
**Assistive products — Guidelines on
cognitive accessibility — Daily time
management**

*Produits d'assistance — Lignes directrices relatives à l'accessibilité
cognitive — Gestion quotidienne*

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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).

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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.

This document was prepared by Technical Committee ISO/TC 173, *Assistive products*.

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.

Introduction

The time-dependent society of today places high demands on every citizen. How we use and manage our time is of great importance for daily life including employment and other domains of participation and well-being. There are cultural differences in how time is understood and used, and performance can vary in differing environments. Time management behaviours relate positively to perceived control of time, job satisfaction and health, and negatively to stress. Children, adolescents and adults living with various types of impairment might need support with daily time management. People with limited ability to manage time show a heightened dependence on others and greater need for support, exacerbating their inferior status and vulnerability. This introduction summarises the concepts and research that inform this document.

The evidence for the effectiveness of cognitive assistive products supporting daily time management (e.g. reminder systems for adults with acquired brain injury) is strong. Time devices can be both digital and analogue and include both mainstream products like smartphones or alarm clocks, and assistive products. Time devices can compensate for a lack of time management skills, and can increase independence and participation. It is known that assistive products are not always used as intended, and that non-use is frequently associated with a decrease of independence in everyday activities.

People with cognitive impairment who find electronic planning devices beneficial tend to use them. People with cognitive impairment and a low level of daily time management who use advanced electronic planning devices tend to be more influenced by environmental factors, such as support from professionals and services. Well-designed electronic planning devices that are matched to the individual user's needs result in greater dependency on those devices of the user. In other words, greater usability of assistive products for time management is associated with greater independence of the user. Research has also highlighted the necessity of adaptation of electronic planning devices to the individual user, regardless of whether it is a mainstream product or a specifically designed assistive product for time management. Therefore, the more that producers of time devices consider making the products easy to understand, easy to manage and motivating (i.e. usable), the more benefit for the individual user, for his/her environment and for society. It is highly recommended to actively engage people with cognitive impairments in the development and evaluation of products used in daily time management.

Although termed cognitive 'accessibility', this document will also adopt the concept of 'usability' to ensure that design principles are based on the unique experiences of users rather than on assumptions of human abilities. Usability reflects a combination of dimensions of effectiveness, efficiency and satisfaction, so it is necessarily a more individual and subjective assessment than accessibility, incorporating psychosocial factors and perceptions of how well an environment enables participation and inclusion. Within this document, usability functions as a framework for specifying design goals and evaluating their achievement.

This document specifies guidelines that are relevant to creating a daily time management support system. It focuses on identifying the critical variables in the design and construction of products (and common exceptions) that affect their usability for people with cognitive impairment. The document provides directions on how to think when manufacturing a product, when giving support and service, and when matching the product to the needs of the person and the environment regarding daily time management. This is done by presenting examples of user needs in relation to daily time management functions followed by design recommendations. The categories are:

- a) Time awareness;
- b) Orientation to time;
- c) Time management;
- d) Adapting to time demands.

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Assistive products — Guidelines on cognitive accessibility — Daily time management

1 Scope

This document specifies principles of cognitive accessibility within the area of daily time management.

This document gives guidelines for design application for features and functions known to increase the accessibility of products and systems used to support daily time management for people with cognitive impairment regardless of age.

This document does not provide test methods and specific instructions for measuring and reporting.

NOTE ANSI/RESNA CA-1:2016 specifies features, measurement methods, and documentation for reporting the universal design specifications that support inclusion of individuals with cognitive impairment that might be applicable and beneficial to use for evaluating products and systems used to support daily time management.

2 Normative references

There are no normative references in this document.

3 Terms and definitions (standards.iteh.ai)

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 <http://www.electropedia.org/>

3.1

adapting to time demands

carrying out actions and behaviours appropriately in the required sequence and within the time allocated

EXAMPLE Running to the station when in danger of missing the train.

Note 1 to entry: See Reference [5].

3.2

assistive product

any product (including devices, equipment, instruments and software), especially produced or generally available, used by or for persons with disability

- for participation;
- to protect, support, train, measure or substitute for body functions/structures and activities; or
- to prevent impairments, activity limitations or participation restrictions

[SOURCE: ISO 9999:2016, 2.3]

**3.3
daily time management**

managing one's time (3.5) in daily life, both alone and along with others, and adapting to time demands

Note 1 to entry: This covers all aspects of managing time in daily routines and adapting to time demands, including socialized time in recurring daily activities e.g. school, employment carried out during weekdays or weekends, or leisure activities and less frequently occurring events like planning for a vacation.

**3.4
haptic**

relating to the sense of touch, in particular relating to the perception and manipulation of objects using the senses of touch and proprioception

Note 1 to entry: While there is no difference between *haptic* and *tactile* in most dictionary definitions, in the area of haptics, researchers and developers use *haptic* to include all haptic sensations, while *tactile* is limited to mechanical stimulation of the skin.

**3.5
managing one's time**

managing the time required to complete usual or specific activities, such as preparing to depart from home, taking medications, and accessing assistive technology and supports

Note 1 to entry: See Reference [4].

**3.6
orientation to time**

cognitive function that produces awareness of today, tomorrow, yesterday, date, month and year including temporal orientation within the past, present and future

**3.7
the quarter hour principle**

way of showing time in 15-minute units

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**3.8
time interval**

amount of time between two specified instants, events, or states

**3.9
time management**

cognitive function of ordering events in chronological sequences, estimation of time needed to execute an activity, allocating amounts of time to different events and activities

Note 1 to entry: See Reference [4].

**3.10
time awareness**

subjective experience of the duration of activities

Note 1 to entry: This concept is similar to time perception. It includes intuitive time and knowing for how long to perform an activity and for how long to wait.

**3.11
user**

individual who accesses or interacts with a system

[SOURCE: ISO/IEC Guide 71:2014, 2.2]

4 Daily time management

4.1 General

Daily time management is how a person in daily life handles time. In the activity and participation domain in ICF-CY there are two categories considered as complementary aspects of “daily time management”: “managing one’s time” in daily life and “adapting to time demands”. Activity and participation in these categories are facilitated by a person’s time-processing ability.

Assistive products can compensate for a lack of time-processing ability and/or modify one’s activities or environment to facilitate daily time management.

For the purpose of this document the following functions are to be compensated for or facilitated:

a) Time awareness

Time awareness includes knowing, having a feeling or a sense of how long (or of how much time) different activities or events take. Also, knowing, having a feeling or a sense of how long (or of how much time) one should wait for the next activity or event. This is in the present, not in the future. “How long” is, in this case, not defined in time units (hours, minutes or seconds) but rather in regular intervals or on demand to meet the user’s needs or preferences.

NOTE 1 Assistive products for time awareness can apply “The quarter hour principle” for compensation of time awareness, making the passage of time visible and understandable.

EXAMPLE 1 A Time Log has a row of light diodes, where many lit diodes indicate a long time and few indicate a short time.

EXAMPLE 2 Assistive products for time awareness could also include timer with alarm function.

b) Orientation to time

Orientation to time includes knowing how to use specific time concepts, like names of the weekdays or months, and to use devices like a calendar for orientation in time. The ability to use time representations allows to know the time of the day or night in hours, minutes or seconds.

The purpose is to know when activities or events will take place and/or to use information planned and provided by others.

NOTE 2 Assistive products for time orientation can apply compensatory interventions to support orientation to time, including the use of calendars, Quarter-hour watches, adapted calendars and other visual devices with or without pictures. They can promote orientation to the time of the day, date, week, month, season and/or year.

EXAMPLE 3 An automatic daily calendar is often used by people with dementia to help them find the day, date, week and/or year.

