TECHNICAL REPORT

ISO/IEC TR 11580

First edition
2007-03-15

Information technology — Framework for describing user interface objects, actions and attributes

Technologies de l'information — Modèle pour décrire des objets, des actions et des attributs pour l'interface utilisateur

Reference number
ISO/IEC TR 11580:2007(E)

© ISO/IEC 2007

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2007

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

© ISO/IEC 2007 – All rights reserved

Contents

Page

Foreword v

Introduction vi

1 Scope 1

2 Terms and definitions 1

3 Modelling objects, actions, and attributes 3

4 Common properties of objects, actions, and attributes 5
4.1 Software identification of objects, actions, and attributes 5
4.1.1 Internal properties of objects, actions, and attributes 5
4.1.2 Internal properties of implemented objects, actions, and attributes 5
4.1.3 Standard internal identifiers 5
4.1.4 Standard of internal states of objects, actions, and attributes 5
4.1.5 Specification of internal identifiers 6
4.1.6 Implementation of internal identifier 6
4.2 Information properties of objects, actions, and attributes 6
4.2.1 Labels 6
4.2.2 Uniqueness of labels 6
4.2.3 Understandability of labels 6
4.2.4 Descriptions 6
4.2.5 States 7
4.2.6 Standard information properties of objects, actions, and attributes 7
4.2.7 Clear and unambiguous purpose 7
4.2.8 Standardized English version of labels, descriptions, and state information 7
4.2.9 Use of information properties of objects, actions, and attributes 7
4.2.10 Result of selection of a label 7
4.2.11 User control of labels 7
4.2.12 User control of descriptions 7
4.2.13 Standardized translations of labels and descriptions 8
4.2.14 Language of labels, descriptions, and state information 8
4.2.15 Developer based translations of labels and descriptions 8
4.2.16 Implementation of alternate languages 8
4.3 Representation properties of objects, actions, and attributes 8
4.3.1 Use of representation properties of objects, actions, and attributes 8
4.3.2 Textual properties 8
4.3.3 Iconic representation 8
4.3.4 Tonal representation 8
4.3.5 Tactile and Haptic representation 9
4.3.6 Standard representation properties of objects, actions, and attributes 9
4.3.7 Variations of representations 9
4.3.8 Cultural and linguistic sensitivity of representations 9
4.4 Operational properties of objects, actions, and attributes 9
4.4.1 Separation of operations 9
4.4.2 Selection of an object, action, or attribute 9
4.4.3 Obtaining information 10
4.4.4 Modifying values 10
4.4.5 Removing and restoring items 10
4.4.6 Activation of function 10
4.5 Technical specifications 10

5 Optional properties 10
5.1 Attribute specific optional properties 10

© ISO/IEC 2007 All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

5.1.1 Inclusion of attribute specific optional properties **10**
5.1.2 Values **11**
5.1.3 Constraints **11**
5.1.4 Permitted values **11**
5.1.5 Default values **11**
5.1.6 Higher structure **11**
5.1.7 Peer structure **11**
5.1.8 Lower structure **11**
5.1.9 Physical structure **11**
5.2 Operation specific optional properties **11**
5.2.1 Inclusion of operational specific optional properties **11**
5.2.2 Pre-conditions **12**
5.2.3 Post-conditions **12**
5.2.4 Error conditions **12**

Annex A (informative) **Developers of this Technical Report** **13**

--`,,```,,,,````-`-`,,`,,`,`,,`---
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
© ISO/IEC 2007 – All rights reserved
Not for Resale

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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

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

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 11580, which is a Technical Report of type 2, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 35, *User interfaces*.

--`,,```,,,,````-`-`,,`,,`,`,,`---

© ISO/IEC 2007 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Introduction

As end users are involved with more and more different applications, they use similar or equivalent objects, actions and attributes that have been implemented in very different ways from one another. This leads to an increasing need for developing usable standards for user interface objects, actions and attributes. However, as each new standard is proposed, it can choose which aspects to emphasize and which to omit regarding the user interface objects, actions and attributes that it describes.

a) The lack of a format for describing user interface objects, actions and attributes has led to a number of different standards being developed that only partially describe their names and/or properties. This provides developers with incomplete guidance and leads to the development of similar but incompatible user interface objects, actions and attributes.

b) There is an increasing need to provide consistent standards for user interface objects, actions and attributes. This Technical Report will support this activity.

