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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 9241-161

Ergonomics of human-system interaction —

Part 161: Guidance on visual user-interface elements

*Ergonomie de l'interaction homme-système —
Partie 161: Éléments de l'interface utilisateur*

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Annex B Visual User-interface elements: Names and Synonyms 68

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 9241-161 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

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

- Part 2: Guidance on task requirements
- Part 5: Workstation layout and postural requirements
- Part 6: Guidance on the work environment
- Part 13: User guidance
- Part 14: Menu dialogues

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

- Part 1: General introduction
- Part 11: Usability: Definitions and concepts
- Part 20: An ergonomic approach to accessibility within the ISO 9241 series
- Part 100: Introduction to standards related to software ergonomics [Technical Report]
- Part 110: Interaction principles
- Part 112: Principles for the presentation of information
- Part 125: Guidance on visual presentation of information
- Part 126: Guidance on the presentation of auditory information
- Part 129: Guidance on software individualization
- Part 143: Forms
- Part 151: Guidance on World Wide Web user interfaces
- Part 154: Interactive voice response (IVR) applications
- Part 171: Guidance on software accessibility
- Part 210: Human-centred design for interactive systems

- Part 220: Processes for enabling, executing and assessing human-centred design within organizations
- 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 for electronic visual displays
- 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 310: Visibility, aesthetics and ergonomics of pixel defects [Technical Report]
- Part 311: Application of ISO 9241-307: LCD screens for workstations [Technical Report]
- Part 312: Readability of electrophoretic displays
- Part 331: Optical characteristics of autostereoscopic displays [Technical Report]
- Part 333: Stereoscopic displays using glasses
- Part 391: Requirements, analysis and compliance test methods for the reduction of photosensitive seizures
- Part 392: Ergonomic recommendations for the reduction of visual fatigue from stereoscopic images
- Part 393: Structured literature review of visually induced motion sickness during watching electronic images
- Part 394: Ergonomic requirements for reducing undesirable biomedical effects of visually induced motion sickness during watching electronic images
- Part 400: Principles and requirements for physical input devices
- Part 410: Design criteria for physical input devices
- Part 411: Evaluation methods for the design of physical input devices [Technical Specification]
- Part 420: Selection of physical input devices
- Part 430: Recommendations for the design of non-touch gestural input for the reduction of biomechanical stress
- Part 500: Ergonomic principles for the design and evaluation of environments of interactive systems
- Part 514: Guidance for the application of anthropometric data in the ISO 9241-500 series
- Part 810: Robotic, intelligent and autonomous systems
- Part 910: Framework for tactile and haptic interaction
- Part 920: Guidance on tactile and haptic interactions
- Part 940: Evaluation of tactile and haptic interactions
- Part 960: Framework and guidance for gesture interactions

- Part 971: Accessibility of tactile/haptic interactive systems

The following parts are under preparation:

- Part ...

Introduction

In different communities in the interactive system development ecosystem, the use, the names and the understanding of user-interface elements differs significantly. One of the results is that users have to cope with elements which differ in terms of keyboard entry and control, mouse behaviour, visual presentation of functionality and different options to control elements. **Consistent element behaviour, functionality and rendering is crucial for the usability of user interfaces.** This causes added efforts in all stakeholders in human-centred design activities, since this multitude needs to be managed in order to ensure high-quality collaboration of various specialists. Especially in the light of new emerging user-interface concepts and designs a common definition of visual user-interface elements and the rationale for their selection as well as their use can be regarded as an effort to sustain cooperation and ensure a sound basis for professional conversation. It is also of importance to state that this part of ISO 9241 of visual user-interface elements in no ways predetermines a visual style of the elements themselves, thus avoiding to impress determinants in creation, brand usage and style development, as outlined in [table 1](#). In addition this part of ISO 9241 is laid out in an independent of platform specifics, so that no specific industrial user-interface styleguide, implementation technology or development process needs to be observed in order to be compliant with this part of ISO 9241.

This part of ISO 9241 aims to provide information on visual user-interface elements to help those responsible for managing software design and re-design processes, create user interface specifications, guidelines, styleguides, design systems and visual concepts to identify, plan and design effective, efficient and satisfactory interactive systems..

Visual user-interface elements described in this part of ISO 9241 complements existing systems design approaches, methods or processes. They can be referenced in any kind of user interface strategy, regardless of the technology used for the user interface.

Table 1 — Overview of different visual user interface properties that are used to build a user interface design.

