

**TRAINING REVOLUTION
LEXICON DICTIONARY V1.0**

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INTRODUCTION

The following documentation is provided as a reference source for program managers, researchers, users and Fleet personnel as a source of basic information on terms associated with current trends in learning, training, human performance (HP), human systems integration (HSI), and policy. Other published glossaries and sources of information include a much broader range of reference terms. The purpose of the current document is to clarify terms associated with the Navy's Revolution in Training and innovations in technologies.

In order to provide a flexible reference source, this document was organized as follows. The Table of Contents outlines the four primary sections as well as major sub-headings included in each section. The body of this document includes the identification of the terms selected for inclusion; a concise, referenced definition of the term; and where practical, an example of the term or explanations of various forms the term might take. The terms are organized to group similar terms and concepts where possible. All citations used to create this document are included in the reference section. An index is provided in the back of the document to allow for quick access to terms alphabetically.

The authors first nominated terms included in this document. Definitions were generated using the best possible source – either from a well-known researcher/ practitioner in the area, a base reference document, or DoD publication. For some terms, there were not published definitions available. In these cases, in-house subject matter experts were asked to provide brief definitions based on their knowledge.

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TRAINING/LEARNING

EDUCATION/LEARNING/TRAINING

Education

Education refers to activities that aim at developing knowledge, values, and understanding in general, rather than the knowledge and skill relating to a specific field of activity. Education typically refers to the gradual process of acquiring knowledge through an instructor or teacher teaching a course. Education differs from training in that courses are not typically developed using the same systematic process that should be used when developing training.

The NATO Training Group's Glossary of Training Technology Terms

Instruction

Instruction is the process whereby students are provided with the means to acquire knowledge, skills, and attitudes.

The NATO Training Group's Glossary of Training Technology Terms

Learning

Learning is the act, process, or experience of gaining knowledge or skills. The result of learning is a change in the individual's behavior. The behavior can be physical and overt (psychomotor), intellectual (cognitive), attitudinal, or a combination of these types of behavior.

MIL-HDBK-29612-4A, Department of Defense Handbook, Glossary for Training, Part 4

Pedagogy

In its broadest sense, pedagogy is the applied theory resulting from scientific study of all aspects of education. "Educational theory" is considered an equivalent term.

The NATO Training Group's Glossary of Training Technology Terms

Training

The systematic acquisition of skills, rules, concepts, or attitudes that result in improved performance in another environment.

Goldstein (1993)

CULTURE OF LEARNING

A continual learning process on the job. Modern organizations have recognized that such a culture is essential if employees are going to keep pace with complex, changing work environments. Also termed Continuous Learning Environment.

ERNT Final Report

Learning Organization

An organization that embraces a culture of learning/provides a continuous learning environment. Involves the belief and practice that individuals and teams can learn continuously and cooperatively to foster an organization's competitive advantage. Hallmarks of learning organizations are sharing the organizational vision, individual excellence, team learning, creating

common mental models, and use of systematic thinking to enhance the use of knowledge as a competitive strategy.

KNOWLEDGE, SKILLS, AND ABILITIES

Knowledge

Underlying rules, facts, relationships, procedures and vocabulary that support effective performance. Can be considered as the distillation of information that has been collected, classified, organized, integrated, abstracted and value added. Knowledge is at a level of abstraction higher than the data and information on which it is based, and can be used to deduce new information and new knowledge. When considering knowledge it is usually in the context of human expertise used in solving problems.

ERNT Final Report; DoD 5000.59 (Glossary DoD M&S); Goldstein (1993)

Skills

A person's capability to execute an appropriate sequence of behaviors; essentially, the ability to actually perform a task. The ability to perform a job-related activity that contributes to the effective performance of the task. Also defined as the ability to perform a psychomotor activity that contributes to the effective performance of a job task.

Glossary of Training Device Terms (MIL HDBK 220B); Glossary for Training Mil-HDBK-29612-4A; ERNT Final Report

Abilities

Typically refer to the person's propensities, that is, his or her innate preferences, talents, strengths, attributes and aptitudes.

Goldstein (1993)

Competencies

Groups of related knowledge, skills, and attitudes needed to perform a job in an effective and efficient manner to an established standard. A person's competencies can be defined as the knowledge, skills, and abilities (KSAs) that he or she brings to the job.

IAEA-TECDOC-1204 and ERNT Final Report

Competency Testing

Examines current job knowledge and skills that will be needed for present and future performance.

Taskwork

Skills associated with the technical aspects of a task. The requirements of a job that are position specific and usually technical in nature (e.g., the ability to interpret a radar display).

Cannon-Bowers and Salas (2000); Smith-Jentsch, Johnston, and Payne (2000)

Teamwork

Skills associated with the team aspects of a task. Includes the processes that individuals use to coordinate their activities (e.g., communication).

Cannon-Bowers and Salas (2000); Smith-Jentsch, Johnston, and Payne (2000)

Motivation

Variability in the direction of behavior, intensity of action, and persistence of direction-specific behaviors over time that is related to biological, emotional, or cognitive forces. Motivation reflects behavioral variability that cannot fully be accounted for solely by individual differences in ability or overwhelming environmental demands.

Kanfer (1990); Vroom (1964)

LEVELS OF PROFICIENCY**Apprentice**

An individual who is learning a trade or occupation and is a beginner or novice. Requires close supervision.

www.Dictionary.com

Journeyman

A person who has learned a trade and works for another more senior person in that specialty.

Glossary for Training, MIL-HDBK-29612-4A

Master

An individual who is an expert in a field. It also refers to an individual who is qualified to teach apprentices and carry on the craft independently. The highest level of proficiency in an occupational specialty.

www.Dictionary.com; Glossary for Training, MIL-HDBK-29612-4A

DISTANCE LEARNING

The delivery of training to persons at locations other than the originating site.

DISTRIBUTED LEARNING

Encompassing programs also referred to as distance learning. Structured learning that takes place without requiring the physical presence of an instructor. Distributed learning is synchronous and/or asynchronous learning mediated with technology and may use one or more of the following media: audio/videotapes, CD ROMs, audio/video tele-training, correspondence courses, interactive television, and video conferencing.

Memorandum from Office of the Under Secretary of Defense (Oct 2001)

ADVANCED DISTANCE LEARNING (ADL)

An evolution of distributed learning (distance learning) that emphasizes collaboration on standards-based versions of reusable objects, networks, and learning management systems, yet may include some legacy methods and media. The development and use of common standards enables content to be tailored to individual needs and delivered anytime-anywhere. ADL also includes establishment of an interoperable “computer-managed instruction” environment that supports the needs of developers, learners, instructors, administrators, and managers/superiors. Hence, training management tools, modeling and simulation and planning tools also will be key enabling technologies.

Memorandum from Office of the Under Secretary of Defense (Oct 2001)

E-Learning

Term covering a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite broadcast, interactive TV, CD-ROM, and more.

ASTD's Online Magazine

Computer Mediated Learning

The learner interacts with a computer, system, or other technology in order to learn. The system reacts to the learner by providing hints or cues, branching to new material, tailoring instruction, and/or providing feedback. Intelligent training technologies (e.g., automated performance assessment, diagnosis and feedback) are crucial to this type of training and will eventually, as technology develops, allow for individual tutoring. Examples include: computer-based training, intelligent tutoring, simulations, games, scenario-based training (one learner), training devices/simulators/stimulators, and interactive electronic technical manuals.

ERNT Final Report

Web-based Learning/Training

Web-based learning is the delivery of educational content via a Web browser over the public Internet, a private intranet, or an extranet. Within web-based training there are often links to other learning resources such as references, email, bulletin boards, and discussion groups. Typical media elements used are text and graphics. Other media such as animation, audio, and video can be used, but require more bandwidth and in some cases additional software. Web-based training can also employ a facilitator who can provide course guidelines, manage discussion boards, deliver lectures, and so forth. When used with a facilitator, WBT offers some advantages of instructor led training while also retaining the advantages of computer-based training. The terms "on-line courses" and "web-based instruction" are sometimes used interchangeably with web-based learning/training.

ASTD E-Learning Glossary; The Public Health Training Network Glossary

Interactive Courseware (ICW)

Computer controlled courseware that relies on trainee input to determine the pace, sequence, and content of training delivery using more than one type of medium to convey the content of instruction. ICW can link a combination of media, to include but not be limited to: programmed instruction, video tapes, slides, film, television, text, graphics, digital audio, animation, and up to full motion video, to enhance the learning process.

Glossary for Training Mil-HDBK-29612-4A

Interactive Technologies

A delivery vehicle that provides for direct and active participation in an event or activity. When applied to instruction, it provides capability for the direct and active participation of the student in an instructional event. Interactive technologies allow for a two-way interaction or exchange of information. Also referred to as Interactive Media.

Glossary for Training, MIL-HDBK-29612-4A; ASTD E-Learning Glossary

Deployable Training

Training that is not dependent on dockside facilities, shored-based sites or fixed ranges. Examples of deployable training include, but are not limited to, mobile training teams, on-board trainers, and distance learning technologies.

Erwin (2001)

Onboard Training

Training provided on ship; similar to On-the-Job Training (OJT) and field training.