This Technical Report provides a format and guidance for describing and implementing user interface objects, actions and attributes.

© ISO/IEC 2007 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Information technology — Framework for describing user interface objects, actions and attributes

1 Scope

This Technical Report defines a format for describing user interface objects, actions and attributes. It provides a basis for standardizing the names and properties of user interface objects, actions and attributes across multiple applications and platforms.

NOTE User interface objects as defined and discussed in this Technical Report are not necessarily equivalent to objects in the software engineering sense. All elements of the user interface which are separately identifiable by the user can be considered to be user interface objects, regardless of how they are technically implemented. This Technical Report focuses on their functionalities without specifying a particular method of implementation.

This Technical Report contains guidance both on the standardization of user interface objects, actions and attributes and on the implementation of these objects, actions and attributes in any or all modalities. This Technical Report is primarily intended for developers of standards, style guides, and architectures involving user interface objects, actions and attributes.

EXAMPLE It is used as the basis for icon-specific accessibility guidance in ISO/IEC 19766.

This Technical Report also provides software developers with a range of functionalities to be considered in the design of objects, actions and attributes within user interfaces.

2 Terms and definitions

2.1
object
user interface object
entity of the user interface that is presented to the user by the software

NOTE 1 Object, as defined in this Technical Report refers to a user interface object (also known as a “user interface element” in ISO 9241-171:2006. These user interface objects may be implemented via any programming method and need not be implemented via object-oriented programming.

NOTE 2 User interface objects may or may not be interactive.

NOTE 3 User interface objects may be containers that serve to group one or more other objects.

NOTE 4 Examples of user interface objects in a graphical user interface include window title bars, menu items, push buttons, image maps, editable text fields and various types of containers (such as windows, grouping boxes, menu bars, menus, groups of mutually-exclusive option buttons, and compound images that are made up of several smaller images). Examples of user interface objects in an audio user interface include such things as menus, menu items, messages and action prompts. Examples of user interface objects in a tactile user interface include such things as tactile controls, Braille pads, tactile maps, soft balls and virtual wells.

2.2
attribute
data item that modifies or describes some aspect of an action or an object

NOTE An attribute can be treated as an object.

Copyright International Organization for Standardization © 2007 – All rights reserved
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

2.3
action
user behaviour that a system accepts as a request for a particular operation

EXAMPLES Pressing a key, clicking a mouse button, moving the pointer over an object, speaking a command.

2.4
operation
predefined system behaviour that a user initiates

EXAMPLES Sending mail, printing, modifying the data or properties of an object.

NOTE A user performs an action or a set of actions to initiate an operation.

2.5
function
task-specific operation of an object

NOTE Objects can have zero, one or many functions.

2.6
internal identifier
language-independent information intended to ensure system-based recognition of a particular user interface object, action or attribute

2.7
state
status of an object, action or attribute which is related to the currently permitted interactions with the object, action or attribute

2.8
label
language-dependent information used to name an object, action or attribute

NOTE This can include information in various languages, e.g. English, Japanese, Blissymbols.

2.9
description
language-dependent set of words used to clarify the meaning of a particular user interface object, action or attribute for the user

2.10
selection
explicitly identifying an object, attribute or operation that is intended as the target for subsequent action

NOTE When a mouse is used, selection is performed by clicking once on a mouse button; then, a second click is used to initiate the default function of the selected item.

2.11
selection indication
cue that indicates the selected object, attribute or operation to which the user may apply a subsequent action

NOTE An object is visually highlighted when selected.

2.12
activation
initiation of a selected function of an object

NOTE When a mouse is used, the activation function is performed by double clicking on a mouse button.

--`,,```,,,,````-`-`,,`,,`,`,,`---
© ISO/IEC 2007 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

3 Modelling objects, actions, and attributes

This clause provides a framework for modelling and structuring groups of objects, actions, and/or attributes. This framework is presented both at a high level and at a detailed level. This framework identifies a logical set of components that can be used for analyzing, designing, evaluating, and standardizing objects, actions, and/or attributes.

— All components of an interface, which are produced by the system, including attributes of components, can be considered to be user interface objects.

— All methods of interacting with user interface objects, which are produced by the user and recognized by the system, can be considered to be actions.

