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Information technology — User interface requirements and recommendations on menu navigation —

Part 3: Navigation with one-direction devices

Technologies de l'information — Exigences et recommandations d'interface portant sur la navigation dans les menus —

Partie 3: Navigation au sein des dispositifs mono-touche

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Foreword

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Information technology — User interface requirements and recommendations on menu navigation —

Part 3:
Navigation with one-direction devices

1 Scope

This document provides requirements and recommendations on the design of navigation methods for menu item selection with use on one-direction devices (using single or double-switch devices). It specifies requirements for menu navigation with one-direction devices in terms of time delay, loops and focus rendering.

This document is applicable to any information technology equipment on which the display area is associated with the one-direction devices.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 17549-2:2020, *Information technology — User interface guidelines on menu navigation — Part 2: Navigation with 4-direction devices*

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
one-direction device
control enabling navigation through menu items in a single direction

Note 1 to entry: A one-direction device can be made of a one-directional key and a one-activation key or a single activation key without any directional key.

Note 2 to entry: A one-direction device can be made of virtual or physical control.

EXAMPLE A one-direction device can be associated to a 3D or tactile gesture or vocal command, or a sip/puff switch. Such devices are mainly used by motor impaired users.

3.2
ladder menu
set of items displayed vertically or horizontally

3.3
menu bar
set of one-dimensional menu items that is always standing by at the root of a menu hierarchy

Note 1 to entry: A menu bar provides tabular functionality and it is different from a “rolling menu”.

3.4
item
element inside a list

Note 1 to entry: Items can be “options’, “contacts”, “sub-categories”. Some items are called “navigation items” because they are opening to a sub-list of items. Others are called “action items” because they are directly operating functions. The former does not modify system state and is for navigation only.

3.5
focusing
action done by a user or by the system to select an *item* (3.4)

Note 1 to entry: If the number of available keys is one, the action of focusing is achieved through *automatic scrolling* (3.9). If the number of keys is at least two, one of them enables the user to focus on the “previous” or “next” item.

Note 2 to entry: A selected item is visually, auditorily, and or tactually highlighted to show that the action of this item can be activated.

3.6
activating
action done by a user through a confirmation key, which enables activation of a focus or a pointed *item* (3.4)

3.7
separator bar
visual, tactile and/or audio interface output that is rendered in order to facilitate recognition of grouped *items* (3.4) or the start or end of a list

3.8
tile menu
set of *items* (3.4) displayed with a number of rows and columns, one of which is to be selected

3.9
automatic scrolling
automated focus movement from the current menu *item* (3.4) to the next one

3.10
loop
focus that moves from the last list *item* (3.4) to the first one

3.11
single-switch device
device with only one key

Note 1 to entry: A single-switch device does not enable the user to directly manage the focus as the single-key is dedicated to activation. Consequently, an *automatic scrolling* (3.9) is needed.

3.12
double-switch device
device with two keys, one directional key, which enables reaching the next *item* (3.4) and another activation key, which enables activating it

Note 1 to entry: A double-switch device does not need automatic *scrolling* (3.9).

4 Conformance

Menu navigation is in conformance with this document if it meets the requirements of Clause 6.

5 General description

5.1 Purpose of single-switch device and double-switch device

Many people with physical impairments rely on computers and other assistive technology to allow them to communicate and interact with the world. One-direction devices provide a way to facilitate navigation through items. With such devices, users can browse items in a linear way. Single-switch devices and double-switch devices are two kinds of one-direction devices. They allow people with physical impairments to independently use a mobile phone, a computer or an augmentative and alternative communication (AAC) device (see Reference [1]).

5.2 Working principles

In the case of a mobile phone that is used in a one-direction device situation, it can be operated with a single-switch device or double-switch device. In the first case, the user can only access one command that enables activation of the currently focused selection that is automatically browsed one-way. In the second case, the user can access two commands, next item one-way selection and activation. The user can choose, with the first key, the menu item they want, and then the second key enables them to activate this item.

Annex A gives some examples of such devices.

Such interaction modes are a challenge for users who are often subject to boredom or fatigue, especially in the case of the single-switch device. In this case, automatic scrolling is on, and the user has to monitor both the scan process and the menu items that have to be read and chosen (see Reference [5]). As the user must focus on so many things, the cognitive load is very high. This, in combination with the physical exertion required to repeatedly press a button, leads to fatigue.

