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Systems and software engineering — Vocabulary

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Contents

Page

List of Figures

Page

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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The main task of ISO/IEC JTC 1 is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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Introduction

The systems and software engineering disciplines are continuing to mature while information technology advances. New terms are being generated and new meanings are being adopted for existing terms. This International Standard was prepared to collect and standardize terminology. Its purpose is to identify terms currently in use in the field and standard definitions for these terms. It is intended to serve as a useful reference for those in the Information Technology field, and to encourage the use of systems and software engineering standards prepared by ISO and liaison organizations IEEE Computer Society and Project Management Institute (PMI). It provides definitions that are rigorous, uncomplicated, and understandable by all concerned.

While it is useful to find the meaning of a term, no word stands in isolation. This International Standard makes it possible to search for related concepts and to view how a term is used in definitions of other terms.

Every effort has been made to use definitions from established systems and software engineering standards of ISO JTC 1/SC 7 and its liaison organizations IEEE Computer Society and the PMI. When existing standards were found to be incomplete, unclear or inconsistent with other entries in the vocabulary, however, new, revised, or composite definitions have been developed. Some definitions have been recast in a systems, rather than software, context.

This International Standard replaces IEEE Std 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology, which was contributed by the IEEE as a source document. The approach and lexical exactitude of IEEE Std 610.12-1990 served as a model for this International Standard. Nevertheless, approximately two-thirds of the definitions in this International Standard are new since IEEE Std 610.12 was last updated in 1990, a reflection of the continued evolution in the field.

The vocabulary is offered in both print and internet-accessible versions for ease of reference.

Systems and software engineering — Vocabulary

1 Scope

Consistent with ISO vocabulary standards, each technical committee is responsible for standard terminology in its area of specialization. This International Standard provides a common vocabulary applicable to all systems and software engineering work falling within the scope of ISO JTC 1/SC 7.

The scope of each concept defined has been chosen to provide a definition that is suitable for general application. In those circumstances where a restricted application is concerned, a more specific definition might be needed.

Terms have been excluded if they were

- considered to be parochial to one group or organization;
- company proprietary or trademarked;
- multi-word terms whose meaning could be inferred from the definitions of the component words;
- terms whose meaning in the information technology (IT) field could be directly inferred from their common English meaning.

1.1 Relationship of the print and internet-accessible versions

The primary tool for maintaining this vocabulary is a database that is modified in a controlled fashion. Hosted by the IEEE Computer Society, the SEVOCAB (systems and software engineering vocabulary) database is publicly accessible at www.computer.org/sevocab. ISO/IEC 24765 is issued periodically as a formal, published International Standard reflecting a "snapshot" of the database.

The copyright notice provided with the database permits users to copy definitions from the database as long as the source of the definition is cited. Permitting public use of the definitions in the database is intended to encourage the use of other ISO/IEC JTC 1 and IEEE systems and software engineering standards.

1.2 Vocabulary structure

Entries in the vocabulary are arranged alphabetically. Blanks precede all other characters in alphabetizing. Hyphens and slashes (- and /) follow all other characters in alphabetizing.

An entry can consist of a single word, such as "software"; a phrase, such as "test case"; or an acronym, such as "CDR". Phrases are given in their natural order (test plan) rather than in reversed order (plan, test). Acronyms can be listed separately as well as in parentheses following the source term. Terms that are verbs are shown without the infinitive marker "to".

After each term, numbered definitions are listed in order of preference, or from the most general to the more specific usages. The different definitions can show the use of a term as a noun, verb and adjective.

This International Standard includes references to the active source standards for each definition, so that the use of the term can be further explored. The sources of most of the definitions are ISO JTC 1/SC 7 or IEEE Computer Society standards and the PMI Glossary, Fourth Edition. Sources are listed in Annex A. In some

cases, the same definition can also be found in other active or withdrawn standards. No source is shown if the original source standard has been withdrawn or archived and the definition has been retained in this vocabulary.

Notes (comments), Examples, and illustrations taken from the source standards have been included to clarify selected definitions.

The following cross-references are used to show a term's relationship to other terms in the dictionary.

- *Syn* refers to a synonym: a term with the same meaning. Synonyms are listed under the preferred term and can be located by searching.

- cf. refers to related terms that are not synonyms.