— Attributes contain data that can be used to modify objects or actions. Attributes with which users interact can be treated by the user interface as objects.

Figure 1 presents a high level framework that shows that there are five major interacting aspects that need to be considered: the internal properties of the object, action, or attribute; information properties; representation properties; operational properties; and additional optional properties.

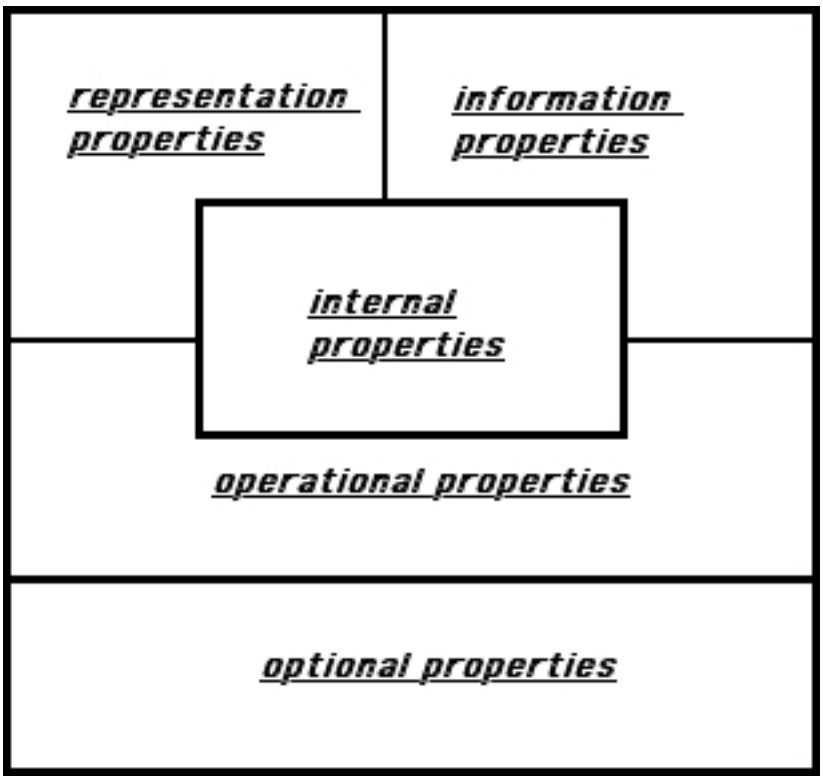

Figure 1 — A high-level framework for objects, actions, and attributes

— Internal properties provide a basis for standards defining objects, actions, and/or attributes and for software implementing standard objects, actions, and attributes. Internal properties are used to distinguish between the different types and instances of objects, actions, and attributes.

— Information properties provide a basis for providing media-independent user-oriented information about the purpose and use of the object, action, or attribute.

© ISO/IEC 2007 All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

— Representation properties provide information on media dependent rendering information for the object, action, or attribute that can be used by developers and/or systems. The representation properties specify how objects are rendered, how actions are input, and how attributes are rendered and input.

— Operational properties describe the functionalities of the object, action, or attribute that are intended to be implemented by the system.

— There are also a variety of optional properties that might apply to and/or be included in a standard defining an object, attribute, or action.

Figure 2 provides a detailed framework for objects, actions, and attributes that expands each aspect (internal properties, information properties, representation properties, operational properties, and optional properties) into a number of specific components. Each of the components, considered in this framework can contribute to the usability and accessibility of an object, action, or attribute and are the subject of guidance within this Technical Report.

