INTERNATIONAL STANDARD

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Ease of operation of everyday products —

Part 1: Design requirements for context of use and user characteristics

Facilité d'emploi des produits quotidiens —

Partie 1: Exigences de conception pour le contexte d'utilisation et pour les caractéristiques de l'utilisateur

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Contents

Page

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 20282-1 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 1, *Ergonomic guiding principles*.

ISO 20282 consists of the following parts, under the general title *Ease of operation of everyday products*:

— *Part 1: Design requirements for context of use and user characteristics*

— *Part 2: Test method* [Technical Specification]

The following parts are under preparation:

— *Part 3: Test methods for consumer products* [Publicly Available Specification]

— *Part 4: Test methods for the installation of consumer products* [Publicly Available Specification]

Introduction

An increasing number of everyday products include computer technology, making them more complex. Users need to understand how to operate products in order to benefit from the functionality they offer, so usability is a key factor in determining a product's success. As product complexity increases, the challenge for the user in understanding how to use the various functions of the product also increases, and for the producer it can be harder to design sufficiently usable products.

Products with low usability often require the assistance of other people in order to be used, and this can result in frustrated users as well as in extra costs for the producer and vendor. Many companies have realized the importance of the usability of their products and employ usability specialists in usability laboratories. Many test organisations include usability in their evaluation procedures.

ISO 20282 is based on ISO 9241-11, which provides guidance on the specification and measurement of usability in general. ISO 20282 applies ISO 9241-11 to the user interfaces of everyday products. The focus on everyday products reflects the fact that many of the products we see around us on a regular basis still suffer from fundamental usability problems. The focus on user interfaces reflects the situation that while there are many factors that may have important effects on usability, all interactive products will have a user interface whose quality can have significant positive or negative effects that facilitate or hamper the usage of the product.

Everyday products include consumer products and walk-up-and-use products. For everyday products it is particularly critical to ensure that the interface enables the user to achieve their main goal(s). The focus on the main goal(s) reflects the outcomes that all users, or a large majority of them, wish to achieve, e.g. to use a telephone to make or receive a phone call, to use a ticket machine to buy a train ticket, or to use a television set to watch a television programme. The term "ease of operation" refers to this subset of the concept of usability and the specific measures used to support users in achieving their main goal(s).

Everyday products are designed for an intended user population, which in general ought to be assumed to include people with a wide range of user characteristics. This part of ISO 20282 describes the user characteristics to be accounted for in the design of an everyday product. In recognizing that the population of older persons of the world is increasing, it takes into account the needs of those users[1)].

ISO 9241-11 states that usability is concerned with the extent to which the users of products are able to use them effectively, efficiently, and with satisfaction. As tasks performed with everyday products are generally fast and of low complexity, the most important usability measure is effectiveness.

1) Developments in the field of accessibility have resulted in the creation and use of a wide variety of terms and definitions, related to older persons and disability, which differ throughout the world. For example, some people prefer to use the term "people with disabilities" and others prefer "disabled people". Overall, terms have evolved to become more precise and descriptive, rather than negative or stigmatizing. As no universal practice exists, the terms used in this part of ISO 20282 reflect the language generally used by international agencies such as the United Nations Organization and the World Health Organization.

Ease of operation of everyday products —

Part 1:
Design requirements for context of use and user characteristics

1 Scope

This part of ISO 20282 provides requirements and recommendations for the design of easy-to-operate everyday products, where ease of operation addresses a subset of the concept of usability concerned with the user interface by taking account of the relevant user characteristics and the context of use.

This part of ISO 20282 is intended to be used in the development of everyday products, for which it

— defines ease of operation,

— explains which aspects of the context of use are relevant, and

— describes the characteristics of the intended user population that may influence usability.

The intended users of this part of ISO 20282 are usability specialists, ergonomists, product designers, interaction designers, product manufacturers and others involved in the design and development of everyday products.

This part of ISO 20282 is applicable to mechanical and/or electrical products with an interface that a user can operate directly or remotely to gain access to the functions provided. These products fall into at least one of the following categories:

a) consumer products intended for some or all of the general public which are bought, rented or used, and which may be owned by individuals, public organizations, or private companies;

b) consumer products intended to be acquired and used by an individual for personal rather than professional use (e.g. alarm clocks, electric kettles, telephones, electric drills);

c) walk-up-and-use products that provide a service to the general public (such as ticket-vending machines, photocopying machines, fitness equipment);

d) products used in a work environment, but not as part of professional activities (e.g. a coffee machine in an office);

e) products including software that supports the main goals of use of the product (e.g. a CD player).

This part of ISO 20282 is not applicable to the following:

f) purely physical products without an interactive user interface (such as a jug or a hammer);

g) products where appearance or fashion is the main goal (such as a watch with no markings);

h) products requiring specialist training, specific skills and/or professional knowledge (such as a musical instrument or a car);

i) standalone software products;

j) products intended to be used for professional activities only.

NOTE 1 Some products include elements within the scope of this part of ISO 20282 and at the same time those that are not. For example, tasks relating to the use of a public internet access terminal such as switching that terminal on and off are within the scope of this part of ISO 20282, whereas tasks relating to the general use of the internet from the terminal are not.

NOTE 2 This part of ISO 20282 can be used in conjunction with ISO 13407, which describes how to take account of wider aspects of usability within a human-centred design process.

NOTE 3 Some of the guidance of this part of ISO 20282 could be applicable to other types of systems in everyday use.

2 Conformity

In order to develop an everyday product that is easy to operate, the context of use and the user characteristics shall be analysed and documented in accordance with Clause 6, and the design of an everyday product shall take account of the range of each characteristic that has been determined as being relevant.

3 Terms and definitions

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

3.1
actual users
group(s) of people who directly interact with a product

NOTE Before a product is released, this relates to the intended user group; after release, it relates to what is known about the actual user group.

3.2
consumer product

product that is intended to be acquired and used by an individual for personal rather than professional use

3.3
context of use
users, tasks, equipment (hardware, software and materials) and physical and social environments in which a product is used

[ISO 9241-11:1998, definition 3.5]

3.4
ease of operation
usability of the user interface of an everyday product when used by the intended users to achieve the main goal(s) supported by the product

NOTE 1 Ease of operation is a specific subset of usability as defined in ISO 9241-11 (see 3.18), which in this case is applied to the operation of everyday products. Ease of operation assumes that the functionality of the product other than the user interface operates correctly.

NOTE 2 Ease of operation is measured as effectiveness of operation, optionally including efficiency of operation and satisfaction with operation.

3.5
effectiveness
accuracy and completeness with which users achieve specified goals

[ISO 9241-11:1998, definition 3.2]

3.6
effectiveness of operation
percentage of users who achieve the main goal(s) of use of a product accurately and completely

NOTE Measures of effectiveness of operation are based on success in achieving the end result independently of whether the goal is achieved in the most efficient way.

3.7
efficiency
resources expended in relation to the accuracy and completeness with which users achieve goals

[ISO 9241-11:1998, definition 3.3]

3.8
efficiency of operation
time taken to achieve the main goal(s)

NOTE This identifies a specific resource for efficiency as defined in 3.7.

3.9
everyday product
consumer product or walk-up-and-use product designed for use by members of the general public

NOTE 1 Some products are designed for use by the general public as well as for professional use, but this definition only applies to non-professional use of the product.

NOTE 2 "Everyday" does not imply that the product must be used every day by the user, rather that it is found in everyday life.

3.10
general public
people having all possible variations of user characteristics, usually within a particular geographical area

3.11
goal
intended outcome

[ISO 9241-11:1998, definition 3.8]

NOTE A goal is stated independently of the functionality used to achieve it.

3.12
intended users
group(s) of people for whom a product is designed

NOTE 1 Adapted from ISO 9241-9:1999, definition 3.4.6

NOTE 2 In many cases the actual user population is different from that originally intended by the manufacturer. The intended user group is based on realistic estimations of who the actual users of the product will be.

3.13
interaction
bi-directional information exchange between users and equipment

[IEC/TR 61997:2001, definition 3.4]

NOTE 1 Equipment includes both hardware and software.

NOTE 2 Information exchange can include physical actions, resulting in sensory feedback.

3.14
main goal
most frequent or important outcome(s) that all, or a large majority of users want to achieve when using a product

EXAMPLE For the user of a mobile phone, it is to communicate, although the device can also be used for many other purposes (camera, organizer, MP3-player). The main goal of the user of a washing machine is to clean clothes, although the machine could offer additional functionality (e.g. allowing delayed washing, at a certain time, or to a certain target time). Such optional purposes and additional functionalities are not regarded as the main goal.

NOTE A goal is stated independently of the functionality used to achieve it.

3.15
satisfaction
freedom from discomfort, and positive attitudes towards the use of the product

[ISO 9241-11:1998, definition 3.4]

3.16
satisfaction with operation
measures of attitude towards the operation of the product user interface

3.17
task
activities required to achieve a goal

NOTE These activities can be physical and/or cognitive.

[ISO 9241-11:1998, definition 3.9]

3.18
usability
extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use

[ISO 9241-11:1998, definition 3.1]

3.19
user
person who interacts with the product

[ISO 9241-11:1998, definition 3.7]

3.20
user characteristics
attributes of a user that can influence usability

3.21
user interface
elements of a product used to control it and receive information about its status, and the interaction that enables the user to use it for its intended purpose

EXAMPLE The user interface of a shower tap is the water control lever, where the movement of the lever controls the temperature of the water and the position of the lever communicates the temperature to the user.

NOTE A list of operating instructions permanently displayed on the product is part of the user interface.

3.22
walk-up-and-use product
everyday product that provides a service to the general public

NOTE This includes products intended for use by the general public in commercial premises such as in a shop or hotel.

4 Ease of operation

In this part of ISO 20282, ease of operation is defined as “the usability of the user interface of an everyday product when used by the intended users to achieve the main goal(s) supported by the product”. The focus on user interfaces is to reflect the situation that, while there are many factors that may have important effects on usability, all interactive products will have a user interface, and the quality of the user interface can have significant positive and negative effects that facilitate or hamper the usage of the product and thereby its adoption.

Ease of operation means that users should be able to achieve their main goals

— with a high success rate (effectiveness of operation),

— within acceptable task times (efficiency of operation), and

— with an acceptable level of satisfaction with operation.

In order to achieve ease of operation, the crucial factor is effectiveness of operation. This is because the tasks associated with achieving the main goal of use of an everyday product involving the user interface are generally fast and of low complexity, and so improvements in efficiency or satisfaction will not usually be of practical importance.

When designing for ease of operation, it is important to achieve high levels of success for first-time users, because users must be successful in using the product the first time before they can use it continuously.

Ease of operation relates to the operational phase of the life cycle of product use, although similar issues apply in other phases, such as installation (see ISO/PAS 20282-4 [2)]).

EXAMPLE A TV set may be easy to operate even though it may be difficult to install.

A user having certain characteristics using an everyday product in a particular context of use has a main goal and performs activities to achieve this goal. The user interface of the product supports the user in achieving this goal. This is illustrated in the example in Figure 1.

Figure 1 shows a ticket vending machine for purchasing train tickets. The main goal of the user is to buy a ticket, and his specific goal in this instance is to operate the machine to buy a single ticket for immediate travel from A to B using a credit card. The user in the example is a first time user of the machine, as he is a visitor to the area.

Context of use and user characteristics influence ease of operation. The relevant aspects of the context of use in the example include location, temperature, illumination, noise, time restriction, and stress. In the example, stress and time restrictions are significant influences, as the user wants to buy a ticket quickly and is under a certain amount of pressure. The relevant user characteristics are age, body size, knowledge of comparable machines, knowledge of the display language, visual abilities, auditory abilities and biomechanical abilities.

2) Under preparation.

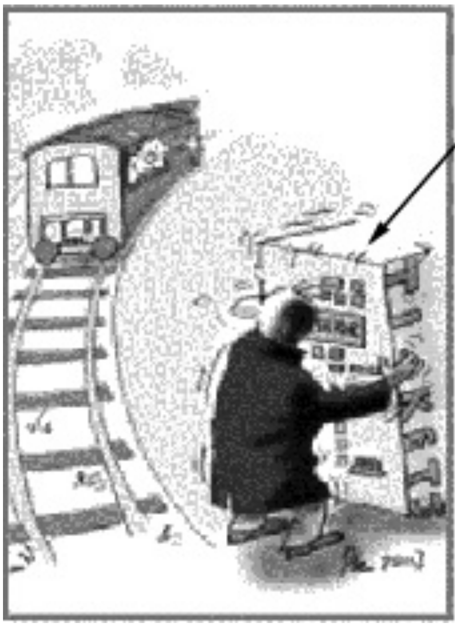
Ease of operation …

Context of use

- location
- temperature
- illumination
- noise
- time restriction
- stress
- additional machines
- individual, group or public use

User characteristics

- age
- body size
- knowledge of comparable machines
- knowledge of the display language
- visual abilities
- auditory abilities
- biomechanical abilities



EXAMPLE

Everyday product: ticket vending machine

Relevant machine part: user interface with displays and control elements

Main goal: buying a ticket

Task: operating the machine to obtain a ticket

Situation: first-time use (user is visitor)

… the usability of the user interface of an everyday product when used by the intended users to achieve the main goal(s) supported by the product

Figure 1 — Example scenario

5 Requirements for review and documentation

5.1 Review stages

In order to develop an everyday product that is easy to operate, i.e. usable by a high percentage of persons, the context of use of the product and the user characteristics shall be assessed and analysed. The process of deciding which contexts of use and user characteristics are relevant and assessing whether these are accounted for in the design should be carried out by someone with usability reviewing expertise.

The specific product to be reviewed and, if appropriate, the organization responsible for provision of the service supported by the product shall be identified.

NOTE Depending on the design stage, a written concept, a model, a functional design model, or a prototype could be available.

5.1.1 Identify main goal(s)

The main goal or goals of use of the product shall be identified. In most cases there is only one goal, which is the most frequent and/or important user goals that the product is intended to support. The goal is related to task activities that need to be carried out in order to achieve this goal. Goals shall be expressed in terms of the intended outcome of the task activity independently of the means by which they are achieved.