Glossary for Training Mil-HDBK-29612-4A

SHAREABLE CONTENT OBJECT REFERENCE MODEL (SCORM)

A collection of specifications adapted from multiple sources to provide a comprehensive suite of e-learning capabilities. SCORM allows for sharing of smaller pieces of e-learning courses, called learning objects. Learning objects include course modules, book chapters, videos or even smaller, discrete pieces of information that enable interoperability, accessibility and reusability of web-based learning content.

WWW.Adlnet.net

Learning Management System (LMS)

Describes a wide range of software applications that automate the administration of training and tracking of student training. The LMS registers users, tracks courses in a catalog, records data from learners, and provides reports to management. An LMS is typically designed to handle courses by multiple publishers and providers. It may or may not include functions such as course authoring capabilities; classroom management, competency management, knowledge management, certification, or compliance training, personalization, mentoring, chat and discussion boards.

ASTD E-Learning Glossary; WWW.Brandonhall.com

Learning Content Management System (LCMS)

An environment where developers can create, store, reuse, manage and deliver learning content from a central object repository, usually a database. These systems usually have good search capabilities, allowing developers to quickly find the text or media needed to build training content.

WWW.Brandonhall.com

Learning Object

A reusable, media-independent collection of information used as a modular building block for e-learning content. Learning objects are most effective when organized by a meta data classification system and stored in a data repository such as an LCMS.

ASTD E-Learning Glossary

Learning Portal

Any website that offers learners or organizations consolidated access to learning and training resources from multiple sources. Operators of learning portals are called content aggregators, distributors, or hosts.

ASTD E-Learning Glossary

PERFORMANCE MEASUREMENT

A process of data collection and analysis to determine the success of trainees on a specific individual or collective task. The collecting and storing of parameters to gain an indication of the trainee's performance. The scoring of trainee proficiency may be either subjective (i.e., opinion) or objective.

Glossary of Training Device Terms, MIL HDBK 220B; Glossary for Training Mil-HDBK-29612-4A

Measures of Effectiveness (MOEs)

Outcome measures. MOEs assess the quantity or quality of the end result. MOEs are influenced by more than human behavior – they also contain variance accounted for by equipment, the surrounding environment, and luck.

Smith-Jentsch, Johnston, and Payne (2000)

Measures of Performance (MOPs)

Process measures. MOPs describe the strategies, steps, or procedures used to accomplish a task. MOPs describe the human factor involved in complex systems.

Smith-Jentsch, Johnston, and Payne (2000)

Measure of Outcome (MOO)

Metric that defines how operational requirements contribute to end results at higher levels, such as campaign or national strategic outcomes.

DoD 5000.59

PERFORMANCE ASSESSMENT

Feedback

A critical characteristic of instructional design typically focused on descriptive characteristics of performance including accuracy, frequency, consistency, and process / outcome. Feedback is providing a response to or comment about a trainee's performance. Feedback can take on many forms, from a one-word response to a more elaborate description. Feedback can be delivered textually, auditorily, or graphically. The intent of providing feedback is that the trainee can use this information to improve his/her understanding and improve his/her performance.

The Commonwealth of Learning Glossary; Kozlowski, Weissbein, Brown, Toney, & Mullins (1997)

Criterion

The standard by which something is measured. In training, the task or learning objective standard is the measure of student performance. In test validation, it is the standard against

which test instruments are correlated to indicate the accuracy with which they predict human performance in some specific area. In evaluation, it is the measure used to determine the adequacy of a product, product, or behavior.

Glossary for Training, MIL-HDBK-29612-4A

Performance Appraisal

Performance appraisal is a structured process used by managers to provide feedback on an individual's performance to encourage improvement. Performance appraisals also provide information for salary decisions and promotions.

Murphy & Cleveland (1995)

360 Degree Feedback

A method and a tool that provides each employee the opportunity to receive performance feedback from his or her supervisor and four to eight peers, reporting staff members, co-workers and customers. Most 360-degree feedback tools are also responded to by each individual in a self assessment. The purpose of 360-degree feedback is to allow each individual to understand how others view his effectiveness as an employee, co-worker, or staff member. The most effective processes provide feedback that is based on behaviors that other employees can observe. The feedback provides insight about the skills and behaviors desired in the organization to accomplish the mission, vision, and goals. A 360-degree feedback appraisal system can be completed either via paper and pencil measures or via a computerized process (i.e., through a web-based program).

Heathfield (n.d.)

COGNITIVE TASK ANALYSIS (CTA)

Analysis of the cognitive demands of a complex task. This includes the knowledge, mental processes, and decisions that are required to perform the task. The goals of the CTA are (1) to identify what factors contribute to cognitive performance difficulty; (2) to uncover the knowledge and skills that expert practitioners have developed to cope with task demands; and (3) to specify ways to improve individual and team cognitive performance in a domain through new forms of training, user interfaces, or decision aids.

Roth, Malsch, & Multer (2001)

Task Analysis

A systematic method used to develop a time-oriented description of personnel-equipment/software interactions brought about by an operator, controller or maintainer in accomplishing a unit of work with a system or item of equipment. It shows the sequential and simultaneous manual and intellectual activities of personnel operating, maintaining or controlling equipment, in addition to sequential operation of the equipment. It is a part of system engineering analysis where system engineering is required. A task analysis is also a process of reviewing actual job content and context to identify the elements of a task by analyzing mission/job conditions, standards, performance steps, required skills and knowledge, safety and environmental factors, references, equipment, and job performance measures.

Glossary for Training, Mil-HDBK-29612-4A

Knowledge Elicitation

Knowledge elicitation is the process of collecting knowledge and information from a human source that is thought to be relevant to that knowledge. Common knowledge elicitation techniques include: interviews, observation, task analysis, protocol analysis, as well as techniques that allow individuals to produce representations of concepts and their structure or interrelationships.

Cooke (1994)

KNOWLEDGE OR SKILL ACQUISITION

In general, the process of learning a new response. In classical conditioning, acquisition involves producing a conditioned response to a conditioned stimulus. Pertaining to memory, acquisition is the first stage of remembering in which we perceive the item and record its important features.

Matlin (1995)

SIMULATION

Simulation

Synthetically representing the characteristics of the real world system or situation, typically by interfacing controls and displays (operational or simulated) and positions of the system with the computer, which solves a mathematical model of the real world system and situation. All or portions of the equipment may be simulated by solving mathematical models of the transfer functions in the simulation computer. It is a process of imitating one system with another. The simulation may encompass the interaction between the human operator and operational systems, the operating environment, and weapon platform.

Glossary of Training Device Terms, MIL-HDBK-220B

Simulation Fidelity

Simulation fidelity refers to the degree to which characteristics of a simulation correspond to those of the actual task domain being represented. Two types of fidelity can be distinguished, i.e., physical and psychological fidelity. Physical fidelity refers to the degree to which the simulation captures physical elements of the real world. Psychological fidelity refers to the reproduction of behavioral and cognitive processes that are necessary to perform the task.

Glossary of Training Device Terms, MIL-HDBK-220B; Goldstein (1993)

Simulator

A training device that substitutes for, by emulation, the functions and environment of actual equipment or systems. Any training device, machine, or apparatus that reproduces a condition or set of conditions synthetically. Specifically for training, a relatively complex item of training equipment, using electronic/mechanical means to reproduce conditions necessary for an individual, or a crew, to practice operational tasks in accordance with training objectives. It represents the operational equipment physically and functionally to varying degrees and follows the mathematical equations that describe performance.

Glossary of Training Device Terms, MIL-HDBK-220B

Stimulation

Stimulation is the use of simulations to provide an external stimulus to a system or subsystem. An example is the use of a simulation representing the radar return from a target to drive (stimulate) the radar of a missile system within a hardware/software-in-the-loop simulation.
Defense Systems Management College (1994)

PC Simulation

A desktop or laptop computer software program that strives to mimic a phenomenon, experience, equipment or environment that is based on reality (purposely excludes fantasy games). The PC Simulation, when applied to a training domain, serves to provide the user with the opportunity for learning in a robust, motivating, and engaging environment, wherein the presentation of the material is optimized by a high degree of user interactivity, fidelity and immersion, and where context and practice are key to learning.
NAVAIR Orlando (2003)

Embedded Training

Simulation-based training that is seamlessly integrated into the operational setting or systems. Training capability built into the weapon system hardware and software such that the weapon system is used for tactical operation or for training depending on the mode selected.
Lyons & McDonald (2001); Glossary of Training Device Terms, MIL-HDBK-220B

Battle Force Tactical Trainer (BFTT)

An onboard training capability installed on many ship classes. The mission of the BFTT system is to provide an effective in port combat systems team training capability from the deck plates to the battle force commanders across all warfare areas. The BFTT system addresses the projected naval operational environment and the paradigm shift toward training crews where they fight.
<http://www.navseadn.navy.mil/project/BFTT.html>; Surface Force Training Manual

Model

A physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process.
DoD Directive 5000.59; DoD 5000.59-P

Modeling and Simulation (M&S)

Modeling is the application of a standard, rigorous, structured methodology to create and validate a model. Simulation is a method for implementing a model over time.
DoD 8320.1-M; DoD Directive 5000.59; DoD 5000.59-P

TECHNICAL TRAINING EQUIPMENT

Actual Equipment Trainer

An actual system or subsystem component modified to allow multiple disassembly or assembly for training of maintenance personnel as specialists for field maintenance level or depot level shops.
Glossary of Training Device Terms, MIL-HDBK-220B

Appended Trainers

A training system attached to the operational system. Requires an instructor operator station, thus reduces portability as compared to an embedded system. Examples of appended trainers include the CVST and the LAV-FIST.

