test or training exercise. The format of the data package is outlined in the test/exercise plan providing step-by-step instructions for acquiring, reducing, and analyzing data.

Customer Feedback Customer's opinion regarding the test/training exercise from first contact with the LR Manager to Closeout.

Customer Person Command, or organization that has a need to sponsor an exercise. The customer controls the phases of the test or training exercise and also collaborates with ranges/facilities management in the planning, scheduling, executing and reviewing activities.

Customer Requirements Test/Training statement of purpose, objective, or goals of a test or training exercise. An example of a customer requirement is: Determine if the M1A1 Battle Tank can come to a full stop on a 60 degree incline, restart and climb to the top of the grade without exceeding 150 ft. lbs. of

torque at a predetermined test point. The length of the incline, coefficient of friction, specific location of the test point and weather conditions would also be specified.

Customer Requirements The purpose, objective, events, conditions, or qualifying factors or desired resources of a test or training exercise. One example of customer requirements could be: Determine is the M1A1 Battle Tank can come to a full stop on a 60 degree incline, restart, and climb to the top of the grade without exceeding 4500 ft. lbs. of torque at a predetermined test point in the suspension system. The length of the of the incline, coefficient of friction, specific location of test point, weather conditions, budget, and timeline would also be specified.

Data A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means. [JSIMS (ORD)]

Data A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means. [DoD 8320.1-M; DoD 8320.1-M-1; DoD 8320.1-M-X; DIS; FIPS Pub 11-3; M&S]

Data Attribute A characteristic of a unit of data such as length, value, or method of representation. [DoD 8320.1-M-1; FIPS Special Pub 500-152; M&S]

Data Collection The process of obtaining information that supports a functional activity, or information requirement. [DoD 8320.1-M; M&S]

Data Dictionary A specialized type of database containing metadata that is managed by a data dictionary system; a repository of information describing the characteristics of data used to design, monitor, document, protect, and control data in information systems and databases; an application of a data dictionary system. [DoDD 8320.1; DoD 8320.1-M-1; DoD 8320.1-M-X]

Data Element A basic unit of information having a meaning and subcategories (data items) of distinct units and values (e.g., address). [JCS Pub 1-02; DoDD 8320.1; I/DB; M&S]

Data Entity An object of interest to the enterprise, usually tracked by an automated system. [DoD 8320.1-M; DoD 8320.1-M-1; NBS Special Pub 500-149; M&S]

Data Exchange Standard Formally defined protocols for the format and content of data messages used for interchanging data between networked simulation and/or simulator nodes used to create and operate a distributed, time and space

coherent synthetic environment. Current standards are ALSP and DIS PDUs. [JSIMS (ORD)]

Data Integrity In information processing, the condition in which data is accurate, current, consistent, and complete. [DoD 8320.1-M; M&S]

Data Issues Issues that developed regarding the Customer Data package. These could be related to data processing, data display, or data collection.

Data Products All products produced during the test/training exercise as per the detailed LR Plan.

Data Quality The correctness, timeliness, accuracy, completeness, relevance, and accessibility that make data appropriate for use. [DoD 8320.1-M; MSMP; M&S]

Data Security The protection of data from accidental or intentional modification or destruction and from accidental or intentional disclosure to unauthorized personnel. [DoD 8320.1-M; M&S]

Data Source Organization or subject matter expert who, because of either mission or expertise, serves as a data producer. [Army TRADOC; M&S]

Data Standardization The process of documenting, reviewing, and approving unique names, definitions, characteristics and representations of data according to established procedures and conventions. [JSIMS (ORD)]

Data Standardization The process of documenting, reviewing, and approving unique names, definitions, characteristics and representations of data according to established procedures and conventions. [DoD 8320.1- M; DoD 8320.1-M-1; M&S]

Data Standards A capability that increase information sharing effectiveness by establishing standardization of data elements, database construction, accessibility procedures, system communication, data maintenance and control. [Army Mstr Plan; M&S]

Data Steward Syn: data administrator [M&S].

Data Store A functional grouping of data storage based on the type of information, or use of the storage. A data store in Sybase is a database partition, while in Oracle it is a tablespace. [DII-COE]

Data Structure The logical relationships which exist among units of data and the descriptive features defined for those relationships and data units; an instance or occurrence of a data model. [DoD 8320.1-M-1; DoD 8320.1-M-X; NBS Special Pub 500-152; M&S]

Data Synchronization The timing requirements of a data element, or between and/or among data elements. [Do8320.1-M; M&S]

Data Validation The documented assessment of data by subject area experts and its comparison to known values. Data user validation is an assessment as appropriate for use in an intended model. Data producer validation is an assessment within stated criteria and assumptions. [JSIMS (ORD)]

Data Validation The documented assessment of data by subject area experts and its comparison to known values. Data user validation is an assessment as appropriate for use in an intended model. Data producer validation is an assessment within stated criteria and assumptions. [DIS; MSMP; M&S]

Data Value A value associated with a data element. One of the allowable values of a data element. Synonym of "a data item." [DoD 8320.1; M&S]

Data Verification Data producer verification is the use of techniques and procedures to ensure that data meets constraints defined by data standards and business rules derived from process and data modeling. Data user verification is the use of techniques and procedures to ensure that data meets user specified constraints defined by data standards and business rules derived from process and data modeling, and that data are transformed and formatted properly. [JSIMS (ORD)]

Data Verification Data producer verification is the use of techniques and procedures to ensure that data meets constraints defined by data standards and business rules derived from process and data modeling. Data user verification is the use of techniques and procedures to ensure that data meets user specified constraints defined by data standards and business rules derived from process and data modeling, and that data are transformed and formatted properly. [MSMP; M&S]

Data Verification, Validation & Certification (VV&C) The process of verifying the internal consistency and correctness of data, validating that it represents real world entities appropriate for its intended purpose or an expected range of purposes and certifying it as having a specified level of quality or as being appropriate for a specified use, type of use, or range of uses. The process has two perspectives: producer and user process. [MSMP; M&S]

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Database A collection of interrelated data, often with controlled redundancy, organized according to a schema to serve one or more applications; the data are stored so that they can be used by different programs without concern for the data structure or organization. A common approach is used to add new data and to modify and retrieve existing data. [DoD 8320.1-M; DoD 8320.1-M-1; DoD 8320.1-M-X; FIPS Pub 11-3; M&S]

Database Administration (DBAdm) The activity responsible for the enforcement of the policies and standards established by the data administrator, to include providing technical support for physical database definition, design, implementation, maintenance, integrity, and security; and coordinating with computer operations technicians, system developers, vendors, and users. Database administration is oriented toward technical support for databases and the effective and efficient use of information technology resources. [DoD 8320.1-M; M&S]

Database Schema The specific data view or design of a particular database. One of the powerful features of a database system is that different applications can have their own view of the database by defining different schema. The database management software handles the details of mapping the actual data representation on disk into the view the application requires. [DII-COE]

Debrief Post execution assessment of the LR test/training exercise.

