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Second edition
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Information technology — User interfaces — Universal remote console —

Part 5: Resource description

Technologies de l'information — Interfaces utilisateur — Console à distance universelle —

Partie 5: Description des ressources

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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

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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.

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 document 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 and IEC 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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC JTC 1, *Information technology*, Subcommittee SC 35, *User interfaces*.

This second edition cancels and replaces the first edition (ISO/IEC 24752–5:2008), which has been technically revised.

ISO/IEC 24752 consists of the following parts, under the general title *Information technology — User interfaces — Universal remote console*:

— *Part 1: Framework*

— *Part 2: User interface socket description*

— *Part 4: Target description*

— *Part 5: Resource description*

— *Part 6: Web service integration*

Introduction

This is the second edition of this part of the International Standard. The main purpose of the revision is an alignment with recent developments in the Web service area, in particular with the new ISO/IEC 24752-6 on Web service integration, along with an overall simplification of the specified technologies.

This part of ISO/IEC 24752 defines a format for describing atomic resources, resource sheets, grouping resources, and grouping sheets relevant to the user interface of a device or service ("target"). For atomic resources that are stored in a resource sheet, a storage format is specified. For atomic resources that are stored externally to the resource sheet, the pertinent format type specification applies.

A *resource* is any object that is used as an entity or to support decision making in the construction of a concrete user interface. This part of ISO/IEC 24752 specifies how resources are described in the context of the universal remote console (URC) framework. It defines a format for describing atomic resources, resource sheets, grouping resources, and grouping sheets relevant to the user interface of a device or service ("target").

Atomic resources include text and non-text elements of a user interface such as labels, help text, keyboard shortcuts (access keys), associated words (keywords) and location text. Non-text elements may include icons, sounds or videos. Atomic resources can be characterized as follows.

An atomic resource is of static nature, i.e. it does not change during the user's interaction with the target.

NOTE 1 This is not meant to exclude atomic resources that contain references (placeholders) to values of socket variables. In this case the atomic resource itself (i.e. the static text with the reference to the socket variable) doesn't change, but its rendition may change when the target's state changes.

An atomic resource can be of any form, including textual, visual, auditory, and multimodal. This is reflected in the atomic resource's type. Atomic resource types include text, sound, image, animation, and video clip. In this context animations and video clips are construed as static objects because they don't change over the user interface's lifetime (the recorded bits of the video clip don't change when it is played).

An atomic resource of type "Text" is modality-independent, i.e. it can be rendered in visual, auditory, or tactile forms. Atomic resources of types other than "Text" are modality-specific.

An atomic resource is typically specific to the cultural, language, and functional accommodation of a user. For example, textual atomic resources are typically language specific; images can be culture-specific; picture symbols can be used to represent concepts that can be understood by people with certain cognitive disabilities.

An atomic resource can be replaced by a (supplemental) resource (which is itself an atomic resource).

Examples of atomic resources are the following:

— a text string used to label a window;

— a text string containing help for an interface element;

— an icon used to label a button;

— a Bliss symbol labelling a function;

— a sound file that announces help instructions;

— a text string that describes how to locate an ATM in a public building.

An *atomic resource description* specifies characteristics (as properties) of an atomic resource. Properties include its type, its use context, and the atomic resource's storage location and format. The use context specifies the usage location (specific element in a specific user interface), usage role (e.g. label or help text), and language context pertaining to the application of an atomic resource.

An atomic resource can have more than one atomic resource description, specifying additional properties and alternative property values, and several sets of use contexts. Also, atomic resource descriptions and the atomic resource they describe don't have to be stored in one file or on one server necessarily. For example, some atomic resources (e.g. images) can be stored as binary files, and their descriptions are stored in text files.

A *grouping resource* (or short *grouping)* specifies a hierarchical grouping of user interface elements that is external to a socket description. This part of ISO/IEC 24752 applies groupings to user interface socket elements, but that is not a restriction in general. Groups of user interface (UI) elements can be nested, and subgroups and UI elements can occur multiple times within different groups. Groupings are structural hints as to how to present a concrete user interface made up of individual user interface elements, including user interface characteristics such as layout and navigation.

Supplemental resources can replace or supplement the target resources. By choosing between a set of alternative objects when constructing the concrete user interface, the result can be tailored towards user preferences and user device capabilities. The mechanism of supplemental resources facilitates the generation of specialized user interfaces that build on a common (modality-independent) user interface model, the user interface socket provided by the manufacturer of a target.

A *resource sheet* is a file that contains atomic resource descriptions of related atomic resources, plus optionally the atomic resources themselves (if they are textual). Alternatively (and for binary atomic resources) the atomic resources can be stored in individual files separate from the resource sheet. Typically, a manufacturer would provide one resource sheet per target and language. Third parties can provide additional resource sheets pertaining to the same target. See Annex A for a sample resource sheet.

A grouping sheet is a file that contains groupings. Typically, a manufacturer would provide one grouping sheet per target in a language-independent manner. Third parties can provide additional grouping sheets pertaining to the same target. See Annex A for a sample grouping sheet.

One purpose of this part of ISO/IEC 24752 is to facilitate the development and deployment of a wide variety of devices (from different manufacturers) that can act as URCs. The URC framework and its components are specified in part 1, and the user interface socket in part 2 of this International Standard. A user interface socket is a machine-interpretable description of the state and functions of the target or a part of the target. The target description is specified in ISO/IEC 24752-4.

Within the URC framework, an atomic resource makes reference to a specific element in a user interface socket (described in a user interface socket description), to a specific element in a target description, or to any form of user interface implementation description.

NOTE 2 Within the URC framework, there needs to be a common set of resource types and a common format for resource descriptions so that they can be used by any URC. This part of ISO/IEC 24752 defines both. In this part of ISO/IEC 24752, the terms "resources" and "resource descriptions" include only those objects and descriptions that conform to the International Standard formats defined in this part of ISO/IEC 24752. It is important to note that URCs can employ other types of resources and resource descriptions beyond those described in this part of ISO/IEC 24752.

Information technology — User interfaces — Universal remote console —

Part 5: Resource description

1 Scope

ISO/IEC 24752 is a multi-part International Standard that aims to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents.

This part of ISO/IEC 24752 defines syntax and semantics for describing atomic resources, resource sheets, groupings, and grouping sheets relevant to the user interface of a device or service ("target").

2 Conformance

An extensible markup language (XML) fragment is an atomic resource description in conformance with this part of ISO/IEC 24752 if it conforms to Clause 6. An atomic resource description may use language extensions if the extensions are coded in XML syntax, and if it follows the syntax and requirements outlined in this part of ISO/IEC 24752 for all of its non-extension parts.

An XML file is a resource sheet in conformance with this part of ISO/IEC 24752 if it conforms to Clause 7. A resource sheet may use language extensions if the extensions are coded in XML syntax, and if it follows the syntax and requirements outlined in this part of ISO/IEC 24752 for all of its non-extension parts.

An XML fragment is a grouping resource in conformance with this part of ISO/IEC 24752 if it conforms to Clause 8. A grouping resource may use language extensions if the extensions are coded in XML syntax, and if it follows the syntax and requirements outlined in this part of ISO/IEC 24752 for all of its non-extension parts.

An XML file is a grouping sheet in conformance with this part of ISO/IEC 24752 if it conforms to Clause 9. A grouping sheet may use language extensions if the extensions are coded in XML syntax, and if it follows the syntax and requirements outlined in this part of ISO/IEC 24752 for all of its non-extension parts.