Generic Trainer

A training system designed to provide training on a type or class of equipment as opposed to a specific weapons system. For instance, Devise 1D23 teaches basic navigation skills not related to any specific aircraft or navigation equipment set, whereas the F4 operational flight trainer (OFT), would teach the student to navigate in an F4.

Glossary of Training Device Terms, MIL-HDBK-220B

Mission Trainer

A device, which enables the trainee to encounter specific mission tasks in a simulated environment. The trainer provides weapons systems operator modes or a mission mode which requires tactical decision-making and provides for integration of skills. The trainee is confronted with in-flight situations that energize aircraft sensors for target acquisition, identification, tracking, evasion, and weapons management. This trainer provides primarily warfighting training.

Glossary of Training Device Terms, MIL-HDBK-220B

FACTORY TRAINING

Training or instruction provided by the vendor or manufacturer on equipment, system, or device that is furnished to the military department. Consists of specialized training required for operation and maintenance. Sometimes referred to as Original Equipment Manufacturer (OEM) training or Vender Training. Factory Training Materials include instructional guides, trainee guides, technical manuals, transparencies, and other materials helpful to the instructor for operation of the Training System and to the maintenance personnel for maintenance of the Training System.

Glossary of Training Device Terms, MIL-HDBK-220B

COUNTERPART TRAINING

Counterpart training involves hands-on training evolutions that link a ship's pre-commissioning crewmembers with OEM or shipyard technicians. The objective of Counterpart Training is to ensure a smooth transition of operational responsibility from the shipbuilder to the pre-commissioning crew.

INSTRUCTIONAL TECHNOLOGY

A systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and non-human resources to bring about more effective instruction.

Glossary for Training, MIL-HDBK-29612-4A

Instructional Features

Those elements of training that improve the probability that effective instruction will be delivered to the trainee. Any part of training that adds instructional capability (e.g., demonstration, practice, feedback, etc.).

Glossary of Training Device Terms, MIL HDBK 220B

Intelligent Tutoring

Systems of intelligent instruction overlaid on a content domain that tracks a learner's progress, makes salient the deficiencies in the learner's knowledge, and individualizes learning curriculums.

Steele-Johnson & Hyde (1997)

Blended Learning/Blended Training

Blended training combines aspects of two or more instructional techniques into a learning event or course.

ASTD E-Learning Glossary

Courseware

Another name for educational or training materials comprising software, documentation, or other media resources.

The NATO Training Group's Glossary of Training Technology Terms

INSTRUCTOR-LED TRAINING

Instructor-led training typically refers to traditional classroom training, in which an instructor teaches a course to a room of learners/trainees. This term is used synonymously with on-site training and classroom training/learning (c-learning).

ASTD E-Learning Glossary

INSTRUCTIONAL SYSTEMS DEVELOPMENT (ISD)

A systematic process used to develop an integrated combination of resources (instructors, materials, equipment, and facilities), techniques, and procedures to efficiently perform the functions required to achieve specified instructional objectives. The five stages of ISD are: analysis, design, development, implementation and evaluation. ISD is a term used for the broad application of the Systems Approach to Training.

The NATO Training Group's Glossary of Training Technology Terms

KNOWLEDGE MANAGEMENT

Knowledge management is the process of capturing, organizing, and storing information and experiences of individual workers as well as groups within an organization and making it available to others. The goal of knowledge management is to help a company or organization gain competitive advantage and capture corporate knowledge by collecting information and lessons learned and other knowledge artifacts in a central or distributed electronic environment.

Adapted from ASTD E-Learning Glossary

MENTORING

Mentoring is a form of developmental interaction in which a more experienced individual (mentor) provides job-related skills, career-related advice (counseling or coaching), as well as psychosocial support to a less experienced individual (protégé). Recently, the traditional definition of mentoring, which considers the mentor –protégé relationship to be hierarchical, has been expanded to include lateral or peer mentoring. In peer mentoring, individuals receive these functions from their peers.

Kram (1985); Kram & Isabella (1985); Noe, Wilk, Mullen, & Wanek (1997)

Coaching

Systematically increasing the ability and experience of the trainee by giving him/her planned tasks, coupled with continuous appraisal or feedback and counseling by the trainer.

The NATO Training Group's Glossary of Training Technology Terms

On-the-job training/learning

On-the-job training/learning refers to teaching individuals to perform their tasks while in the actual job environment. On-the-job training can range from informal to structured training. On-the-job training typically involves techniques such as observation, explanation, demonstration, and practice. Generally means the process of learning while producing.

Goldstein (1993); Navy Total Force Manpower (Req HDBK)

COLLABORATIVE LEARNING

Occurs when learners teach and guide one another. It involves learners working together in small groups to develop their own answer through interaction and consensus building. Group members share authority and responsibility for the groups actions/decisions. Monitoring the groups or correcting "wrong" impressions is not the role of the trainer since there is generally no right answer to the scenarios/problems given to the group. Collaborative learning is considered distinct from cooperative learning. Collaborative learning is student-centered while cooperative learning is more teacher-centered.

Northwest Link Learning Glossary

On-line Collaborative Learning

Collaborative learning often, but not always, occurs between learners who are physically dispersed and require technologies to provide collaborative learning environments that allow distributed users to be networked together. In this situation, learners' interactions are computer-mediated (termed "computer-mediated cooperative work"). This type of learning may or may not include a formal instructor or expert and often involves a scenario or exercise.

Collaboration Technology

Software, platforms, or services that enable people at different locations to communicate and work with each other in a secure, self-contained environment. May include capabilities for document management, application sharing, presentation development and delivery, whiteboarding, chat, and more.

ASTD E-Learning Glossary

Cooperative Learning

Involves the more conventional notion of cooperation, in that learners work in small groups on an assigned project or problem under the guidance of the trainer who monitors the groups, making sure the learners are staying on task and are coming up with the correct answers (if there is a right or a best answer). Cooperative learning differs from collaborative learning in that it is typically more directive and is closely controlled by the teacher/instructor.

Northwest Link Learning Glossary

PERFORMANCE SUPPORT**Performance Support Systems**

Systems that seek to provide operators with the knowledge they need to perform their jobs as they are working.

ERNT Final Report

Electronic Performance Support Systems

An integrated electronic environment that is available to and easily accessible by each employee and is structured to provide immediate, individualized on-line access to the full range of information, software, guidance, advice and assistance, data, images, tools, and assessment and monitoring systems to permit job performance with minimal support and intervention by others. Also referred to as an electronic job aid.

Glossary for Training, MIL-HDBK-29612-4A; Gery (1991)

SAILORIZATION

Relates to the hand-off of delayed entry program personnel between recruiter and recruit company commander, then between master chief and so on throughout a Sailor's career.

ERNT Final Report

SELF-DIRECTED LEARNING

Training designed to master material independently and at the person's own pace. Also termed self-paced learning.

Discovery Learning

A learning environment that allows the learner to actively explore and experiment with the task and encourages the learner to infer and learn the rules, principles, and strategies for effective task performance.

derived from Smith, Ford, & Kozłowski (1997)

SCENARIO-BASED TRAINING

Event-Based Approach to Training (EBAT)

A systematic approach that links together training objectives, exercise events, performance criteria, and developmental feedback strategies. EBAT creates training opportunities by systematically identifying and introducing events within training exercises that provide known opportunities to observe specific behaviors of interest.

Fowlkes, Dwyer, Oser, & Salas (1998)

TACTICAL DECISION MAKING UNDER STRESS (TADMUS)

An Office of Naval Research program devoted to developing and improving training and decision support technology in the United States Navy.

Collyer & Malecki (2000)

TEAM

A distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission, who have been assigned specific roles or functions to perform, and who have a limited life-span of membership.

Salas, Dickinson, Converse, & Tannenbaum (1992)

Team Training

The acquisition or refinement of skills or knowledge that are specific to the collective or group environment that characterizes a team.

Andrews, Waag, & Bell (1992)

Collective Training

Instruction and applied exercises that prepare an organizational team (e.g., squad, crew, battalion, or multi-service task force) to accomplish required tasks and/or missions as a unit.

Integrated Logistics

Team Building

A planned intervention, often facilitated by a third party, that is designed to develop problem-solving skills and to help solve problems within intact groups. A central tenet of team building is the notion that “enlisting the participation of a group in planning and implementing change will be more effective than imposing change on the group.

Salas, Rozell, Mullen, Driskell (1999)

TEAM TRAINING TECHNIQUES

Guided Team Self-Correction

In exercise-based training, the use of a facilitator who (a) keeps the team’s discussion focused, (b) establishes a positive climate, (c) encourages and reinforces active participation, (d) models effective feedback skills, and (e) coaches team members in stating their feedback in a constructive manner.

Smith-Jentsch, Payne, & Johnston (1996)

Team Dimensional Training (TDT)

Objective-based training for teamwork skills. A strategy for guided team self-correction. Using TDT, instructors (a) systematically collect data on specific teamwork behaviors, (b) organize these data into a format that is structured according to a data-driven model of teamwork, and (c) facilitate guided team self-correction.

