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Edition 4.0 2024-06

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Dependability management –
Part 1: Managing dependability

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Partie 1: Gérer la sureté de fonctionnement

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Gestion de la sûreté de fonctionnement – Partie 1: Gérer la sureté de fonctionnement

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DEPENDABILITY MANAGEMENT –

Part 1: Managing dependability

FOREWORD

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IEC 60300-1 has been prepared by IEC technical committee 56: Dependability. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2014. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) more guidance on integration of dependability activities into an existing management system;
b) greater detail on the activities required to establish and implement a programme of dependability activities;
c) changes to provide consistency with other dependability standards.

The text of this International Standard is based on the following documents:

Draft	Report on voting
56/2031/FDIS	56/2044/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60300 series, published under the general title *Dependability management*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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INTRODUCTION

Dependability is the ability to perform as and when required. A dependable item is one where there is justified confidence that it operates as desired and satisfies agreed stakeholder needs and expectations. Dependability has many attributes but is usually characterised in terms of reliability, maintainability and supportability, and the resulting availability. In some cases, attributes such as resilience, recoverability, durability, integrity, safety, security, and trustworthiness are included in, or overlap with, dependability.

The specification and verification of dependability attributes provide stakeholders with assurance that requirements will be met into the future and quality will be maintained over time. The dependability of a system, product or service influences the business strategies associated with its design, acquisition and use, and costs over its life cycle. The dependability of an organization's systems, products and services has a strong impact on the perception of the value and trustworthiness of the organization.

Dependability is managed as a key element of an organization's wider management system, particularly aspects relating to assets, quality and finance.

This document highlights the importance and benefits of managing dependability. It gives guidance on dependability activities and their integration into an existing management system and life cycle processes so that an efficient, effective and economical approach is achieved.

Dependability activities bring benefits whenever they are performed but greater benefit is achieved the sooner in the life cycle they are implemented.

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This document is applicable to a broad range of industry sectors and organizations of any size. It applies to systems of systems, large unique systems, mass produced industrial and consumer products, software applications, components and services. These categories are not mutually exclusive. For example, many products and components are in themselves complex systems.

The document will be useful for:

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- managers and technical personnel;
- those involved in deciding how their systems, products and services can be made dependable;
- organizations such as regulators who evaluate the dependability of systems, products and services;
- those (e.g. users or the public) who need justified confidence in systems, product and services that might affect them;
- developers of other dependability related standards.

This document is one of a suite of "top level" interrelated IEC dependability standards that provide managers and technical personnel with guidance on how to effectively plan and implement dependability activities. Other documents in the suite are:

– IEC 60300-3-4 which provides guidance on writing dependability requirements in specifications, and on the means of assuring the achievement of those requirements;

– IEC 60300-3-10 and IEC 60300-3-14 which provide guidance on how to identify and apply appropriate analysis and assurance techniques for maintainability (and maintenance) and supportability (and support) respectively;

– standards to cover reliability and availability, which are planned.

DEPENDABILITY MANAGEMENT –

Part 1: Managing dependability

1 Scope

This document provides guidance on:

- the meaning and significance of dependability from a business, technical and financial perspective;
- achieving dependability through suitable adaptation of organizational management systems such as those described in ISO 9001 (quality management) and ISO 55001 (asset management);
- the activities that are integrated into management systems and life cycle processes in order to achieve dependable systems, products and services;
- planning and implementing dependability activities throughout the life cycle to achieve and assure required outcomes, taking into account factors such as costs, safety, the environment, customer goodwill, brand and reputation.

This document is applicable to any type of system, both new and existing, to mass produced industrial or consumer products, to components and to services. This document addresses all elements of systems, products and services including hardware, software, data, processes, procedures, facilities, materials, and personnel required for operations and support.

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2 Normative references

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IEC 60050-192:2015, *International Electrotechnical Vocabulary (IEV) – Part 192: Dependability* (available at www.electropedia.org)

3 Terms, definitions, and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 60050-192 and the following apply.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Terms and definitions

3.1.1
accountability
state of being answerable for decisions and activities to the organization's governing bodies, legal authorities and, more broadly, its stakeholders and society in general

Note 1 to entry: Accountability involves an obligation on management, the organization and individuals to be answerable for the impact of their decisions and activities on stakeholders, society and the environment. Accountability thus implies answerability to those affected and to society in general.