User Interface Design				
Interactive Properties		Informative Properties		Decorative Properties

Ergonomics of human-system interaction —

Part 161: Guidance on visual user-interface elements

1 Scope

This part of ISO 9241 describes visual user-interface elements presented by software and provides requirements and recommendations on when and how to use them. This part of ISO 9241 is concerned with visual software components of interactive systems to make human-system interaction usable.

This part of ISO 9241 provides a comprehensive list of **generic** visual user-interface elements in whatever context these elements are being implemented. The guidance given in part 161 is intended to be used in conjunction with ISO 9241 guidance on interaction techniques. It recognizes that additional elements can evolve. It also addresses **derivates**, **compositions** (assemblies) and **states** of user-interface elements. It gives requirements and recommendations on selection, usage and dependencies of visual user-interface elements and their application. It is applicable regardless of a fixed, portable or mobile interactive system, or cross-device use.

It does not provide detailed coverage of the methods and techniques required for design of visual user-interface elements. This standard does not address implementation (e.g. graphical design of elements) and interaction details for specific input methods or technologies. It does not cover decorative user-interface elements that are intended to address solely aesthetic (hedonic) qualities in the user interface eg. background images.

The information in this part of ISO 9241 is intended for use by those responsible for the selection and implementation of visual user-interface elements in interactive systems and for evaluating user interfaces. It is intended for use by those planning and managing platform specific aspects of user interface screen design. It also provides guidance for human factors/ergonomics and usability professionals involved in human-centred design. It addresses technical issues only to the extent necessary to allow users of this international standard to understand the relevance and importance of a consistent interface element usage and selection in the design process as a whole.

2 Normative References

The following referenced documents are indispensable for the application 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 9241-143:2012, *Ergonomics of human-system interaction — Part 143: Forms*

ISO 9241-171:2008, *Ergonomics of human-system interaction — Part 171: Guidance on software accessibility*

3 Terms and Definitions

For the purposes of this part of ISO 9241, the following definitions apply.

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

[SOURCE: ISO 9241-112:2017]

3.2

default action

operation predefined for an object or set of objects (including an entire dialogue box) that will take place when the user actuates the default action mechanism

[SOURCE: ISO 9241-143:2011]

EXAMPLE In a search application, pressing the ENTER key activates the Search button

3.3

canvas

area on the screen that is used to present or manipulate data, user-interface elements or to collect user input

3.4

click zone

area in the user interface that is able to be activated by input device

3.5

deactivation

operation on a user-interface element that renders the object unable to receive any user input

3.6

dialogue

<interactive systems>

exchange of meaningful information between a user and an interactive system as a sequence of user actions (inputs) and system responses (outputs) in order to achieve a goal

3.7

form element

user-interface element applicable to forms

[SOURCE: ISO 9241-143:2011]

3.8

form

structured display of fields and other user-interface elements that the user reads, fills in, selects entries for (e.g., through choice buttons or radio buttons), or modifies

[SOURCE: ISO 9241-143:2011]

3.9

form structure

organization and arrangement of information on individual and sets of forms, and the interconnections among forms for user navigation

[SOURCE: ISO 9241-143:2011]

3.10

hover area

area of the user interface that is sensitive to an overlying pointer

Note 1 to entry: In touchscreen interfaces, often hover events are not used. Alternative means to signify the respective element are to be considered.

3.11

hover effect

change of the user-interface element representation triggered by overlying pointer

3.12

list

set of items

Note 1 to entry: A list can be sorted or unsorted, depending on the task.

3.13

navigation

moving from one user-interface element to another within a user interface and to move throughout an interactive system

3.14

picker

selector

chooser

user-interface element that provides means of selection of formatted data

Note 1 to entry: Examples of formatted data are colour values, dates, times

3.15

pointing device

device that translates a human controlling operation to a controlling operation of a pointer on the display

Note 1 to entry: Depending on the applied technology, not only machine devices but also parts of the human body (e.g. fingers, arms) can currently be used as pointing devices.

Note 2 to entry: Almost any hardware can be used to control a pointer with the appropriate software.

3.16

state

status

distinct condition of an object

[SOURCE: ISO 11064-5]

3.17

Task object

construct and its attributes presented in the user interface, required by the user during the completion of one or more tasks with the interactive system.

Note 1 to entry: Task objects are composed of visual user-interface elements.

EXAMPLE 1 A boarding pass within an airline application is a task object.