Debrief Report Issues that arise during the test/training exercise. These can be attributed, but not limited to: engineering, technology, weather or management performance.

Define Logical Range Scenario During this activity the boundaries that the LR Scenario will use to meet customer requirements are determined. There may be several valid scenarios which can be used to achieve the same test/exercise objectives. The customer and the LR Manager will define the scenario to be ultimately used as an input to the planning phase. Criteria utilized to achieve LR Scenario definition could be but will not be limited to: resource/technology availability and time or budget constraints.

Define Scenario Characteristics During this activity the acceptable boundaries or specifics that the LR Scenario will use to meet customer requirements are determined. These boundaries are selected as inputs, ranges or limits for the construction of the scenarios. Scenario characteristics include: type of test/training exercise, environment, events, participants, or particular LR Resources.

Define Scenarios During this activity the customer and the LR Manager will define the scenario to be ultimately used as an input to the planning phase.

Criteria utilized to achieve LR Scenario definition could be but will not be limited to: resource/technology availability and time or budget constraints.

Define Secondary & Support Requirements Identification of test/training exercise facility/range specific requirements as well as logistics support requirements. Logistics support could include financial, communications, computation, personnel, security, safety, and environmental.

Determine Primary Resources Availability During this activity the accessibility of high-level or essential resources is determined utilizing the Primary Schedule Requirements, the Joint, Facilities/Ranges Schedules, and the LR scheduling tools, and procedures.

Develop Cost Estimate This activity develops the test/training exercise estimated costs based on the "Scenarios Requirements" and cost information provided by the supporting facilities/ranges.

Development Environment The software environment required to create, compile, and test software. This includes compilers, editors, linkers, debug software, and developer configuration preferences such as command aliases. The development environment is distinct from the runtime environment, and must be separated from the runtime environment, but it is usually an extension of the runtime environment. [DII-COE]

Distributability The ability of the architecture to be easily adapted to meet new and ever-changing requirements and environments. The architecture should enable the system to be easily upgraded or modified to support add-on requirements without requiring restructuring of the existing architecture. Add-ons could include providing more and/or different work stations from which planning and exercise control would be conducted, incorporating new data networks, including new sensors and weapons and/or models to simulate them, etc. [IIE96].

Distributed Database A database whose data objects exist across, or are fragmented across, multiple computer systems or sites. The ability to distribute a database across multiple sites is key to collaborative planning in a number of problem domains including GCCS, GCSS, and ECPN. [DII-COE]

DoD Components The Office of the Secretary of Defense (OSD), the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant commands, the Inspector General of the Department of Defense, the Defense Agencies; and the DoD Field Activities. [DoDD 5000.59; M&S]

Domain The physical or abstract space in which the entities and processes operate. The domain can be land, sea, air, space, undersea, a combination of

any of the above, or an abstract domain, such as an n-dimensional mathematics space, or economic or psychological domains. [SIMTAX,M&S]

Domain Engineering The encompassing system engineering discipline that includes identification (domain analysis), design (domain design), and the construction and certification (domain implementation) of reusable components to address the problems of system and subsystem development.

Emitter A device that is able to discharge detectable electromagnetic or acoustic energy. [DIS; MSETT - Intro to Netwkng Pub 5; M&S]

Encapsulation The process of hiding the details of an object that do not contribute to its essential characteristics. [DMSO 93 SAFOR Survey; M&S]

Enterprise An arbitrarily-defined functional and administrative entity that exists to perform a specific, integrated set of missions and achieve associated goals and objectives, encompassing all of the primary functions necessary to perform those missions. [DoD 8320.1-M-X; M&S]

Environment The texture or detail of the domain, that is terrain relief, weather, day, night, terrain cultural features (such as cities or farmland, sea states, etc.); (2) the external objects, conditions, and processes that influence the behavior of a system (such as terrain relief, weather, day/night, terrain cultural features, etc.). [JSIMS (ORD)]

Environment (Rationale Def) The conditions under which the Participant is immersed during the execution of a Logical Range Test/Training Exercise.

Establish LR Operating Financial Environment During this activity the LR Manager generates the required financial documentation for each organization involved in the Logical Range.

Events (Rationale Def) An event is an expression of scenario conditions in the environment and/or of the participants which are of special interest to exercising the scenario

Exception An exception in the programming language sense of a possible error - signaling return value. The initiator will be informed of these exceptions. [HLA]

Execute Plan During this activity the steps outlined in the LR Plan will be followed in order to conduct the LR test/training exercise.

Execute During this activity the LR Plan will be followed to carry out the operational aspects of performing the test/training exercise.

Executive Agent See DoD M&S Executive Agent. [MSMP; M&S]

Exercise A term used generically to mean any use of the TENA system to achieve a specific goal, no matter whether it is for training, mission rehearsal, doctrine development, analysis, education, etc. [JSIMS (ARCH)]

Exercise Plans The explicit, ordered, sequential mapping of all events, resources, and plans for conducting an exercise.

Facilities/Ranges Capability Description Facilities/Ranges Capability Description - Functional, managerial, operational and performance specifications as well as costing information of facility/range resources.

Federate A member of a HLA Federation. All applications participating in a Federation are called Federates. In reality, this may include Federate Managers, data collectors, live entity surrogates simulations, or passive viewers. [HLA]

Federation A named set of interacting federates, a common federation object model, and supporting RTI, that are used as a whole to achieve some specific objective. [HLA]

Federation Object Model (FOM) An identification of the essential classes of objects, object attributes, and object interactions that are supported by an HLA federation. In addition, optional classes of additional information may also be specified to achieve a more complete description of the federation structure and/or behavior. [HLA]

Field A series of contiguous bits treated as an instance of a particular data type that may be part of a higher level data structure. [DIS; MSETT - Intro to Netwkng, Pub 1; M&S]

Financial Data Cost-related information derived and collected during the plan execution activity.

Financial Documentation The set of formal financial records required for the conduct of a LR test/training exercise.

Flexibility The ability to respond to a variety of needs and situations. Flexibility is the characteristic of a system to handle a wide variety of planning and exercise requirements and to operate from a variety of platforms. Flexibility will enable TENA to be immediately useful to many potential users in order to accomplish a wide range of tasks (e.g., real-time and post-test processing, planning, scheduling, exercise reconstruction, virtual, constructive, or live simulation, etc.). This characteristic pertains to the capability of the system at a given moment whereas extensibility, malleability and modifiability refer to altering the system in some way.

