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Ingénierie des systèmes et du logiciel — Processus du cycle de vie — Gestion des risques

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the rules given in the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Systems and software engineering*, in cooperation with the Systems and Software Engineering Standards Committee of the IEEE Computer Society, under the Partner Standards Development Organization cooperation agreement between ISO and IEEE.

This edition cancels and replaces ISO/IEC 16085:2006, which has been technically revised.

The main changes compared to ISO/IEC 16085:2006 are as follows:

— Use common terminology, common process names, and common process structure with ISO/IEC/IEEE 15288:2015 and ISO/IEC/IEEE 12207:2017.

— Improve consistency with ISO 31000:2018, which provides generic principles, framework, and process for managing all forms of risk.

— Provide specialized guidance for performing risk management within the context of systems and software engineering projects.

This document is intended to be used in conjunction with ISO/IEC/IEEE 15288:2015, ISO/IEC/IEEE 12207:2017, ISO 31000 and IEC 31010, and is not a replacement.

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Introduction

This document is an elaboration standard for the risk management process described in ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207. This document provides requirements for the tasks and activities of the risk management process in Clause 6, consistent with these life cycle process International Standards. This document provides a definition of the content of the risk management plan (8.1) and risk treatment plan (8.2). This document also provides guidance for how risk management outcomes, activities, and tasks pertain to other processes.

This document prescribes a continuous process for risk management. Clause 1 provides an overview and the purpose, scope, and field of application. Clause 2 lists the normative references. Clause 3 provides terms and definitions. Clause 4 prescribes conformance criteria. Clause 5 describes key concepts and application with other International Standards. Clause 6 elaborates the risk management process as required by ISO/IEC/IEEE 15288 or ISO/IEC/IEEE 12207. Clause 6 also defines required purpose, outcomes, tasks, and activities of the risk management process for application to systems and software engineering projects in an integrated manner as described in Clause 7 and produces the information products described in Clause 8. Clause 7 suggests some typical risk areas, some typical opportunity areas, and some typical treatments for each life cycle process. Clause 8 prescribes the content for the risk management information items. The Bibliography lists informative references that are either referenced by this document or of interest to users of this document.

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Systems and software engineering — Life cycle processes — Risk management

1 Scope

1.1 Overview

This document:

— provides risk management elaborations for the processes described in ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207,

— provides the users of ISO/IEC/IEEE 15288, ISO/IEC/IEEE 12207 and their associated elaboration standards with common terminology and specialized guidance for performing risk management within the context of systems and software engineering projects,

— specifies the required information items that are to be produced through the implementation of risk management process for claiming conformance, and

— specifies the required contents of the information items.

This document provides a universally applicable standard for practitioners responsible for managing risks associated with systems and software over their life cycle. This document is suitable for the management of all risks encountered in any organization or project appropriate to the systems or software projects regardless of context, type of industry, technologies utilized, or organizational structures involved.

This document does not provide detailed information about risk management practices, techniques, or tools which are widely available in other publications. Instead this document focuses on providing a comprehensive reference for integrating the large and wide variety of processes, practices, techniques, and tools encountered in systems and software engineering projects and other lifecycle activities into a unified approach for risk management, with the purpose of providing effective and efficient risk management while meeting the expectations and requirements of organization and project stakeholders.

1.2 Purpose

This document provides information on how to design, develop, implement, and continually improve risk management in a systems and software engineering project throughout its life cycle.

1.3 Field of application

This document is compatible with risk management as described in ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207 and can also be applied in conjunction with ISO 31000. Depending on the scope and context of the systems or software engineering project of interest, there are a number of additional International Standards that can be applicable to the risk management effort including ISO 9001. This document is intended to provide additional information useful in implementing a system for integrated risk management for systems and software engineering projects. 5.2 discusses in more detail how this document can be applied with other standards.

This document is applicable to:

— project teams which use ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207 on projects dealing with man-made systems, software-intensive systems, software and hardware products, and services

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related to those systems and products, regardless of organization or project scope, product(s), methodology, size, or complexity;

— project teams performing risk management activities to aid in ensuring that their application of risk management conforms to ISO/IEC/IEEE 15288 and/or ISO/IEC/IEEE 12207;

— project teams using ISO/IEC/IEEE 15289 on projects dealing with human-made systems, software-intensive systems, software and hardware products, and services related to those systems and products, regardless of organization or project scope, product(s), methodology, size, or complexity; and

— project teams generating information items developed during the application of risk management processes to conform to ISO/IEC/IEEE 15289.

This document can be applied in conjunction with ISO 31000 and IEC 31010 to augment risk management performed within the context of ISO/IEC/IEEE 15288 and/or ISO/IEC/IEEE 12207.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC/IEEE 12207:2017, *Systems and software engineering — Software life cycle processes*

ISO/IEC/IEEE 15288:2015, *Systems and software engineering — System life cycle processes*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO, IEC, and IEEE maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/

— IEC Electropedia: available at http://www.electropedia.org/

— IEEE Standards Dictionary Online: available at: http://dictionary.ieee.org

NOTE Definitions for other system and software engineering terms typically can be found in ISO/IEC/IEEE 24765, available at www.computer.org/sevocab.