Note 2 to entry: Task objects are accompanied by tools that enable the user to perform necessary operations on the task object

EXAMPLE 2 Tools used with a boarding pass enable the user to print the boarding pass, to save a boarding pass as a PDF file, or to show the departure time of the flight

3.18

touch area

part of the user interface that is sensitive for touch events

3.19

user-interface element

basic entity of the user interface

Note 1 to entry: User-interface elements are used to specify and design information objects and functions presented on the user interface

Note 2 to entry: User-interface elements can be interactive or not.

EXAMPLE 1 Text, hyperlink, push button.

EXAMPLE 2 Text is not interactive. Hyperlinks are interactive.

3.20

User interface pattern

composition of user-interface elements for a specified purpose, that can be reused across a variety of contexts of use

EXAMPLE 1 The user-interface elements in an online shop are optimized for the success of the check-out process

EXAMPLE 2 The composition of user-interface elements to manipulate and to close a window

4 Accessibility

Software that provides user-interface elements shall use the accessibility services provided by the platform to cooperate with assistive technologies. (ISO 9241-171, 8.5.3)

It is important to recognize that visual user-interface elements will also be used by users unable to interact with them in a visual way.

All visual user-interface elements shall provide alternative text to support accessibility (see ISO IEC 20071-11 for guidance on text alternatives to images).

User-interface elements shall conform to ISO 9241-171.

NOTE Conformity with ISO 9241-171 implies that every applicable requirement and every applicable recommendation is met. See ISO 9241-171:2008, 7.2 for details.

5 Compositions of visual user-interface elements

Visual User-interface elements are typically used in conjunction with one another to either compose a task object (such as a letter, sales order or a document) or to compose a tool / executable function (such as a print dialogue or a search tool).

User-interface elements are the basis to construct both, user interface design patterns as well as operating functions needed in a specific context of use. User interface patterns are general solutions to commonly occurring design problems across many specific contexts of use.

Example 1 Wizards are a design pattern for assisted task completion that solve the design problem “Users need to be guided through an unknown or strictly sequential procedure in steps that are logical to the users.”

Operating functions are the task objects and tools needed in a specific context of use. Task objects and tools are compositions of visual user-interface elements that have a specific meaning to the user within the context of each task that the user performs with the help of the interactive system.

Example 2 Using an e-mail client, the user interacts with e-mails (task object). The tools needed by the user, that allow operations on e-mails are “create”, “send”, “reply to”, “move to folder” etc.

Note This document does not give further guidance on user interface patterns, task objects and tools, as they are context specific.

6 Relationship of input techniques and visual user-interface elements

Visual user-interface elements can be operated by various input techniques including:

- Typing (e.g. using keyboard);
- Pointing (e.g. using mouse, pens, gesture recognition, eye tracking);

- Gesturing (e.g. hand movement, movement of the body); and
- Speaking (e.g. voice commands).
- Thinking (e.g. brain-system interfaces)

User-interface elements shall be operable by the input techniques available in the interactive system.

NOTE 1 This is important to support accessibility (see ISO 9241-171).

Input methods may be used singularly or in combination.

Some input techniques use specific user-interface elements.

EXAMPLE 1 Keyboard use requires a clear visualization of the input focus where interaction takes effect.

Use of a pointing method (mouse and/or pen) requires a visual pointer to indicate the virtual position of the device where interaction takes effect.

Due to direct manipulation, touchscreens do not require a pointing device.

EXAMPLE 2 If a keyboard is provided, check boxes are accessible by the keyboard. Checking and unchecking a check box is realized with the use of the same key.

EXAMPLE 3 If a pointing device is provided, check boxes are accessible by the pointing device.

NOTE 2 For touch input, a minimum user-Interface element size is to be provided to ensure effective use of the user interface..

NOTE 3 Different platform have different strategies to implement accessibility of user-interface elements, and these differ further based on the type of disability. The ISO IEC 13066 multipart standard series includes technical reports on different platform specific accessibility APIs.

7 States of visual user-interface elements

A user-interface element may have the following different states (status) depending on system status and user interaction. Each state shall be visually clearly distinguishable from all other states. States listed together in a single item within the following list are mutually exclusive. There may also be other states beside the ones listed below.