Gateway A device that connects two systems, especially if the systems use different protocols. For example, a gateway is needed to connect two independent local networks, or to connect a local network to a long-haul network. [MSETT - Intro to Netwkng, Pub 9; M&S]

Hardware-in-the-Loop (HITL) A hybrid simulation that includes actual system (prototype or production) hardware or software in conjunction with digital models and external stimuli to demonstrate the operations and functions of the hardware/software within an environment simulating actual operating conditions. Functioning of the simulation with the hardware or software is often accomplished in an integration laboratory.

Hierarchical Model A model of information in which data are represented as trees of records connected by pointers. [JDBE; M&S]

Hierarchy Hierarchy is a ranking or ordering of abstractions. [DMSO 93 SAFOR Survey; TEMS]

High Level Architecture (HLA) Major functional elements, interfaces, and design rules, pertaining as feasible to all DoD simulation applications, and providing a common framework within which specific system architectures can be defined. [JSIMS (ORD)]

Identify Payment Issues Payment issues are identified by comparing the Financial Data collected during the execution phase to the Financial Documentation, and Refined Cost Estimate. Some Payment Issues that could arise include deviations from the Refined Cost Estimate or funding not received by any Logical Range Resource provider.

Information System (IS) The organized collection, processing, maintenance, transmission, and dissemination of information in accordance with defined procedures, whether automated or manual. [DoDD 5200.28; DoD 8320.1-M; DoD 8320.1-M-1; M&S]

Information Any communication or reception of knowledge such as facts, data, or opinions, including numerical, graphic, or narrative forms, whether oral or maintained in any medium, including computerized databases, paper, microform, or magnetic tape. [DoD 8320.1-M; DoDD 8000.1; DoD 8320.1-M-1; DoD 8320.1-M-X; M&S]

Infrastructure The underlying software foundation on which any computer application is written, providing the basic services necessary for that application to function effectively. [JSIMS (ARCH)]

Installed System Test Facilities (ISTF) Are facilities where entire systems or sub-systems get their first workout in the environment in which they will operate (e.g., inside an aircraft).

Instantiation represent an abstraction by a concrete instance. [DMSO; M&S]

Integrated Product Team (IPT) Integrated Product Teams are a means to achieve concurrent engineering or IPPD. They are multi-disciplinary teams consisting of representatives from all disciplines involved in the system acquisition process, from requirements development through disposal. Having the participation of all the appropriate disciplines, IPTs are often empowered to make decisions to achieve successful development of their particular product. [DSMC 1; TEMS]

Integration The process of combining components, usually hardware and software, into a new, larger component to achieve some architectural requirement. Integration requires resolution of compatibility issues between components that are to be interconnected. Integration attempts to allow sharing of a common resource (such as data) without the need for intermediate translations from one format to another. Note that the COE is a technique for achieving integration that ensures interoperability. [DII-COE]

Integration Laboratory (IL) A facility that supports the integration of system components and/or software in a laboratory environment for development, experiments, and testing. The integration laboratory “simulates” (or replicates) a system to a known extent and allows the modification/addition of component hardware/software for use without many of the restrictions or difficulties that would be encountered using actual system hardware or host platforms.

Interoperability The ability of systems, units, or forces to provide and receive services from other systems, units or forces, and to use the services so interchanged as to enable them to operate effectively together. Interoperability is a system characteristic which allows the assets of one test or training facility to be used and controlled by one or more other facilities “on-demand” within the context of a logical range; as seamlessly as if they were an integral part of their organic systems.

Interoperability The ability of two or more systems or components to exchange and use information (IEEE STD 610.2). This definition is extended in the context of a TENA to include levels of interoperability, and relate interoperability to interfacing (lowest, least desirable level) versus true integration (highest, most desirable level). [DII-COE]

Joint Program Any Defense acquisition system, subsystem, component, or technology program that involves formal management or funding by more than

one DoD Component during any phase of a system's life-cycle. [DoDI 5000.2; M&S]

Joint, Service Ranges/Facilities Schedules All official records of the utilization timeline for LR assets. These are compiled from facilities such as hardware in the loop, installed test facilities, T&E and training ranges, as well as Joint and Commanders in Chief schedules.

Latency The time required for a device to begin physical output of a desired piece of data once processing is complete. [DMSO; M&S]

Legacy System Currently existing system that does not support any capabilities. Starting point for migration toward TENA compliancy.

Lessons Learned Managerial or operational understanding derived from the execution of this particular process. This information is collected and analyzed for process improvement purposes.

Local Area Network A class of data network which provides high data rate interconnection between network nodes in close physical proximity. [USMC Mstr Plan; M&S]

Logical Range A set of assets required to conduct a specific test exercise or training event logically assembled into a system used to conduct that exercise or event. The assets may come from one or more facilities.

Logical Range Lessons Learned A compilation of specific managerial, operational, performance or financial information that pertains to the Logical Range instantiation. These will be kept on a Logical Range repository for analysis and future review of Logical Range users.

Logical Range Plan Detailed account of all test/training exercise to include: objectives, resources requirements and allocation divided by provider, execution planning, cost estimate, and timelines.

Logical Range Primary Resources (Rationale Def)

Logical Range Procedures The managerial and operational doctrine and processes that govern and provide guidance for all phases of the execution of a LR test/training exercise. These may include safety, security, environmental, communications, financial, and computational procedures.

Logical Range Resources (Rationale Def) The Logical Range Resources comprise those secondary resources that are required to implement a specific Logical Range Scenario.

Logical Range Scenario The particular scenario selected to be utilized for planning of the Logical Range.

Logical Range Scenario (Rationale Def) The particular Scenario selected to be utilized for planning of a specific instance of a Logical Range.

Logical Range Support Those capabilities and applications that provide the required functionality to enable the integration of facilities into a Logical Range within the Tena enterprise.

Logical Range Working Schedule The timeline assigned to the LR for the utilization of high-level or essential assets and resources required to execute a Logical Range test/training exercise.

Logistics Annex Document that outlines Safety, Environmental, Air/Water Space plans and other logistics issues. This document is developed on as apply basis, and should include particular chapters dedicated to the documentation of particular facility/range resource/services provider information.

Logs A chronological documentation of the test/training exercise events.