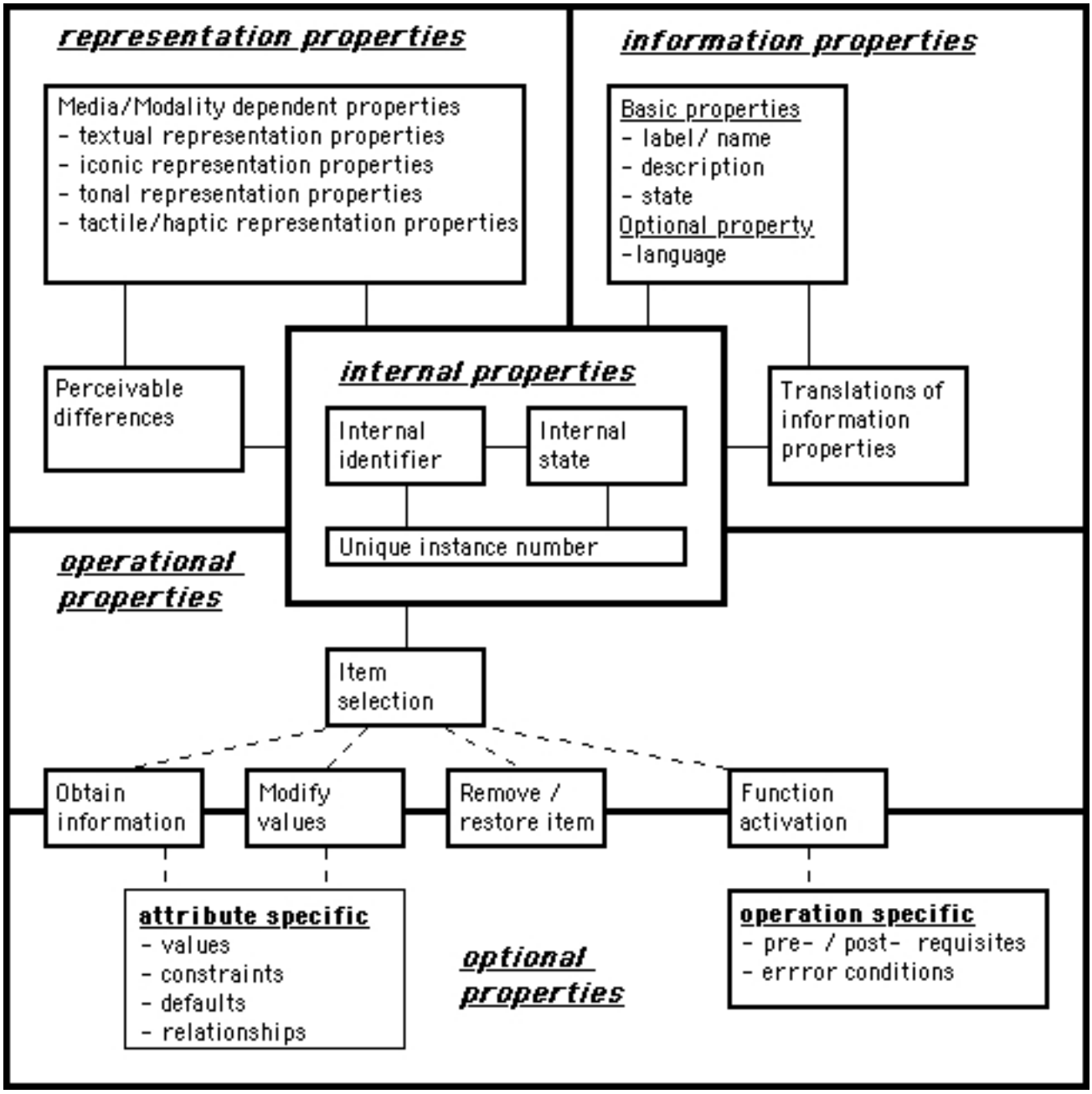

Figure 2 — A detailed framework for objects, actions, and attributes

--`,,```,,,,````-`-`,,`,,`,`,,`---
© ISO/IEC 2007 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

In this detailed model, most operational properties are optional, with the exception of the need to be able to specify how an object, action, or attribute is selected.

— Obtaining information and modifying values can apply to attribute specific properties, information properties, and representation properties.

— Remove / restore controls the presence or absence of an object, action, or attribute in the current configuration of the user interface.

— Function activation applies to the activation of a selected operation of an object.

4 Common properties of objects, actions, and attributes

4.1 Software identification of objects, actions, and attributes

4.1.1 Internal properties of objects, actions, and attributes

All user interface objects, actions, and attributes should have the following attributes:

a) an internal identifier;

b) an internal state attribute.

4.1.2 Internal properties of implemented objects, actions, and attributes

When an application involves multiple instances of a user interface object, action, and/or attribute, each instance should have third internal property: a unique instance number that can be used internally to distinguish it from other instances within the application.

4.1.3 Standard internal identifiers

Where user interface objects, actions, or attributes are standardized, they should be provided with a unique internal identifier.