Interaction possibilities:

- a) Visible vs. invisible: user-interface element is visible vs. not visible by the user
- b) Enabled vs. disabled (available for use vs. unavailable for use): user-interface element is able to receive user interaction or not able to receive user interaction
- c) Editable vs. not-editable / read-only: user-interface element allowing content to be edited or not

Feedback on current user interaction:

- d) Hovered vs. not-hovered: the cursor of a pointing device is located visually “over” the visual user-interface element vs. it is not visually placed over the user-interface element
- e) Pressed vs. not-pressed: user-interface element (e.g., a button) visually appears as pressed vs. not pressed
- f) Focused vs. not-focused: keyboard events are assigned to the user-interface element vs. keyboard events are not assigned to the user-interface element, whereas only one user-interface element can be in focus at a time

Selection:

- g) Selected vs. not-selected: user-interface element has been selected or not been selected

- h) Checked vs. not-checked vs. conditionally checked: user-interface element value has been set vs. has not been set vs. represents a group of elements with both checked and unchecked status

View on the UI element:

- i) Collapsed vs. expanded: user-interface element is displayed with minimized vs. maximized space consumption
- j) Maximized vs. minimized: user-interface element appears in the state in which it occupies the largest visual area vs. it is in a state where it occupies the smallest visual area or is even only represented with another User-interface element

Other attributes:

- k) Filled vs. empty: user-interface element contains content vs. it does not contains content
- l) Valid vs. invalid vs. not-validated
- m) Visited vs. not-visited
- n) Masked vs. unmasked

8 Describing Visual user-interface elements

The description of each user-interface element in this document is structured into the following sections:

- Description
 - A short explanation of the element and its purpose.
- Components
 - A list of visual assets or user-interface elements from which the respective user-interface element is assembled.
 - An illustration as one example (if applicable) of the user-interface element that indicates also the components of the element with additional text describing the illustration. The illustration is not intended to be a design guidance.s
- States
 - A list of different states that can be assigned to the user-interface element. For each user-interface element described, the states listed are the standard or minimum set; additional states are possible depending on the design solution.
- When to use [user-interface element name]
 - Identification when the element is the appropriate choice (or not);
 - Identification of alternative elements to achieve the same results.
- How to use [user-interface element name]
 - Guidance on how the user interacts logically with the element.
 - Guidance on how to incorporate the element into the user interface design.

NOTE Platform specific user-interface guidelines can constrain the location or use of user-interface elements.

9 Visual User-interface elements

9.1 Accordion

9.1.1 Description

An accordion is an assembly of multiple collapsible containers that each present a group of user-interface elements.

An accordion is either vertically or horizontally arranged. It expands therefore vertically or horizontally.

9.1.2 Components

An accordion consists of the following components:

A number of collapsible containers. Per section:

- Section label, describing the section;
- Means to Collapse / expand section;
- Canvas, displaying section content;

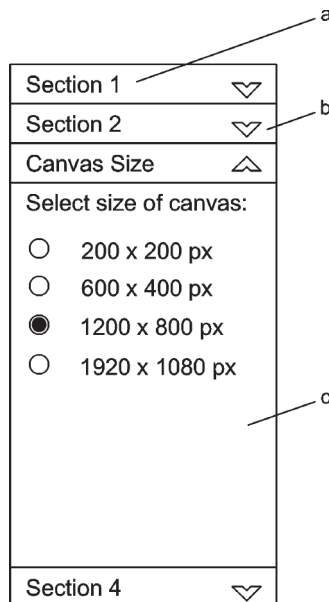


Figure 1 — Example of an accordion, vertically expanding

9.1.3 States

The accordion itself can have the following states:

- Enabled / disabled
- Maximized / minimized

The containers of the accordion are collapsible, i.e. they can be in either collapsed or expanded mode. Depending on the implementation of the accordion, 0, 1, or multiple containers can be expanded at a time.

9.1.4 When to use an accordion

An accordion is an applicable design solution, if both of the following conditions are true:

- The available space is limited: it is not possible to display all panes at once;
- The set of panes is static.

In the case that one or both conditions are not met:

- Space is not limited:
 - Consider using a group.
- The set of panes is variable:
 - Consider using list or table with detail display for selected rows.
- Alternative user-interface elements in case of restricted space:
 - Consider **Hierarchical list**;
 - Consider **Menu**;
 - Consider **tab set**; or
 - Consider other mechanisms to select from a set of views. User-interface elements for selection are **combination box**, **check boxes**, **radio buttons**, and **toggle buttons**.

9.1.5 How to use an accordion

The interaction that expands a pane of an accordion shall be the same as the interaction that closes a pane of an accordion.

9.2 Analogue form element / slider

9.2.1 Description

An analogue form element is a user-interface element that allows the user to select a value within a continuous range

EXAMPLE Rotary dials, slider.

[SOURCE: ISO 9241-143:2011]

9.2.2 Components

Components of an analogue form element depend on the design solution applied. Common to all design solutions are:

- a) Label;
- b) Means to change data in a bi-directional way;
- c) Output pane showing the current value of the data (eg. percentage or tick marks).