Note 2 to entry: Accountability implies that individuals, organizations and the community are responsible for their actions and can be required to justify them to others.

[SOURCE: ISO 26000:2010, 2.1, modified – "and society in general" has been added to the definition and notes to entry have been added.]

3.1.2
adaptability
ability to adjust to changed conditions or to be modified for a particular purpose or for a changed environment

3.1.3
assurance
grounds for justified confidence that a claim has been or will be achieved

[SOURCE: ISO/IEC/IEEE 15026-1:2019, 3.1.1]

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3.1.4
availability
ability to be in a state to perform as required under given conditions

Note 1 to entry: Availability depends upon the combined attributes of the reliability, maintainability, supportability and on the maintenance and support provided.

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Note 2 to entry: Availability can also be affected by delays before it is recognised that maintenance or support are needed, for example fault detection time (192-06-18) and administrative delay (192-07-12).

Note 3 to entry: Given conditions include aspects that affect availability such as mode of operation, stress levels, environmental conditions and maintenance defined in the life profile.

Note 4 to entry: Availability may be quantified using measures defined in IEC 60050-192:2015, 192-08, *Availability related measures*.

[SOURCE: IEC 60050-192:2015, 192-01-23, modified – in the definition "of an item" has been deleted, "under given conditions" has been added, Note 1 to entry has been modified, and Notes 2 and 3 to entry have been added.]

3.1.5
business process
partially ordered set of inter-related enterprise activities that can be executed to achieve some desired end-result in pursuit of a given objective of an organization

Note 1 to entry: Business is interpreted broadly to mean those activities that are core to the purposes of the organization's existence whether the organization is public, private, for profit or not for profit.

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.445, modified – Note 1 to entry has been added.]

3.1.6
dependability
ability to perform as and when required

Note 1 to entry: A dependable item or service is one where there is justified confidence that it operates as desired and satisfies agreed stakeholder expectations.

Note 2 to entry: In most cases, the term dependability is used as an umbrella term to express its core attributes of reliability, maintainability, and supportability and the resulting availability. In some cases, attributes such as resilience, recoverability, durability, integrity, safety, security and trustworthiness are included in or overlap with dependability.

Note 3 to entry: In order to express the ability to perform, requirements in terms of functions to be performed, when the performance is to be achieved, and the life profile conditions, are specified by the customers, users or stakeholders.

Note 4 to entry: The attributes of dependability can be expressed qualitatively or quantitatively.

Note 5 to entry: It is also a common practice to use the term dependability in the context of a subject of study or discipline.

[SOURCE: IEC 60050-192:2015, 192-01-22, modified – "of an item" has been deleted, the notes have been deleted and new notes to entry have been added.]

3.1.7
dependability activity
set of cohesive tasks carried out to achieve a dependability related purpose

Note 1 to entry: A dependability activity can be mapped to a process view that uses a combination of life cycle processes, activities and tasks as defined in ISO/IEC/IEEE 15288.

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3.1.8
dependability case
evidence-based, reasoned, traceable argument created to support the contention that a defined system does and/or will satisfy the dependability requirements

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Note 1 to entry: A dependability case is an assurance case for dependability-related claims, see ISO/IEC/IEEE 15026-2.

[SOURCE: IEC 62741:2015, 3.1.1, modified – Note 1 to entry has been added.]

3.1.9
dependability plan
information item that presents a systematic course of action for achieving a declared purpose related to dependability including when, how and by whom specific tasks are to be performed

3.1.10
durability
ability to perform as required, under defined conditions of use and maintenance until a defined end state is reached

Note 1 to entry: The degree to which maintenance and repair are within the scope of durability will vary by product or product group.

Note 2 to entry: The end state can be based on technological, social or economic aspects.

Note 3 to entry: Durability can be expressed in units appropriate to the part or product concerned, e.g. calendar time, operating cycles, distance run, etc. or the probability of being able to achieve a given period of usage. The units should always be clearly stated.