Smith-Jentsch, Zeisig, Acton, & McPherson (2000)

Cross Training

A strategy in which each team member is trained on the tasks, duties, and responsibilities of his or her team members. The goal of this type of training is to provide team members with a clear understanding of the entire team function and how one's particular tasks and responsibilities relate with those of the other team members. The type of knowledge that individuals acquire through cross training is referred to as inter-positional knowledge.

Volpe, Cannon-Bowers, Salas, & Spector (1996)

Inter-positional knowledge

Inter-positional knowledge refers to the body of knowledge that a team member holds about the tasks, roles, and appropriate behavioral responses required of his or her teammates in various situations.

Volpe, Cannon-Bowers, Salas, & Spector (1996)

TRAINING REQUIREMENT

A need, established by the training organization, for support of specified nature. A requirement to train personnel in a specified quantity to perform identified duties and thereafter be available for assignment to the duties at a specified time. A requirement for a training or educational program which will produce trained personnel for an identified purpose. The performance that is required of a person in order to be effective in a given situation. Thus, the jobs to which individuals are assigned have performance connotations, which are training requirements in the sense that the individuals must be trained to perform as required.

Navy Total Force Manpower Requirements Handbook (2000)

TRAINING OBJECTIVES

Statements about skills, knowledge, and attitudes that a trainee is expected to acquire as a result of formal training including: (1) principles and relationships, (2) procedures, (3) perceptual-motor acts, (4) motives and attitudes, (5) identifications and discriminations, and (6) techniques of decision-making and choosing courses of action. A statement of the behavior or performance expected of a trainee as a result of a learning experience, expressed in terms of the behavior, the conditions under which it is to be exhibited, and the standards to which it will be performed or demonstrated. May also be referred to as "behavioral objectives" or "learning objectives."

Glossary of Training Device Terms, MIL-HDBK-220B; Glossary for Training, MIL-HDBK-29612-4A

TRAINING EFFICIENCY

The extent to which training resources (including time) are used economically while achieving training effectiveness. Refers to resource investments required to achieve specific training objectives or requirements. Resources may include time, instructor assets, training device assets,

aircraft assets and costs. Training efficiency is directly related to training effectiveness. There can be no efficiency if there is no effectiveness, because effectiveness implies a benefit from the resources invested. Common benefits that accrue by investment in a training program include (but are not limited to) decreased course length/time to train, more training events/interventions per unit of time, decreased travel and per diem costs, lower attrition, and decreased ordnance and consumable cost.

Glossary of Training Device Terms, MIL-HDBK-220B; Glossary for Training, MIL-HDBK-29612-4A

TRAINING EFFECTIVENESS

The training benefit gained in terms of operational readiness. The thoroughness with which training objectives have been achieved, regardless of training efficiency. Enhanced student, safety and/or environmental benefits that accrue as the result of investment in a training program, including (but not limited to) improved quality, increased capability, increased safety, decreased security risk or decreased environmental impact. Training effectiveness is a measurable component of Return on Investment (ROI).

Glossary of Training Device Terms, MIL-HDBK-220B; Glossary for Training, MIL-HDBK-29612-4A

Training Effectiveness Evaluation (TEE)

The systematic process of measuring the training benefit gained through instruction in terms of operational readiness. A continuous evaluation activity integrated throughout each Instructional Systems Development stage, beginning with analysis and continuing through the life cycle of the system. TEEs provide feedback to developers and life-cycle managers as to the instructional effectiveness of the training being evaluated.

Glossary for Training, MIL-HDBK-29612-4A

Formative Evaluation

An evaluation employed during the development process that provides information about the effectiveness of training objectives and the student acceptance of training materials. This information is used to guide the refinement of the product under development. The testing of training devices and scenarios accomplished during the development of a training device and before it leaves the production facility to determine their instructional effectiveness. Sample students and instructors use the training device as they would in a school setting while government personnel determine what problem areas may exist.

Glossary for Training, MIL-HDBK-29612-4A; Glossary of Training Device Terms, MIL-HDBK-220B

Summative Evaluation

Overall assessment of training at the completion of the developmental process. Considers the usability and adequacy of the intervention and gathers information about the results that will be used by senior decision makers in the organization.

Glossary for Training, MIL-HDBK-29612-4A

TRAINING FIDELITY

The extent to which cue and response capabilities in training allow for the learning and practice of specific tasks so that what is learned will enhance performance tasks of the operational environment.

Glossary of Training Device Terms, MIL-HDBK-220B

TRANSFER OF TRAINING

The effect of a specific learning experience on an individual's performance of the task at a later time. Transfer is said to be positive when the learning experience facilitates the performance of the task, and negative when it interferes with task performance. It is a function of the amount of insight possessed by the learner, and, in general, the degree of similarity between the learning situation and the task in terms of contents, principles, and techniques.

Glossary of Training Device Terms, MIL-HDBK-220B

INTERDEPLOYMENT TRAINING CYCLE (IDTC)

Term used to describe the maintenance and workup period between deployments.

Surface Force Training Manual

HUMAN PERFORMANCE

ATTENTION

The conscious or non-conscious engagement in perceptual, cognitive or motor activities. The concentration of mental resources on particular physical or mental events.

Nature Publishing Group (2002); Magill (2000)

Divided Attention

When two or more separate tasks must be performed simultaneously and attention must be paid to both. Situation in which people try to distribute their attention among two or more competing tasks.

Matlin (1995); Sanders & McCormick (1993)

Shift of Attention

Performance of two or more tasks where each task is segmented into small subtasks and performed serially, giving the impression of simultaneous task performance. Performance costs are associated with each shift of attention.

Threshold

The minimum difference in stimulation that a person can detect 50% of the time. Also called a difference threshold or “just noticeable difference (JND)” which means that the change in stimulation is “just noticeable” to the human system. Sometimes called the difference threshold.

Gleitman, Fridlund, & Reisberg (2000)

PROCESSING

Automatic Processing

The type of cognitive processing that requires little or no conscious attention or thought.

Automatically-processed tasks are done rapidly and with little or no effort. Automatic processing does not necessarily demand processing resources, freeing the system for higher-level processing and alternative control processing.

Shiffrin & Dumais (1981)

Automaticity

Cognitive and/or physical activities performed fast, effortlessly and with little or no attention or conscious mental processing. Developed after consistent and repeated practice. Not all skills can be automated; usually, they can be if there is a relatively consistent stimulus or context and response.

Shiffrin & Dumais (1981)

Speed/Accuracy Trade Off

Generally, the faster a human performs a task, the less accurate they become. However, once automaticity is reached for a task, humans typically are performing at the highest level (ceiling) for both speed and accuracy.

Controlled Processing

Slow, effortful, attentionally demanding mental processing by the human. Typically operates serially and is under the control of the human.

Schneider & Shriffrin (1977)

DECISION MAKING

A traditional definition describes decision making as an active cognitive process that selects a set of possible courses of action. It includes a weighing up of the pros and cons of different alternatives. Decision making requires a choice between two or more alternatives that results in some real or imaginary consequences to the decision maker.

Lehto (1997); Glossary from the Enhancement Program for European Air Traffic Management (2003)

Naturalistic Decision Making (NDM)

The way people use their experience to make decisions in field settings. NDM differs from the traditional definition of decision making in that the focus is front-loaded – decision makers are more concerned about sizing up the situation and refreshing their situation awareness through feedback, rather than developing multiple options to compare to one another.

Zsombok (1997)

Recognition-Primed Decision Making (RPD)

RPD is an example of NDM. Demonstrates that people make good decisions without having to perform extensive analysis – people use experience to recognize problems that they have previously encountered and for which they already know solutions. A strategy that allows people to quickly make difficult decisions, rather than having to decompose situations into basic elements and perform analyses and calculations on the elements.

Beach, Chi, Klein, Smith, & Vicente (1997)

Decision Aid

A tool used to improve the quality of human decision making and reduce mental workload on the operators.

Moray (1997)

DUAL-TASK PERFORMANCE

When more than one task is performed at the same time, there is typically a cost to performance. Assessing dual-task performance gives an idea of the degree of cost.

Secondary Task

In an experimental assessment of dual task performance, this is the task to which less attention or performance is given by the performer. Often, the secondary task is referred to as a “distracter” task and used to assess performance of the primary task when distracted to differing degrees.

Workload

Term used to describe aspects of the interaction between an operator and assigned tasks. The concept of mental workload assumes there is a limited capacity for information processing.

Workload is the difference between the capacity to perform satisfactorily and the capacity available at any given time.

Gopher & Donchin (1986)

EXPERTISE

The manifestation of exceptional abilities or skills in some domain. Characterised by superior performance and mastery of the three phases of skill acquisition. Usually acquired after extensive and deliberate practice. True expertise often takes at least ten years to develop.

Glossary from the Enhancement Program for European Air Traffic Management

Nature Publishing Group (2002)

FATIGUE

A physical and/or mental weariness, real or imaginary, existing in a person, adversely affecting the ability to perform work.

Navy Total Force Manpower (Req HDBK)

GAP ANALYSIS

Describes the difference between current results and consequences and desired results and consequences. It is the last step in the performance analysis process.