EXAMPLE 4 Interventions with pictures presenting daily activities in time order are well established for supporting children with autism. They provide an organized and predictable environment, and are also used for individuals with severe intellectual impairment.

c) Time management

Time management (as part of higher cognitive functions) includes knowing how to plan for and schedule different events and activities and the time in between. Time management also includes knowing how much time is needed for each activity and how to allocate the time needed.

The purpose is to use both time awareness and orientation to time to plan independently according to one’s own preferences (what one must do and what one wants to do).

NOTE 3 Assistive products for time management can apply interventions to promote, develop and/or compensate for deficits in time management with a focus on scheduling skills.

EXAMPLE 5 Interventions to promote management of oneself might include the introduction of low-tech time devices (e.g. an adapted paper-based personal organizer), and high-tech time devices (e.g. software for mobile devices).

NOTE 4 Time management is an executive function depending on other executive functions, e.g. organization and other cognitive functions, e.g. calculation.

d) Adapting to time demands

Adapting to time demands includes knowing how to adapt to changes in schedule and to unexpected events disrupting one's previously planned time.

NOTE 5 Functions in assistive products could provide a "plan B" or a "plan of crisis" (alternative actions) helping to adapt to time demands. The examples of assistive products facilitating or compensating for time processing ability are aimed at increasing daily time management in general and specifically managing one's time. Therefore, adapting to time demands is presented as a separate category. There are few assistive products aimed at facilitating or compensating for adapting to time demands. These products would present different options to find alternative ways to adapt the plan made to fit the new situation, a "crisis management plan".

Time awareness, orientation to time and time management can be seen as one ability, operationalized as different hierarchical levels of complexity in time-processing ability. Time awareness is the basic level of time-processing ability followed by orientation to time and time management being the highest level of time-processing ability. This is reflected in childhood development, where children first learn which activities take a long or short time before learning to orient themselves to time using information from a clock or calendar and subsequently also to acquire the cognitive skill of time management making their own plans of how to use their time. Youth and adults with cognitive impairment as well as elderly people or people with dementia might have moderate or severe difficulties in time-processing ability and thus difficulties with daily time management.

It is important that the design is familiar to persons with cognitive impairment, for example after acquired brain injury, and that it requires minimal new learning as they often have problems with new learning. To be accepted it is important that the design is attractive, modern and consistent with the users' life style. The design should be neutral and not stigmatize or make the user seem different in some way.

The next section is structured as follows, a presentation of how problems in time awareness, orientation to time, time management, both in managing one's time and in adapting to time, might be compensated for, or prevented through the use of assistive products. For each concept, there is at least one case described, with the needs of a person and a variety of design recommendations and of desired outcomes. The aim of the structure is to guide the reader in how to think, starting with a person and the function to be compensated for, then the needs of that person as a potential user of a product.

Examples of possible outcomes for a person using the assistive product are presented in [Annex B](#).

4.2 Time awareness

4.2.1 To be aware of the passage of time

In this case, a person has little sense of time and does not know how long something will take to do, or for how long to wait before starting or ceasing an activity. This could impact on the subjective experience of the duration of activities.

4.2.1.1 User needs

Some users need greater specificity regarding passage of time:

- a) to understand the duration of activities, for example "Is it a long or short time left to continue with a task, or an activity?";

- b) to understand a specific length of time, for example “How long is my break or for how long must I wait?”;
- c) to understand the length of time, or time until the start or end of an event, e.g. “How long is it until the next important event takes place?”;
- d) to understand the time of day, for example “is it still night time?”.

4.2.1.2 Design recommendations

4.2.1.2.1 Provide options that indicate decreasing time intervals

Time intervals are shown graphically as dots ([Figure 1](#)), bars or as a surface ([Figure 2](#)) fading or diminishing to show time passing. Time intervals can be divided into different steps for example 2,5 or 15 minutes.

EXAMPLE 1 Time displayed graphically as dots ([Figure 1](#)), one dot for each quarter of an hour as light-emitting diode (LED) that is unlit at the passing of time, one for each quarter of an hour until the time interval is completed. Set intervals, e.g. as dots, are easier to perceive.



Figure 1 — Example of dots representing the remaining amount of time out of one hour

EXAMPLE 2 Each of four quadrants of a circle, capable of being illuminated separately; dimmed one-at-a-time in an anti-clockwise direction in 15 minute-intervals, see [Figure 2](#).

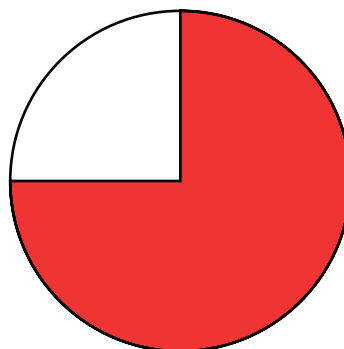


Figure 2 — Example of surface that increase

EXAMPLE 3 A clock face with a surface decreasing in clockwise direction in 5-minute intervals, see [Figure 3](#).

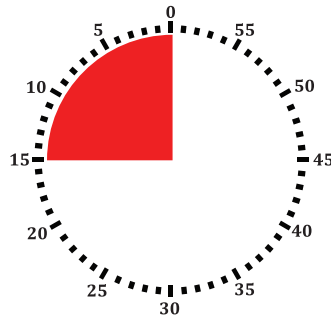


Figure 3 — Example of surface that decreases

4.2.1.2.2 Provide options that indicate increasing time intervals

Measured time is visualized graphically as dots (Figure 4), bars or a surface that increases in numbers or size. For example: A watch that makes it possible to measure time as dots, the number of lit dots increases until the activity is finished. How many dots does it take to do the things I usually do?

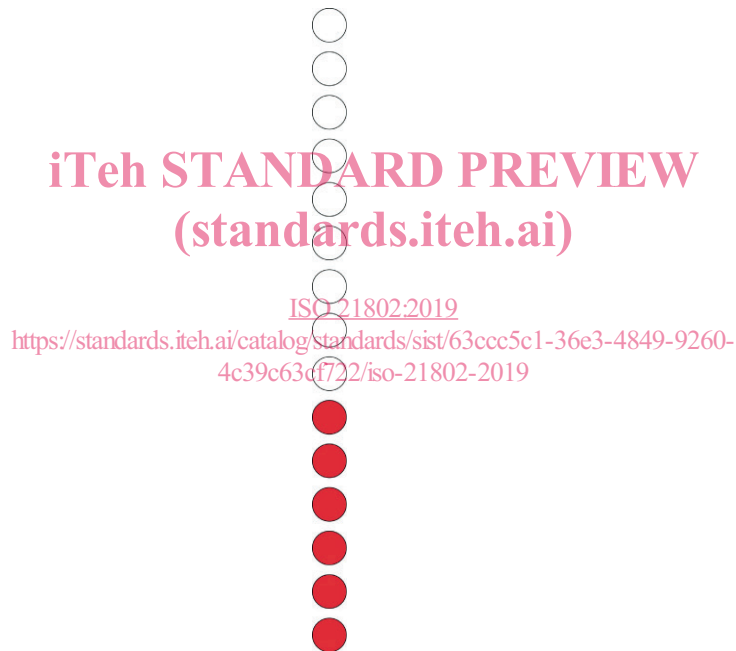


Figure 4 — Example of dots in minutes that increase

NOTE Increasing time intervals are used when measuring time, whereas decreasing time intervals are used to illustrate a count down.

4.2.1.2.3 How time can be indicated using different modalities

- a) Visual
 - Bar that increases or decreases in fixed steps
- b) Visual or Haptic
 - Surface that increases or decreases in size (See Figures 2 and 3)
- c) Haptic feedback
 - for example Vibrations indicating certain time intervals