1.3 PMI Glossary provisions

The Project Management Institute (PMI) Glossary definitions have been included without alteration in accordance with the copyright agreement. Many of these definitions include explanatory material. For other terms and other definitions that have ISO/IEC and IEEE standards as their source, explanatory matter is shown in the Notes and Examples.

Many of the definitions from the PMI Glossary begin with a word or phrase in brackets, such as [Process], [Output/Input], [Technique]. These bracketed entries refer to the schema of the Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK®[1)] Guide)* – Fourth Edition, which provides further explanation.

2 Conformance

The definitions in this International Standard are drawn from normative standards and informative guidance documents, including ISO Technical Reports (TR). This International Standard may be used as a normative document for projects and organizations claiming conformance to the normative source standards. Where terms have multiple definitions, users should consult the source standards for further information on appropriate usage within a specific context. Annex B lists other references.

Terms, definitions, and notes use spelling preferred in the USA. The use of capital letters has been minimized and generally limited to proper names and acronyms. In some cases the source standard uses another correct spelling (such as *behaviour* rather than *behavior*, *on-line* rather than *online*). Other correct spellings and capitalization of the terms, according to a national standard, an authoritative general dictionary or accepted style guide may be used with the definitions.

3 Terms and definitions

3.1
<Viewpoint> language
1. definitions of concepts and rules for the specification of an ODP system from the <viewpoint> viewpoint. ISO/IEC 10746-3:1996 Information technology — Open Distributed Processing — Reference Model: Architecture.4.2.1.1

NOTE Thus, engineering language is defined as "definitions of concepts and rules for the specification of an ODP system from the engineering viewpoint".

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1) PMBOK is a trademark of the Project Management Institute, Inc. which is registered in the United States and other nations.

3.2
<X> federation
1. a community of <x> domains. *ISO/IEC 10746-3:1996, Information technology — Open Distributed Processing — Reference Model: Architecture.*5.1.2

3.3
<x> interceptor
1. an engineering object in a channel, placed at a boundary between <x> domains. *ISO/IEC 10746-3:1996, Information technology — Open Distributed Processing — Reference Model: Architecture.*8.1.11

NOTE An <x> interceptor performs checks to enforce or monitor policies on permitted interactions between basic engineering objects in different domains; performs transformations to mask differences in interpretation of data by basic engineering objects in different domains. An inter-subnetwork relay is an example of an interceptor.

3.4
1GL
1. first-generation language

cf. machine language

3.5
2GL
1. second-generation language

cf. assembly language

3.6
3GL
1. third-generation language

cf. high order language

3.7
4GL
1. fourth-generation language

3.8
5GL
1. fifth-generation language

3.9
A-0 context diagram
1. the only context diagram that is a required for a valid IDEF0 model, the A-0 diagram contains one box, which represents the top-level function being modeled, the inputs, controls, outputs, and mechanisms attached to this box, the full model name, the model name abbreviation, the model's purpose statement, and the model's viewpoint statement. *IEEE Std 1320.1-1998 (R2004) IEEE Standard for Functional Modeling Language — Syntax and Semantics for IDEF0*

3.10
A4, A5
1. International Standard paper sizes. *ISO/IEC 15910:1999, Information technology — Software user documentation process.*4.1

NOTE A4 is 210 mm by 297 mm and A5 is 148 mm by 210 mm; see ISO 216:2007.

3.11
abend
1. abbreviation for abnormal end

3.12
abnormal end (abend)
1. termination of a process prior to completion

cf. abort, exception

3.13
abort
1. to terminate a process prior to completion

cf. abnormal end (abend), exception

3.14
absolute address
1. an address that is permanently assigned to a device or storage location and that identifies the device or location without the need for translation or calculation. *Syn:* explicit address, specific address

cf. relative address, relocatable address, symbolic address, absolute assembler, absolute code, absolute instruction

3.15
absolute assembler
1. an assembler that produces absolute code

cf. relocating assembler

3.16
absolute code
1. code in which all addresses are absolute addresses. *Syn:* specific code

cf. relocatable code

3.17
absolute instruction
1. a computer instruction in which all addresses are absolute addresses

cf. direct instruction, effective instruction, immediate instruction, indirect instruction

3.18
absolute loader
1. a loader that reads absolute machine code into main memory, beginning at the initial address assigned to the code by the assembler or compiler, and performs no address adjustments on the code

cf. relocating loader

3.19
abstract class
1. a class that cannot be instantiated independently. *IEEE Std 1320.2-1998 (R2004) IEEE Standard for Conceptual Modeling Language Syntax and Semantics for IDEF1X97 (IDEFobject).*3.1.1

NOTE That is, instantiation must be accomplished via a subclass. A class for which every instance must also be an instance of a subclass in the cluster (a total cluster) is called an abstract class with respect to that cluster.