HUMAN ERROR

Inadequate system performance for which a root cause is found to be the result of errors of omission or errors of commission, rather than equipment failure. An inappropriate or undesirable human decision or behavior that reduces, or has the potential for reducing, effectiveness, safety, or system performance.

IAEA-TECDOC-1204; Sanders & McCormick (1993)

HUMAN PERFORMANCE

(a) The accomplishment of a task by a human operator. (b) A measure of human functions and actions in a specified environment, reflecting the ability of actual users and maintainers to meet the system's performance standards, including reliability and maintainability, under the conditions in which the system will be employed. (c) The goal of human performance is to optimize system performance through careful allocation of functions to humans and machines and is achieved through the design of equipment, selection of personnel, and training that is compatible with human capabilities and limitations.

(a) *Gawron (2000)*

(b) *MIL-HDBK-1908*

(c) *Fleishman & Quaintance (1984)*

HUMAN PERFORMANCE IMPROVEMENT (HPI)

The systematic process of discovering and analyzing important human performance gaps, planning for future improvements in human performance, designing and developing cost-effective and ethically justifiable interventions to close performance gaps, implementing the interventions, and evaluating the financial and non-financial results.

ASTD

HUMAN PERFORMANCE SYSTEM MODEL

A four-quadrant process used to represent a new set of fundamental, often behind-the-scenes, processes. Included in the model are well defined human performance requirements, optimal human performance solutions developed with the science of learning, coordinated development and integration of the human performance components, and executed as well as measured effectiveness, which then links the learning to the original requirements.

ERNT Final Report

INFORMATION PROCESSING

The perception, transformation, and reaction to information.

Wickens & Carswell (1997)

MENTAL MODEL

The term mental model has been given both structural and functional definitions. Structurally, it has been defined as a psychological representation of the elements of knowledge within an environment as well as the relationships between those knowledge elements (Klimoski and Mohammed, 1994). Functionally, Rouse and Morris (1986) define mental models as "the mechanism where by humans are able to generate descriptions of system purpose and form, explanations of system functioning, observe system states, and prediction of future system states" (pg. 351). That is, mental models help people describe, explain, and predict events in the environment.

Klimoski & Mohammed (1994); Rouse and Morris (1986)

Structural Knowledge

The integration and organization of knowledge in memory. An intermediate type of knowledge that mediates the translation of declarative into procedural knowledge and facilitates the application of procedural knowledge.

Jonassen, Beissner, & Yacci (1993)

Shared Mental Model

Shared knowledge about the team and its objectives as well as common information about team roles, behavior patterns, and interaction patterns. The extent to which team members hold similarly organized expectations surrounding the task or each other.

Kraiger & Wenzel (1997)

METACOGNITION

Refers to knowledge of one's own thought processes and the ability to keep track of what one is doing while analyzing problems and managing tasks.

Lovejoy (2001)

JOB ANALYSIS

A detailed examination of a job to determine the duties, responsibilities, and specialized requirements necessary for its performance.

Glossary of Defense Acquisition Acronyms and Terms (10th Ed.)

ORGANIZATIONAL ANALYSIS

Organizational analysis examines the organizational mission, vision, values, goals and strategies.

ORGANIZATIONAL DESIGN AND DEVELOPMENT

A process that examines the operation and management of an organization and facilitates needed changes in an effort to improve efficiency and competitiveness. A field that encompasses many interventions, including organizational design, team building, culture change, leadership, strategy development, management systems, and a variety of other techniques designed to transform an organization's beliefs, values, operations, or interrelationships. OD practitioners look for opportunities to make the human part of a system work better and thus focus on humanistic rather than behavioristic strategies.

ORGANIZATIONAL LEARNING

Refers to the pattern of actions, individuals, symbols and processes that enable this to happen. This process of transforming the "how" of its functioning is supported by five distinct subsystems in an organization--learning, organization, people, knowledge and technology. These subsystems are connected, mutually dependent, and must be flexed in order to maintain competitive advantage. Organizational learning is highly dependent upon the dynamic social forces within an organization. It builds on past knowledge and experience of employees and also on the organization's collective memory. Hence, institutional mechanisms are combined with the shared insights, knowledge, and experiences of the organization's members to create a climate to support learning and continual improvement. Organizational learning is not a means to an end, but a continuum in which the behaviors that define learning and the behaviors that define "being productive" are one and the same.

ERNT Final Report

OCCUPATIONAL STANDARDS

Standards that express the Navy's minimum requirements for enlisted occupational skills.

Navy Total Force Manpower (Req HDBK)

PERFORMANCE ANALYSIS

Performance analysis identifies and clarifies the problem or performance gap by focusing on three areas: desired performance state, actual performance state, and the gap between desired and actual performance. It looks at three levels-organization, process, and job/performer and considers three variables-goals, design, and management.

PERFORMANCE CONSULTANTS

Performance consulting is a disciplined approach to diagnosing individual and organizational performance issues and developing the entire range of possible solutions. Performance consultants understand human performance and competencies and also appreciate the range of potential solutions for imparting those competencies. Ideally, they have an educational background and experience in an applied human performance/behavioral science field. They require all the competencies of education specialists, plus an understanding of the job context and the contributions of structured experience, wearable hardware, and other performance enhancement options. Fundamentally, they act as system engineers for the human part of people

and machines working together. Performance consultants always work in close association with subject matter experts and end users when they are most effective. In fact, it is almost always the case that a team of performance consultants with a variety of complementary expertise will be deployed to analyze a performance situation. It is also important to note that many companies have recently employed performance consultants to deal with urgent issues-in stark contrast to the historic use of education specialists as long-term curriculum design experts.

ERNT Final Report

SITUATION AWARENESS

The perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status to the near future. Teamwork dimension characterized by an individual's ability to: 1) avoid tunnel vision and maintain awareness of all relevant events; 2) note deviations from steady state; 3) identify potential or anticipated problems; 4) recognize other team members' need for some of one's own information; 5) recognize the need for action; and 6) be proactive versus reactive.

Endsley (1987); Smith-Jentsch, Johnston, and Payne (2000)

HUMAN SYSTEMS INTEGRATION

HUMAN SYSTEMS INTEGRATION (HSI)

(a) A disciplined, unified, and interactive approach to integrate human considerations into system design to improve total system performance and reduce costs of ownership. The major categories of human considerations are manpower, personnel, training, human factors engineering, safety, and health. (b) The technical process of integrating the areas of human engineering, manpower, personnel, training, systems safety, and health hazards with a materiel system to ensure safe, effective operability and supportability. (c) A process that optimizes the human part of the total system equation by integrating human factors engineering (HFE); manpower, personnel, training (MPT); health hazards; safety factors; medical factors; personnel (or human) survivability factors; and habitability considerations into the system acquisition process (c).

(a) http://www.manningaffordability.com/S&twweb/PUBS/Man_Mach/annexi.html

(b) *Glossary: Defense Acquisition Acronyms and Terms 10th edition (2001)*

(c) *Human Systems Information Analysis Center (2003)*

Habitability

Involves determining whether the design of the physical living environment in the military (e.g., berth, toilet, and bath) allows the using personnel to live, work, and move about the inhabited spaces. Also includes requirements for support services (e.g., food, medical, clergy, recreation) that have a direct impact on sustained mission effectiveness, recruitment and retention of personnel, maintaining quality of life, and minimizing total system costs.

Human Systems Information Analysis Center (2003)

Survivability

The capability of a system and its crew to avoid or withstand a man-made hostile environment without suffering an abortive impairment of its ability to accomplish its designated mission.

Department of Defense (2001)

Personnel Survivability Factors

Design features that improve safety and mission success while reducing health hazards in hostile natural and combat environments. Includes protection against fratricide, detection, and instantaneous, cumulative, and residual nuclear, biological, and chemical effects. Also ensures the integrity of the crew compartment, reduces the probability of being attacked, and enables the crew to withstand man-made hostile environments without aborting the designated mission or suffering acute chronic illness, disability, or death.

Department of Defense (2001)

Warfighter Survivability

The design characteristics or operational requirements of a system that: reduce detectability by the enemy; reduce fratricide; facilitate cover and concealment; minimize likelihood and extent of injuries if engaged; and minimize physical and mental fatigue (a design concern shared with human factors engineering). MANPRINT Domain.

MANPRINT in acquisition: A handbook (2000)

Environmental Safety and Occupational Health

The application of engineering and management principles, criteria, and techniques to optimize safety within the constraints of operational effectiveness, time, and cost throughout all phases of the system life cycle.

Department of Defense (2001)

Safety Factors

Refers to system design features and operating characteristics that serve to minimize the potential for human or machine errors or failures that cause injurious accidents or death.

Human Systems Information Analysis Center (2003)

System Safety Management

All plans and actions taken to identify, assess, mitigate, and continuously track, control, and document environmental, safety, and health mishap risks encountered in the development, test, acquisition, use, and disposal of DoD weapon systems, subsystems, equipment, and facilities.

Military Design Standard: Standard Practice for System Safety, MIL-STD-882D

Medical Factors

Concerns the use of Human Systems Integration (HSI) to design the medical equipment and health services for the warfighter.

Human Systems Information Analysis Center (2003)

Health Hazards

Refers to system design features and operating characteristics that create significant risks of death, injury, or acute or chronic illness, disability, and/or reduce job performance of personnel. Important hazards include acoustic energy, chemical substances, biological substances, temperature extremes, radiation energy, oxygen deficiency, shock (not electrical), trauma, and vibration.