3.1
consequence
outcome of an event affecting one or more *stakeholders* (3.11)

Note 1 to entry: An event can lead to a range of consequences.

Note 2 to entry: A consequence can be certain or uncertain and can have positive or negative effects on *objectives* (3.3).

Note 3 to entry: Consequences can be expressed qualitatively or quantitatively.

Note 4 to entry: Initial consequences can escalate through follow-on effects.

[SOURCE: ISO Guide 73:2009, 3.6.1.3, modified — In the definition, "objectives" has been replaced by "one or more stakeholders"; the notes to entry have been reordered.]

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3.2
likelihood
chance of something happening

Note 1 to entry: In *risk* (3.5) management terminology, the word "likelihood" is used to refer to the chance of something happening, whether defined, measured, or determined objectively or subjectively, qualitatively or quantitatively, and described using general terms or mathematically (such as a probability or a frequency over a given time period).

Note 2 to entry: The English term "likelihood" does not have a direct equivalent in some languages; instead, the equivalent of the term "probability" is often used. However, in English, "probability" is often narrowly interpreted as a mathematical term. Therefore, in risk management terminology, "likelihood" is used with the intent that it should have the same broad interpretation as the term "probability" has in many languages other than English.

[SOURCE: ISO Guide 73:2009, 3.6.1.1]

3.3
objective
result to be achieved

Note 1 to entry: An objective can be strategic, tactical, or operational.

Note 2 to entry: An objective can relate to different disciplines (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product, and process).

Note 3 to entry: An objective can be expressed in other ways, e.g. as an intended outcome, a purpose, an operational criterion, an objective related to *risk* (3.5) management, or by the use of other words with similar meaning (e.g. aim, goal, or target).

Note 4 to entry: Objectives related to risk management are set by the *organization* (3.4), consistent with the risk policy, to achieve specific results.

[SOURCE: ISO/IEC 19770-1:2017, 3.37, modified — In Note 3 to entry, "asset management objective" has been replaced by "objective related to risk management"; the original Note 4 to entry has been replaced by a new one.]

3.4
organization
person or group of people that has its own functions with responsibilities, authorities, and relationships to achieve its *objectives* (3.3)

Note 1 to entry: The concept of organization includes, but is not limited to sole-trader, company, corporation, firm, enterprise, authority, partnership, association, charity or institution, or part or combination thereof, whether incorporated or not, public or private.

[SOURCE: ISO 9000:2015, 3.2.1, modified — Note 2 to entry has been removed.]

3.5
risk
effect of uncertainty on *objectives* (3.3)

Note 1 to entry: An effect is a deviation from the expected — positive or negative. A positive effect is also known as an opportunity.

Note 2 to entry: Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product, and process).

Note 3 to entry: Risk is often characterized by reference to potential events and *consequences* (3.1), or a combination of these.

Note 4 to entry: Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated *likelihood* (3.2) of occurrence.

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Note 5 to entry: Uncertainty is the state, even partial, of deficiency of information related to understanding or knowledge of an event, its consequence, or likelihood.

[SOURCE: ISO Guide 73:2009, 1.1, modified — In Note 1 to entry, the last sentence has been added.]

3.6
risk criteria
terms of reference against which the significance of a *risk* (3.5) is evaluated

Note 1 to entry: Risk criteria are based on organizational *objectives* (3.3), and external and internal context.

Note 2 to entry: Risk criteria can be derived from standards, laws, policies, and other requirements.

[SOURCE: ISO Guide 73:2009, 3.3.1.3]

3.7
risk exposure
potential loss presented to an individual, project, or *organization* (3.4) by a *risk* (3.5)

Note 1 to entry: Risk exposure is commonly defined as the product of a probability and the magnitude of a *consequence* (3.1), that is, an expected value or expected exposure."

3.8
risk profile
description of any set of *risks* (3.5)

Note 1 to entry: The set of risks can contain those that relate to the whole *organization* (3.4), part of the organization, or as otherwise defined.

Note 2 to entry: The phrase "as otherwise defined" includes one or more projects.

[SOURCE: ISO Guide 73:2009, 3.8.2.5, modified — Note 2 to entry has been added.]

3.9
risk threshold
measure of the level of uncertainty or the level of impact at which a *stakeholder* (3.11) may have a specific interest

Note 1 to entry: Different risk thresholds can be defined for each risk, risk category or combination of risks, based on differing *risk criteria* (3.6). Below that risk threshold, the *organization* (3.4) will accept the *risk* (3.5). Above that risk threshold, the organization will not tolerate the risk;

3.10
risk tolerance
degree, amount, or volume of *risk* (3.5) that an *organization* (3.4) or individual will withstand

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.3543]

3.11
stakeholder
individual or *organization* (3.4) having a right, share, claim, or interest in a system or in its possession of characteristics that meet their needs and expectations

EXAMPLE End users, end user organizations, supporters, developers, producers, trainers, maintainers, disposers, acquirers, supplier organizations and regulatory bodies.

Note 1 to entry: Some stakeholders can have interests that oppose each other or oppose the system.

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.59]

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