INTERNATIONAL STANDARD

ISO 9241-20

Second edition
2021-11

Ergonomics of human-system interaction —

Part 20: An ergonomic approach to accessibility within the ISO 9241 series

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Ergonomie de l'interaction homme-système —
Partie 20: Approche ergonomique de l'accessibilité dans la série ISO 9241

ISO 9241-20:2021
https://standards.iteh.ai/catalog/standards/sist/48473ca1-83c4-4701-b27c-4519a6626a44/iso-9241-20-2021

Reference number
ISO 9241-20:2021(E)

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Published in Switzerland

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Foreword

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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).

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This second edition cancels and replaces the first edition (ISO 9241-20:2008), which has been technically revised.

The main changes are as follows:

— The guidance in the previous edition has been replaced by references to many different standards that now contain applicable guidance.

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.

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Introduction

The ISO 9241 series provides ergonomic guidance that contributes to the accessibility of interactive systems to meet the needs of users.

Two parts of ISO 9241 particularly address accessibility: ISO 9241-171 and ISO 9241-971. In addition, a number of parts in the ISO 9241 series integrate guidance supporting accessibility.

Accessibility in the design of products, systems and services is important to ensure that they are usable by the widest possible range of users. Designed solutions that support accessibility result from the understanding and implementation of user requirements, including those user requirements specific to accessibility.

Ergonomic principles and human-centred design activities contained in the ISO 9241 series provide a basis for identifying user accessibility needs and deriving user requirements specific to accessibility.

This document identifies standards within the ISO 9241 series and in other related standards that contain guidance related to accessibility.

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Ergonomics of human-system interaction —

Part 20: An ergonomic approach to accessibility within the ISO 9241 series

1 Scope

This document provides:

a) an introduction to the importance of accessibility to human-system interaction;

b) a discussion of the relationship of principles within the ISO 9241 series and accessibility;

c) descriptions of activities related to the processes in ISO 9241-210 that focus on accessibility;

d) references to standards relevant to the accessibility of interactive systems.

2 Normative references

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There are no normative references in this document.

3 Terms and definitions

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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:

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

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

3.1
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, characteristics and capabilities to achieve identified goals in identified contexts of use

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

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

3.2
usability
extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use

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 knowledge, competencies, activities and design attributes that contribute to usability, such as usability expertise, usability professional, usability engineering, usability method, usability evaluation, usability heuristic.

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

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3.3
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]

3.4
user accessibility need
user need related to features or attributes that are necessary for a system to be accessible

Note 1 to entry: User accessibility needs vary over time and across contexts of use.

Note 2 to entry: User accessibility needs are transformed into user requirements considering the context of use, user priorities, trade-offs with other system requirements and constraints.

[SOURCE: ISO/IEC 29138-1:2018, 3.10]

4 Accessibility and ergonomics of human-system interaction

Accessibility in the design of products, systems and services is important to ensure that they are usable by the widest possible range of users.

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Design solutions that support accessibility result from understanding and application of specific user requirements, including those user requirements specific to accessibility.

While the ISO 9241 series currently contains two standards specifically focused on accessibility (ISO 9241-171 and ISO 9241-971), all parts of the ISO 9241 series provide ergonomic guidance that can benefit accessible design solutions. Additionally, ISO 9241-220 identifies the concept of human-centred quality, which includes accessibility as one of its four main components.

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Planning for accessibility as an integral part of the human-centred design process (as described in ISO 9241-210 and ISO 9241-220) involves the systematic identification of requirements for accessibility, including accessibility measurements and verification criteria within the context of use. These provide design targets that can form the basis for verification of the resulting design.

5 Ergonomic principles in the ISO 9241 series supporting accessibility

5.1 General

There are many principles contained within the ISO 9241 series that provide important support for accessibility. Violating any of these principles will limit the accessibility of any resulting system, product or service.

This clause identifies both principles and sources of guidance related to these principles that are found in the ISO 9241 series.

NOTE Annex A contains further information about major sources of international-level accessibility guidance.

5.2 Principles from ISO 9241-171

5.2.1 Suitability for the widest range of use

ISO 9241-171:2008, Clause 5, contains the principle of "suitability for the widest range of use", which it says "involves designing with the objective of producing solutions that will be useful, acceptable

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and available to the widest range of users within the intended user population, taking account of their special abilities, variations in their capabilities, the diversity of their tasks, and their differing environmental, economic and social circumstances."

NOTE ISO/IEC Guide 71:2014, 6.2.1 transforms this principle into a goal it calls "suitability for the widest range of users". It explains that "A system is suitable for the widest range of users if it meets the needs of diverse users in diverse contexts."

ISO 9241-11:2018, 3.1.7, defines a user as a "person who interacts with a system, product or service". It recognizes that, "the objective of designing for accessibility is to enable products, systems, services, environments and facilities to be used by people with the widest range of user needs, characteristics and capabilities in diverse contexts of use. Accessibility is included as a component of human-centred quality to emphasize its importance as part of human-centred design."

While the accessibility guidance in ISO 9241-171 and ISO 9241-971 can support suitability for the widest range of users, there are no parts of the ISO 9241 series that provide guidance on identifying the widest range of users.

5.2.2 Equitable use

ISO 9241-171:2008, Clause 5, contains the principle of "equitable use", which it describes thus: "Equitable solutions provide the same means of use for all users: identical whenever possible; equivalent when not. Achieving equitable use will ensure that solutions designed to increase accessibility do not result in such things as loss of privacy, increased risks to personal safety or security, or the stigmatization of individuals."

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NOTE ISO/IEC Guide 71:2014, 6.2.10 transforms this principle into a goal it calls "equitable use". It explains that "A system provides equitable use if it allows diverse users to accomplish tasks in an identical manner whenever possible or in an equivalent manner when an identical manner is not possible."

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5.2.3 Robustness

ISO 9241-171:2008, Clause 5, contains the principle of "robustness", which it describes thus: "Software should be designed to be as robust as possible to allow it to work with current and future assistive technologies. Although it is not feasible to make all software accessible without add-on assistive technologies, these guidelines should help designers develop software that increases accessibility without the use of assistive technologies, and, by providing the necessary interface information, enables assistive software and devices to operate effectively and efficiently when used. The software can promote integration of assistive technologies by providing information that can be read by assistive technologies, and by communicating through standard application-to-application communication protocols."

NOTE ISO/IEC Guide 71:2014, 6.2.11 transforms this principle into a goal it calls "compatibility with other systems". It explains that "A system provides compatibility if it allows diverse users to use other systems as a means to interact with it to accomplish the task."

5.3 Principles from ISO 9241-110

5.3.1 Suitability for the user's tasks

ISO 9241-110:2020, 5.1 contains the principle of "suitability for the user's tasks", which it describes thus: "An interactive system is suitable for the user's tasks when it supports users in the completion of their tasks, i.e. when the operating functions and the user-system interactions are based on the task characteristics (rather than the technology chosen to perform the task)." It also notes that, "A

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prerequisite for suitability for the user's tasks is that the tasks themselves have been based on user needs."

NOTE ISO/IEC Guide 71:2014, 6.2.8 replaces this principle with a goal that it calls "usability". It explains that "A system is usable if it supports diverse users in their diverse contexts to accomplish their tasks with effectiveness, efficiency and satisfaction." The ISO 9241 series recognizes usability as an outcome of use, rather than as a goal. ISO 9241-11 provides definitions and concepts related to usability.

ISO 9241-110 provides general design recommendations related to suitability for the user's tasks, including guidance on:

— identifying suitability of the interactive system for a given task;

— optimizing effort in task accomplishment;

— defaults supporting the task.

5.3.2 Self-descriptiveness

ISO 9241-110:2020, 5.2 contains the principle of "self-descriptiveness", which it describes thus: "The interactive system presents appropriate information, where needed by the user, to make its capabilities and use immediately obvious to the user without the need for unnecessary user-system interactions."

NOTE ISO/IEC Guide 71:2014, 6.2.5 and 6.2.6 replaces this principle with two goals:

— "perceivability", which it describes thus: "A system is perceivable if diverse users in diverse contexts can sense the information and functionalities it presents."

— "understandability", which it describes thus: "A system is understandable if its information and functionalities are interpretable by diverse users."

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ISO 9241 provides general design recommendations related to self-descriptiveness, including guidance on:

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— presence and obviousness of information;

— clear indication of processing status.

ISO 9241-112 provides ergonomic guidance on the presentation of information (see also 5.4).

5.3.3 Conformity with user expectations

ISO 9241-110:2020, 5.3 contains the principle of "conformity with user expectations", which it describes thus: "The interactive system's behaviour is predictable based on the context of use and commonly accepted conventions in this context."

NOTE ISO/IEC Guide 71:2014, 6.2.2 transforms this principle into a goal it calls "conformity with user expectations". It explains that "A system conforms to user expectations if it is predictable based on the user's past experience, the context of use, laws and standards, and/or commonly accepted conventions."

ISO 9241-110 provides general design recommendations related to conformity with user expectations, including guidance on:

— appropriate system behaviour and responses;

— consistency (internal and external);

— changes in the context of use.

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5.3.4 Learnability

ISO 9241-110:2020, 5.4 contains the principle of "learnability", which it describes thus: "The interactive system supports discovery of its capabilities and how to use them, allows exploration of the interactive system, minimizes the need for learning and provides support when learning is needed."

NOTE ISO/IEC Guide 71:2014, 6.2.8 combines the ISO 9241-110 principles of "suitability for the task" and "learnability" within its goal of "usability". (See 5.3.1 for a discussion of this ISO/IEC Guide 71 goal.)

ISO 9241-110 provides general design recommendations related to learnability, including guidance on:

— discovery (of information and controls that users are looking for);

— exploration (of information and controls that users have discovered);

— retention (of information about the system).

5.3.5 Controllability

ISO 9241-110:2006[1)], 4.9 contained a principle of "suitability for individualization" which it described thus: "A dialogue is capable of individualization when users can modify interaction and presentation of information to suit their individual capabilities and needs."

ISO 9241-110:2020, 5.5 recognizes that individualization is a major component of controllability and thus combines individualization within its principle of "controllability".

ISO 9241-110:2020, 5.5 combines suitability for individualization and controllability into the principle of "controllability", which it describes thus: "The interactive system allows the user to maintain control of the user interface and the interactions, including the speed and sequence and individualization of the user-system interaction."

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NOTE ISO/IEC Guide 71:2014, 6.2.7 transforms this principle into a goal it calls "controllability", which it describes thus: "A system is controllable if the user is able to initiate and complete the interaction(s) required to accomplish the task." It also retains a goal based on "suitability for individualization" that it calls "support for individualization", which it describes thus: "A system supports individualization if its components, functions or operations can be tailored to meet the needs of individual users."

ISO 9241-110 provides general design recommendations related to controllability, including guidance on:

— interruption by the user;

— flexibility;

— individualization.

ISO 9241-920 provides ergonomic guidance on the design of tactile or haptic controls.

ISO 9241-129 provides ergonomic guidance on software individualization.

5.3.6 Use error robustness

ISO 9241-110:2020, 5.6 goes beyond error tolerance, which was a principle in ISO 9241-110:2006, and renames it "use error robustness", which it describes thus: "The interactive system assists the user in avoiding errors and in case of identifiable errors treats them tolerantly and assists the user when recovering from errors."

NOTE ISO/IEC Guide 71:2014, 6.2.9 transforms this principle into a goal it calls "error tolerance", which it describes thus: "A system has error tolerance if despite predictable errors, diverse users can complete the intended task or activity with either no, or minimal, corrective action or negative consequences."

1) Cancelled and replaced by ISO 9241-110:2020.

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