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Ergonomics of human-system interaction —

Part 112:
Principles for the presentation of information

Ergonomie de l'interaction homme-système —

Partie 112: Principes et lignes directrices relatives à la présentation de l'information

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human–system interaction*.

This first edition of ISO 9241-112, together with ISO 9241-125, cancels and replaces ISO 9241-12:1998.

A list of all parts in the ISO 9241 series can be found on the ISO website.

Introduction

This document presents principles for the presentation of information that apply to the design and evaluation of user interfaces.

The application and use of the principles and general recommendations in this document results in a variety of benefits to users of interactive user interfaces, including improvements in speed, accuracy, mental effort, and user experience. They also help prevent users from experiencing usability problems with presented information. Examples of such problems include the following:

— Users do not detect information, although the information is present.

— Users are distracted from information they are focusing on by other information.

— Users cannot discriminate between pieces of information, since they appear to be identical.

— Users misinterpret information since the meaning of the information is ambiguous.

— Users expend unnecessary time in understanding information since the information is presented is unnecessarily lengthy.

— Users do not understand information due to unknown conventions used in the information.

The principles and general recommendations will help to avoid misinterpretations by providing guidance on the appropriate and effective presentation of information. The guidance in this document does not deal with the identification of the specific information to be presented.

This document contains general recommendations that apply across modalities. ISO 9241-125 provides detailed recommendations relating to the design and evaluation of visual user interfaces.

This document can be used with ISO 9241-110 to provide principles covering interaction with user interfaces, including the presentation of information.

These principles replace the "characteristics of presented information" listed in ISO 9241-12:1998, 4.1. The characteristic "legibility" formerly contained in ISO 9241-12 is not being dealt with specifically in this document since it is specific to visual information, but it is covered in general as part of "Discriminability" and "Interpretability". "Clarity" and "Comprehensibility" also formerly contained in ISO 9241-12 are now being dealt with as part of "Freedom from distraction" and "Interpretability".

This document focuses on software aspects of the presentation of information and does not include guidance on the hardware-controlled physical characteristics of information presented in different modalities.

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Ergonomics of human-system interaction —

Part 112:
Principles for the presentation of information

1   Scope

This document establishes ergonomic design principles for interactive systems related to the software-controlled presentation of information by user interfaces. It applies to the three main modalities (visual, auditory, tactile/haptic) typically used in information and communication technology. These principles apply to the perception and understanding of presented information. These principles are applicable in the analysis, design, and evaluation of interactive systems. This document also provides recommendations corresponding to the principles. The recommendations for each of the principles are not exhaustive and are not necessarily independent from one another.

While this document is applicable to all types of interactive systems, it does not cover the specifics of particular application domains. This document also applies to outputs from interactive systems (such as printed documents, e.g. invoices).

The guidance in this document for presenting information is aimed at helping the user to accomplish tasks. This guidance is not aimed at the presentation of information for other reasons (e.g. corporate branding or advertising).

It is intended for the following types of users:

— user interface designers, who will apply the guidance during the development process;

— developers, who will apply the guidance during design and implementation of system functionality;

— evaluators, who are responsible for ensuring that products meet the recommendations;

— designers of user interface development tools and style guides to be used by user interface designers;

— project managers, who are responsible for managing development processes;

— buyers, who will reference this document during product procurement.

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 9241-171:2008, *Ergonomics of human-system interaction — Part 171: Guidance on software accessibility*

3   Terms and definitions

For the purposes of this document, the following terms and definitions 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
user
person who interacts with a system, product or service

Note 1 to entry: A person who uses an output or service provided by a system, such as a bank customer who receives a paper or electronic statement, visits a branch, or carries out telephone banking using a call centre, is considered to be a user.

[SOURCE: ISO 26800:2011, 2.10, modified — Change in notes.]

3.2
user interface
all components of an interactive system (software or hardware) that provide information and controls for the *user* (3.1) to accomplish specific tasks with the interactive system

[SOURCE: ISO 9241-110:2006, 3.9]

3.3
user-interface element
user-interface object
entity of the user interface that is presented to the *user* (3.1) by the software

EXAMPLE   Text, graphic, control.

Note 1 to entry: User-interface elements can be interactive or not.

Note 2 to entry: Both entities relevant to the task and entities of the *user interface* (3.2) are regarded as user-interface elements. A user-interface element can be a visual representation or an interaction mechanism for a task object (such as a letter, sales order, electronic part, or wiring diagram) or a system object (such as a printer, hard disk, or network connection). It can be possible for the user to directly manipulate some of these user-interface elements.

Note 3 to entry: User-interface elements in a graphical *user interface* (3.2) include such things as basic objects (such as window title bars, menu items, push buttons, image maps, and editable text fields) or containers (such as windows, grouping boxes, menu bars, menus, groups of mutually-exclusive option buttons, and compound images that are made up of several smaller images). User-interface elements in an audio user interface include such things as menus, menu items, messages, and action prompts.