3.20
abstract data type
1. a data type for which only the properties of the data and the operations to be performed on the data are specified, without concern for how the data will be represented or how the operations will be implemented

3.21
abstract design
1. a generic form that needs specialization (further design work) to produce concrete designs. ***2.*** design aimed at producing designs

3.22
abstraction
1. a view of an object that focuses on the information relevant to a particular purpose and ignores the remainder of the information. ***2.*** the process of formulating a view

cf. data abstraction

3.23
acceptability
1. the exposure to loss (financial or otherwise) that an organization is willing to tolerate from a risk

NOTE Risk acceptability may apply to an individual risk or to a collection of risks, such as the totality of risks confronting a project or enterprise. Acceptability may differ for different categories of risk and may depend on the cost of treatment or other factors.

3.24
acceptable
1. meeting stakeholder expectations that can be shown to be reasonable or merited. *ISO/IEC 38500:2008, Corporate governance of information technology.*1.3.1

3.25
acceptance criteria
1. the criteria that a system or component must satisfy in order to be accepted by a user, customer, or other authorized entity. ***2.*** those criteria, including performance requirements and essential conditions, which must be met before project deliverables are accepted. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Fourth Edition*

cf. requirement, test criteria

3.26
acceptance test
1. the test of a system or functional unit usually performed by the purchaser on his premises after installation with the participation of the vendor to ensure that the contractual requirements are met. *ISO/IEC 2382-20:1990, Information technology — Vocabulary — Part 20: System development.*20.05.07.

cf. acceptance testing, validation testing

3.27
acceptance testing
1. testing conducted to determine whether a system satisfies its acceptance criteria and to enable the customer to determine whether to accept the system. *IEEE Std 829-2008 IEEE Standard for Software and System Test Documentation.*3.1.1. *Syn:* validation testing, acceptance test. ***2.*** formal testing conducted to enable a user, customer, or other authorized entity to determine whether to accept a system or component. *IEEE Std 829-2008 IEEE Standard for Software and System Test Documentation.*3.1.1.

cf. validation testing, acceptance test

3.28
access
1. to obtain the use of a resource. *ISO/IEC 2382-1:1993, Information technology — Vocabulary — Part 1: Fundamental terms.*01.01.04

3.29
access facility
1. a set of service primitives that allow a stub objects to negotiate the abstract and transfer syntax to be used for the operation data to be transmitted over the channel*. ISO/IEC 14752:2000, Information technology — Open Distributed Processing — Protocol support for computational interactions.*3.3.1

3.30
access method
1. a technique to obtain the use of data, the use of storage in order to read or write data, or the use of an input-output channel to transfer data*. ISO/IEC 2382-1:1993, Information technology — Vocabulary — Part 1: Fundamental terms.*01.08.03

3.31
access routine
1. a routine that provides access to a data structure that is hidden, usually because it is a global variable or used in an abstract data type

3.32
access transparency
1. a distribution transparency which masks differences in data representation and invocation mechanisms to enable interworking between objects*. ISO/IEC 10746-3:1996, Information technology — Open Distributed Processing — Reference Model: Architecture.*4.4.1.1

3.33
accessibility
1. usability of a product, service, environment or facility by people with the widest range of capabilities*. ISO/IEC 25062:2006, Software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Common Industry Format (CIF) for usability: test reports.*4.1; *ISO/IEC 26514, Systems and software engineering--requirements for designers and developers of user documentation.*4.1

NOTE Although "accessibility" typically addresses users who have disabilities, the concept is not limited to disability issues.

