Review Document For

Systems Engineering Workflow Use Case

Terminology and Definitions

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# Table of Definitions

Table 1: Definition of Terms

| **Name** | **Description** | **Acronym** |
| --- | --- | --- |
| Stakeholder Requirements Traceability | All stakeholder requirements should have bidirectional traceability, including to their source, such as the source document or the stakeholder need. [2] (section 4.1) |  |
| Concept of Deployment | Describes the way the system will be delivered and installed. [2] (section 4.1) |  |
| Concept of Operations | Also known as "ConOps" - Describes the way the system works from the operator's perspective. The ConOps includes the user description and summarizes the needs, goals, and characteristics of the system's user community. This includes operation, maintenance, and support personnel. [2] (section 4.1) | ConOps |
| Concept of Support | Describes the desired support infrastructure and manpower considerations for maintaining the system after it is deployed. This includes specifying equipment, procedures, facilities, and operator training requirements. [2] (section 4.1) |  |
| Concept of Production | Describes the way the system will be manufactured, including any hazardous materials used in the process. [2] (section 4.1) |  |
| Measures of Effectiveness Needs | Measures of Effectiveness (MOEs) are the "operational" measures of success that are closely related to the achievement of the mission or operational objective being evaluated, in the intended operational environment under a specified set of conditions (i.e., how well the solution achieves the intended purpose). [2] (section 4.1) | MOEs |
| Stakeholder Requirements | Formally documented and approved stakeholder requirements that will govern the project, including: required system capabilities, functions, and/or services; quality standards; and cost and schedule constraints. [2] (section 4.1) |  |
| Validation Criteria | May specify who will perform validation activities, and the environments of the system-of-interest. [2] (section 4.1) |  |
| MOE Data | Data provided to measure the MOEs. . [2] (section 4.1) |  |
| Initial RVTM | Initial Requirements Verification and Traceability Matrix - A list of requirements, their verification attributes, and traceability. [2] (section 4.1) | I-RVTM |
| Analyze Needs Outputs | A collection of output artifacts for the Stakeholder Requirements Definition Process establish the initial set of stakeholder requirements for project scope and associated agreements. . [2] (section 4.1) |  |
| Analyze Needs Inputs | A collection input artifacts required for the Stakeholder Requirements Definition Process. . [2] (section 4.1) |  |
| Source Documents | Extract, clarify, and prioritize all of the written directives embodied in the source documents relevant to the particular stage of procurement activity. [2] (section 4.1) |  |
| Project Constraints | Includes all other constraints from the stakeholder including cost, schedule, and solution constraints. [2] (section 4.1) |  |
| Analyze Needs Controls and Enablers | A collection of artifacts that control and enable the Stakeholder Requirements Definition Process.  This includes:  Applicable Laws and Regulations  Industry Standards - relevant industry specifications and standards  Agreements - terms and conditions of the agreements  Project Procedures and Standards - including project plans  Project Directives  Organization/Enterprise Policies, Procedures, and Standards - including guidelines and reporting mechanisms  Organization/Enterprise Infrastructure  Project Infrastructure [2] (section 4.1) |  |
| Stakeholder Needs | Description of users' and other stakeholders' needs or services that the system of interest will provide. [2] (section 4.1) |  |
| Conceptual System Architecture | The Conceptual System Architecture (CSA) is an early view of the finalized system architecture and is typically captures in the proposal stage.  The CSA describes the basic concepts and approach of the actual system architecture. Typically more detail is captured in this early stage of development in aspects of the system that are perceived to contain more risk. In a model-based environment the CSA is captured in the form of a SysML model. A document may also be generated from the CSA model to assist in the review and to help communicate to people without access to the model. | CSA |
| Review Package | The review package describes what has changed. Typically this is measured against the previous baseline. The review package contains all the changed items and any additional needed to complete the context of those changed items.  The review package should highlight what items have been added, deleted or updated, e.g. document change bars, red lines, text color changes, annotation, etc.  The review package can consist of any type of artifact, including SysML models, documents, code, parts of the system, prototypes, etc. |  |
| Review Comments | The Review Comments artifact is produced as a result of reviewing a Review Package. Comments may add, delete or update items in the Review Package. Comments can be captured in many different forms, i.e. document change bars, red lines, text color changes, annotation, etc.. Each comment should identify the reviewer and the time of change.  The set of comments in the Review Comments artifact can be of multiple forms, e.g. an annotated version of the review package, a separate report, etc. |  |
| Regulatory Documents | Regulatory compliance documents establish a set or rules, principles or usages that describe the goals that an organization, a system or equipment should implement to ensure the awareness of and take steps to comply with relevant laws and regulations. |  |
| Acquirer | The stakeholder that acquires or procures a product or service from a supplier. [2] |  |
| Baseline | The gate-controlled step-by-step elaboration of business, budget, functional, performance, and physical characteristics, mutually agreed to by buyer and seller, and under formal change control.  Baselines can be modified between formal decision gates by mutual consent through the change control process. [2] |  |
| Commercial off-the-shelf | Commercial items that require no unique acquirer modifications or maintenance over the life cycle of the product to meet the needs of the procuring agency. [2] | COTS |
| Component | A system element comprised of multiple parts; a cleanly identified item. [2] |  |
| Configuration item | A hardware, software, or composite item at any level in the system hierarchy designated for configuration management. (The system and each of its elements are individual CIs.) CIs have four common characteristics:  1. Defined functionality,  2. Replaceable as an entity,  3. Unique specification,  4. Formal control of form, fit, and function  [2] INCOSE SE Handbook | CI |
