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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Guidance on human aspects of dependability

**Lignes directrices relatives aux facteurs humains dans la sûreté de
fonctionnement**



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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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Guidance on human aspects of dependability

FOREWORD

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IEC 62508 has been prepared by IEC Technical Committee 56: Dependability. It is an International Standard.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

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

- a) The emphasis on user-centred design in the previous edition was reduced in favour of a greater emphasis on human dependability in an existing operational environment.
- b) The emphasis on human error and error-rate determination methods was reduced in favour of a greater emphasis on means of providing organizational support for the workforce in their execution of required tasks.
- c) Where appropriate, discussions of human factors in an operational environment were aligned with current theory, terminology and practice.

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

| Draft | Report on voting |
|--------------|------------------|
| 56/2074/FDIS | 56/2096A/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.

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

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

This document is intended as a basic guide for managers, engineers and other professionals. It concerns good practice for improving dependability of humans in an operational environment, as well as optimizing the interactions between humans and equipment, software, and organizational systems. Modern workplaces often involve the integration of humans with complex technologies and production systems. This document is intended to assist management to:

- understand the basis for human dependability, including designing equipment and systems to minimize human error rather than overly relying on the workforce to act correctly,
- assess the risks related to human performance in an operational environment, and
- implement changes in an operational environment in order to improve the effectiveness of personnel in relation to the technology and systems with which they interact.

One objective in implementing the guidelines in this document is to facilitate the optimization of interactions between humans and equipment, software, facilities, services and organizational systems. A second objective is to reduce the potential for failures to occur that can adversely affect production, equipment maintenance, safety or the well-being of the workforce. Towards this end, guidance on applicable methods and metrics are included for assessing the risks associated with human dependability.

This document is not intended as a handbook or theoretical guide to the fields of human factors or human-systems interactions. These are available elsewhere, and some useful references are listed in the bibliography. Rather, it is intended as a tool for managers and engineers who are tasked with designing, assessing or controlling the human and technical elements of their area of responsibility.

Rather than being a review of human "undependability", the aim is to describe the elements of operational systems that positively contribute to human performance. This document provides an awareness of the relative importance of these elements to dependability, and the tools for assessing how well they are functioning in the organization, and how they can be enhanced.

In accordance with other dependability standards (cf. IEC 60300-1), the term 'human reliability' will refer to qualitative and, where appropriate, quantitative measures of human performance. The term "human dependability" will be applied more broadly to the ability of humans to conduct a task or job as-required and when-required, with an outcome that satisfies agreed stakeholder expectations. The concepts of "maintainability" and "supportability" will still apply, but in the broader context of the organizational factors required for maintaining and supporting human performance.

Although knowledge of the field of human factors in the workplace and principles of human-centred design would be useful, this document will help managers, engineers and other professionals to identify the areas of their responsibility that would benefit from improvement in terms of human dependability, and to put in place interventions designed to optimize human performance.

This document primarily addresses complex technical systems, but some parts are also applicable to manufacturing of mass-produced industrial and consumer products. Principles for the design of the human-machine interface (usability) are described, and further information can be found in technical literature and in relevant product standards.

1 Scope

This document provides guidance on current knowledge and practice concerning dependability in an operational environment, in terms of the humans, teams and organizations involved in conducting the work. It is part of a suite of IEC standards that are intended to address the dependability of both the technical and human elements of equipment and organizations.

This document describes the human elements of a typical operational system, and the importance of those elements to overall dependability. It also describes the means of assessing how well these elements are functioning, and general concepts on how the reliability of humans can be improved. These elements typically include the individual workers, the groups or teams into which they are organized, the interfaces between humans and technical systems, and the overall organization.

The following guidance is applicable to any industry that depends on human-systems interactions involving the technology, software, or systems of work required to support the production and safety objectives of an organization. This document primarily addresses complex technical systems, but some parts are also applicable to the manufacturing of industrial and consumer products. Principles for design of the human-machine interface (usability) are described, and further information can be found in the technical literature and in relevant product standards. Although this document does not specifically cover worker health or safety, the application of this document can raise related issues, particularly in process safety, which is closely associated with system reliability.

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.

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

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

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

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