[SOURCE: ISO 9241-171:2008, 3.38]

3.4
attribute
data item that modifies or describes some aspect of an action or an object

Note 1 to entry: An attribute whose value is subject to change can be treated as an object.

[SOURCE: ISO/IEC TR 11580:2007, 2.2, modified — Change of the note.]

3.5
action
user (3.1) behaviour that a system accepts as a request for a particular operation

EXAMPLE   Pressing a key, clicking a mouse button, moving the pointer over an object, speaking a command.

[SOURCE: ISO/IEC TR 11580:2007, 2.3]

3.6
operation
predefined system behaviour that a *user* (3.1) initiates

EXAMPLE   Sending mail, printing, modifying the data or properties of an object.

Note 1 to entry: A *user* (3.1) performs an *action* (3.5) or a set of actions to initiate an operation.

[SOURCE: ISO/IEC TR 11580:2007, 2.4]

3.7
function
task-specific *operation* ([3.6](#)) of an object

Note 1 to entry: Objects can have zero, one, or many functions.

[SOURCE: ISO/IEC TR 11580:2007, 2.5]

3.8
state
status of an object, *action* ([3.5](#)), or *attribute* ([3.4](#)) which is related to the currently permitted interactions with the object, action, or attribute

[SOURCE: ISO/IEC TR 11580:2007, 2.7]

3.9
selection
explicitly identifying an object, *attribute* ([3.4](#)), or *operation* ([3.6](#)) that is intended as the target for subsequent *action* ([3.5](#))

Note 1 to entry: When a mouse is used, selection is performed by clicking once on a mouse button, then, a second click is used to initiate the default *function* ([3.7](#)) of the selected item.

[SOURCE: ISO/IEC TR 11580:2007, 2.10]

3.10
context of use
*user*s ([3.1](#)), tasks, equipment (hardware, software and materials), and the physical and social environments in which a product is used

[SOURCE: ISO 9241-11:1998, 3.5]

3.11
modality
mode of interaction referring to one of the human senses

Note 1 to entry: The three modalities most commonly used in information/communication technology (ICT) are: visual, auditory, tactile/haptic.

Note 2 to entry: Modalities are used in interactions between *user*s ([3.1](#)) and systems.

3.12
medium, sing.
media, pl.
different specific forms of presenting information to the *user* ([3.1](#))

EXAMPLE   Text, video, graphics, animation, audio.

[SOURCE: ISO 14915-1:2002, 3.3, modified — The phrase "human user" has been shortened to "user" as the latter is a term defined as a person.]

3.13
convention
specific design solution that is widely applied within a culture and therefore commonly expected to apply

EXAMPLE   Western languages are typically read from left to right.

3.14
group
set of information items or *user interface element*s ([3.3](#)) that are semantically related and perceptually distinct

3.15
accessibility
extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of *user* (3.1) needs, characteristics and capabilities to achieve identified goals in identified *contexts of use* (3.10)

Note 1 to entry: Context of use includes direct use or use supported by assistive technologies.

4 Introduction to the presentation of information

4.1 Sources of guidance on presentation of information within the ISO 9241-100 series and their relationship

Guidance on presentation of information is contained in various international standards, as well as in guidelines produced by manufacturers of interactive systems. Whenever the usability of interactive systems is addressed in guidance documents, presentation of information is part of the consideration.

Figure 1 gives an overview on types of source documents which contain guidance on presented information.

NOTE The following description also serves as alternative text for Figure 1.

In ISO 9241-110, principles and general recommendations for the interaction between user and system that apply across application domains and particular technologies are introduced. In particular, the principles of self-descriptiveness and conformity with user expectations are related to the presentation of information. Information, which is not self-descriptive, will mislead the user. Information that is not located where users expect it is likely to be not detected and information that does not conform to other user expectations might be misunderstood.

In ISO 9241-112, principles and general recommendations for the presentation of information are introduced that apply across the three main modalities (visual, auditory, and tactile/haptic) typically used in ICT. These principles and general recommendations also apply across application domains and across technologies.

Other ISO standards contain recommendations and requirements with a specific thematic focus.

— Requirements and recommendations specific to the visual presentation of information can be found in ISO 9241-125.

— Requirements and recommendations specific to dialogue techniques can be found in standards such as ISO 9241-143.

— Requirements and recommendations specific to an application domain can be found in standards such as ISO 9241-151 and ISO 9241-154.

— Requirements and recommendations specific to accessibility can be found in standards such as ISO 9241-20 and ISO 9241-171.

ISO standards contain guidance at the levels of

— principles,

— general recommendations, and

— requirements and recommendations specific to a thematic subject.