Maintainability The ability of an item to be retained in or restored to a specified condition when maintenance is performed by personnel having specified skill levels, using prescribed procedures and resources, at each level of maintenance and repair. This refers to an item's ability to remain in satisfactory working order or to be readily repaired and returned to satisfactory working order by maintenance personnel at the appropriate maintenance facility. [DODDir80]

Malleability The ability to adjust to and incorporate new technology. The architecture shall not be so rigid as to require significant redesign or alteration in order to accommodate new technologies for modeling and simulation, communication, processing, signal interfacing, operator interfacing, new software etc. [Amer92]

Match Capabilities to Scenario Requirements This process will utilize existing facilities/ranges capabilities and defined scenarios to determine if customer requirements could be met.

Matched Capabilities This process will utilize existing facilities/ranges capabilities and defined scenarios to determine if customer requirements could be met.

Matched Requirements The specific facilities/ranges resources required to execute the test/training exercise.

Measure of Performance (MOP) Measure of how the system/individual performs its functions in a given environment (e.g., number of targets detected,

reaction time, number of targets nominated, susceptibility of deception, task completion time.) It is closely related to inherent parameters (physical and structural) but measures attributes of system behavior. See also: measure of effectiveness. [DIS; IEEE; TEMS]

Measures of Effectiveness (MOE) A qualitative or quantitative measure of a M&S's performance or a characteristic that indicates the degree to which it performs the task or meets a requirement under specified conditions. See also: measure of performance. [AFI 16-102; TEMS]

Measures of Outcome (MOO) Metrics that define how operational requirements contribute to end results at higher levels, such as campaign or national strategic outcomes. [DSMC 1; TEMS]

Methodology The system of principles, practices, and procedures, applied to a specific branch of knowledge. {DMSO;} Metric A measure of the extent or degree to which a product possesses and exhibits a certain quality, property, or attribute. [IEEE 83; M&S]

Metric(s) A process of algorithm that may involve statistical sampling, mathematical computations, and rule-based inferencing. Metrics provide the capability to detect and report defects within a sample. [DoD 8320.1- M-3; M&S]

Mission Space Mission space refers to the entities, actions, and interaction that are present in the real-world or must be represented to produce credible simulations of the specific mission area being addressed. [JSIMS (ARCH)]

Mission Space (Rationale Def) The Mission Space comprises those primary resources that are the focus of the Logical Range Scenario.

Mock-Up A full-sized structural, but not necessarily functional, model built accurately to scale, used chiefly for study, testing, or display. See also: physical model. [DIS; IEEE; M&S]

Model A physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process. [DoD 5000.59; HLA]

Modeling and Simulation (M&S) The use of models, including emulators, prototypes, simulators, and stimulators, either statically or over time, to develop data as a basis for making managerial or technical decisions. The terms "modeling" and "simulation" are often used inter-changeably. [JSIMS (ORD)]

Modeling and Simulation (M&S) Accreditation The official certification that a model or simulation is acceptable for use for a specific purpose. [JSIMS (ORD)]

Modeling Application of a standard, rigorous, structured methodology to create and validate a physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process. [DoD 8320.1- M; M&S]

Model-Test-Model An integrated approach to using models and simulations in support of pre-test analysis and planning; conducting the actual test and collecting data; and post-test analysis of test results along with further validation of the models using the test data. [DSMC 1; M&S]

Modifiability The ability of a hardware or software component to be easily modified to perform various tasks, to operate within new systems or environments, or to adapt to changes in scope or magnitude of performance requirements. Modifiability often depends on an item's modularity and use of standard interfaces and is normally more easily achieved with software. As an example, to be modifiable the simulation of a sensor or weapon system must provide for the various performance parameter values to be determined by preset and easily changeable data files/tables rather than "hard" coded. In another example, a printed circuit board back-plane would conform to a stated standard and contain spare slots. The associated enclosure would contain sufficient empty volume to allow for installation of additional components without altering the locations and interfaces between existing components. [Amer92]

Modularity The extent to which a system can be divided into a set of individual modules that are mostly independent. This gives an architecture the ability to draw together existing systems and components and interconnect them with each other and with newly developed or modified components as required. Modules will perform specific focused and restricted functions and will have a defined set of inputs and outputs. Both hardware and software modules are defined by form, fit and function. For hardware the form and fit refer to physical characteristics related to the components envelope and exterior dimensions. For software the form and fit refer to the ability to interface with the external operating system and characteristics of required processing time, data interfaces, needed memory etc. Modularity will enable replacement of one module with another to perform the same or an expanded function while not requiring alteration to the connected or attached or adjacent modules. Modularity is necessary to enable malleability and the aspect of flexibility which is to be able to perform with interchangeable units. [Smith96]

Multisensory I/O The use of more than one sensory mechanism (visual, aural, tactile, etc.) to interact with a computer-generated environment. [DSMC 2; M&S]

Multi-State Objects Mission space entities that express a changing state (in attribution and visual display) as the simulation progresses (e.g., damage to structures, changes in vegetation, damage system representations such as vehicles, tanks, etc.). [MSMP; M&S]

Network Filter A system to selectively accept or reject data received from the network. [DIS; M&S]

Network Management The collection of administrative structures, policies, and procedures that collectively provide for the management of the organization and operation of the network as a whole. See: network manager. [DIS; IEEE 1278.1; M&S]

Network Manager A TENA core component responsible for managing network resources at a facility.

Network Node A specific network address. See: node. Contrast with: processing node. [DIS; M&S]

Node A general term denoting either a switching element in a network or a host computer attached to a network. See: processing node; network node. [DIS; IEEE 1278.1; IEEE 1278.2; M&S]

Notional Data Speculative or theoretical data rather than actual data. [DMSO; M&S]

Object State, behavior, and identity; the instantiation of a class. An object is a basic unit of functionality in an object-oriented software system, combining state, behavior and identity into one software construct. In general, an object has a well-defined interface, an internal state not normally visible to or accessible by other software constructs (this feature is called encapsulation), and its own identity. Objects are instances of classes. A class is a pattern for the creation of objects, describing what types of interfaces and internal state the object must have but not specifying the exact functionality behind an interface or the values of the internal state variables. Classes are thus more abstract than objects, and are sometimes called meta-objects. A class is said to inherit from another class if it contains at least those interfaces and state variables defined for the class from which it is inheriting. Classes themselves may be thought of as instantiations of higher-level abstractions (called metaclasses) and this process of abstraction can continue ad infinitum. An object behaves polymorphically if the decision on what functionality is to be executed when its interface is invoked is decided at run time rather than at compile time. An object is said to have persistence if its state outlives the process that created it, usually by having the state saved to a persistent store such as magnetic media. In contrast to the definition presented above, in the U.S. Department of Defense's High Level Architecture for Modeling and Simulation (HLA) an object is a data structure that represents a thing in the simulated world that exists over a period of time. In the HLA, an object is distinguished from an interaction, which exists only at a single point in time. Because distinct pieces of an individual object (attributes, below) can be managed, transported, and accessed differently from other pieces of the same object, an HLA object is not the same as a software object as defined above.