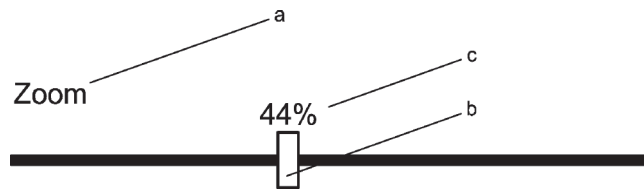


Figure 2 — Example of an analogue form element (slider), where a handle is moved along an horizontal axis, visualized as a bar, to increase or decrease a value represented as percentage.

9.2.3 States

An analogue form element can have the following states:

- enabled / disabled
- focused / unfocused
- hovered / unhovered
- pressed / unpressed.

9.2.4 When to use an analogue form element

An analogue form element is an applicable design solution, if the following conditions are true:

- bounded values are needed as input to the system;
- changing values where continuous, immediate feedback is needed about the value setting's effect;
- enough space in one direction; and
- enough space to visualize values.

In the case that one or both conditions are not met:

- consider stepper.

Alternative user-interface elements in case of restricted space:

- consider new window with entry fields.

9.2.5 How to use an analogue form element

An analogue form element should be used for input only.

9.3 Avatar

9.3.1 Description

An avatar is a representation of a real or artificial person within an interactive system. The representation is usually realized using graphics or photographs.

9.3.2 Components

Components of an avatar depend on the design solution applied. Common components to all design solutions are:

- a) Representation of person;
- b) Label;

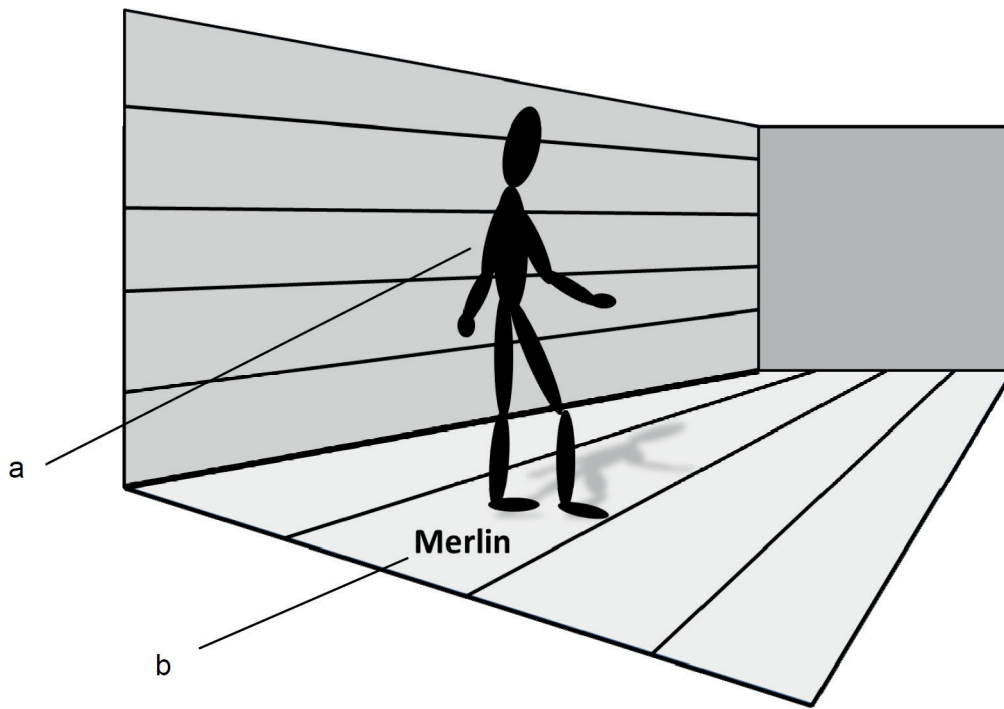


Figure 3 — Example of an avatar in an virtual environment, where a label is used to identify the person (Merlin), that is being represented by the avatar

9.3.3 States

An avatar can have the following states:

- enabled / disabled
- focused / unfocused
- hovered / unhovered
- pressed / unpressed.
- visible / invisible.

9.3.4 When to use an avatar

An avatar is an applicable design solution, if one or all of the following conditions are true:

- Users collaborate using an interactive system
- Users need to know with whom they interact
- Users need to disguise their identity during interaction with other users

9.3.5 How to use an avatar

An avatar should be presented in a way that is not too distracting to the user.

Avatars that represents not real persons shall be presented in a way that clearly communicates to the user that this avatar is represented by an automated system.