Human Systems Information Analysis Center (2003)

Occupational Hazard

Conditions, procedures, and practices directly related to the work environment that create a potential for producing occupational injuries or illnesses.

Department of the Army (2000)

Manpower

Refers to the number and mix of personnel who operate, maintain, support, and provide training for the system. Determining this number and mix requires consideration of essential job tasks and of workload.

Human Systems Information Analysis Center (2003)

Optimal Manning

The right number of crewmembers based on the principles of HSI and related cost/benefit trades from a total ownership cost standpoint.

Manning

The specific inventory of personnel at an activity in terms of numbers, grades, and occupational groups.

Navy Total Force Manpower (Req HDBK)

Manpower Models

Mathematical equations which best describe the relationship between the independent workload variable(s) and manpower requirements.

Navy Total Force Manpower (Req HDBK)

Manpower Scheduling and Loading

Effective and efficient utilization and scheduling of available manpower according to their skills to ensure required manufacturing operations are properly coordinated and executed.

Department of Defense (2001)

Manpower Spaces Per System

Total on and off equipment maintenance staffing requirements per system including number of spaces and skill levels.

Determining Mission Capability and Supportability Requirements – AFI 10-602

Non-Budgeted Manpower

Manpower resources used by an activity that are not included in the activity's budget line such as TAD, transient, non-appropriated funded, reserves, military students, marines, borrowed, and other support such as volunteers, civilian student aids, inter-service support received categories.

Navy Total Force Manpower (Req HDBK)

Training

The instruction or education, and on-the-job or unit training, required to provide personnel with the job skills, knowledge, and attitudes required to operate and maintain systems.

Human Systems Information Analysis Center (2003)

Personnel

Refers to the human aptitudes, skills, knowledge, and experiences required to perform the job tasks of the operators, maintainers, and support personnel.

Personnel Inventory

Numbers of personnel available by occupational classification, pay grade, and distribution category.

Navy Total Force Manpower Requirements Handbook (2000)

Personnel Qualification System (PQS)

A formal qualification system in theory (PQS 100s), systems (PQS 200s), and watch qualifications (PQS 300s).

Surface Force Training Manual

Human Factors Engineering

Human Factors Engineering (HFE), or Ergonomics, is the systematic application of relevant information about human abilities, characteristics, behavior, motivation, and performance to optimize their interface with a system. HFE includes principles and applications in areas such as human engineering, anthropometrics, personnel selection, training, life support, job performance aids, human-machine interfaces, and human performance evaluation.

Human Systems Information Analysis Center (2003)

HUMAN COMPUTER INTERACTION (HCI)

Any communication between humans and computers. This includes information given to computer by human and receipt of information by human from computer.

Graphical User Interface (GUI)

System design that allows the user to affect commands, enter into transaction sequences, and receive displayed information through graphical representations of objects (menus, screens, buttons, etc.)

Military Specifications and Standards Reform Program (1998)

Interface

The link between the human and equipment or between two pieces of equipment, allowing them to communicate with each other. A physical or functional connection between two or more devices or systems.

Glossary for Training Mil-HDBK-29612-4A

Input Device

A mechanism used to feed or transfer information into a computer or processing system (e.g., keyboard, keypad, light pen, trackball, mouse, joystick, or touch screen).

Glossary for Training Mil-HDBK-29612-4A

Man Machine Interface

The actions, reactions, and interactions between humans and other system components. This also applies to a multi-station, multi-person configuration or system. Term also defines the properties of the hardware, software or equipment that constitute conditions for interactions.

Definitions of Human Factors Terms, MIL-HDBK-1908B

User Computer Interface (UCI)

The modes by which the human user and the computer communicate information and by which control is commanded, including areas such as: information presentation, displays, displayed information, formats and data elements; command modes and languages; input devices and techniques; dialog, interaction and transaction modes; timing and pacing of operations; feedback, error diagnosis, prompting, queuing and job performance aiding; and decision aiding.

Definitions of Human Factors Terms, MIL-HDBK-1908B

Usability

The ease with which a user can learn to operate, prepares inputs for, and interprets outputs of a system or component.

IEEE (1990)

User Friendly

Primarily a term used in automated data processing (ADP), it connotes a machine (hardware) or program (software) that are compatible with a person's ability to operate them successfully and easily.

Department of Defense (2001)

NEEDS ASSESSMENT

A systematic study that incorporates data and opinions from varied sources in order to create, install and evaluate educational and informational products and services. The effort commences as a result of a "hand-off" from performance analysis. Also known as training needs assessment, needs analysis, front-end analysis, task or subject matter analysis.

OPERATIONAL REQUIREMENTS

User-or user representative-generated validated needs developed to address mission area deficiencies, evolving threats, emerging technologies or weapon system cost improvements. Operational requirements form the foundation for weapon system unique specifications and contract requirements.

Department of Defense (2001)

TOTAL OWNERSHIP COST (TOC)

A concept designed to determine the true cost of design, development, ownership and support of DoD weapons systems. At the DoD level, Total Ownership Cost is comprised of the costs to research, develop, acquire, own, operate and dispose of defense systems, other equipment and real property; the costs to recruit, retain, separate, and otherwise support military and civilian personnel; and all other costs of the business operations of the DoD. At the individual program level, Total Ownership Cost is synonymous with the life cycle cost of the system.

Department of Defense (2001)

USE CASE

A modeling technique used in development of a software application. Use cases are used primarily to capture the high level user-functional requirements of a system. The use case model is about describing what the system will do at a high-level and with a user focus for the purpose of scoping the project and giving the application some structure.

Kenworthy (n.d.)

Work Unit

The basic identification of work accomplished or services performed. Work units should be easy to identify, convenient for obtaining productive count, and usable for scheduling, planning, and costing.

Navy Total Force Manpower Requirements Handbook (2000)

Work Sampling

A work measurement tool based on the laws of probability and consists of taking observations at random intervals. Inferences are drawn, from the proportion of observations in each category, concerning the work area under study.

Navy Total Force Manpower Requirements Handbook (2000)

HSI RELATED ANALYSES

Analysis of Alternatives (AoA)

An analysis intended to aid decision-making by illuminating the risk, uncertainty, and the relative advantages and disadvantages of alternatives being considered to satisfy a mission need. The AoA shows the sensitivity of each alternative to possible changes in key assumptions (e.g., threat) or variables (e.g., performance capabilities). Part of the Cost as an Independent Variable (CAIV) process.

Department of Defense (2001)

Test and Evaluation (T&E)

Process by which a system or components are exercised and results analyzed to provide performance-related information. The information has many uses including risk identification and risk mitigation and empirical data to validate models and simulations. T&E enables an assessment of the attainment of technical performance, specifications and system maturity to determine whether systems are effective, suitable and survivable for intended use, and/or lethal. There are three distinct types of T&E defined in statute or regulation: Developmental (DT&E), Operational (OT&E), and Live Fire Test and Evaluation (LFT&E).

Department of Defense (2001)

Developmental Test and Evaluation (DT&E)

Test and evaluation performed to (1) identify potential operational and technological limitations of the alternative concepts and design options being pursued, (2) support the identification of cost-performance trade-offs, (3) support the identification and description of design risks, (4) substantiate that contract technical performance and manufacturing process requirements have been achieved, and (5) support the decision to certify the system ready for operational test and evaluation.

Definitions of Human Factors Terms, MIL-HDBK-1908B

Operational Test and Evaluation (OT&E)

Part of the test and evaluation process of introducing new systems into the fleet.
Surface Force Training Manual (1999)

Live Fire Test and Evaluation (LFT&E)

A test process to evaluate the vulnerability and /or lethality aspects of a conventional weapon or conventional weapon system. LFT&E is required by law (Title 10 U.S.C. §2366) for covered systems, major munitions programs, missile programs, or product improvements to covered systems, major munitions programs, or missile programs, before they can proceed beyond low rate initial production (LRIP). A covered system is any vehicle, weapon platform, or

conventional weapon system that includes features designed to provide some degree of protection to users in combat and that is an acquisition category (ACAT) I or ACAT II program. *Department of Defense (2001)*

Early Comparability Analysis (ECA)

An analytical process used to identify manpower, personnel, and training high-driver tasks in current predecessor or systems similar to that being developed. The objective is to design the new system such that these negative characteristics are avoided or minimized. A secondary benefit of the ECA is that insights may be gained into how to mitigate these impacts with the current system, either through changes in manning, personnel considerations, or training fixes. *MANPRINT in acquisition: A handbook (2000)*

Feasibility Study

A study of the applicability or desirability of any management or procedural system from the standpoint of advantages versus disadvantages in any given case. *Department of Defense (2001)*

Function Analysis

An analysis following a Mission Analysis that identifies the specific sequence of functions that must be accomplished correctly for the mission to be successfully achieved. An analysis of system functions describing broad activities that may be implemented by personnel, and/or hardware and/or software.

Wickens (1992); Office of Naval Research (2002)

Functional Analysis/Allocation

The examination of a function to identify all sub-functions necessary to the accomplishment of that function, and the identification of functional relationships and interfaces and the capturing of those relationships in a functional architecture. The subsequent flow down of upper-level performance requirements to lower-level sub-functions.