NOTE URC manufacturers are encouraged to implement their URCs so that unrecognized markup (that may belong to unknown language extensions) is ignored without failing.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 10646:2011, *Information technology — Universal Coded Character Set (UCS)*

ISO 15836:2009, *Information and documentation — The Dublin Core metadata element set*

ISO/IEC 24752-1, *Information technology — User interfaces — Universal remote console — Part 1: Framework*

ISO/IEC 24752-2, *Information technology — User interfaces — Universal remote console — Part 2: User interface socket description*

ISO/IEC 24752-4, *Information technology — User interfaces — Universal remote console — Part 4: Target description*

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 24752-1, ISO/IEC 24752-2 and ISO/IEC 24752-4, and the following apply.

4.1
anonymous atomic resource
atomic resource that has no global identifier

4.2
anonymous resource
resource that has no global identifier

4.3
language extension
addition of elements, attributes, or values to an XML-based language beyond the original language specification

Note 1 to entry: Language extensions can be provided by standards organizations, consortia, vendors, or other organizations.

5 Relation to other standards

5.1 Relation to Dublin Core Metadata Element Set

This International Standard adopts some of the metadata properties defined within the Dublin Core Metadata Initiative (DCMI) Terms, a standard for the description of cross-domain information. Where appropriate, the syntax employed follows the Dublin Core Metadata Initiative's document "Guidelines for implementing Dublin Core in XML".

5.2 Relation to XML

This Standard defines an XML based language. Markup in XML is case sensitive.

Tag names, and attribute names and values are not localizable, i.e. they are identical for all international languages. However, the text content between tags can be language specific. As with all XML based languages, white space characters immediately surrounding tags are non-significant.

This specification makes use of the XML namespaces concept to enable the import of element and attribute names defined elsewhere.

All element and attribute names used in Clauses 6 and 7 with no namespace prefix are defined by this International Standard and are part of the resource sheet namespace with URI "http://openurc.org/ns/rsheet-2". The namespace identifier 'rs' should be used for it, if not defined as default namespace.

All element and attribute names used in Clauses 8 and 9 with no namespace prefix are defined by this International Standard and are part of the grouping sheet namespace with URI "http://openurc.org/ns/grpsheet-2". The namespace identifier 'gs' should be used for it, if not defined as default namespace.

Throughout this document, the following namespace prefixes and corresponding namespace identifiers are used for referencing foreign namespaces:

— dc: The Dublin Core Metadata Element Set V1.1 namespace (http://purl.org/dc/elements/1.1/), as specified in ISO 15836

— dcterms: The DCMI Metadata Terms namespace (http://purl.org/dc/terms)

— xsd: The XML Schema namespace (http://www.w3.org/2001/XMLSchema)

— xsi: The XML Schema Instance namespace (http://www.w3.org/2001/XMLSchema-instance)

6 Atomic resource description — <AResDesc>

6.1 General

An atomic resource description describes an atomic resource in terms of its properties, including in what context the atomic resource may be applied. An atomic resource is a resource that is used as an atomic entity in the construction of a concrete user interface. Some properties of atomic resources are optional, and some may occur several times for one atomic resource.

An atomic resource description shall be in the XML format, and shall be coded in UCS according to ISO/IEC 10646. It shall have the <AResDesc> element as its root element.

EXAMPLE

```
<AResDesc about="http://example.com/thermometer.rsheet#temperature_label">
   <content xml:lang="en">Temperature</content>
   <useFor>
      <Context>
         <eltRef resource="http://example.com/thermometer.socket#temperature"/>
         <role resource="http://openurc.org/ns/res#label"/>
         <forLang>en</forLang>
      </Context>
   </useFor>
   <dc:publisher>MyCorp, Inc.</dc:publisher>
   <dc:type>Text</dc:type>
</AResDesc>
```

6.2 The 'about' attribute

An <AResDesc> element may have an 'about' attribute, specifying an unambiguous identifier of an atomic resource. This shall be a globally unique identifier in the form of a Uniform Resource Identifier (URI), as specified in IETF RFC 3986, including a trailing fragment identifier. The URI may or may not be resolvable.

NOTE 1 A good practice is to use as identifier the identifier (URI) of the resource sheet that contains the atomic resource description, followed by a hash sign '#', followed by a fragment identifier that is unique within the resource sheet (see example above).

NOTE 2 For retrieving a copy of the resource, use the <contentAt> element value rather than the 'about' attribute.

If the 'about' attribute is not present, the pertaining atomic resource description is called "anonymous atomic resource description".

An atomic resource description should be stable as much as possible.

NOTE 3 The identifier as a value of the attribute about conforms to the Dublin Core metadata element identifier, http://purl.org/dc/elements/1.1/identifier

6.3 The <content> element

6.3.1 General

An <AResDesc> element may have one <content> subelement, providing the content of the atomic resource in XML-encoded form. However, one <AResDesc> element shall not have a <content> and a <contentAt> element (see 6.4) at the same time.

EXAMPLE

```
   <content xml:lang="en">Temperature</content>
```

NOTE 1 An atomic resource description that has neither <content> nor <contentAt> elements may be used to add use context to an atomic resource that is described somewhere else.

NOTE 2 There is no pertinent Dublin Core metadata element for <content>.

NOTE 3 The <content> element can contain content that imposes security risks when being interpreted. Users of atomic resources are strongly encouraged to take appropriate protective measures.

6.3.2 The 'xsi:type' attribute

A <content> element may have an 'xsi:type' attribute for identifying the type of text content for the XML parser. Binary atomic resources (such as images) can be specified in textual encoding, for example in Base64-encoding. The value of the 'xsi:type' attribute shall be the QName of a built-in datatype (see XML Schema Definition Part 2).

EXAMPLE The QName xsd:base64Binary references the XSD-native datatype base64Binary for arbitrary binary encoding using the Base64 Alphabet.

Alternatively, binary atomic resources may be stored as separate files and referenced via URI (see 6.4).

NOTE The use of the 'xsi:type' attribute follows XML Schema Definition Part 1.

6.3.3 The 'xml:lang' attribute

A <content> element may have an 'xml:lang' attribute to specify the language of the atomic resource content. The values of the 'xml:lang' attribute shall be language codes as defined by the Extensible Markup Language (XML) 1.0.

NOTE If the text of the atomic resource consists of parts in different languages, the 'xml:lang' attribute on the <content> element specifies the default language for the text. Language changes within the text should be marked using elements inside the text (see 6.3.5).

6.3.4 The element

6.3.4.1 General

A <content> element may have one or more subelements for the purpose of specifying language changes inside textual content, and segmentation of long help texts ("layered help"). elements may be nested.

EXAMPLE A French word is used inside an English text.

```
<content xml:lang="en-ca">
   Do you have a <span xml:lang="fr-ca">'Carnet de Passages en Douane'</span> issued by
the Canadian Automobile Association?
</content>
```

A element may have an 'id' attribute.

6.3.4.2 The 'xml:lang' attribute

A element may have an 'xml:lang' attribute.

Language changes inside text atomic resources should be identified by enclosing the foreign-language content string in a element with an 'xml:lang' attribute, as defined by the Extensible Markup Language (XML) 1.0.