NOTE It is expected that an ISO registry of user interface objects, actions, and attributes will maintain a record the internal identifiers of all standardized user interface objects, actions, and attributes.

4.1.4 Standard of internal states of objects, actions, and attributes

Where user interface objects, actions, or attributes are standardized, the standard should specify the permitted states and internal state attributes to identify each state of each standardized user interface object, action, or attribute.

NOTE 1 It is expected that the ISO registry of user interface objects, actions, and attributes will maintain a record the permitted states identifiers of all standardized user interface objects, actions, and attributes.

NOTE 2 The states of objects can include but are not limited to: fixed, movable but not otherwise modifiable, or modifiable.

NOTE 3 The states of actions can include but are not limited to: available, selected, executing, or unavailable.

NOTE 4 The states of attributes can include but are not limited to: system provided read only value; system stored value not available for input; system stored value available for new input; or user entered value not yet stored by system.

NOTE 5 It is not intended that internal states be presented directly to the user. See 4.2.5 for guidance on presenting state information to users.

© ISO/IEC 2007 All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

4.1.5 Specification of internal identifiers

Where standardized internal identifiers are not available for a particular user interface object, action, or attribute, the developer may specify an internal identifier for the particular user interface object, action, or attribute according to the format for developers-specified internal identifiers.

4.1.6 Implementation of internal identifier

Both the internal identifier and a unique instance number should be implemented as a software identifiable property of all user interface objects, actions, and attributes.

NOTE 1 This will allow software to recognize the purpose of the user interface object, action, or attribute regardless of how of it is rendered.

NOTE 2 This identifier can be used to assist in the translation of user interface objects, actions, and attributes from one form of rendering to another to support accessibility.

NOTE 3 It is not intended that internal identifiers be presented to the user.

4.2 Information properties of objects, actions, and attributes

4.2.1 Labels

Labels used to name and clarify the meaning of user interface objects, actions, and attributes should be provided in the language of the user.

EXAMPLE An icon used to execute a save function has the label "Save" when used in English.

4.2.2 Uniqueness of labels

Labels should be unambiguous within the context in which they are used.

NOTE This can be achieved either by ensuring that all labels are unique within the context where they are used or that there is some form of contextual assistance available to the user to help distinguish between labels which are the same.

EXAMPLE 1 Where there are three possible e-mail addresses associated with a single person, they are labeled "e-mail-1", "e-mail-2", and "e-mail-3".

EXAMPLE 2 Where a different e-mail address is associated with each of three persons, the layout provides contextual assistance to associate each "e-mail" label with the correct person.

4.2.3 Understandability of labels

Labels provided should be based on the name or names by which users refer to the object, action, or attribute when naming it.

EXAMPLE A control used to create a new record has the label "New".

4.2.4 Descriptions

Object descriptions should be used to provide information on the purpose and/or use of user interface objects, actions, and attributes.

NOTE 1 Object descriptions are used to provide supplementary information to users who are not familiar with an object, action, or attribute or who do not recognize its purpose and/or use based on its rendering and/or its label.

--`,,```,,,,````-`-`,,`,,`,`,,`---

© ISO/IEC 2007 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

NOTE 2 Object descriptions will vary in length depending on the complexity of the information to be provided.

4.2.5 States

Information identifying the current state of user interface objects, actions, and attributes

a) should directly correspond to the internal states of the object, action, or attribute;

b) should be provided in the language of the user.

4.2.6 Standard information properties of objects, actions, and attributes

Where user interface objects, actions, or attributes are standardized, they should be provided with a label and description that can be used by the user of the objects, actions, and/or attributes.

4.2.7 Clear and unambiguous purpose

Where user interface objects, actions, or attributes are standardized, the standard should include a clear, unambiguous statement of the primary purpose of an object, action, or attribute that can be included within the description of the object, action, or attribute.

4.2.8 Standardized English version of labels, descriptions, and state information

An international standard should provide an English language label, description, and wording for state information for each object, action, and/or attribute that it specifies.

4.2.9 Use of information properties of objects, actions, and attributes

Information properties, composed of text that can be formatted and presented to the user via the widest possible variety of modalities / media, should be defined and used to provide information to the user about the object, action, or attribute.

4.2.10 Result of selection of a label

Selection of a label shall have the same result as selecting the user interface object, action, or attribute.