3.34
accident
1. an unplanned event or series of events that results in death, injury, illness, environmental damage, or damage to or loss of equipment or property. *IEEE Std 1228-1994 (R2002) IEEE Standard for Software Safety Plans.*3.1.1

3.35
accuracy
1. a qualitative assessment of correctness, or freedom from error. ***2.*** a quantitative measure of the magnitude of error

3.36
accuracy of measurement
1. the closeness of the agreement between the result of a measurement and the true value of the measurand*. ISO/IEC TR 14143-3:2003, Information technology — Software measurement — Functional size measurement — Part 3: Verification of functional size measurement methods.*3.1

NOTE Accuracy is a qualitative concept. The term precision should not be used for "accuracy". [ISO/IEC Guide 99:2007 International vocabulary of metrology — Basic and general concepts and associated terms] A true value is a value consistent with the definition of a given particular quantity and this is a value that would be obtained by a perfect measurement. In contexts where perfect measurement is not practically feasible, a conventional true value is a value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose. 'Conventional true value', in the same reference, is sometimes called assigned value, best estimate of the value, conventional value or reference value. The accuracy should be expressed in terms of the Mean magnitude of relative error.

3.37
ACID
1. Atomicity Consistency Isolation Durability*. ISO/IEC 10746-1:1998, Information technology — Open Distributed Processing — Reference model: Overview*

3.38
acquire project team
1. [Process] the process of confirming human resource availability and obtaining the team necessary to complete project assignments. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Fourth Edition*

3.39
acquirer
1. stakeholder that acquires or procures a product or service from a supplier*. ISO/IEC 12207:2008 (IEEE Std 12207-2008), Systems and software engineering — Software life cycle processes.*4.1. ***2.*** the individual or organization that specifies requirements for and accepts delivery of a new or modified software product and its documentation. *IEEE Std 1058-1998 IEEE Standard for Software Project Management Plans.*3.1; *ISO/IEC 15288:2008 (IEEE Std 15288-2008), Systems and software engineering — System life cycle processes.*4.1. *Syn:* buyer, customer, owner, purchaser

NOTE The acquirer may be internal or external to the supplier organization. Acquisition of a software product may involve, but does not necessarily require, a legal contract or a financial transaction between the acquirer and supplier.

3.40
acquisition
1. process of obtaining a system, software product or software service*. ISO/IEC 12207:2008 (IEEE Std 12207-2008) Systems and software engineering — Software life cycle processes.*4.2. ***2.*** process of obtaining a system product or service*. ISO/IEC 15288:2008 (IEEE Std 15288-2008), Systems and software engineering — System life cycle processes.*4.2. *Syn:* outsourcing

3.41
acquisition strategy

1. specific approach to acquiring products and services that is based on considerations of supply sources, acquisition methods, requirements specification types, contract or agreement types, and related acquisition risks

3.42
action
1. element of a step that a user performs during a procedure*. ISO/IEC 26514, Systems and software engineering--requirements for designers and developers of user documentation.*4.2. ***2.*** a description of an operation to be taken in the formulation of a solution*. ISO 5806:1984, Information processing — Specification of single-hit decision tables.*3.7

3.43
action entry
1. an indication of the relevance of an action to a particular rule*. ISO 5806:1984, Information processing — Specification of single-hit decision tables.*3.9

3.44
action of interest
1. an action in a transaction which leads to a state change of significance to the transaction*. ISO/IEC 10746-3:1996 Information technology — Open Distributed Processing — Reference Model: Architecture.*13.7.1.2

3.45
action stub
1. a list of all the actions to be taken in the solution of a problem*. ISO 5806:1984, Information processing — Specification of single-hit decision tables.*3.11

3.46
activation
1. one occurrence of a function's transformation of some subset of its inputs into some subset of its outputs. *IEEE Std 1320.1-1998 (R2004) IEEE Standard for Functional Modeling Language — Syntax and Semantics for IDEF0.*2.1.3

3.47
activation constraint
1. a function's requirement for the presence of a non-empty object set in a particular arrow role as a precondition for some activation of the function. *IEEE Std 1320.1-1998 (R2004) IEEE Standard for Functional Modeling Language — Syntax and Semantics for IDEF0.*2.1.4

3.48
active area
1. (on-screen documentation) area that responds to user input.4.3

EXAMPLE a window, icon or text field

3.49
active interconnection
1. a physical interaction mechanism allowing the action of one thing to cause a change or to stimulate an action in another thing. *IEEE Std 1175.2-2006 IEEE Recommended Practice for CASE Tool Interconnection — Characterization of Interconnections.*3.1