6.3.4.3 The 'title' attribute

A element may have a 'title' attribute. The 'title' attribute is useful to break up long help texts in "layers". Each layer is contained in a element, with the 'title' attribute specifying a natural language title for the layer.

EXAMPLE

```
<content xml:lang=”en”>
   <span title=”Intro”>
      This will reset the maximum and minimum temperature.
   </span>
   <span title=”Maximum and minimum temperature”>
     The maximum temperature is the highest temperature that was measured since the last reset.
The minimum temperature is the lowest temperature that was measured since the last reset.
   </span>
</content>
```

The title of the element should be in the language specified by the ‘xml:lang’ attribute of the element, or if not present, in the language of the closest ‘xml:lang’ attribute of any containing or <content> element.

NOTE A element may have both an ‘xml:lang’ and a ‘title’ attribute to combine title specification and language change.

6.3.4.4 The <value> element

A element may contain one or more <value> subelements. Textual atomic resources that apply to elements of a socket description or UIID, can thus contain references to socket variables in order to facilitate the inclusion of dynamic text fragments within an atomic resource. The reference in the atomic resource will be replaced by the value of the referenced socket variable at runtime, and updated whenever the value changes.

An empty <value> element shall be used to specify the location within the atomic resource where the value of the socket variable should be inserted. The value of the ‘ref’ attribute shall specify the pertaining socket variable in XPointer syntax, i.e. the URI (see IETF RFC 3986) of the pertaining socket description, a hash sign (#), and the id of the socket variable.

EXAMPLE A label for the checkReset notify of the socket description for the digital thermometer could include the current temperature, which will be used as the new value for the maximum and minimum variables.

```
<AResDesc about=”http://example.com/thermometer.rsheet#checkReset_label”>
   <content xml:lang=”en”>
   Are you sure you want to reset the maximum and minimum temperature to
   <value ref=”http://example.com/thermometer/socket#temperature”/>?
   </content>
</AResDesc>
```

The <value> element shall not be applied to Textual atomic resources pertaining to elements of a target description.

NOTE Since there is no control session involved in the discovery phase, there is no access to socket variables at that time.

6.4 The <contentAt> element

An <AResDesc> element may have one or more <contentAt> subelements, each specifying a local URI (as specified in IETF RFC 3986) that can be used to retrieve the external content for the described atomic resource from a local network (i.e. the target-URC network (TUN) within the URC framework). However, one <AResDesc> element shall not have a <content> (see 6.3) and a <contentAt> element at the same time.

NOTE 1 <contentAt> can occur multiple times to identify multiple copies that are available on a local network.

The URI shall be specified as value of the attribute ‘resource’ which shall be present. The URI may be relative, in which case it is based on the resource sheet’s URI. This format works for both textual and binary atomic resources.

EXAMPLE 1 <contentAt resource=“images/temperature.gif” />

In this example a relative URI is specified; its absolute interpretation is based on the URI of the containing resource sheet.

EXAMPLE 2 If the resource sheet URI is http://192.168.0.1/thermostat.rsheet (a URL), the absolute URI of the external atomic resource would be http://192.168.0.1/images/power.gif

NOTE 2 The <contentAt> element could be meaningful only in a local network environment, and not on a global scale.

NOTE 3 For every non-text label provided through <contentAt>, there needs to be a pure text-label for the same use context provided to make sure that a pure textual representation of a target or socket is possible. In general, the textual label can be used as alternate text for the non-textual label.

NOTE 4 The <contentAt> element can reference external content that imposes security risks when being interpreted. Users of atomic resources are strongly encouraged to take appropriate protective measures.

6.5 The <dc:type> element

An <AResDesc> element may have one or more <dc:type> subelements, each specifying a nature or genre of the atomic resource. <dc:type> applies to atomic resources that are defined as part of the atomic resource description (see 6.3), as well as to atomic resources that are stored externally to the atomic resource description (see 6.4).

If an <AResDesc> element has no <dc:type> subelement, the value of the first <dc:type> element for the encompassing resource sheet (see 7.6.2) shall be assumed.

The <dc:type> element shall have an element content as defined by the Dublin Core vocabulary for type (http://www.dublincore.org/documents/dcmi-type-vocabulary/).

Values include, but are not limited to:

— "Text" for textual atomic resources (default value);

— "Image" for pictorial atomic resources. In this case, the <dc:format> element (see 6.6) specifies the format type of the atomic resource.

EXAMPLE 1 Properties for a text label that is provided in plain text.

```
<dc:type>Text</dc:type>
<dc:format>text/plain</dc:format>
```

EXAMPLE 2 Properties for an icon label without any text, provided as JPEG image.

```
<dc:type>Image</dc:type>
<dc:format>image/jpeg</dc:format>
```

EXAMPLE 3 Properties for an icon label with text included in the image, provided as JPEG image.

```
<dc:type>Image</dc:type>
<dc:type>Text</dc:type>
<dc:format>image/jpeg</dc:format>
```

NOTE <dc:type> conforms to the Dublin Core metadata element type, http://purl.org/dc/elements/1.1/type. Its values are specified in the Dublin Core vocabulary for type (http://www.dublincore.org/documents/dcmi-type-vocabulary/).

6.6 The <dc:format> element

An <AResDesc> element may have one <dc:format> subelement, specifying the digital manifestation of the atomic resource, as format type, as defined by the Dublin Core Metadata Element Set (see ISO 15836).

<dc:format> shall be present if <dc:type> is "Image" or if the atomic resource is provided externally to the resource sheet (see 6.4). If it is missing, a default value of "text/xml" is assumed.

EXAMPLE

```
<dc:format>image/jpeg</dc:format>
```


If an <AResDesc> element has no <dc:format> subelement, the value of the first <dc:format> element for the encompassing resource sheet (see 7.6.3) shall be assumed.

A label whose content is an unformatted character sequence with a dc:type value of “Text” and a dc:format value of “text/xml” or “application/xml” is called a “text label”.

NOTE <dc:format> conforms to the Dublin Core metadata element format, http://purl.org/dc/elements/1.1/format

6.7 The <useFor> element

6.7.1 General

An <AResDesc> element may have one <useFor> subelement specifying where and how the atomic resource can be applied. A use context consists of up to six different components: “element reference”, “value reference”, “operation reference”, “role”, “language context”, and “target instance”.

EXAMPLE

```
<useFor>
   <Context>
      <eltRef resource=”http://example.com/thermometer/socket#temperature”/>
      <role resource=”http://openurc.org/ns/res#label”/>
      <forLang>en</forLang>
   </Context>
</useFor>
```

NOTE If a resource description has no <useFor> element, a use context can be added for it by another resource description with the same ‘about’ attribute value.

6.7.2 The <Context> element

6.7.2.1 General

A <useFor> element may have any number of <Context> subelements, each of which introduces a container for the components of a use context.

6.7.2.2 The <eltRef> element

A <Context> element shall have an <eltRef> subelement, specifying a reference to a specific element in a specific structure. The structure may be either one of a socket, a UIID, a target description, or any other relevant resource for a concrete user interface in the context of the URC framework.

The reference shall be specified as value of the attribute ‘resource’ which shall be present on <eltRef>. The value shall be a URI (as specified in IETF RFC 3986), and may include a fragment identifier. Where appropriate, the URI syntax and semantics should follow the XPointer framework.