4.2.11 User control of labels

The user should be able to control

a) whether or not individual labels and/or all labels are presented;

b) the choice of available languages to be used for presentation of the labels;

c) the positioning of the label relative to the user interface objects, actions, and attributes that they name.

4.2.12 User control of descriptions

The user should be able to control

a) the choice of available languages to be used for presentation of the descriptions;

b) the positioning of the description relative to the user interface objects, actions, and attributes that they describe.

© ISO/IEC 2007 All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

4.2.13 Standardized translations of labels and descriptions

International, regional, and national standards may assign standardized translations in languages other than English to be used for the label, description, and wording for state information of the object, action, or attribute.

4.2.14 Language of labels, descriptions, and state information

Labels, descriptions, and state information should be implemented by systems in the language(s) of the intended users.

4.2.15 Developer based translations of labels and descriptions

If users require languages not having standardized labels, descriptions, and wordings for state information for a particular user interface object, action, or attribute, the developer may identify and use suitable translations, where required.

4.2.16 Implementation of alternate languages

Where alternate languages are available,

a) the user should be able to select the available language to use to present textual information (including information properties) for all objects, actions, and attributes;

b) the user may be given the ability to select the available language to use to present textual information for individual objects, actions, and/or attributes;

c) each object, action, and/or attribute should contain an additional information property to record the current user-selected language to be used for presenting all textual information of the object, action, or attribute.

4.3 Representation properties of objects, actions, and attributes

4.3.1 Use of representation properties of objects, actions, and attributes

Information properties should be defined and used to define the rendering of user interface objects, actions, and attributes.

4.3.2 Textual properties

Textual properties should identify the wording used for rendering object, action, or attribute related text in one or more of the visual, auditory, and/or tactile modalities.

4.3.3 Iconic representation

Iconic representation should identify the icon(s) and or other graphical representation(s) that are typically used to visually represent the object, action, or attribute.

NOTE 1 Iconic representations can be described restrictively or permissively.

NOTE 2 Where iconic representations are not identified in a standard, developers are free to create their own iconic representations.

EXAMPLE ISO/IEC 11581 describes the iconic representation of all the icon objects that it standardizes.

4.3.4 Tonal representation

Tonal representation should identify the tonal properties and/or representation(s) (e.g. "earcons") that are typically used to aurally represent the object, action, or attribute.

© ISO/IEC 2007 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

NOTE 1 Tonal representations can be described restrictively or permissively.

NOTE 2 Where tonal representations are not identified in a standard, developers are free to create their own tonal representations in a standard, developers are free to create their own tonal representations

4.3.5 Tactile and Haptic representation

Tactile and haptic representation should identify the typical representation(s) of an object, action, or attribute using the human sense of touch and kinesthesia.

NOTE 1 Tactile representations can be described restrictively or permissively.

NOTE 2 Where tactile representations are not identified in a standard, developers are free to create their own tactile representations.

NOTE 3 Tactile/haptic representations typically involve one or more physical properties which can be combined with one or more spatial properties and/or temporal properties.

4.3.6 Standard representation properties of objects, actions, and attributes

a) Where user interface objects, actions, or attributes are standardized, the standard should include identification of the information properties to represent the objects, actions, and/or attributes in one or more modalities and/or media.

b) The standard should include specification of perceivable differences that are used to represent alternate states of the user interface object, action, or attribute.

4.3.7 Variations of representations

Where user interface objects, actions, or attributes are standardized, the standard should include information on

a) the range of and/or limitations on permitted variations,

b) methods for creating/evaluating permitted variations.

NOTE 1 Variations can be described using differing levels of specificity or generality.

NOTE 2 Where variations are not identified or limited, it is expected that any reasonable variation is permitted.

4.3.8 Cultural and linguistic sensitivity of representations

All representations presented to a user should be suitable to the language and culture of the user.

4.4 Operational properties of objects, actions, and attributes

4.4.1 Separation of operations

To prevent inadvertent activation or manipulation of objects, actions, or attributes, their selection should be performed by separate operation from other operations.

4.4.2 Selection of an object, action, or attribute

A specific selection operation should be used consistently within the application to perform selection of an object, action, or attribute.

EXAMPLE A single click of a mouse button is used to select an object.

--`,,```,,,,````-`-`,,`,,`,`,,`---

© ISO/IEC 2007 All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

4.4.3 Obtaining information

A method should be provided for obtaining information about an object, action, or attribute without otherwise manipulating or activating it.