Note 4 to entry: Durability as a measure relates to the longevity of the interval.

[SOURCE: IEC 60050-192:2015, 192-01-21, modified – "end of useful life" has been replaced with "defined end state", and notes to entry have been added.]

3.1.11
integrity
<in dependability> ability to prevent or withstand unauthorised modification

Note 1 to entry: Modification can involve hardware, software or data.

3.1.12
life profile
stresses and their levels, content, duration and sequence encountered during the life of an item

Note 1 to entry: Stresses can be internal (such as operating cycles) or external (such as environmental stress, input power level, or rate of service requests over a network).

Note 2 to entry: Life profile can be actual, expected or predicted.

3.1.13
maintainability
ability to be retained in, or restored to a state to perform as required, under given conditions

Note 1 to entry: Given conditions include location for maintenance, accessibility, maintenance procedures and maintenance resources as well as conditions defined in the life profile.

Note 2 to entry: Maintainability can be quantified using appropriate measures. See IEC 60050-192:2015, 192-07, *Maintainability and maintenance support measures*.

3.1.14
measurement
process of experimentally obtaining one or more values that can reasonably be attributed to a quantity

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Note 1 to entry: Measurement does not apply to nominal properties.

Note 2 to entry: Measurement implies comparison of quantities, including counting of entities.

Note 3 to entry: Measurement presupposes a description of the quantity commensurate with the intended use of a measurement result, a measurement procedure, and a calibrated measuring system operating according to the specified measurement procedure, including the measurement conditions.

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Note 4 to entry: The French word "mesure" has several meanings in everyday French language. It is for this reason that the French word "mesurage" has been introduced to describe the act of measurement. Nevertheless, the French word "mesure" occurs many times in forming terms, following current usage, and without ambiguity. Examples are: unité de mesure (unit of measurement), méthode de mesure (measurement method), instrument de mesure (measurement instrument). This does not mean that the use of the French word "mesurage" in place of "mesure" in such terms is not permissible when advantageous.

[SOURCE: ISO/IEC GUIDE 99:2007, 2.1, modified – Note 4 to entry has been added.]

3.1.15
need
prerequisite identified as necessary, to achieve an intended outcome, implied or stated, within a specific context of use

3.1.16
reliability
ability to perform as required, without failure, for a given interval under given conditions

Note 1 to entry: The interval can be expressed in units appropriate to the item concerned, for example calendar time, operating cycles, distance run, etc., and the units should always be clearly stated.

Note 2 to entry: Given conditions include aspects that affect reliability such as: mode of operation, stress levels, environmental conditions and maintenance.

Note 3 to entry: Reliability can be quantified using measures defined in IEC 60050-192:2015, 192-05, *Reliability related concepts: measures*.

[SOURCE: IEC 60050-192:2015, 192-01-24, modified – in the definition "of an item" and "time" have been deleted.]

3.1.17
requirement
<in dependability> statement which translates or expresses a need and its associated constraints and conditions

Note 1 to entry: Requirements exist at different levels in the system structure.

Note 2 to entry: A requirement is an expression of one or more particular needs in a very specific, precise and unambiguous manner.

Note 3 to entry: A requirement always relates to a system, software or service, or other item of interest.

Note 4 to entry: A requirement is a statement where evidence or assurance of compliance can be provided.

[SOURCE: ISO/IEC/IEEE 29148:2018, 3.1.19, modified – Note 4 to entry has been added.]

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3.1.18
risk
effect of uncertainty on objectives

IEC 60300-1:2024
https://standards.iteh.ai/catalog/standards/sist/...-60300-1-2024

Note 1 to entry: An effect is a deviation from the expected. It can be positive or negative or both and can address, create or result in opportunities and threats.

Note 2 to entry: Objectives can have different aspects and categories and can be applied at different levels.

Note 3 to entry: Risk is usually expressed in terms of risk sources, potential events, their consequences and their likelihood.

[SOURCE: ISO 31000:2018, 3.1]

3.1.19
safety
freedom from unacceptable risk of physical injury or damage to the health of people or damage to property or the environment

3.1.20
security
protection against intentional subversion or forced failure