Thus it is important that the term object be distinguished as to whether it represents a software object or an HLA object. In this document, *the word "object" always refers to a software object*, unless specifically described as an HLA object. [JSIMS (ARCH)]

Object Model A specification of the objects intrinsic to a given system, including a description of the object characteristics (attributes) and a description of the static and dynamic relationships that exist between objects. [HLA]

Object-Based A software design methodology adhering to only some of the properties of object oriented software; for example, Ada does not support inheritance, a key property of object oriented systems, therefore Ada is often referred to as an object based language. See: object oriented. [JSIMS (ORD)]

Octet A sequence of eight bits, usually operated upon as a unit. [IEEE 1278.1; M&S]

Office of the Secretary of Defense (OSD) Includes the immediate Offices of the Secretary and Deputy Secretary of Defense, the Under Secretaries of Defense, the Director of Defense Research and Engineering, the Assistant Secretaries of Defense (ASDs), the General Counsel of the Department of Defense (GC, DoD), the Assistants to the Secretary of Defense (ATSDs), the OSD Directors, or equivalents, who report directly to the Secretary or the Deputy Secretary of Defense, and such other staff offices as the Secretary of Defense establishes to assist in carrying out assigned responsibilities. [D0DD 5000.59; DoDI 5000.XX; M&S]

Off-Line Storage Devices Off-line storage devices generally are used for data backup and archival applications, using media like magnetic tapes or removable hard or floppy disks. [IDA ADS Paper; M&S]

On-Line Storage Devices On-line storage devices provide more immediate retrieval of data and usually refer to devices such as magnetic or optical hard disk drives. [IDA ADS Pape; M&S]

Open Air T&E/Training Range The Open Air T&E/Training Range is a combination of the physical open-air range assets available to participate in the Logical Range Test/Training Exercise.

Open System A system that implements sufficient open specifications for interfaces, services, and supporting formats to enable properly engineered applications software(a) to be ported with minimal changes across a wide range of systems, (b) to interoperate with other applications on local and remote systems, (c) to interact with users in a style that facilitates user portability, and (d) to enable users to increase processing power as their functional needs grow, without the need to re-write applications (i.e., scalability) (POSIX ISO 9945-1).

The “openness” of a system is a multi-dimensional measurement that in essence determines how easy it is to change the system from one intended purpose to another. [DII-COE]

Operational Architecture Descriptions of the tasks, operational elements, and information flows required to accomplish or support a warfighting function. The operational architecture is best thought of as that which identifies the warrior's need(JTA). The operational architecture is closely tied to CONOPS (Concept of Operations) and is often dictated by policy rather than technology. It represents the desired system process and is more of the “what” rather than the “how.” An example of an operational architecture is the reporting chain of command from a soldier in the field to the CJTF. [DII-COE]

Operational Environment A composite of the conditions, circumstances, and influences which affect the employment of military forces and the decisions of the unit commander. Frequently characterized as permissive, semi-permissive, or non-permissive. [DIS; M&S]

Optimize Logical Range Schedule During this activity the facilities/ranges schedules and the LR Primary Resources Availability Report are utilized in conjunction with the schedule optimization tool to generate Optimized LR Resources.

Optimize Schedule During this activity the facilities/ranges schedules, and the LR Primary Resources Availability Report are utilized in conjunction with the schedule optimization tool to generate Optimized LR Resources.

Participant (Rationale Def) The Participant is the focus of a particular Logical Range Test/Training Exercise. Instances of the participant class are those items that the range and/or facility is monitoring.

Payment Issues The result of any deviations from the Refined Cost Estimate or financial consequences that arise during the test or training exercise. Examples of Payment Issues include deviations from the Refined Cost Estimate or funding not received by any Logical Range Resource provider.

Period The time interval between successive events in a discrete simulation. [IEEE; DIS; M&S]

Plan Preparation, coordination, and production of the LR Plan. During this activity there are three parallel efforts - preparation of the LR Plan, preparation of a refined cost estimate and acquisition of the necessary resources and logistic support.

Platform A generic term used to describe a level of representation equating to vehicles, aircraft, missiles, ships, fixed sites, etc. in the hierarchy of

representation possibilities. Other representation levels include units (made up of platforms) and components or modules (which make up platforms). [DIS; MSETT - Intro to Netwkng Pub 6; M&S]

Portability The ability of a system, hardware or software component, or data to be easily transferred from one hardware or software environment/system to another. This requires the existence and use of common interfaces so that hardware/software components and data can be easily inserted into various environments/systems with minimal reformatting or interface modification. [DIIMP95]

Portability The degree to which system components may be transferred from one hardware or software environment to another (IEEE STD 610.12). High portability means that the transfer occurs with minimal or no modifications. For example, a COE segment which was originally developed on a Solaris platform that can be executed correctly on a Hewlett Packard or Silicon Graphics platform by rebuilding the segment without modifying the source code is highly portable. [DII-COE]

Predictive Model A model in which the values of future states can be predicted or are hypothesized; for example, a model that predicts weather patterns based on the current value of temperature, humidity, wind speed, and so on at various locations. [DIS; IEEE; M&S]

Preliminary Data Package Post-test/training exercise results formatted and processed as per LR Plan. This package will be presented to the customer for review and approval for delivery.

Pre-Test/Training Exercise Brief A summary of all the events, and coordination related with the test/training exercise. All parties involved from safety, environmental, engineering, and management will be involved at levels of correspondence. At this point the plan and schedules should be cleared and understood by all parties involved.

Primary Resources (Rationale Def) Include the participant, or item under test, the environment, either real or simulated, and the specific events that will define the Logical Range Test/Training Exercise.

Primary Resources Assignments The specific combination of high-level or essential LR resources to be utilized during the execution of the LR test/training exercise.

Primary Resources Availability Report Report containing the corresponding timeframe of primary (high-level or essential) resources availability.

Primary Schedule Requirements Logical range high-level or essential resources' time assignment.