EXAMPLE Pressing and holding down the mouse button for longer than one second is used to have a description of the object presented for the duration while the mouse button remains depressed.

4.4.4 Modifying values

Where modification is appropriate, a method should be provided for modifying values of an object, action, or attribute without otherwise manipulating or activating it.

4.4.5 Removing and restoring items

Where it is appropriate to allow a user to remove an object, action, or attribute from an interface, a pair of methods should be provided for removing and for restoring the object, action, or attribute without otherwise manipulating or activating it.

4.4.6 Activation of function

The method or methods used to activate a particular function should be consistent within the application.

NOTE 1 Different functions can have different methods of activation.

NOTE 2 A single function can have multiple different methods of activation.

EXAMPLE A double-click of a mouse button is used to select and activate an icon function.

4.5 Technical specifications

Technical specifications, which are included within standards of user interface objects, actions, and/or attributes, should describe the basic operational requirements for all implementations of the object, action, or attribute.

5 Optional properties

5.1 Attribute specific optional properties

5.1.1 Inclusion of attribute specific optional properties

The following attribute specific optional properties of an object, action, or attribute may be included in standards and/or implementations.

a) Values.

b) Constraints.

c) Permitted values.

d) Default values.

e) Relationships:

   1) higher structure;

--`,,```,,,,````-`-`,,`,,`,`,,`---
© ISO/IEC 2007 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

2) peer structure;

3) lower structure;

4) physical structure.

5.1.2 Values

Where used, the values specify any application / task specific data items that apply to the object, action, or attribute that the user is able to access.

5.1.3 Constraints

Where used, the constraints specify any conditions that should be satisfied to ensure the integrity of data within an attribute.

NOTE One method of specifying constraints is to identify permitted values.

5.1.4 Permitted values

Where used, the permitted values specify individual values, ranges of values, and/or sources of individual or range values that should be used to ensure the integrity of data within an attribute.

5.1.5 Default values

Where used, the default value should specify the individual value, or the source of the individual value that may be presented to the user as a default value.

5.1.6 Higher structure

Where used, the higher structure should describe the relationship between the object and other objects of which it is an instance or a part.

5.1.7 Peer structure

Where used, the peer structure should describe the relationship between an object and other objects that are associated with the object.

5.1.8 Lower structure

Where used, the lower structure should describe the relationship between an object and any other objects that are parts of and/or instances of the object.

5.1.9 Physical structure

Where used, the physical structure should describe the physical relationship (in terms of positioning and spacing) between an object and any other objects that are adjacent to it in a physical layout.

5.2 Operation specific optional properties

5.2.1 Inclusion of operational specific optional properties

The following operation specific optional properties of an object, action, or attribute may be included in standards and/or implementations:

a) pre-conditions;

--`,,```,,,,````-`-`,,`,,`,`,,`---
© ISO/IEC 2007 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

b) post-conditions;

c) error conditions.

5.2.2 Pre-conditions

Pre-conditions should identify the states when an action can be successfully performed.

5.2.3 Post-conditions

Post-conditions should describe the results of an action being performed.

5.2.4 Error conditions

Error conditions should describe the situations where errors in processing the action can occur and should describe further actions that can be performed to correct the error.

© ISO/IEC 2007 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex A
(informative)

Developers of this Technical Report

The project editor of this Technical Report was Jim Carter (Canada).

The co-editor of this Technical Report was David Fourney (Canada).

This Technical Report was developed by WG7 of ISO/IEC JTC 1/SC 35 under the convenorship of Jim Carter (Canada).

Other WG7 experts involved in this development included:

— Jeong Myung Choi (Korea)

— Folke Eliasson (Sweden)

— Al Gillman (U.S.A.)

— Hidezuki Matsubara (Japan)

— Katsumi Mizumo (Japan)

— Yoshihiko Nakano (Japan)

— Yoshikazu Seki (Japan)

— Yoshikazu Yamamoto (Japan)

— Gottfried Zimmermann (U.S.A.)

— Chae-Woo Yoo (Korea)

© ISO/IEC 2007 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

ICS 35.240.20

Price based on 13 pages

--`,,```,,,,````-`-`,,`,,`,`,,`---

© ISO/IEC 2007 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale