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Ergonomics of human-system interaction —

Part 171: Guidance on software accessibility

Ergonomie de l'interaction homme-système —

Partie 171: Lignes directrices relatives à l'accessibilité aux logiciels



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 9241-171 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

This first edition of ISO 9241-171 cancels and replaces ISO/TS 16071:2003, of which it constitutes a technical revision.

ISO 9241 consists of the following parts, under the general title *Ergonomic requirements for office work with visual display terminals (VDTs)*:

- *Part 1: General introduction*
- *Part 2: Guidance on task requirements*
- *Part 3: Visual display requirements*
- *Part 4: Keyboard requirements*
- *Part 5: Workstation layout and postural requirements*
- *Part 6: Guidance on the work environment*
- *Part 7: Requirements for display with reflections*
- *Part 8: Requirements for displayed colours*
- *Part 9: Requirements for non-keyboard input devices*
- *Part 11: Guidance on usability*
- *Part 12: Presentation of information*
- *Part 13: User guidance*
- *Part 14: Menu dialogues*
- *Part 15: Command dialogues*

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— *Part 16: Direct manipulation dialogues*

— Part 17: Form filling dialogues

Guidance on software individualization and human-centred design process for interactive systems are to form the subjects of future parts 129 and 210.

ISO 9241 also consists of the following parts, under the general title *Ergonomics of human-system interaction*:

— *Part 20: Accessibility guidelines for information/communication technology (ICT) equipment and services*

— *Part 110: Dialogue principles*

— *Part 151: Guidance on World Wide Web user interfaces*

— *Part 171: Guidance on software accessibility*

— *Part 300: Introduction to electronic visual display requirements*

— *Part 302: Terminology for electronic visual displays*

— *Part 303: Requirements for electronic visual displays*

— *Part 304: User performance test methods*

— *Part 305: Optical laboratory test methods for electronic visual displays*

— *Part 306: Field assessment methods for electronic visual displays*

— *Part 307: Analysis and compliance test methods for electronic visual displays*

— *Part 308: Surface-conduction electron-emitter displays (SED)* [Technical Report]

— *Part 309: Organic light-emitting diode (OLED) displays* [Technical Report]

— *Part 400: Principles and requirements for physical input devices*

— *Part 410: Design criteria for physical input devices*

— *Part 920: Guidance on tactile and haptic interactions*

Framework for tactile and haptic interaction is to form the subject of a future part 910.

Introduction

The purpose of this part of ISO 9241 is to provide guidance on the design of the software of interactive systems so that those systems achieve as high a level of accessibility as possible. Designing human-system interactions to increase accessibility promotes increased effectiveness, efficiency and satisfaction for people having a wide variety of capabilities and preferences. Accessibility is therefore strongly related to the concept of usability (see ISO 9241-11).

The most important approaches to increasing the accessibility of a human-system interface are

- adopting a human-centred approach to design (see ISO 13407),
- following a context-based design process,
- providing the capacity for individualization (see ISO 9241-110), and
- offering individualized user instruction and training.

It is important to incorporate accessibility goals and features into the design as early as possible, when it is relatively inexpensive compared to the cost of modifying products to make them accessible once they have been designed. As well as providing guidance for achieving that, this part of ISO 9241 addresses the increasing need to consider social and legislative demands for ensuring accessibility by the removal of barriers that prevent people from participating in life activities such as the use of environments, services, products and information.

This part of ISO 9241 is applicable to software that forms part of interactive systems used in the home, in leisure activities, in public situations and at work. Requirements and/or recommendations are provided for system design, appearance and behaviour, as well as specific accessibility issues, thereby complementing International Standards ISO 9241-11, ISO 9241-12, ISO 9241-13, ISO 9241-14, ISO 9241-15, ISO 9241-16 and ISO 9241-17, ISO 9241-110 and ISO 14915, as well as reflecting the goals outlined in ISO Guide 71 ^[60]. Conforming with the aforementioned International Standard is also important if the goal of accessibility is to be achieved.

NOTE 1 While the requirements and recommendations of this part of ISO 9241 are generally applicable to all software application domains, additional detailed guidance on the accessibility of Web content (including Web applications) is available from the Web Content Accessibility Guidelines (WCAG) ^[53].

