



International  
Standard

**ISO 9241-115**

**Ergonomics of human-system  
interaction —**

Part 115:

**Guidance on conceptual design,  
user-system interaction design,  
user interface design and  
navigation design**

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*Ergonomie de l'interaction homme-système —*

*Partie 115: Recommandations relatives à la conception  
conceptuelle, la conception de l'interaction utilisateur-système,  
la conception de l'interface utilisateur et la conception de la  
navigation*

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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 document 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](http://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](http://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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 122, *Ergonomics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 9241-115 cancels and replaces the first edition of ISO 14915-2:2003, which has been technically revised.

The main changes are as follows:

- much of the content of ISO 14915-2:2003 has been removed or simplified. The content which has been retained is included in [Clause 8](#);
- the Scope has been expanded significantly from just navigation design to "conceptual design, user-system interaction design, user interface design and navigation design". New material has been added accordingly.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Every interactive system has a user interface, regardless of whether or not its design was planned, organized and documented. Risks related to the use of interactive systems can increase due a lack of a planning, organization and documentation in their design.

Within this context, there are two main categories of design for interactive systems, each with their own sub-categories.

- 1) Human-centred design: this deals with the design of interactive aspects of the system and its uses.
  - Human-centred design focuses on satisfying user needs and meeting user requirements.
  - Human-centred design includes conceptual design, user-system interaction design, user interface design and navigation design.
- 2) Technical design: this enables the required interactions between humans and the interactive system from an internal design perspective.
  - Technical design is beyond the scope of this document (see ISO/IEC/IEEE 12207 for further information relating to the technical design of software systems).

ISO 9241-210:2019, 7.1 provides high-level guidance on the human-centred design of interactive systems and recognizes that "human-centred design activities can be incorporated in design approaches as diverse as object-oriented, waterfall, HFI (human factors integration), agile, and rapid development, etc." As stated in the introduction of ISO 9241-210:2019, "Human-centred design is an approach to interactive systems development that aims to make systems usable and useful by focusing on the users, their needs and requirements, and by applying human factors/ergonomics, and usability knowledge and techniques. This approach enhances effectiveness and efficiency, improves human well-being, user satisfaction, accessibility and sustainability; and counteracts possible adverse effects of use on human health, safety and performance."

ISO 9241-220 elaborates on ISO 9241-210 to identify processes, typical activities and process outcomes for enabling, executing and assessing human-centred design within organizations. Many of the process outcomes focus on attributes of the design of interactive systems.

While both ISO 9241-210 and ISO 9241-220 focus on design activities, there is a need for guidance on the outcomes of those design activities.

This document therefore focuses particularly on guidance concerning the outcomes of conceptual design, user-system design, user interface design and navigation design.

# Ergonomics of human-system interaction —

## Part 115:

# Guidance on conceptual design, user-system interaction design, user interface design and navigation design

## 1 Scope

This document provides guidance on aspects of the design of human-system interaction, including conceptual design, user-system interaction design, user interface design and navigation design for interactive systems.

This document applies to all design and development approaches and methodologies, including human-centred design, object-oriented, waterfall, human factors integration (HFI), agile and rapid development.

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 the 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.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

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

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

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

### 3.1 Major subjects of designs

#### 3.1.1

**design**, verb

<process> to define the architecture, system elements, interfaces, and other characteristics of a system or system element

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.1]

### 3.1.2

#### **conceptual design**, noun

outcome of *design* (3.1.1) that describes the intended approach to how the system will be perceived and be used by the *user* (3.3.2)

Note 1 to entry: Conceptual design is discussed in [Clause 5](#).

### 3.1.3

#### **interaction design**, noun

##### **user-system interaction design**

outcome of *design* (3.1.1) that describes how *interaction sequences* (3.5.3) serve each of the *tasks* (3.3.4) within an interactive system

Note 1 to entry: Interaction design also includes *navigation design* (3.1.5).

Note 2 to entry: Interaction design is discussed in [Clause 6](#).

### 3.1.4

#### **interface design**, noun

##### **user interface design**

outcome of *design* (3.1.1) that describes the selection, combination, arrangement and behaviour of *user interface elements* (3.5.7) for all *user interface instances* (3.5.6) as required for *interaction* (3.5.1) between the *user* (3.3.2) and the *user interface* (3.5.5)

Note 1 to entry: Interface design is discussed in [Clause 7](#).