EXAMPLE 1 A reference to a variable with id=“varId” in the socket description http://example.com/thermometer/socket

<eltRef resource=“http://example.com/thermometer/socket#varId” />

NOTE 1 References to a socket description’s set, command or notification follow the same pattern (“socketURI#elementId”).

EXAMPLE 2 A reference to an implicit group that is automatically created by some URCs as a wrapper for the dimensional variable with id=“dimVarId” in the socket description “http://example.com/thermometer/socket”. This example references the whole set of components of the variables, as opposed to referencing a single component of the variable, as shown in example 1.

<eltRef resource=“http://example.com/thermometer/socket#group(dimVarId)” />

NOTE 2 References to a wrapper for a dimensional set, command or notification follow the same pattern ("socketURI#group(dimElementId)").

EXAMPLE 3 A reference to a group with resource="http://example.com/thermometer/socket/a.gsheet#groupId" in a grouping sheet

<eltRef resource="http://example.com/thermometer/socket/a.gsheet#groupId" />

NOTE 3 References to a group allow for the provision of labels and other atomic resources for groups specified in grouping sheets (see Clause 9).

EXAMPLE 4 A reference to a definition of the type with name="typeName" in the socket description "http://example.com/thermometer/socket".

<eltRef resource="http://example.com/thermometer/socket#typeName" />

NOTE 4 References to a socket-internal type allow for the provision of labels and other atomic resources for variables of that type, and for indices occurring within dimensional sets and elements when the index is of that type. Note that the reference to the type's 'name' attribute value (rather than to the 'id' attribute value) requires that all 'id' and 'name' attribute values are unique within the socket description (see ISO/IEC 24752-2).

EXAMPLE 5 A reference to a definition of the type with name="typeName" in the XML Schema file at the URI "http://example.com/types.xsd".

<eltRef resource="http://example.com/types.xsd#typeName" />

NOTE 5 References to a socket-external type allow for the provision of labels or other atomic resources for variables of that type, and for indices occurring within dimensional sets and elements when the index is of that type.

EXAMPLE 6 A reference to the <uiSocket> root element with id="socketId" in the socket description "http://example.com/thermometer/socket".

<eltRef resource="http://example.com/thermometer/socket#socketId" />

NOTE 6 This allows for the provision of a title/label and other resources for the user interface (socket).

EXAMPLE 7 A reference to the <target> root element with id="targetId" in the target description "http://example.com/thermometer".

<eltRef resource="http://example.com/thermometer#targetId" />

NOTE 7 This allows for the provision of a title/label, location description and other resources for a target.

EXAMPLE 8 A reference to the <locator> element with id="locatorId" in the target description "http://example.com/thermometer".

<eltRef resource="http://example.com/thermometer#locatorId" />

NOTE 8 This allows for the provision of a title/label and other resources for a locator function of a target.

EXAMPLE 9 A reference to an element with id='powerId' in the UIID "http://example.com/thermometer/html".

<eltRef resource="http://example.com/thermometer/html#powerId" />

NOTE 9 This allows for the provision of a title/label and other resources for a user interface implementation description given in HTML.

EXAMPLE 10 A reference to the XML element <container> occurring within a value of the socket variable with id="didlLiteContent" (which is of a complex XML type for browsing a directory of digital media items) in the socket description "http://example.com/mediaPlayer/socket".

<eltRef> http://example.com/mediaPlayer/socket#didlLiteContent//container </eltRef>

NOTE 10 This allows for the provision of a label and other atomic resources for hierarchical content, such as the DIDL-LITE description language for digital media used in UPnP. Typically, such hierarchical content is represented as an XML document of a complex XML type or of type xsd:anyType (i.e. an arbitrary but well-formed XML content tree).

EXAMPLE 11 A reference to the XML element <container> occurring within a value of the complex XML type with name="root.type" which is defined in the namespace "urn:schemas-upnp-org:metadata-1-0/DIDL-Lite".

<eltRef> urn:schemas-upnp-org:metadata-1-0/DIDL-Lite#root.type//container </eltRef>

NOTE 11 This allows for the provision of a label and other atomic resources for hierarchical content, represented as the value of a complex XML type (such as the type "root.type" of the DIDL-LITE namespace) or of type xsd:anyType. This example is similar to example 10, but referring to a socket-external type rather than a socket variable. Thus, the label or other atomic resource applies to the XML content of any socket variable of type "root. type" of namespace "urn:schemas-upnp-org:metadata-1-0/DIDL-Lite".

6.7.2.3 The <valRef> element

A <Context> element may have one or more <valRef> subelements, each specifying a reference to a specific value that the specified element (given by <eltRef>) can have and to which the atomic resource applies. The value reference is specified as element content of the <valRef> element.

EXAMPLE The label "Fahrenheit" is defined for the value "F" of the element with id="scale" in the socket of a thermometer.

```
<AResDesc about="http://example.com/thermometer.rsheet#scale_Fahrenheit">
      <content xml:lang="en">Fahrenheit</content>
      <useFor>
      <Context>
         <eltRef resource="http://example.com/thermometer/socket#scale"/>
         <valRef>F</valRef>
         <role resource="http://openurc.org/ns/res#label"/>
         <forLang>en</forLang>
      </Context>
      </useFor>
</AResDesc>
```

If <valRef> is missing or empty, the atomic resource applies to the referenced element as a whole, rather than to a specific value. If specified multiple times, the resource applies to multiple values of the referenced element.

<valRef> shall not be applied to elements of a target description.

6.7.2.4 The <opRef> element

A <Context> element may have one or more <opRef> subelements, each specifying a reference to a specific operation on the specified element (given by <eltRef>). Operations are referenced by a URI (see IETF RFC 3986) as the value of the 'resource' attribute which shall occur on <opRef>.

EXAMPLE <opRef resource="http://openurc.org/ns/res#up" />

Operation references include but are not limited to:

— *http://openurc.org/ns/res#up* — increase operation for types that have a totally ordered value space. This URI shall only be used in a <useFor> that references either a socket variable whose type has the fundamental facet ordered="total", or that references a range interactor;

— *http://openurc.org/ns/res#down* — decrease operation for types that have a totally ordered value space. This URI shall only be used in a <useFor> that references either a socket variable whose type has the fundamental facet ordered="total", or that references a range interactor.

NOTE Descriptions of the referenced operations can be found at their URIs (e.g. at http://openurc.org/ns/res#up). Resource providers who see the need for additional operation references are encouraged to define new operation reference URIs (in domains other than http://openurc.org), and to provide pertinent descriptions at the locations of the new URIs.

The <opRef> element can be used to provide a resource (such as a label, help text, keyword or access key) for a specific operation on an element in a specific structure (e.g. on a socket variable or UIID interactor).

If <opRef> is missing, the atomic resource applies to the referenced element or to its value directly, rather than to a specific operation on the element. If specified multiple times, the resource applies to multiple operations on the referenced element.

A <Context> element shall either have:

a) no <valRef> and no <opRef> elements;

b) at least one <valRef> and no <opRef> elements; or

c) no <valRef> and at least one <opRef> elements.

6.7.2.5 The <role> element

A <Context> element may have a <role> element, specifying how the atomic resource should be applied to the given element and value.

The role shall be specified as value of the 'resource' attribute on <role>, as URI (see IETF RFC 3986).

EXAMPLE <role resource="http://openurc.org/ns/res#label" />

Allowed role URIs include but are not limited to:

http://openurc.org/ns/res#label — The atomic resource is used to present the element in a user interface.

http://openurc.org/ns/res#help, *http://openurc.org/ns/res#help-purpose*, or *http://openurc.org/ns/res#help-effect* — The atomic resource is used as a help item in a user interface. The International Standard defines the two help categories "purpose" and "effect". http://openurc.org/ns/res#help-purpose specifies that the atomic resource is a statement of the purpose of the element. http://openurc.org/ns/res#help-effect specifies that the atomic resource is a (longer) explanation of the relationship between the state of the element and the state of the target.

http://openurc.org/ns/res#accesskey — This role specifies a single character that can be used in combination with a platform-specific modifier key to move the focus to the element. If the element is bound to a socket command, it will be activated.

http://openurc.org/ns/res#keyword — The atomic resource is a keyword pertaining to the referenced element. Keywords may be used to support other types of navigation through a user interface, such as search or natural language based.

http://openurc.org/ns/res#location — The atomic resource is a location description pertaining to the referenced element. Location descriptions may be applied to <target> elements of target descriptions (see ISO/IEC 24752–4) to provide location information for target devices.

NOTE Descriptions of the roles can be found at their URIs (e.g. at http://openurc.org/ns/res#label. Resource providers who see the need for additional roles are encouraged to define new role URIs (in domains other than http://openurc.org), and to provide pertinent descriptions at the locations of the new URIs.

If a <Context> element has no <role> subelement, the value of the first <role> element for the encompassing resource sheet (see 7.6.7) shall be assumed.

6.7.2.6 The <forLang> element

A <Context> element may have one or more <forLang> elements, each describing the general language context in which the atomic resource can be applied. If <forLang> occurs multiple times with different values, the resource can be applied in multiple language contexts.

<forLang> shall contain a language identifier as element content, or be empty. The format and coding schema of the language identifier shall be as for the 'xml:lang' attribute of the Extensible Markup

Language (XML) 1.0. In addition, an empty <forLang> element indicates that the atomic resource is not language-specific.

EXAMPLE An atomic resource intended to be used only as part of an English user interface would be specified as:

<forLang>en</forLang>

NOTE In general, the language context (specified by <forLang>) is different from the language coding (specified by the 'xml:lang' attribute on , see 6.3.5.2). For example, an atomic resource such as an English movie title (xml:lang="en") may be shown as part of a Spanish TV user interface (<forLang>es</forLang>).

If a <Context> element has no <forLang> subelement, the value of the first <forLang> element for the encompassing resource sheet (see 7.6.5) shall be assumed.

6.7.2.7 The <forTargetInstance> element

A <Context> element may have one or more <forTargetInstance> subelements, each specifying a target instance as element content for which the atomic resource can be applied. If <forTargetInstance> occurs multiple times, the atomic resource applies to every target instance specified.

EXAMPLE <forTargetInstance> AB-3D-7F-3E </forTargetInstance>

NOTE The <forTargetInstance> element is useful for atomic resources that carry installation-specific information. For example, these resources may be stored on a local resource server that resides in a home network.

6.7.3 More examples for <useFor>

This section contains more examples of <useFor> descriptions for atomic resources.

EXAMPLE 1 A label for the volume variable in the socket description of a TV from MyCompany. It applies to English language contexts. Note that it contains no value reference.

```
<useFor>
   <Context>
      <eltRef resource="http://example.com/tv-2003/socketdescription#volume"/>
      <role resource="http://openurc.org/ns/res#label"/>
      <forLang>en</forLang>
   </Context>
</useFor>
```

EXAMPLE 2 Consider an online travel service (version 1.0) from TravelCompany. A simple help text atomic resource (role is "help/purpose") that is specific to the socket variable 'airport', and the value "ORD" is shown below. It can be used in any language context, hence an empty <forLang> element is specified.

```
<useFor>
   <Context>
      <eltRef resource="http://www.travelcompany.com/online/1.0/socketdescr#airport"/>
      <valRef>ORD</valRef>
      <role resource="http://openurc.org/ns/res#help-purpose"/>
      <forLang/>
   </Context>
</useFor>
```

EXAMPLE 3 A French label for the Model-2000 elevator of the company "LiftMaker". This atomic resource references a target description's element with id "elevatorTarget". No value reference is given.

```
<useFor>
      <Context>
         <eltRef resource="http://www.liftmaker.com/model-2000/td#elevatorTarget"/>
         <role resource="http://openurc.org/ns/res#label" />
         <forLang>fr</forLang>
      </Context>
</useFor>
```

EXAMPLE 4 An English label is provided for increasing the socket variable that specifies the volume for a radio. This label could be used to label a small "louder" button as part of a volume slider (the "louder" button would be an implicit part of the UI rendering). Or it could be used to facilitate a simple natural language command to increase the volume.

```
<AResDesc about="http://example.com/radio.rsheet#volume_incr_label">
      <content xml:lang="en">louder</content>
      <useFor>
         <Context>
            <eltRef resource="http://example.com/radio/socket#volume"/>
            <role resource="http://openurc.org/ns/res#label"/>
            <opRef resource="http://openurc.org/ns/res#up"/>
            <forLang>en</forLang>
         </Context>
      </useFor>
</AResDesc>
```

EXAMPLE 5 An English target location description is provided for an electronic building directory (target device instance) that has been installed in a public building.

```
<AResDesc about="http://example.com/directory.rsheet#location">
   <content xml:lang="en">In the North-East corner of the lobby</content>
   <useFor>
      <Context>
         <eltRef resource="http://example.com/directory#target" />
         <role resource="http://openurc.org/ns/res#location" />
         <forLang>en</forLang>
         <forTargetInstance> AB-3D-7F-3E </forTargetInstance>
      </Context>
   </useFor>
</AResDesc>
```

6.8 The <dc:creator> element

An <AResDesc> element may have one or more <dc:creator> subelements, each specifying a creator for an atomic resource as element content. A creator shall be specified as a string, and may be a URI (as specified in IETF RFC 3986).

NOTE 1 A creator is an entity primarily responsible for making the content of an atomic resource (e.g. a person, an organization, or a service). An atomic resource may have multiple creators.

EXAMPLE 1 <dc:creator>MyCorp, Inc.</dc:creator>

NOTE 2 <dc:creator> conforms to the Dublin Core metadata element creator, http://purl.org/dc/elements/1.1/creator

If used to specify a creator according to a formal identification schema, the 'xsi:type' attribute should be used on <dc:creator> to identify a datatype given as QName.

EXAMPLE 3 The following code specifies a creator with code "XYZ", according to the 'creators' type defined in the namespace with prefix 'myns':

```
<dc:creator xsi:type="myns:"> XYZ </dc:creator>
```

If an <AResDesc> element has no <dc:creator> subelement, the values of all <dc:creator> elements for the encompassing resource sheet (see 7.6.8) shall be assumed.

6.9 The <dc:publisher> element

An <AResDesc> element may have one or more <dc:publisher> subelements, each specifying as element content an entity that makes the atomic resource available (e.g. a person, an organization, or a service). A publisher shall be specified as string, and may be a URI (as specified in IETF RFC 3986). An atomic resource may have multiple publishers.

EXAMPLE <dc:publisher>MyCorp, Inc.</dc:publisher>

NOTE <dc:publisher> conforms to the Dublin Core metadata element publisher, http://purl.org/dc/elements/1.1/publisher

If used to specify a publisher according to a formal identification schema, the 'xsi:type' attribute should be used on <dc:publisher> to identify a datatype given as QName.

If an <AResDesc> element has no <dc:publisher> subelement, the values of all <dc:publisher> elements for the encompassing resource sheet (see 7.6.8) shall be assumed.

6.10 The <dc:contributor> element

An <AResDesc> element may have one or more <dc:contributor> subelements, each specifying as element content a contributor to the content of an atomic resource (e.g. a person, an organization, or a service). A contributor shall be specified as string, and may be a URI (as specified in IETF RFC 3986). An atomic resource may have multiple contributors.

EXAMPLE <dc:contributor>MyCorp, Inc.</dc:contributor>

NOTE <dc:contributor> conforms to the Dublin Core metadata element contributor, http://purl.org/dc/elements/1.1/contributor

If used to specify a contributor according to a formal identification schema, the 'xsi:type' attribute should be used on <dc:contributor> to identify a datatype given as QName.

If an <AResDesc> element has no <dc:contributor> subelement, the values of all <dc:contributor> elements for the encompassing resource sheet (see 7.6.8) shall be assumed.

6.11 The <dc:rights> element

An <AResDesc> element may have one or more <dc:rights> subelements, each specifying as element content copyright and other Digital Copyright Management (DCM) related terms of use, as a text string (no formal syntax required).

EXAMPLE <dc:rights>Copyright 2003 by MyCorp, Inc. All rights reserved.</dc:rights>

NOTE <dc:rights> conforms to the Dublin Core metadata element rights, http://purl.org/dc/elements/1.1/rights

If used to specify a rights according to a formal identification schema, the 'xsi:type' attribute should be used on <dc:rights> to identify a datatype given as QName.

If an <AResDesc> element has no <dc:rights> subelement, the values of all <dc:rights> elements for the encompassing resource sheet (see 7.6.8) shall be assumed.

6.12 The <dcterms:audience> element

An <AResDesc> element may have one or more <dcterms:audience> subelements, each specifying as element content a class of entity for whom the atomic resource is intended or useful. The element content may be any string value (no formal syntax required).

EXAMPLE <dcterms:audience>K-2</dcterms:audience>

A class of entity may be determined by the creator or the publisher or by a third party. This may be used in two ways: to identify a class of users or a class of URCs that may use this atomic resource. This International Standard does not define or restrict the use of this property. Future releases of the Standard may, however, define a vocabulary that may be used to describe an audience property of relevance to consumers of atomic resources.

NOTE <dcterms:audience> conforms to the Dublin Core metadata element audience, http://purl.org/dc/terms/audience

If used to specify an audience according to a formal identification schema, the 'xsi:type' attribute should be used on <dcterms:audience> to identify a datatype given as QName.

If an <AResDesc> element has no <dcterms:audience> subelement, the values of all <dcterms:audience> elements for the encompassing resource sheet (see 7.6.6) shall be assumed.

6.13 The <dcterms:hasVersion> element

An <AResDesc> element may have one or more <dcterms:hasVersion> subelements, each referencing a version, edition, abbreviation, summarization, or any adaptation of the described atomic resource. The referenced atomic resource shall be specified as element content, and shall be a URI (as specified in IETF RFC 3986).

EXAMPLE <dcterms:hasVersion>http://example.com/thermometer/anotherRsheet#temp_label_version </dcterms:hasVersion>

NOTE 1 Changing an atomic resource description can lead to a changed identifier (URI). The <dcterms:hasVersion> is a way to express the relation between the original and the derived atomic resource description.

NOTE 2 <dcterms:hasVersion> conforms to the Dublin Core metadata element refinement hasVersion, http://purl.org/dc/terms/hasVersion which is a refinement of http://purl/org/dc/elements/1.1/relation

If an <AResDesc> element has no <dcterms:hasVersion> subelement, no values shall be inherited from the encompassing resource sheet.

NOTE 3 Inheriting a resource sheet's value of <dcterms:hasVersion> would not be meaningful since it references a resource sheet (rather than an atomic resource).

6.14 The <dcterms:isVersionOf> element

An <AResDesc> element may have one or more <dcterms:isVersionOf> subelements, each referencing an atomic resource that the described atomic resource is a version, edition or any adaptation of. The referenced atomic resource shall be specified as element content, and shall be a URI (as specified in IETF RFC 3986).

EXAMPLE <dcterms:isVersionOf>http://example.com/thermometer/anotherRsheet#temp_label </dcterms:isVersionOf>

NOTE 1 Changing an atomic resource description can lead to a changed identifier (URI). The <dcterms:hasVersion> is a way to express the relation between the derived and the original atomic resource description.

NOTE 2 <dcterms:isVersionOf> conforms to the Dublin Core metadata element isVersionOf, http://purl.org/dc/terms/isVersionOf which is a refinement of http://purl.org/dc/element/1.1/relation.

If an <AResDesc> element has no <dcterms:isVersionOf> subelement, no values shall be inherited from the encompassing resource sheet.

NOTE 3 Inheriting a resource sheet's value of <dcterms:isVersionOf> would not be meaningful since it references a resource sheet (rather than an atomic resource).

6.15 The <dcterms:isReplacedBy> element

An <AResDesc> element may have one or more <dcterms:isReplacedBy> subelements, each specifying an atomic resource that supplants, displaces, or supersedes the described atomic resource. The referenced atomic resource shall be specified as value of an 'resource' attribute on <dcterms:isReplacedBy>, and shall be a URI (as specified in IETF RFC 3986).

EXAMPLE <dcterms:isReplacedBy resource="http://example.com/thermometer/anotherRsheet#temp_label_repl" />

NOTE 1 The <dcterms:isReplacedBy> is a way to express that an atomic resource description is obsolete, and that its identified replacement should be used instead.

NOTE 2 <dcterms:isReplacedBy> conforms to the Dublin Core metadata element refinement isReplacedBy, http://purl.org/dc/terms/isReplacedBy which is a refinement of http://purl/org/dc/elements/1.1/relation

If an <AResDesc> element has no <dcterms:isReplacedBy> subelement, no values shall be inherited from the encompassing resource sheet.

NOTE 3 Inheriting a resource sheet's value of <dcterms:isReplacedBy> would not be meaningful since it references a resource sheet (rather than an atomic resource).

6.16 The <dcterms:replaces> element

An <AResDesc> element may have one or more <dcterms:replaces> subelements, each specifying that the described atomic resource supplants, displaces, or supersedes the referenced atomic resource. This means that the described atomic resource may be used instead of the referenced atomic resource, in any use context specified by the referenced atomic resource. The referenced atomic resource shall be specified as value of an 'resource' attribute on <dcterms:replaces>, and shall be a URI (as specified in IETF RFC 3986).

EXAMPLE 1 <dcterms:isReplacedBy resource="http://example.com/thermometer/rsheet#temp_label" />

NOTE 1 The <dcterms:replaces> can be used if an atomic resource description is created to replace an obsolete one.

EXAMPLE 2 A possible use case for the <dcterms:isReplacedBy> and <dcterms:replaces> elements is a target manufacturer wanting to replace an erroneous resource (and its description) that is hard-coded in a target, by a resource that is available through the target manufacturer's resource service. The old (hard-coded) resource would be tagged with a <dcterms:isReplacedBy> element, and the new one (in the resource service) with <dcterms:replaces>.

NOTE 2 <dcterms:replaces> conforms to the Dublin Core metadata element refinement isReplacedBy, http://purl.org/dc/terms/replaces which is a refinement of http://purl/org/dc/elements/1.1/relation.

If an <AResDesc> element has no <dcterms:replaces> subelement, no values shall be inherited from the encompassing resource sheet.

NOTE 3 Inheriting a resource sheet's value of <dcterms:replaces> would not be meaningful since it references a resource sheet (rather than an atomic resource).

6.17 Other elements from DCMI

Additionally, an <AResDesc> element may have any number of any element and element refinement from the Dublin Core Metadata Initiative (DCMI) Metadata Terms document (see ISO 15836) as subelements, to describe an atomic resource, if appropriate. Each of them may occur multiple times.

For any of these elements, the 'xsi:type' attribute may be used to identify a datatype (given as QName) used for the coding of the contained literal.

For any DCMI Metadata Term that is not present on an <AResDesc> element, but present on its encompassing <ResSheet> element (see 7.5), the <AResDesc> element shall inherit all values from the encompassing <ResSheet> element.

7 Resource sheet — <ResSheet>

7.1 General

A resource sheet is a file that contains atomic resource descriptions. These atomic resource descriptions are typically describing atomic resources of a particular domain, language, or type, or any combination of these. However, this structure is not required by the International Standard.

A resource sheet may be provided by a target (referenced from its target description), or by any resource service.

A resource sheet file shall have a MIME type of "application/urc-ressheet+xml", if applicable (as specified in IETF RFC 2046). The 'charset' parameter (see IETF RFC 3023) should be used to specify the character

encoding of the resource sheet. Its value shall be “utf-8” or “utf-16”. If the ‘charset’ parameter is absent, the procedure specified in “Extensible Markup Language (XML) 1.0 (Fifth Edition)”, section 4.3.3 shall be followed to determine the character encoding.

A resource sheet shall be written in XML format, and coded in UCS according to ISO/IEC 10646. For character encoding, “UTF-8” or “UTF-16” shall be used.

A resource sheet shall have the <ResSheet> element as root element of the namespace “http://openurc.org/ns/rsheet-2”. The namespace identifier ‘rs’ should be used in resource sheets or this namespace should be made the default namespace (as in the example below).

A resource sheet is described in terms of its properties, scents and contained atomic resource descriptions. *Properties* apply to the resource sheet as a whole (see 7.2, 7.3, 7.4, and 7.5). *Scents* describe the occurrence of a particular property value on at least one of the contained atomic resource descriptions (see 7.6).

Most scents of the resource sheet are automatically inherited by the contained atomic resources, unless otherwise specified at the atomic resource sheet level (see 6.5, 6.6, 6.7.2.5, 6.7.2.6, 6.8, 6.9, 6.10,6.11, 6.12, and 6.17, but with the exception of 6.13, 6.14, 6.15, and 6.16).

EXAMPLE The following is a shortened example of a resource sheet for an electronic thermostat. See Annex A for a full example. As typical, namespace identifiers are defined within the <ResSheet> root element.

```
<?xml version=”1.0” encoding=”UTF-8”?>
<!-- Note: This document should be served with a MIME type of ”application/urc-
ressheet+xml”, if applicable -->
<ResSheet
   about=”http://openurc.org/res/devices/basic-thermostat.rsheet”
   xmlns=”http://openurc.org/ns/rsheet-2” xmlns:dc=”http://purl.org/dc/elements/1.1/”
   xmlns:dcterms=”http://purl.org/dc/terms/” xmlns:xsi=”http://www.w3.org/2001/
XMLSchema-instance”
   xsi:schemaLocation=”http://openurc.org/ns/rsheet-2 http://openurc.org/ns/rsheet-2
   http://purl.org/dc/elements/1.1/http://dublincore.org/schemas/
xmls/qdc/2006/01/06/dc.xsd
   http://purl.org/dc/terms/http://dublincore.org/schemas/xmls/qdc/2006/01/06/dcterms.xsd”>
   <dcterms:modified>2011-09-14</dcterms:modified>
   <dcterms:conformsTo>http://openurc.org/ns/rsheet-2/isoiec24752-5-2013</
dcterms:conformsTo>
   <dc:creator>Vishal Bhuva</dc:creator>
   <dc:contributor>Gottfried Zimmermann</dc:contributor>
   <dc:publisher>OpenURC Alliance</dc:publisher>
   <dc:title xml:lang=”en”>Resource sheet for Thermostat connected via Wi-Fi</dc:title>
   <scents>
      <dc:type>Text</dc:type>
      <forDomain>http://openurc.org/res/devices/basic-thermostat.uis</forDomain>
      <forLang>en</forLang>
   </scents>

   <resItems>

   <!-- labels for groups -->
   <AResDesc
      about=”http://openurc.org/res/devices/basic-thermostat.rsheet#mainGroup”>
      <content xml:lang=”en”>Main Group</content>
      <useFor>
         <Context>
            <eltRef resource=”http://openurc.org/res/devices/basic-thermostat.
uis#mainGroup”/>
            <role resource=”http://openurc.org/ns/res#label”/>
         </Context>
      </useFor>
   </AResDesc>
<!-- labels for socket elements -->

   <AResDesc
      about=”http://openurc.org/res/devices/basic-thermostat.rsheet#modelNumber”>
      <content xml:lang=”en”>Model Number</content>
      <useFor>
         <Context>
```



```
            <eltRef resource="http://openurc.org/res/devices/basic-thermostat.
uis#modelNumber"/>
         <role resource="http://openurc.org/ns/res#label"/>
         </Context>
      </useFor>
   </AResDesc>

   <!-- More atomic resource descriptions -->
   </resItems>
</ResSheet>
```

7.2 The 'about' attribute

The <ResSheet> element may have an 'about' attribute specifying an unambiguous identifier of the resource sheet. This shall be a globally unique identifier in the form of a Uniform Resource Identifier (URI, as specified in IETF RFC 3986), with no fragment identifier appended. This URI may or may not be resolvable.

NOTE 1 Target manufacturers and resource providers are encouraged to make resource sheets publicly available by posting the resource sheet at the URI specified by the 'about' attribute.

NOTE 2 The identifier as a value of the attribute about conforms to the Dublin Core metadata element identifier, http://purl.org/dc/elements/1.1/identifier

If the 'about' attribute is not present, the pertaining resource sheet is called "anonymous resource sheet".

7.3 The <dcterms:modified> element

The <ResSheet> element may have a <dcterms:modified> subelement. However, it is strongly recommended to be used for resource sheets that were changed after deployment. The presence of <dcterms:modified> indicates that the resource sheet has been modified from its original version, but still uses the same identifier ('about' attribute, see section 7.2).

If present, the <dcterms:modified> element shall contain the latest modification date of the resource sheet as element content which shall be of type xsd:date or xsd:dateTime.

EXAMPLE <dcterms:modified>2003-12-30</dcterms:modified>

NOTE <dcterms:modified> conforms to the Dublin Core metadata element refinement modified, http://purl.org/dc/terms/modified

A resource sheet should remain stable as much as possible once it has been made available to URCs or resource services. A resource sheet that has already been deployed may be changed only if its identifier ('about' attribute) or its modification date is changed.