3.50
active redundancy
1. in fault tolerance, the use of redundant elements operating simultaneously to prevent, or permit recovery from, failures

cf. standby redundancy

3.51
active text
1. text displayed on the screen that responds to user input

3.52
active white space
1. area around textual or graphical elements, not including margins, which breaks up text, separates topic and subtopic groupings, indicates hierarchical and topical relationships, highlights information or makes text easier to read. *ISO/IEC 15910:1999, Information technology — Software user documentation process.*4.54

3.53
activity
1. set of cohesive tasks of a process. *ISO/IEC 12207:2008 (IEEE Std 12207-2008), Systems and software engineering — Software life cycle processes.*4.3; *ISO/IEC 15288:2008 (IEEE Std 15288-2008), Systems and software engineering — System life cycle processes.*4.3. ***2.*** a component of work performed during the course of a project. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Fourth Edition.* ***3.*** an order submitted to the system under test (SUT) by a user or an emulated user demanding the execution of a data processing operation according to a defined algorithm to produce specific output data from specific input data and (if requested) stored data. *ISO/IEC 14756:1999, Information technology — Measurement and rating of performance of computer-based software systems.*4.1. ***4.*** a defined body of work to be performed, including its required input information and output information. *IEEE Std 1074-2006 IEEE Standard for Developing a Software Project Life Cycle Process.*Annex E. ***5.*** collection of related tasks. *ISO/IEC 90003:2004, Software engineering — Guidelines for the application of ISO 9001:2000 to computer software.*3.1. ***6.*** element of work performed during the implementation of a process. *IEEE Std 829-2008 IEEE Standard for Software and System Test Documentation.*3.1.2

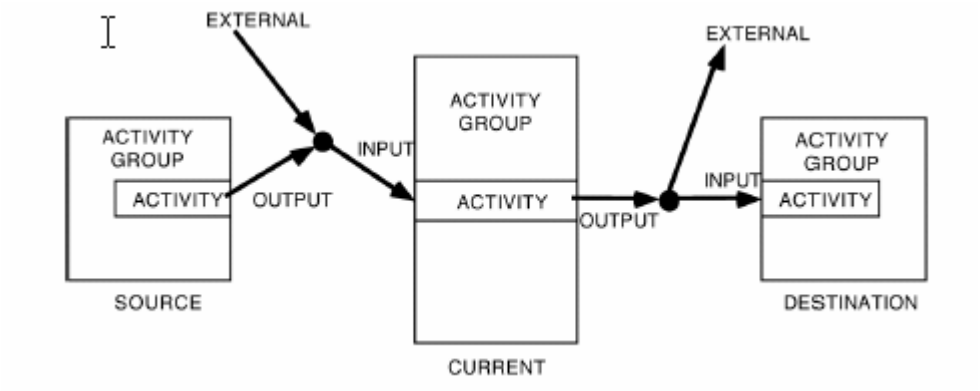

Figure 1 —Activity

NOTE An activity normally has an expected duration, cost, and resource requirements. Activities are often subdivided into tasks.

3.54
activity attributes
1. [Output/Input] multiple attributes associated with each schedule activity that can be included within the activity list. Activity attributes include activity codes, predecessor activities, successor activities, logical relationships, leads and lags, resource requirements, imposed dates, constraints, and assumptions. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Fourth Edition*

3.55
activity code
1. one or more numerical or text values that identify characteristics of the work or in some way categorize the schedule activity that allows filtering and ordering of activities within reports. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Fourth Edition*

3.56
activity duration
1. the time in calendar units between the start and finish of a schedule activity. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Fourth Edition*

3.57
activity group
1. a set of related activities. *IEEE Std 1074-2006 IEEE Standard for Developing a Software Project Life Cycle Process.* Annex E

3.58
activity identifier
1. a short unique numeric or text identification assigned to each schedule activity to differentiate that project activity from other activities. Typically unique within any one project schedule network diagram. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Fourth Edition*

3.59
activity list
1. [Output/Input] a documented tabulation of schedule activities that shows the activity description, activity identifier, and a sufficiently detailed scope of work description so project team members understand what work is to be performed. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) — Fourth Edition*

3.60
activity type
1. a classification of activities defined by the execution of the same algorithm. *ISO/IEC 14756:1999, Information technology — Measurement and rating of performance of computer-based software systems.*4.2