Principal Staff Assistants The Under Secretaries of Defense; the Assistant Secretaries of Defense (ASDs); the General Council of the Department of Defense (GC, DoD); the Assistants to the Secretary of defense (ATSDs); and the OSD Directors, or equivalents, who report directly to the Secretary or Deputy Secretary of Defense. [DoDI 5000.XX; M&S]

Process (1) the act of going on or being carried on, or a related series of actions or events. (2) a thread of control in the execution of a computer program that manages its own unique set of resources. A computer process is distinguished from a *thread* in that a process has its own resources, while a thread shares the resources of its parent process with other threads in that process. [JSIMS (ARCH)]

Process Model A model of the processes performed by a system; for example, a model that represents the software development process as a sequence of phases. Contrast with: structural model. [DIS; M&S]

Processing Node The hardware and software processing resources devoted to one or more simulation entities. See: node. Contrast with: network node. [DIS; M&S]

Produce Line A group of products sharing a common, managed set of features that satisfy specific needs of a selected market or mission. [Northrop, 1997]

Product Line Approach A methodology for developing and supporting range hardware, software, architectures, and systems in the distributed test and training environment

Product Line Support Group Defines the development and execution environments for range products

Protocol Suite A defined set of complementary protocols within the communication architecture profile. [MSETT - Intro to Netwkng Pub 5; M&S]

Protocol A set of rules and formats (semantic and syntactic) that define the communication behavior of simulation applications. [MSMP; DIS; IEEE 1278.1; M&S]

Prototype A preliminary type, form, or instance of a system that serves as a model for later stages or for the final, complete version of the system. [IEEE; DIS; M&S]

Qualitative Data A data value that is a non-numeric description of a person, place, thing, event, activity, or concept. [DoD 8320.1-M-1; M&S]

Quantitative Data Numerical expressions that use Arabic numbers, upon which mathematical operations can be performed. [DoD 8320.1-M-1; M&S]

Questionnaires Tools utilized to measure success for technical, operational, planning, and funding issues.

Queue In queuing theory, a set of zero or more entities waiting to be serviced by a service facility. [DIS; IEEE; M&S]

Random Pertaining to a process or variable whose outcome or value depends on chance or on a process that simulates chance, often with the implication that all possible outcomes or values have an equal probability of occurrence; for example, the outcome of flipping a coin or executing a computer-programmed random number generator. [DIS; IEEE; M&S]

Range Product Development Group Develop and deliver range products for users in the field. They develop a system architecture using the Product-Line architecture, including the technical architecture and components

Ranges/ Facilities Procedures The official managerial and operational doctrine and processes that control and provide guidance the execution of a test/training exercise at a specific facility or range.

Real-Time In modeling and simulation, simulated time advances at the same rate as actual time; for example, running the simulation for one second results in the model advancing time by one second. Contrast with: fast time; slow time. [JSIMS (ORD)]

Real-Time Service A service which satisfies timing constraints imposed by the service user. The timing constraints are user specific and should be such that the user will not be adversely affected by delays within the constraints. [MSETT - Intro to Netwkng Pub 5; M&S]

Real-Time System A system that computes its results as quickly as they are needed by a real-world system. Such a system responds quickly enough that there is no perceptible delay to the human observer. In general use, the term is often perverted to mean within the patience and tolerance of a human user. [AFI 16-102; DSMC 1; M&S]

Refined Cost Estimate A detailed cost estimate that takes into consideration all support required to conduct the test/training exercise.

Reliability The ability of a hardware or software system or component to continuously operate successfully while being used under stated operating conditions (temperature, humidity, vibration, shock, radiation, and contact with salt or other corrosion agents, etc.). Reliability of hardware items usually

depends on both the conditions under which they are transported and stored during non-operation as well as the conditions during their use. High reliability results from a high probability that the item will provide failure/fault-free performance over an extended period of time. [DODDir80]

Reliable Service A communication service in which the received data is guaranteed to be exactly as transmitted. [DIS; IEEE 1278.1; IEEE 1278.2; MSETT - Intro to Netwkng Pub 5; M&S]

Remote Install The ability to electronically install segments from a local site to a remote site. In a “push” mode, the local site initiates and controls the segment installation. In a “pull” mode, the remote site initiates and controls the segment installation. [DII-COE]

Research, Development, and Acquisition (RDA) RDA includes all M&S used for design, development, and acquisition of weapons systems and equipment. M&S in the RDA domain are used for scientific inquiry to discover or revise facts and theories of phenomena, followed by transformation of these discoveries into physical representations. RDA also includes test and evaluation (T&E) where M&S are used to augment and possibly reduce the scope of real-world T&E. [Army; TEMS]

Resolution The degree of detail and precision used in the representation of real-world aspects in a model or simulation. See also: granularity. [JSIMS (ORD)]

Resolve/Close Payment/Data Issues During this activity any payment or data issues are reconciled to the satisfaction of the Customer, Logical Range Manager, and any Facility or Range which participated during the Logical Range instance.

Resources Any item that is available to be scheduled and participate in a Logical Range Exercise. Also called an Asset.

Reusability Reuse is the ability to use the same products at multiple facilities. An example product might be a software package built to TENA standards to build graphic displays. Other examples include designs, processes, and test plans. Reuse supports a common-core of a product that is, in fact, exactly the same from instance to instance, and it also supports the ability to adapt the reusable product in predetermined ways at the level of a local instance. Reuse is distinct from commonality in that commonality implies every instance of the reused product is exactly the same. Effective reuse is an optimization of commonality and flexibility that recognizes the unique requirements of individual facilities within a common core environment or domain. Reuse enables significant savings in long-term development and maintenance costs and is an effective and efficient path to sharing and interoperability.

Roadmap Guidelines and/or instructions that provide directions toward a specific goal or capability.

Scalability The ability to use the same architecture and application software on many different classes of hardware/software platforms from personal computers to super computers and for tasks varying in scope (extends the portability concept). The capability to handle various operations of greatly different scales of operational requirements and to be able to easily grow to accommodate increased workloads beyond the initial capability. An example of scalability in the TENA context is to be able to run a single vehicle exercise at single range or a multi-vehicle exercise at multiple ranges and other facilities with the same basic system [DIIMP95].

Scale Model A physical model that resembles a given system, with only a change in scale; for example, a replica of an airplane one tenth the size of the actual airplane. [DIS; IEEE; M&S]

Scenario Characteristics The set of acceptable boundaries or specifics for a particular scenario. These boundaries are selected as inputs, ranges or limits for the construction of the scenarios. Scenario characteristics include: type of test/training exercise, environment, events, participants, or particular LR Resources.

Scenario Requirements A set of high-level or essential resources, services or operations necessary for the scenario execution.

Scenarios The combination of environment, participants, LR Resources and events which can be used to meet the test/training exercise customer requirements.

Schedule Logical Range During this activity the LR primary resources will be scheduled following established LR scheduling procedures and utilizing the LR scheduling tools.