This part of ISO 9241 is based on the current understanding of the characteristics of individuals who have particular physical, sensory and/or cognitive impairments. However, accessibility is an issue that affects many groups of people. The intended users of interactive systems are consumers or professionals — people at home, at school, engineers, clerks, salespersons, Web designers, etc. The individuals in such target groups vary significantly as regards physical, sensory and cognitive abilities and each target group will include people with different abilities. Thus, people with disabilities do not form a specific group that can be separated out and then disregarded. The differences in capabilities can arise from a variety of factors that serve to limit the capability to engage in the activities of daily living, and are a “universal human experience” ^[50]. Therefore, accessibility addresses a widely defined group of users including

- people with physical, sensory and cognitive impairments present at birth or acquired during life,
- elderly people who can benefit from new products and services but who experience reduced physical, sensory and cognitive capacities,
- people with temporary disabilities, such as a person with a broken arm or someone who has forgotten his/her glasses, and
- people who experience difficulties in particular situations, such as a person who works in a noisy environment or has both hands occupied by other activities.

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When designing and evaluating interactive systems there are other terms that are often associated with accessibility. In Europe, the expression *design for all* or, in North America, *universal design* ^[9], address the goal of enabling maximum access to the maximum number and diversity of users, irrespective of their skill level, language, culture, environment or disability. This does not mean that every product will be usable by every consumer. There will always be a minority of people with severe or multiple disabilities who will need adaptations or specialized products. Accessibility as defined in this part of ISO 9241 emphasizes the goals of maximizing the number of users and striving to increase the level of usability that these users experience.

This part of ISO 9241 recognizes that some users of software will need assistive technologies in order to use a system. In the concept of designing software to be accessible, this includes the capability of a system to provide connections to, and enable successful integration with, assistive technologies, in order to increase the number of people who will be able to use the interactive system. Guidance is provided on designing software that integrates as effectively as possible with common assistive technologies. It is important to note that accessibility can be provided by a combination of both software and hardware controlled by software. Assistive technologies typically provide specialized input and output capabilities not provided by the system. Software examples include on-screen keyboards that replace physical keyboards, screen-magnification software that allows users to view their screens at various levels of magnification, and screen-reading software that allows blind users to navigate through applications, determine the state of controls, and read text via text-to-speech conversion. Hardware examples include head-mounted pointing devices instead of mice and Braille output devices instead of a video display. There are many others. When users employ add-on assistive software and/or hardware, usability is enhanced to the extent that systems and applications integrate with those technologies. For this reason, platforms (including operating systems) must provide programming services to allow software to operate effectively with add-on assistive software and hardware as specified in this part of ISO 9241. If systems do not provide support for assistive technologies, the probability increases that users will encounter problems with compatibility, performance and usability.

This part of ISO 9241 serves the following types of users:

- designers of user-interface development tools and style guides to be used by interface designers;
- 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;
- those responsible for implementing solutions to meet end-user needs;
- buyers, who will reference this part of ISO 9241 during product procurement;
- evaluators, who are responsible for ensuring that products are in accordance with this part of ISO 9241.

NOTE 2 In this document the term “developers” is used as shorthand for *all those involved in the development of software design and creation*, which sometimes can span different collaborating or contracting organizations.

The ultimate beneficiary of this part of ISO 9241 will be the end-user of the software. Although it is unlikely that end-users will read this part of ISO 9241, its application by designers, developers, buyers and evaluators ought to provide user interfaces that are more accessible. This part of ISO 9241 concerns the development of software for user interfaces. However, those involved in designing the hardware aspects of user interfaces may also find it useful when considering the interactions between software and hardware aspects.

ISO 9241 was originally developed as a seventeen-part International Standard on the ergonomics requirements for office work with visual display terminals. As part of the standards review process, a major restructuring of ISO 9241 was agreed to broaden its scope, to incorporate other relevant standards and to make it more usable. The general title of the revised ISO 9241, “Ergonomics of human-system interaction”, reflects these changes and aligns the standard with the overall title and scope of Technical Committee ISO/TC 159, SC 4. The revised multipart standard is structured as series of standards numbered in the “hundreds”: the 100 series deals with software interfaces, the 200 series with human-centred design, the 300 series with visual displays, the 400 series with physical input devices, and so on.

See Annex A for an overview of the entire ISO 9241 series.