6 Requirements and recommendations for designing menus

6.1 General

When designing a user interface for a one-direction device, common and general ergonomic aspects listed in ISO/IEC 17549-2:2020, 5.1. shall apply. Those general ergonomic aspects deal with control consistency, visualization rules and hierarchy organization.

6.2 Ladder menu

The following general rules apply for navigating in a ladder menu.

In the case of a short ladder menu (seven items or less), the “back” item, which enables going back to the previous menu, shall be inserted at the end of the list.

In the case of a long ladder menu (more than seven items), as many “back” items as necessary should be inserted at least every 10 items or another method should be proposed to the user.

NOTE Another method can be to open a pop-up window after each validation, or to open it only after a period of inactivity.

The function, label and associated graphical symbol for a ladder menu should be in accordance with Table 1.

Table 1 — Function, label and associated graphical symbol for ladder menu and tile menu

Single-key	Function	Preferred label[a]	Graphical symbol (Example)
	Activate the current item	**OK**	**OK** or ✓
Double-keys	**Function**	**Preferred label[a]**	**Graphical symbol (Example)**
	Move to the next item	**Next**	**▼ or ▶**
	Make a choice about a high-lighted item	Select or OK	**OK** or ✓

a The "Preferred label" is not included in this document because a label can be adopted according to various cultural and linguistic backgrounds.

6.3 Designing for one-direction device in the context of a tile menu

In the case of a tile menu on a single screen, the "back" items shall be inserted at the top and at the bottom of the page.

In the case of a long tile menu on several screens, "back" items shall be inserted at the end of every third line.

The function, label and associated graphical symbol for a tile menu should be in accordance with Table 1.

6.4 Indicators

Navigation with one-direction devices shall be accessible to a user having perceptive constraints. As navigation with one-direction devices is achieved without pointing, but through focusing and activating sequences, the focus rendering shall be by visual, auditory and/or tactile feedback.

Visual indication of selection allows users to see that a selection was made. This feedback notifies users that their focus has been stopped at the appropriate place.

EXAMPLE Such visual indications are realized by additional coloured borders or popup.

The system shall provide a mechanism of audio feedback for the user to avoid visual checking (see Reference [2]) whenever an item is focused and whenever an item is activated.

Some users do not wish to hear the audio indication of selection (see Reference [2]). Therefore, the system shall provide a method for the user to disable audio cues.

The next focused item shall always be completely visible before the focus automatically or manually changes to it.

6.5 Rules for loops and sub-loops

Ladder menus or tile menus shall be navigable through loops (see Reference [3]).

The first and the last list items should be separated by a separator bar that should be either visually, audibly, or tactilely perceivable.

The separator bar should not be focusable.

Loops shall start from the first list item, end with the last one, and restart from the first one.

Each sub-loop shall include a "back" item command enabling the user to go back to the previous menu.

When the hierarchy of a sub-loop has multiple levels (four or five levels), then a specific item should offer to go directly to the menu bar.

The level of hierarchy should not be more than five.

6.6 Rules applicable to menu navigation with a double-switch device

A double-switch device shall enable manual scrolling.

NOTE 1 The navigation through items is manually operated by the user through the first key. The second key enables the user to activate the item on the menu currently in focus.

For double-switch devices the first command shall be attributed to the next item command.

For double-switch devices, the second command shall be attributed to the activation command.

NOTE 2 The “activation” command enables validation of the focused item.

6.7 Rules applicable to menu navigation with a single-switch device

6.7.1 Simple automatic scrolling

For single-switch devices, each item shall be focused on automated navigation.

NOTE 1 As the system needs to provide at least one scanning method to make the menu in conformity with single-switch devices, it then becomes a matter of which method should be the default. The very basic scanning technique is single item scanning, where there is no grouping and the cursor just moves to each individual item, one after another, in one direction.

For single-switch devices the single command shall be attributed to activation function.

NOTE 2 This command enables validation of the focused item.

When the menu contains a large quantity of items, this method has low efficiency (see Reference [8]). Other methods, named “grouping methods”, can then be used.

6.7.2 Other types of automatic scrolling

6.7.2.1 Automatic scrolling with the grouping menu items

Speeding up the selection process can be achieved by moving away from a linear sequential selection to navigation across groups (see Reference [4]).