They do not prescribe "standardized solutions" in terms of conventions (e.g. "the title bar of a window in focus is coloured blue" or "put anything users usually do not need to see in the lower-left corner or bottom of the window"). Such "standardized conventions" are published by industry sources and can be found in literature. However, the guidance relating to presented information in ISO standards is

intended to be applied when establishing or assessing standardized conventions for user interfaces of interactive systems.
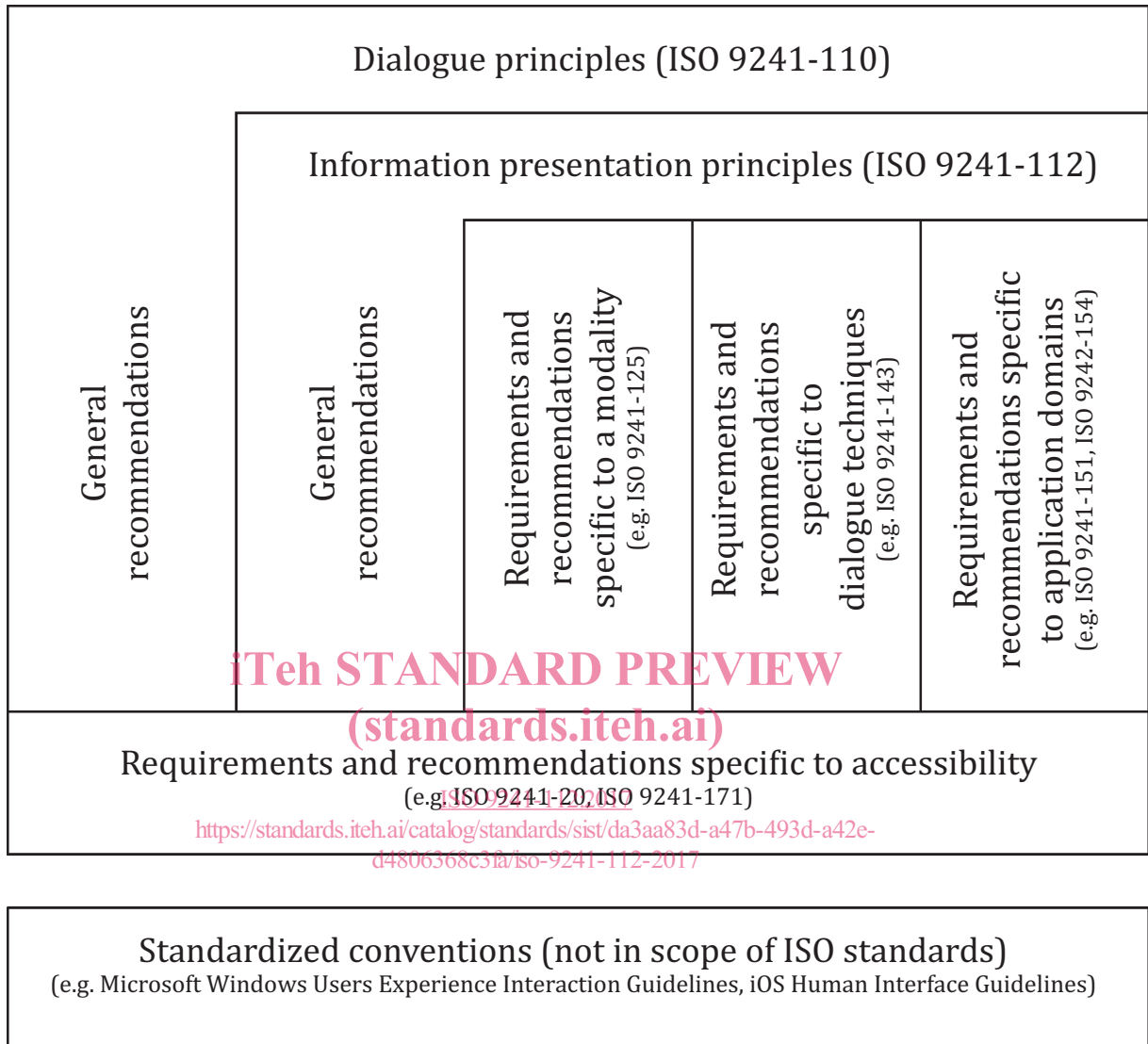

Figure 1 — Relationship between ISO 9241-112 and other sources of guidance on the presentation of information

4.2 Modalities and media

Modalities are based on human senses:

— visual (seeing);

— auditory (hearing);

— tactile/haptic (touching);

— olfactory (smelling);

— gustatory (tasting).

While humans can perceive information based on all modalities, the visual, auditory, and tactile/haptic modalities are the ones commonly used in ICT systems. While the principles apply across all modalities, the three modalities provide the basis for the specific recommendations in this document.