### 3.1.5

#### **navigation design**

outcome of *design* (3.1.1) that describes how access to interface elements and *interactions* (3.5.1) is enabled and structured for *users* (3.3.2)

Note 1 to entry: Information architecture leads to navigation design.

Note 2 to entry: Different users and user groups can have different needs for *navigation* (3.5.8), which can be served differently by a common navigation design.

Note 3 to entry: Navigation design is discussed in [Clause 8](#).

### 3.1.6

#### **information design**

*design* (3.1.1) that describes the presentation of meaningful information (e.g. texts, labels, icons, symbols) in order to support the comprehensibility and interpretability of the contents presented in the *task* (3.3.4) objects

## 3.2 Modelling

### 3.2.1

#### **mental model**

belief and understanding *users* (3.3.2) have of themselves, others, the environment and the objects with which they interact

### 3.2.2

#### **task model**

description of a *task* (3.3.4) and its subtasks that has to be carried out in order to reach the *user's* (3.3.2) *goals* (3.3.3)

### 3.2.3

#### **conceptual model**

designer's understanding of how each *user's* (3.3.2) *task* (3.3.4) will be performed supported by the interactive system



### 3.2.4

#### **scenario of use**

description of the sequence of events from the *user's* (3.3.2) perspective to perform a *task* (3.3.4) in a specified *context of use* (3.3.1)

## 3.3 Context of use, user needs and user requirements

### 3.3.1

#### **context of use**

combination of *users* (3.3.2), *goals* (3.3.3) and *tasks* (3.3.4), resources and environment

Note 1 to entry: The “environment” in a context of use includes the technical, physical, social, cultural and organizational environments.

[SOURCE: ISO 9241-11:2018, 3.1.15]

### 3.3.2

#### **user**

person who interacts with a system, product or service

Note 1 to entry: Users of a system, product or service include people who operate the system, people who make use of the output of the system and people who support the system (including providing maintenance and training).

[SOURCE: ISO 9241-11:2018, 3.1.7]

### 3.3.3

#### **goal**

intended outcome

[SOURCE: ISO 9241-11:2018, 3.1.10]

### 3.3.4

#### **task**

set of activities undertaken in order to achieve a specific *goal* (3.3.3)

Note 1 to entry: These activities can be physical, perceptual and/or cognitive.

Note 2 to entry: While goals are independent of the means used to achieve them, tasks describe particular means of achieving goals.

[SOURCE: ISO 9241-11:2018, 3.1.11]

### 3.3.5

#### **user need**

prerequisite identified as necessary for a *user* (3.3.2), or a set of users, to achieve an intended outcome, implied or stated within a specific *context of use* (3.3.1)

EXAMPLE 1 A presenter (user) needs to know how much time is left (prerequisite) in order to complete the presentation in time [*goal* (3.3.3)] during a presentation with a fixed time limit (context of use).

EXAMPLE 2 An account manager (user) needs to know the number of invoices received and their amounts (prerequisite), in order to complete the daily accounting log (goal) as part of monitoring the cash flow (context of use).

Note 1 to entry: A user need is independent of any proposed solution for that need.

Note 2 to entry: User needs are identified based on various approaches, including interviews with users, observations, surveys, evaluations and expert analysis.

Note 3 to entry: User needs often represent gaps (or discrepancies) between what is desired and what is.

[SOURCE: ISO 25065:2019, 3.1.9, modified — Original Notes 2 and 3 to entry have been modified and Note 4 to entry has been removed.]

### 3.3.6

#### **user requirements**

set of requirements for use that provide the basis for *design* (3.1.1) and evaluation of interactive systems to meet identified *user needs* (3.3.5)

Note 1 to entry: User requirements are derived from user needs and capabilities in order to allow the *user* (3.3.2) to make use of the system in an effective, efficient, safe and satisfying manner.

Note 2 to entry: User requirements are not requirements of users on systems, rather than on the users.

Note 3 to entry: User requirements include *user-system interaction requirements* (3.3.7) and *use-related quality requirements* (3.3.8).

Note 4 to entry: In software engineering terms, user requirements include both "functional" and "non-functional" requirements derived from user needs and capabilities.

[SOURCE: ISO 9241-220:2019, 3.46, modified — Original Notes 1 and 2 to entry have been modified. Note 3 to entry added.]