EXAMPLE Automatic scrolling is primarily done from the first part to the second part to the third part of the menu, and then when one of those parts is activated, the automatic scrolling is done through items of the selected part.

When the scanning method involves grouping items, the groups should be relatively equal in size.

Browsing groups having the same size contribute to having a better perception. The group size should not contain more than five items per group (see Reference [7]).

6.7.2.2 Automatic scrolling with the crosshair method

Speeding up the selection process is achieved by moving away from a linear sequential selection to automatic pointing navigation.

NOTE Automatic scrolling crosshair selection can be cognitively intensive for some users.

EXAMPLE In this case, the screen is scanned from left to right and from top to bottom. When the target menu item is focused, the user activates it in order to stop the scan. Then the user is in a situation to activate the item.

6.7.2.3 Providing multiple scanning methods

Since single-switch mode users have different abilities or different levels of fatigue, a single-switch device should provide the multiple scanning method (see References [5] and [6]).

6.7.3 Scanning speed

6.7.3.1 Allowing scanning speed adjustment

The system shall provide a variable scanning speed, enabling the user to adjust the device to their abilities (see Reference [5]).

The time delay between two items shall be adjustable from 150 ms to 5 s.

NOTE An inaccurate scanning speed generates a lot of errors from the user and leads to being unable to use the system.

EXAMPLE 1 When the scanning speed is slower than the user requires it can result in more fatigue than necessary (see Reference [9]).

EXAMPLE 2 When the scanning speed is faster than the user requires they cannot use the system and cannot activate the key in time (see Reference [10]).

6.7.3.2 Providing appropriate default scanning speed

The default scanning speed shall be 1 s (see References [9] and [10] for additional details).

6.7.3.3 Providing automatic adjustments of scanning speed

To fine tune the scanning speed to a user's specific abilities and change in abilities over time, the scanning speed should be automatically adjusted during use (see Reference [2]).

NOTE 1 Having the system monitor user response speed and error rates can allow the system to adjust the speed to fit the user's current needs.

Once automatic adjustment of the scanning speed is calculated by the system, it shall be displayed to the user in order to avoid surprises.

The system shall have the ability to accept the request from a user for rejection of this automatic adjustment.

NOTE 2 Sometimes automatic adjustment can be a problem for a user. In this case, the user can reject it.

6.7.4 Scanning start and pause delays

As users of scanning do not always want to scan, the system should pause after three menu loops without any user activity.

When in pause, an “Activation” command shall awaken the system, without validating the current focused item.

Awaking from pause, the time delay shall be doubled before automatically focusing the next item.

6.7.5 Post-activation delay

A scan delay shall be provided after validating the focused item. The scanning shall pause to let the user find the next item they wish to select.

NOTE 1 With automatic scrolling time pressure is always there. When activation is completed by the user, they need a delay to prepare for the next system event (see Reference [9]).

The system should provide a way for the user to disable post-activation delay if they want to (see Reference [2]).

NOTE 2 The short delay after input will increase the time that it takes for the user to reach their next selection. Some users do not need this extra time and prefer not to be slowed down by it.

The system should provide adjustment to post-activation delay time so that users who require more time to search for next item have the time they require (see Reference [2]).

6.7.6 Re-scan and skip scan

Missing the targeted selection and having to wait for a complete repeat of the whole scan is frustrating for users (see Reference [4]).

The system should provide a way for the user to re-scan a section or skip the scan of the next section if they missed the selection (see Reference [12]).

NOTE 1 A re-scan method is achieved by cycling through the same scan a few times before returning to a higher scan level.

NOTE 2 A re-scan method is achieved by integration of a 'go back/return' symbol every ten items (see Reference [4]).

NOTE 3 A skip scan method is achieved by integration of a 'skip scan item' at the beginning of each item list. Then the current list is skipped and the next one is reached directly, which accelerates the scan between groups.

6.7.7 Scanning indicators

The system shall provide a clearly visible focus indicating where the selectable item is located (see Reference [8]).

As some users need an auditory indication of scanning, the system shall provide audio cues during scanning.

NOTE 1 This can be a simple tone or various tones depending on what is being scanned, or even an audio description of the item.

As audio cues are distracting for some users (see Reference [2]), the system shall provide an option to turn off audio cues.

The system should provide options for customizing simple audio cues.

NOTE 2 Users who are unable to see the menu need richer audio cues.