Department of Defense (2001)

Health Hazard Assessment (HHA)

The application of biomedical knowledge and principles to document and quantitatively determine the health hazards of systems. This assessment identifies, evaluates, and recommends solutions to control the risks to the health and effectiveness of personnel who test, use, or service Army systems. This assessment includes the evaluation of hazard severity, hazard probability, risk assessment, and operational constraints; the identification of required precautions and protective devices; and the training requirements.

U.S. Army Center for Health Promotion and Preventive Medicine (2001)

Human Factors Test and Evaluation (HFTE)

Part of the system testing effort conducted in accordance with approved test plans. HFTE includes all testing directed toward validation and evaluation of human factors analyses, studies, criteria, decisions, and operational and maintenance design characteristics, and features. These may include engineering design tests, model tests, mockup evaluations, demonstrations, and

subsystem tests conducted to verify system level requirements. Human factors tests are a part of system developmental test and evaluation and operational test and evaluation.

Definitions of Human Factors Terms, MIL-HDBK-1908B

Link Analysis

A technique performed to assist in the redesign of a display, other equipment or people arrangements. A technique for representing and attempting to optimize the interactions between an operator or operators and equipment or between multiple operators.

Buck (1983); Office of Naval Research (2002)

Mishap Risk Assessment

The process of characterizing hazards within risk areas and critical technical processes, analyzing them for their potential mishap severity and probabilities of occurrence, and prioritizing them for risk mitigation actions.

Department of Defense (2000)

Operational Assessment

An evaluation of operational effectiveness and operational suitability made by an independent operational test activity, with user support as required, on other than production systems. The focus of an OA is on significant trends noted in development efforts, programmatic voids, risk areas, adequacy of requirements, and the ability of the program to support adequate operational testing (OT). An OA may be conducted at any time using technology demonstrators, prototypes, mock-ups, engineering development models, or simulations, but will not substitute for the Initial Operational Test and Evaluation (IOT&E) necessary to support full rate production decisions. Normally conducted prior to, or in support of, Milestone C.

Department of Defense (2001)

Preliminary Hazard Analysis (PHA)

The initial effort in hazard analysis during the system design phase or the programming and requirements development phase for facilities acquisition. It may also be used on an operational system for the initial examination of the state of safety. The purpose of the PHA is not to affect control of all risks but is to fully recognize the hazardous states with all of the accompanying system applications.

U.S. Army Center for Health Promotion and Preventive Medicine (2001)

Risk Analysis

A technique for assessing the risk associated with reducing or eliminating functions/sub-functions. This is accomplished by assigning a priority code to all functions/ subfunctions. Impact statements for lowest priority work are developed for use by management in deciding whether to eliminate or reduce low priority tasking.

Navy Manpower Analysis Center (2000)

Risk Assessment

The scientific process of evaluating the toxic properties of a chemical and the conditions of human exposure to it, in order to both ascertain the likelihood that exposed humans will be adversely affected, and to characterize the nature of the effects they may experience. It may

contain some or all of the following four steps: a. Hazard Identification: The determination of whether a particular chemical is or is not causally linked to particular health effect(s); b. Dose-Response Assessment: The determination of the relation between the magnitude of exposure and the probability of occurrence of the health effects in question; c. Exposure Assessment: The determination of the extent of human exposure; and d. Risk Characterization: The description of the nature and often the magnitude of human risk, including attendant uncertainty.

U.S. Army Center for Health Promotion and Preventive Medicine (2001)

Display Tailoring

Designing displays to meet the specific task needs of a user, rather than providing a general display which can be used for many purposes.

Definitions of Human Factors Terms, MIL-HDBK-1908B

Integrated Product and Process Development (IPPD)

A management technique that simultaneously integrates all essential acquisition activities through the use of multidisciplinary teams to optimize the design, manufacturing, and supportability processes. IPPD facilitates meeting cost and performance objectives from product concept through production, including field support. One of the key IPPD tenets is multidisciplinary teamwork through Integrated Product Teams (IPTs).

Department of Defense (2001)

Integrated Product Team (IPT)

Team composed of representatives from appropriate functional disciplines working together to build successful programs, identify and resolve issues, and make sound and timely recommendations to facilitate decision making. There are three types of IPTs: 1) Overarching IPTs (OIPs) that focus on strategic guidance, program assessment, and issue resolution; 2) Working level IPTs (WIPTs) that identify and resolve program issues, determine program status, and seek opportunities for acquisition reform; and 3) Program level IPTs that focus on program execution and may include representatives from both government and after contract award industry.

Department of Defense (2001)

Major Issue

An issue identified within one or more of the MANPRINT domains, which is expected to result in one or more of the following problems: extensive system damage; injury to friendly personnel; a major reduction in mission performance or effectiveness; or a major negative impact on the ability of the MPT community to support fielding with trained and available personnel. A major issue may become critical over time, and should be resolved as soon as possible in the next acquisition phase.

Office of the Deputy Chief of Staff for Personnel (2000)

HSI RELATED TOOLS

Engineering Development Model (EDM)

A production representative system acquired during the System Development and Demonstration Phase. EDMs may be used to demonstrate maturing performance via an operational assessment

or operational testing, and to finalize proposed production specifications and drawings. Formal initial operational test and evaluation (IOT&E) required by statute or regulation before a Full Rate Production Decision Review is normally performed on LRIP articles during the Production and Deployment phase.

Department of Defense (2001)

Improved Performance Research Integration Tool (IMPRINT)

A MANPRINT tool consisting of multiple software components that can be used either singly or in a combination for a determination of the number, attributes, availability, and training needs of soldiers required to operate and maintain Army systems. It can be used to develop constraints and subsequently, to evaluate requirements.

Office of the Deputy Chief of Staff for Personnel (2000)

Macro Models

Manpower estimating models which use various data sources to produce roughly right predictions of manpower requirements. Emphasis is placed on utilization of programmable variables which can be used in the PPBS/POM process.

Navy Total Force Manpower (Req HDBK)

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.

HSI RELATED DOCUMENTS AND PLANS

Equipment Facility Requirements (EFR) Plan

A plan prepared by the Training Support Agency (TSA), which, (a) identifies the training equipment, devices and aids required to be installed at a Training Activity; (b) identifies the type and amount of shore facilities needed in association with the above; (c) establishes a plan and schedule for the completed installation transfer from the Training Support Agency to the Training Agent.

Glossary of Training Device Terms, MIL-HDBK-220B

Capstone Requirements Document (CRD)

A document that contains capabilities-based requirements that facilitates the development of individual ORDs by providing a common framework and operational concept to guide their development. It is an oversight tool for overarching requirements for a system-of-systems or family-of-systems.

Department of Defense (2001)

Health Standards

Published documents specifying conditions of acceptable risk for individual health hazards. These can include medical exposure limits, health conservation criteria, and materiel design standards.

U.S. Army Center for Health Promotion and Preventive Medicine (2001)

Operational Requirements Document (ORD)

A formatted statement containing performance and related operational performance parameters for the proposed concept or system. Prepared by the user or user's representative at Milestone B and Milestone C.

CJCSI 3170.01A; Department of Defense (2001)

Key Performance Parameters (KPPs)

A critical subset of the performance parameters found in the ORD, and are included in the performance portion of the Acquisition Program Baseline (APB). Each KPP has a threshold and an objective value. KPPs represent those capabilities or characteristics so significant that failure to meet the threshold value of performance can be cause for the concept or system selected to be reevaluated or the program to be reassessed or terminated. KPPs are validated by the Joint Requirements Oversight Council (JROC) for ACAT I and ACAT IA programs.

Department of Defense (2001)

Projected Operational Environment (POE)

The environment in which the ship or squadron is expected to operate, including the military climate (e.g., at sea, at war, capable of continuous operations at readiness Condition III).

Navy Manpower Analysis Center (2000)

Navy Training Systems Plan (NTSP)

Document used to describe required training for new systems planned for fleet introduction.

Surface Force Training Manual

Billet Sequence Code (BSC)

A five-digit, ascending sequence of numbers determined by manpower claimants and/or activities to organizationally structure manpower requirements, organizational headers, and billet notes within an activity's Activity Manning Document (AMD).

Navy Total Force Manpower (Req HDBK)

Required Operational Capability (ROC)

Statements prepared by mission and warfare sponsors which detail the capabilities required of ships and squadrons in various operational situations. The level of detail sets forth which weapon will be ready at varying degrees of readiness. Example: perform anti-air warfare with full capability conditions of readiness I, partial capability in condition if readiness III.

Navy Personnel Command

HSI RELATED FIELDS

Anthropometrics

The scientific measurement and collection of data about human physical characteristics and the application (engineering anthropometry) of these data to the design and evaluation of systems, equipment, and facilities. Anthropometry is concerned with designing systems that are compatible with the physical constraints of the human body such as the line of sight of the eyes and the positioning and reach of the limbs.

Definitions of Human Factors Terms, MIL-HDBK-1908B; Wickens (1992)

Ergonomics

The scientific study of the relationship between man and his working environment. Ergonomics can be considered as the study of the anatomical, physiological, and psychological aspects of workers in their working environment with the object of optimizing health, safety, comfort, and efficiency.