| System | A combination of interacting elements organized to achieve one or more stated purposes [2}  An integrated set of elements, subsystems, or assemblies that accomplish a defined objective. These elements include products (hardware, software, and firmware), processes, people, information, techniques, facilities, services, and other support elements. An example would be an air transportation system. [2] |  |
| Supplier | An organization or an individual that enters into an agreement with the acquirer for the supply of a product or service. [2] |  |
| System Element | A member of a set of elements that constitutes a system a major product, service, or facility of the system (the term subsystem is sometimes used instead of element) [2] |  |
| Systems Engineering | Systems Engineering (SE) is an interdisciplinary approach and means to enable the realization of successful systems. It focuses on defining customer needs and required functionality early in the development cycle, documenting requirements, and then proceeding with design synthesis and system validation while considering the complete problem: operations, cost and schedule, performance, training and support, test, manufacturing, and disposal. SE considers both the business and the technical needs of all customers with the goal of providing a quality product that meets the user needs. [2] | SE |
| Subsystem | A system element comprising an integrated set of assemblies, which performs a cleanly and clearly separated function, involving similar technical skills, or a separate supplier. [2] |  |
| Element | See System element [2} |  |
| Design Constraints | The boundary conditions, externally or internally imposed, for the system-of-interest within which the organization must remain when executing the processes during the concept and Development Stage. [2] |  |
| Measure of Effectiveness | The "operational" measures of success that are closely related to the achievement of the mission or operational objective being evaluated, in the intended operational environment under a specified set of conditions; i.e. how well the solution achieves the intended purpose. (Adapted from DOD 5000.2, DAU, INCOSE) [9]  A measure used to quantify the performance of a system, product or process in terms that describe a measure to what degree the real objective is achieved. [2] | MOE |
| Validation | A confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled [ISO 9000: 2000] [2] |  |
| Verification | Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled [ISO 9000: 2000] [2] |  |
| Specialty Engineering | Analysis of specific features of a system that requires special skills to identify requirements and assess their impact on the system life cycle. [2] |  |
| Interface | In computing, an interface is a shared boundary across which two separate components of a computer system exchange information. The exchange can be between software, computer hardware, peripheral devices, humans and combinations of these. ([8] Wikipedia) |  |
| Environment | The surroundings (natural or man-made) in which the system-of interest is utilized and supported; or in which the system is being developed, produced and retired.[2] |  |
| Measure of Performance | The measures that characterize physical or functional attributes relating to the system operation, measured or estimated under specified testing and/or operational environment conditions. (Adapted from DOD 5000.2, DAU, INCOSE, and EPI 280-04, LM Integrated Measurement Guidebook) [9] | MOP |
| Technical Measures | Technical measurements is the set of measurement activities used to provide the supplier and/or acquirer insight into progress in the definition and development of the technical solution and the associated risks and issues. This insight helps project management make better decisions throughout the life-cycle to increase the probability of delivering a technical solution that meets both the specified requirements and the mission needs. This insight is also used in trade-off decisions when performance exceeds the threshold. [9] |  |
| Technical Performance Measure | TPMs measure attributes of a system element to determine how well a system or system element is satisfying or expected to satisfy a technical requirement or goal. [9] | TPM |
| Key Performance Parameter | A critical subset of the performance parameters representing those capabilities and 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 project to be reassessed or terminated. (Adapted from Glossary of Defense Acquisition Acronyms and Terms, Defense Acquisition University Press, January 2001). [9] | KPP |
| Model-based Systems Engineering | "Model-based systems engineering (MBSE) is the formalized application of modeling to support system requirements, design, analysis, verification, and validation activities beginning in the conceptual design phase and continuing throughout development and later life cycle phases".  Ref - International Council on Systems Engineering (INCOSE), Systems Engineering Vision 2020, Version 2.03, TP-2004-004-02, September 2007. | MBSE |
| Model-based Systems Development | Model-based Systems Development (MBSD) is the formalized application of modeling to support all aspects of product engineering and support system requirements, design, implementation, analysis, verification, validation, manufacturing, support and management activities beginning in the conceptual design phase and continuing throughout development and later life cycle phases. Therefore MBSD includes domains such as MBSE, software design and implementation and mechanical design and implementation, and electrical design and implementation. | MBSD |
| Product Development System | Product Development System (PDS) is the system used to provide an integrated environment of tools and capabilities required to develop products that are systems. This includes the environment for systems engineering, software design and implementation engineering, mechanical design and implementation engineering, electrical design and implementation engineering and interfaces to external domains including manufacturing support and product management. | PDS |
| System of Interest | The system whose life cycle is under consideration.[2]  A specific system in the context of a set of systems that is the primary focus of evaluation, analysis or development. | SoI |
| Hazard | A hazard is system state that when combined with other environmental conditions inevitably leads to an accident [7]. |  |
| Fault | A safety fault is a non-conformance of a system that leads to a hazard [7]. |  |
| Safety Measure | Safety measures are activities and precautions taken to improve safety, i.e. reduce risk related to human health [6].  A safety measure could be used to detect or mitigate a fault [7]. |  |
| Safety Report | The result of a safety analysis and evaluation. |  |

# Citations

1. Watson, John C. System Engineering Workflow Use Cases (Document and Rhapsody Model), September 14, 2014, Version 1.0, Lockheed Martin Corporation2. INCOSE. 2011. INCOSE Systems Engineering Handbook, Version 3.2.2. San Diego, CA, USA: International Council on Systems Engineering (INCOSE), INCOSE-TP-2003-002-03.2.2. 3. Pyster, A. and D.H. Olwell (eds). 2013. The Guide to the Systems Engineering Body of Knowledge (SEBoK), v. 1.2. Hoboken, NJ: The Trustees of the Stevens Institute of Technology. Accessed DATE. www.sebokwiki.org4. International Standard - ISO/IEC 15288 and IEEE 15288 - 2008, Second Edition 2008-02-01, Systems and software engineering - System life cycle processes5. ISO/IEC 2008. Systems and Software Engineering -- System Life Cycle Processes. Geneva, Switzerland: International Organization for Standardization / International Electromechanical Commissions. ISO/IEC/IEEE 15288:2008 (E).6. Wikipedia: Safety: Mar 31, 2015: http://en.wikipedia.org/wiki/Safety#Safety\_measures7. Douglas, Bruce: Safety Analysis of UML Models8. 8. Wikipedia. Main Page. Mar 31, 2015. http://en.wikipedia.org/wiki9. Roedler, G.J. and Jones, C. December 27, 2005. Technical Measurement, Version 1.0, Practical Software and Systems Measurement (PSM) and International Council on Systems Engineering (INCOSE). INCOSE-TP-2003-020-01