Schema Descriptive representation of data and/or data requirements that describe conceptual, internal, or external views of information/data needs. [DoD 8320.1-M-X; M&S]

Script A file containing commands to be executed by an operating system shell. Such files are generally called “scripts” in the UNIX environment, but are typically called “batch files” in the MS-DOS and Windows environment. [DII-COE]

Seamless Perfectly consistent. Transparent. [DMSO; M&S]

Secondary & Support Requirements Definition A list of facility/range specific support services and assets definition accompanied by proposed provider(s).

Select Implementation Scenario During this activity the LR Manager in conjunction with the Customer select the LR Scenario to be used to conduct the test/training exercise.

Server A computer program that provides some service. Servers are producers of data while clients are consumers of data. [DII-COE]

Setup The steps followed to prepare for plan execution. These could be LR specific and will follow LR Procedures as well as Ranges/Facilities Procedures.

Sharability The ability of one facility to utilize the products generated by another facility is sharing. Interoperability is the most extensive form of sharing, but is not the only form. This definition of sharing includes a variety of "one-way" information exchanges where data or data products are sent to many facilities, but control of the data generation is strictly at one source. One example is the effective transmission of post-test analysis products without custom translation required for each product user.

Simulate To represent a system by a model that behaves or operates like the system. [DMSO Glossary of M&S Terms; DIS Glossary; STEP]

Simulated Time Time as represented within a simulation. Syn: virtual time. See also: fast time; real time; slow time. [IEEE; M&S]

Simulation (more properly "computer simulation") - A selective re-creation of reality in software. A simulation is an application containing one or more models that interact with one another. A simulation represents products, conditions, processes or entities in computer software, and evolves them over time. A simulation is necessarily selective in its representation of reality and is thus at best an approximation of the real world. It is important to note that no simulation is 100% accurate in its portrayal of the real world. To be 100% accurate, the simulation would have to be indistinguishable from the object being simulated, and would thus represent not a simulation of that object but a total re-creation of that object. Thus any simulation will be inaccurate in some respects and to some degree. The art of simulation construction is to understand how and why a simulation differs from that which is being simulated, and what the consequences of such inaccuracies are. [JSIMS (ARCH)] Also, a technique for testing, analysis, or training in which real-world systems are used, or where real-world and conceptual systems are reproduced. Also a method for implementing a model over time. [DMSO Glossary of M&S Terms; DoDD 5000.59; STEP]

a. Live Simulation. A simulation involving real people operating real systems.

b. Virtual Simulation. A simulation involving real people operating simulated systems. Virtual simulations inject HITL in a central role by exercising motor control skills (e.g., flying an airplane), decision skills (e.g., committing fire control resources to action), or communications skills (e.g., as members of a C^4I team).

c. Constructive Model or Simulation. Models or simulations that involve real people making inputs into a simulation that carries out those inputs by simulated people operating simulated systems. [DMSO Glossary of M&S Terms; M&S Master Plan] by a model. [DoD 5000.59; HLA]

Simulation Clock A counter used to accumulate simulated time. [DIS; IEEE; M&S]

Simulation Environment (1) Consists of the operational environment surrounding the simulation entities including terrain, atmospheric, bathospheric and cultural information. (2) All the conditions, circumstances, and influences surrounding and affecting simulation entities including those stated in (1). [DIS; M&S]

Simulation Exercise An exercise that consists of one or more interacting simulation applications. Simulations participating in the same simulation exercise share a common identifying number called the exercise identifier. These simulations also utilize correlated representations of the synthetic environment in which they operate. See: live simulation. [DIS; IEEE 1278.1 & 1278.2; M&S]

Simulation Fidelity Refers to the degree of similarity between the training situation and the operational situation that is being simulated. [DIS; MSETT - Intro to Netwkng, Pub 3; M&S]

Simulation Game A simulation in which the participants seek to achieve some agreed-upon objective within an established set of rules. For example, a management game, a war game. Note: The objective may not be to compete, but to evaluate the participants, increase their knowledge concerning the simulated scenario, or achieve other goals. Syn: gaming simulation. [DIS; IEEE; M&S]

Simulation Language Programming language used to implement simulations. [IEEE; DIS; M&S]

Simulation Management A mechanism that provides centralized control of the simulation exercise. Functions of simulation management include: start, restart, maintenance, shutdown of the exercise, and collection and distribution of certain types of data. [DIS; IEEE 1278.1; M&S]

Simulation Object Model (SOM) A specification of the intrinsic capabilities that an individual simulation offers to federations. The standard format in which

SOMs are expressed provides a means for federation developers to quickly determine the suitability of simulation systems to assume specific roles within a federation. [HLA]

Simulation Process The imitative representation of the actions of platform(s), munition(s), and life form(s) by computer program(s) in accordance with a mathematical model and the generation of associated battlefield entities. May be fully automated or partially automated. In the latter case, the human-in-the-loop injects command-level decisions into the process and is not intended to be a "trainee". [DIS; M&S]

Simulation Support Entity Processing modules used to support, control, or monitor the simulation environment, but which do not actually exist on the battlefield. This includes battlefield viewing devices for controllers or exercise observers such as the stealth vehicle, the plan view display, after action review systems, and simulation control systems. [DIS; MSETT-Intro to Netwkng Pub 6; M&S]

Simulation System A group of simulations components (e.g., terrain database, threat database, engagement database) that may interface to external systems (e.g., JSIMS, TBMCS). [JSIMS (ARCH)]

Simulation Time (1) A simulation's internal representation of time. Simulation time may accumulate faster, slower, or at the same pace as sidereal time. (2) The reference time (e.g., Universal Coordinated Time) within a simulation exercise, this time is established ahead of time by the simulation management function and is common to all participants in a particular exercise. [DIS; IEEE 1278.1; M&S]

Simulation, Test, and Evaluation Process (STEP) Is an iterative process that integrates both simulation and test for the purpose of evaluating the performance, military worth, or effectiveness of systems to be acquired. In STEP, simulation and test are integrated, each pending on the other to be effective and efficient. Simulations provide predictions of the system's performance and effectiveness, while tests are "part of a strategy to provide information regarding risk and risk mitigation, to provide empirical data to validate models and simulations, to permit an assessment of the attainment of technical performance specification and system maturity, and to determine whether systems are operationally effective, suitable, and survivable for intended use." [DOD 5000.2R]

Simulator (1) A device, computer program, or system that performs a simulation. (2) For training, a device which duplicates the essential features of a task situation and provides for direct practice. (3) For DIS, a physical model or simulation of a weapons system, set of weapons systems, or piece of equipment

which represented some major aspects of the equipment's operation. [DMSO Glossary of M&S Terms; DIS Glossary; STEP]