Murrell (1969); Fraser (1989)

Human Engineering

The application of knowledge about human capabilities and limitations to system or equipment design and development to achieve efficient, effective, and safe system performance at minimum cost and manpower, skill, and training demands. Human engineering assures that the system or equipment design, required human tasks, and work environment are compatible with the sensory, perceptual, mental, and physical attributes of the personnel who will operate, maintain, control and support it.

Definitions of Human Factors Terms, MIL-HDBK-1908B

Human Factors

The study of human beings and their interaction with products, environments, and equipment in performing tasks and activities. The systematic application of relevant information about human abilities, characteristics, behavior, motivation, and performance. It includes principles and applications in the areas of human engineering, anthropometrics, personnel selection, training, life support, job performance aids, and human performance evaluation.

Czaja (1997); Department of Defense (2001)

Systems Engineering

A comprehensive, iterative technical management process that includes translating operational requirements into configured systems, integrating the technical inputs of the entire design team, managing interfaces, characterizing and managing technical risk, transitioning technology from the technology base into program specific efforts, and verifying that designs meet operational needs. It is a life cycle activity that demands a concurrent approach to both product and process development.

Department of Defense (2001)

ACQUISITION

The conceptualization, initiation, design, development, test, contracting, production, deployment, logistic support, modification, and disposal of weapons and other systems, supplies, or services

(including construction) to satisfy DoD needs, intended for use in or in support of military missions.

Department of Defense (2001)

Evolutionary Acquisition

An acquisition strategy that defines, develops, produces or acquires, and fields an initial hardware or software increment (or block) of operational capability. Consists of two basic approaches. The first approach (**Spiral Development**) defines the ultimate functionality at the beginning of the program with the content of each increment determined by the maturation of key technologies. In the second approach (**Incremental Development**), the ultimate functionality cannot be defined at the beginning of the program and each increment of capability is defined by the maturation of the technologies matched with the evolving needs of the user.

Under Secretary of Defense (2002)

Technology Readiness Level (TRL)

A defined level of maturity (1 to 9) of a technology. TRLs are designed to enable the technology transition process from S&T efforts to the operational community.

DoD 5000.2-R (2001)

ACQUISITION LOGISTICS

Acquisition logistics includes those technical and management activities that ensure supportability implications are considered early and throughout the acquisition process to minimize support costs and provide the user with the resources to sustain the system in the field.

Department of the Air Force (2002)

Integrated Logistic Support

A unified and iterative approach to the management and technical activities needed to influence operational and materiel requirements and design specifications; define the support requirements best related to system design and to each other; develop and acquire the required support; provide required operational phase support at lowest cost; seek readiness and life-cycle cost improvements in the materiel system and support systems during the operational life cycle; and repeatedly examine support requirements throughout the service life of the system.

Logistics Requirements

These include operations, maintenance (including depot activities), training, and base operating support requirements. Logistics encompasses design interface; maintenance planning; support equipment; supply support; packaging, handling, storage, and transportation; technical data; facilities; personnel; training and training support; and computer resources support.

Department of the Air Force (2002)

Logistics Supportability

The degree of ease to which system design characteristics and planned logistics resources allow for the meeting of system availability and wartime usage requirements.

Department of Defense (2001)

MILESTONE DECISION REVIEW (MDR)

The decision point, separating life cycle phases, at which the system's status is assessed for fitness to proceed to the next phase. The activities that have been performed in the preceding life-cycle management phase, the status of program execution and program management's plans for the remainder of the program, are assessed and exit criteria for the next life-cycle management phase are established during the milestone review and decision process.

Office of the Deputy Chief of Staff for Personnel (2000)

Milestone Decision Authority (MDA)

The individual designated in accordance with criteria established by the Under Secretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)), or by the Assistant Secretary of Defense (Command, Control, Communications, and Intelligence) (ASD(C 3 I)) for automated information system (AIS) acquisition programs, to approve entry of an acquisition program into the next phase.

DoDI 5000.2; Department of Defense (2001)

MISSION PROFILE

A time phased description of operational events and environments from beginning to end of a specific mission. Identified are tasks, events, durations, operating conditions and environment.

Paraphrased from Definitions of Human Factors Terms - MIL-HDBK-1908B

AUTOMATED TOOLS

Software performing a sequence of operations to assist the user in achieving a goal (e.g., within graphics software, functions that align objects, smooth curves, or draw circles).

Military Specifications and Standards Reform Program (1998)

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION (RDT&E)

Activities for the development of a new system that include basic and applied research, advanced technology development, demonstration and validation (DEM/VAL), engineering development, developmental and operational testing and the evaluation of test results. Includes activities to expand the performance of fielded systems. An appropriation consisting of budget activities for basic research, applied research, advanced technology development, demonstration and validation, engineering and manufacturing development, RDT&E management and support and operational systems development.

Department of Defense (2001)

INITIAL OPERATIONAL CAPABILITY (IOC)

The first attainment of the capability to employ effectively a weapon, item of equipment, or system of approved specific characteristics with the appropriate number, type, and mix of trained and equipped personnel necessary to operate, maintain, and support the system. It is normally defined in the Operational Requirements Document (ORD).

Department of Defense (2001)

INTEROPERABILITY

The ability of systems, units, or forces to provide data, information, materiel, and services to and accept the same from other systems, units, or forces, and to use the data, information, materiel, and services so exchanged to enable them to operate effectively together.

Department of the Air Force (2002)

Logistics Interoperability

A form of interoperability in which the service to be exchanged are assemblies, components, spares, or repair parts. Logistic interoperability will often be achieved by making such assemblies, components, spares, or repair parts interchangeable, but can sometimes be a capability less than interchangeability when a degradation of performance or some limitations are operationally acceptable.

Department of Defense (2001)

MAINTAINABILITY

Describes the ease with which an item to be retained in, or restored to, a specified condition when maintenance is performed by personnel having specified skills using prescribed procedures and resources at each prescribed level of maintenance and repair.

Department of the Air Force (2002)

RELIABILITY, AVAILABILITY, AND MAINTAINABILITY (RAM)

Requirement imposed on acquisition systems to insure they are operationally ready for use when needed, will successfully perform assigned functions, and can be economically operated and maintained within the scope of logistics concepts and policies. RAM programs are applicable to materiel systems; test measurement and diagnostic equipment, training devices; and facilities developed, produced, maintained, procured, or modified for use.

Department of Defense (2001)

SUPPORTABILITY

The degree of ease to which system design characteristics and planned logistic resources, including the logistic support (LS) elements, allow for the meeting of system availability and wartime utilization requirements.

Department of Defense (2001)

LIFECYCLE

All phases of the system's life including design, research, development, test and evaluation, production, deployment (inventory), operations and support, and disposal.

Department of Defense (2000)

Lifecycle Support

The ability to update, modify, and otherwise change training materials and/or equipment after delivery.

Glossary for Training, MIL-HDBK-29612-4A

MISSION CRITICAL SYSTEM

A system whose operational effectiveness and operational suitability are essential to successful completion or to aggregate residual combat capability. If this system fails, the mission likely will not be completed. Such a system can be an auxiliary or supporting system, as well as a primary mission system.

Department of Defense (2001)

POLICY

SEA POWER 21

Vision of how the Navy will organize, integrate, and transform. A broadened strategy in which naval forces are fully integrated into global joint operations against regional and transnational dangers. Consists of three fundamental concepts – Sea Shield, Sea Strike, and Sea Basing – and is enabled by ForceNet. Sea Trial, Sea Warrior, and Sea Enterprise are three initiatives supporting enhanced warfighting capabilities for the fleet.

Clark (2002)

Sea Shield

Develops naval capabilities related to homeland defense, sea control, assured access, and projecting defense overland. By doing so, it reassures allies, strengthens deterrence, and protects the joint force.

Clark (2002)

Sea Strike

A broadened concept for naval power projection that leverages enhanced C4ISR, precision, stealth, and endurance to increase operational tempo, reach, and effectiveness.

Clark (2002)

Sea Basing

Projects the sovereignty of the United States globally while providing Joint Force Commanders with vital command and control, fire support, and logistics from the sea, thereby minimizing vulnerable assets ashore.

Clark (2002)

Sea Warrior

The process of developing 21st century Sailors. It identifies the knowledge, skills, and abilities needed for mission accomplishment; applies a career-long training and education continuum; and employs a responsive, interactive career management system to ensure the right skills are in the right place at the right time.

Clark (2002)

Sea Trial

A continual process of concept and technology development through focused wargames, experiments, and exercises. It strengthens the Navy's culture of innovation and accelerates the delivery of enhanced capabilities to the Fleet.

Clark (2002)

Sea Enterprise

Captures efficiencies by employing lessons. From the business revolution to assess organizational alignment; target areas for improvement, and prioritize investments.

Clark (2002)

ForceNet

An overarching effort to integrate warriors, sensors, networks, command and control, platforms, and weapons into a fully netted, combat force. ForceNet will be the Navy's plan to make network-centric warfare an operational reality.

Clark (2002)

Network-Centric Warfare

A fundamental shift from platform-centric warfare. An information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization.

Alberts, Garstka, & Stein (1999)

JOINT VISION 2020

Long-range vision document of the Chairman of the Joint Chiefs of Staff outlining the capabilities that are needed to produce a highly effective, interoperable Joint Force in the year 2020.

Deputy Under Secretary of Defense (Science and Technology) (2000)

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