### 3.3.7

#### **user-system interaction requirements**

*user requirements* (3.3.6) that specify *interactions* (3.5.1) (e.g. recognizing information, making inputs, making selections and receiving outputs) required by the *users* (3.3.2) to achieve the *goals* (3.3.3)

[SOURCE: ISO 25065:2019, 3.1.11]

### 3.3.8

#### **use-related quality requirements**

*user requirements* (3.3.6) that specify the intended outcomes of use of the interactive system and associated quality criteria

[SOURCE: ISO 25065:2019, 3.1.12]

### 3.3.9

#### **user assistance**

additional information or interactive capabilities beyond the regular *user-system interaction* (3.5.1) that is provided to the *user* (3.3.2) on request (user-initiated) or is automatically provided by the system (system initiated).

Note 1 to entry: User assistance can be presented as text, images, videos and auditive information dependent on the *context of use* (3.3.1).

Note 2 to entry: User assistance can be information only or provide interactive capabilities ("interactive user assistance").

## 3.4 Outcomes of use

### 3.4.1

#### **human-centred quality**

extent to which requirements for *usability* (3.4.3), *accessibility* (3.4.2), *user experience* (3.4.4) and avoidance of *harm from use* (3.4.5) are met

Note 1 to entry: Provision of the necessary technical functionality is a prerequisite for human-centred quality.

Note 2 to entry: Usability, accessibility, user experience and avoidance of harm from use can only be managed to the extent that they can be controlled by designed aspects of the interactive system.

Note 3 to entry: Human-centred quality is a collective term for the intended outcomes of interaction of the *user* (3.3.2) with the system.

[SOURCE: ISO 9241-220:2019, 3.12]

### 3.4.2

#### **accessibility**

extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of *user needs* (3.3.5), characteristics and capabilities to achieve identified *goals* (3.3.3) in identified *contexts of use* (3.3.1)

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

[SOURCE: ISO 9241-112:2017, 3.15]

### 3.4.3

#### **usability**

extent to which a system, product or service can be used by specified *users* (3.3.2) to achieve specified *goals* (3.3.3) with effectiveness, efficiency and satisfaction in a specified *context of use* (3.3.1)

Note 1 to entry: The “specified” users, goals and context of use refer to the particular combination of users, goals and context of use for which usability is being considered.

Note 2 to entry: The word “usability” is also used as a qualifier to refer to the *design* (3.1.1) knowledge, competencies, activities and design attributes that contribute to usability, such as usability expertise, usability professional, usability engineering, usability method, usability evaluation and usability heuristic.

[SOURCE: ISO 9241-11:2018, 3.1.1]

### 3.4.4

#### **user experience**

*user's* (3.3.2) perceptions and responses that result from the use and/or anticipated use of a system, product or service

Note 1 to entry: User perceptions and responses include the user's emotions, beliefs, preferences, perceptions, comfort, behaviours and accomplishments that occur before, during and after use.

Note 2 to entry: User experience is a consequence of brand image, presentation, functionality, system performance, interactive behaviour and assistive capabilities of a system, product or service. It also results from the user's internal and physical state resulting from prior experiences, attitudes, skills, abilities and personality, and from the *context of use* (3.3.1).

[SOURCE: ISO 9241-11:2018, 3.2.3, modified — Notes 3 and 4 to entry have been removed.]

### 3.4.5

#### **harm from use**

negative consequences regarding health, safety, finances or the environment that result from use of the system

Note 1 to entry: The negative consequences can be for the *user* (3.3.2) or for any other stakeholder.

Note 2 to entry: Although avoidance of harm from use, i.e. eliminating any exposure of risk that poses a potential harm, cannot be achieved completely, designing an interactive system can aim at mitigating risks to an acceptable minimum.

[SOURCE: ISO 9241-220:2019, 3.10]

## 3.5 Interactions and content

### 3.5.1

#### **interaction**

##### **user-system interaction**

exchange of information between a *user* (3.3.2) and an interactive system via the *user interface* (3.5.5)

[SOURCE: ISO 9241-110:2020, 3.11, modified — "interaction" has been made a preferred term. "to complete the intended task" has been removed from the definition. Note 1 to entry has been removed.]

### 3.5.2

#### **specific interaction**

single *user-system interaction* (3.5.1) within an *interaction design* (3.1.3)