Single Point-of-Entry The organization (s) responsible for entering data values for a data element. [DoD 8320.1-M; M&S]

Site Manager The individual responsible for the maintenance and operation of the simulators and local area network operations to support the requirement of the users. Additional responsibilities include: providing appropriate terrain; safety; data collection; and providing appropriate information for training feedback such as after action reviews and take- home packages. [DIS; M&S]

Site (1) An actual physical location at a specific geographic area, e.g., the Ft. Knox Close Combat Test Bed (CCTB) which can contain a single cell, multiple cells, or only part of a cell. (2) A node on the Distributed Interactive Simulation (DIS) long haul network which can contain a single cell, multiple cells, or only part of a cell. (3) A level of configuration authority within a DIS exercise. [DIS; M&S]

Slow Time The duration of activities within a simulation in which simulated time advances slower than actual time. [DIS; M&S]

Smart Product Models Smart Product Models are a representation of the physical characteristics of a specific system or platform, the business practices associated with developing and operating it, and the processes and costs of manufacturing it. These models are capable of interacting with users throughout the entire acquisition life cycle. [TEMS]

Smoothing Interpolation of the previous state of an entity (location, velocity, etc.) to the current state, creating a smoothed transition between two successive entity state updates. [DIS; M&S]

Software Model A symbolic model whose properties are expressed in software; for example, a computer program that models the effects of climate on the world economy. Contrast with: graphical model; mathematical model; narrative model; tabular model. [DIS; IEEE ; M&S]

Stability Constancy of purpose; steadfastness. Reliability; dependability. [DoD 8320.1-M-3; M&S]

Stabilized-Variable Model A model in which some of the variables are held constant and the others are allowed to vary; for example, a model of a controlled climate in which humidity is held constant and temperature is allowed to vary. [DIS; IEEE; M&S]

Stakeholder A group or organization that has a concern, interest, or investment into a undertaking.

Standard A rule, principle, or measurement established by authority, custom, or general consent as a representation or example. [MSMP; M&S]

Stimulators (1) A hardware device that injects or radiates signals into the sensor system(s) of operational equipment to imitate the effects of platforms, munitions, and environment that are not physically present. (2) A battlefield entity consisting of hardware and/or software modules which injects signals directly into the sensor systems of an actual battlefield entity to simulate other battlefield entities in the virtual battlefield. [DIS; M&S]

Subject Matter Experts Test/Training exercise personnel who are called upon to perform the tasks required to execute the Logical Range.

Support Staff The required test/training exercise personnel. This include, but are not limited to: test engineers, program/test managers, data analysts, range/safety officers, programmers, etc.

Synthetic Environments Internetted simulations that represent activities at a high level of realism from simulations of theaters of war to factories and manufacturing processes. These environments may be created within a single computer or a vast distributed network connected by local and wide area networks and augmented by super-realistic special effects and accurate behavioral models. They allow complete visualization of and total immersion into the environment being simulated. [DMSO Glossary of M&S Terms; M&S Master Plan]

System A set of different elements so connected or related as to perform a unique function not performable by the elements alone. The most important and distinguishing characteristic of a system, therefore, is the relationships among the elements. An example is an automobile. All the individual elements may be in working order but do not individually provide transportation. Transportation only exists when all the elements are connected and function as a whole. [DII-COE]

System Architecture An architecture that inherits all properties of the Technical Reference Architecture, but adds decisions, and standards to further constrain the implementation in order to meet goals and requirements of the specified system.

Technical Infrastructure The internal framework that must be built to implement an operational service. [DoD 8320.1-M; M&S]

Technical Reference Architecture An abstract architecture that provides the structure and coordination capabilities that form the foundation upon which system architectures are built.

Telecommunication Information Networking Architecture Industry initiated Standards and Protocols group.

Time Management A collection of mechanisms and services to control the advancement of time within each federate during an execution in a way that is consistent with federation requirements for message ordering and delivery. [HLA]

Tools The required manual or automated systems to support the Logical Range. Tools could support scheduling, financial planning, test/training exercise conduct, or data analysis.

Understandability The system shall be easily understood from the design, implementation, operation, and maintenance perspectives. The operator interface must strive to be intuitive for users with experience operating normal desktop computers. Standard range system and range operation terminology and symbology will be used for displays and controls. System architecture and design documents must provide straightforward easy to grasp descriptions of the system features, characteristics and components. Hardware and software documentation must provide a clear description of the components so that the current construction of the components can be easily determined and potential methods of repair and/or modification can easily be determined and defined. [Smith96]

Unicast A transmission mode in which a single message is sent to a single network destination, i.e., one-to-one. [DIS; MSETT - Intro to Netwkng, Pub 1; M&S]

Unmatched Requirements A report that identifies what requirements could not be matched and explains the reasons why.

Usability Usability is the system characteristic of serving the intended uses or needs while enabling the users to perform their tasks effectively and efficiently. A usable system is capable of being used by a variety of system operators, for a variety of tasks. Although operators may have unique or specialized skills; i.e. test conductors, flutter engineers, graphics operator, etc., they should not need special training to use those skills via standard system interfaces. Operator interfaces will be “friendly” and operators will be able to perform their tasks following the instructions and guidance in manuals or on-line help. Operator entries will be by point and click (mouse, track ball etc.), pull-down menu selection, keyboard or other simple interface device. Displays will be easy to understand. [IIE96]

Use Case A description of a sequence of events used to demonstrate and validate the function and interaction of a capability being examined.

Validation The process of determining the degree to which a model or simulation is an accurate representation of the real world from the perspective of the intended uses of the model or simulation. [DMSO Glossary of M&S Terms; DoDD 5000.59]

Verification The process of determining that model or simulation implementation accurately represents the developer's conceptual description and specification. Verification also evaluates the extent to which the model or simulation has been developed using sound and established software engineering techniques. [DMSO Glossary of M&S Terms; DoDD 5000.59]

Verify Preliminary Data Package During this activity the preliminary data package is validated against the specifications outlined in the plan. The customer may be part of this activity and may accept or reject the data package.

Virtual Prototype A computer-based simulation of systems and subsystems which exhibits both geometric and functional realism. This three-dimensional virtual mockup may be used to evaluate prototypes or concepts and provides a common platform which all functional disciplines (design, test, manufacturing, logistics, training, operations, etc.) can work. [DMSO Glossary of M&S Terms; DSMC Guidebook on M&S]

Virtual Prototyping The process of using a virtual prototype, in lieu of a physical prototype, for test and evaluation of specific characteristics of a candidate design. [DSMC *Virtual Prototyping*]

Appendix A

References

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