7.4 The <dcterms:conformsTo> element

The <ResSheet> element shall have one or more <dcterms:conformsTo> subelements, each specifying a reference to an established standard to which the resource sheet and its contents (atomic resource descriptions) conform. The value of each <dcterms.conformsTo> element shall be a URI (as specified in IETF RFC 3986), and shall be provided as element content.

EXAMPLE <dcterms:conformsTo>http://openurc.org/ns/rsheet-2/isoiec24752-5-2013<dcterms:conformsTo/>

The value "http://openurc.org/ns/rsheet-2/isoiec24752-5-2013" indicates that the described resource sheet conforms to this International Standard.

NOTE 1 Multiple occurrences are allowed to indicate compatibility with future versions of this International Standard, or with other implementation guidelines.

NOTE 2 The value of the <dcterms:conformsTo> element can be used when testing for conformance of a resource sheet.

NOTE 3 <dcterms:conformsTo> conforms to the Dublin Core metadata element refinement conformsTo, http://purl.org/dc/terms/conformsTo which is a refinement of the Dublin Core element http://purl.org/dc/elements/1.1/relation

7.5 Other resource sheet properties from DCMI

The <ResSheet> element may have any number of elements and element refinements from Dublin Core Metadata Terms (see ISO 15836) as subelements, if appropriate, to describe the resource sheet. Each of them may occur multiple times.

In particular, the following Dublin Core Metadata terms may occur:

— <dc:creator>

— <dc:publisher>

— <dc:contributor>

— <dc:rights>

— <dc:title> (with optional 'xml:lang' attribute)

NOTE These elements describe the resource sheet as a whole. In contrast, resource sheet scents (see 7.6) describe individual atomic resources in the resource sheet, and their properties.

7.6 The <scents> element

7.6.1 General

The <ResSheet> element may have a <scents> subelement.

If present, the <scents> element may have any number of subelements, providing hints as to what the resource sheet contains. The presence of each of these scent elements indicates that the scent value applies to at least one atomic resource in the resource sheet. The same scent elements may hereby occur multiple times, but with different values.

NOTE Scents apply to individual atomic resources. In contrast, resource sheet properties (see 7.2, 7.3, 7.4, and 7.5) apply to the resource sheet as a whole.

7.6.2 The <dc:type> element

A <dc:type> element may occur any number of times underneath the <scents> element. If present, it specifies an atomic resource type that applies to one or more atomic resources in the resource sheet.

The value space is the same as for the <dc:type> element for atomic resource descriptions (see 6.5).

EXAMPLE <dc:type>Text</dc:type>

7.6.3 The <dc:format> element

A <dc:format> element may occur any number of times underneath the <scents> element. If present, it specifies an atomic resource format that applies to one or more atomic resources in the resource sheet.

The value space is the same as for the <dc:format> element for atomic resource descriptions (see 6.6).

EXAMPLE <dc:format>text/xml</dc:format>

7.6.4 The <forDomain> element

A <forDomain> element may occur any number of times underneath the <scents> element. If present, each <forDomain> element shall specify a URI (as specified in IETF RFC 3986) as element content. Each

URI indicates that a domain with the given URI is used as use context in one or more atomic resource descriptions in the resource sheet. A domain of an atomic resource is the first part (URI) of the <eltRef> value, referencing a structure (e.g. socket) which an atomic resource applies to (see 6.7.3.2).

EXAMPLE <forDomain>http://example.com/thermometer/socket</forDomain>

7.6.5 The <forLang> element

A <forLang> element may occur any number of times underneath the <scents> element. If present, it specifies a language context that applies to one or more atomic resources in the resource sheet.

The value space for <forLang> is the same as for <forLang> of atomic resources (see 6.7.3.6).

EXAMPLE <forLang>en</forLang>

7.6.6 The <dcterms:audience> element

A <dcterms.audience> element may occur any number of times underneath the <scents> element. If present, it specifies an audience that one or more atomic resources are ascribed to.

The value space is the same as for the <dcterms:audience> element for atomic resource descriptions (see 6.12).

EXAMPLE <dcterms:audience>K-2</dcterms:audience>

7.6.7 The <role> element

A <role> element may occur any number of times underneath the <scents> element. If present, it specifies a role URI that is used in a use context of one or more atomic resource descriptions in the resource sheet.

The role shall be specified as value of the 'resource' attribute on <role>, as URI (see IETF RFC 3986). The value space for <role> is the same as for <role> for use contexts of atomic resources (see 6.7.2.5).

EXAMPLE <role resource="http://openurc.org/ns/res#label" />

7.6.8 Other resource sheet scents from DCMI

Any other element and element refinement from the Dublin Core Metadata Initiative (DCMI) Metadata Terms document (see ISO 15836) may occur as subelement of <scents> any number of times, indicating a scent that applies to one or more resource descriptions in the resource sheet.

7.7 The <resItems> element

7.7.1 General

The <resItems> element shall occur exactly once as subelement of <ResSheet>.

7.7.2 Subelements of <resItems>

The <resItems> element shall contain one or more <AResDesc> elements as subelements (see Clause 6).

7.8 Security considerations

For applications and environments that are sensitive to privacy and integrity, resource sheets should be protected by an appropriate level of security. Vendors and platform carriers are strongly encouraged to consider the employment of privacy and integrity services, such as transport security (e.g. HTTP over TLS). However, concrete security measures are outside the scope of this International Standard.

8 Grouping resource — <Grouping>

8.1 General

A grouping resource (short “grouping”) specifies a presentational structure of user interface socket elements or UIID elements in a top-down fashion that is external to a socket description. In a grouping individual subgroups and user interface elements may occur multiple times (in different parent groups).

A grouping shall be written in XML format, and coded in UCS according to ISO/IEC 10646. It is specified by the <Grouping> element which may occur one or multiple times in a grouping sheet (see Clause 9). A group in one grouping sheet may reference another group in the same or in a different grouping sheet as its subgroup.

NOTE Part 1 of this International Standard requires at least one grouping per socket, containing references to all of its elements that are supposed to be shown to the user, but no references to elements of other sockets or UIIDs.

EXAMPLE Grouping for the UI socket description of a digital thermostat.

```
<Grouping about=”http://openurc.org/res/devices/basic-thermostat.gsheet#grouping”>
   <forDomain resource=”http://openurc.org/res/devices/basic-thermostat.uis”/>
   <mainGroup resource=”http://openurc.org/res/devices/basic-thermostat.
gsheet#mainGroup”/>
   <modalGroup resource=”http://openurc.org/res/devices/basic-thermostat.
gsheet#resetNotifyGroup”/>
   <modalGroup resource=”http://openurc.org/res/devices/basic-thermostat.
gsheet#connectionErrorGroup”/>
   <groups>
      <Group about=”http://openurc.org/res/devices/basic-thermostat.gsheet#mainGroup”>
         <cohesion>weak</cohesion>
         <eltRef resource=”http://openurc.org/res/devices/basic-thermostat.
uis#modelNumber”/>
         <eltRef resource=”http://openurc.org/res/devices/basic-thermostat.
uis#operatingMode”/>
         <eltRef resource=”http://openurc.org/res/devices/basic-thermostat.
uis#temperatureUnit”/>
         <eltRef resource=”http://openurc.org/res/devices/basic-thermostat.
uis#currentRoomTemp”/>
         <eltRef resource=”http://openurc.org/res/devices/basic-thermostat.
uis#targetTemp”/>
         <eltRef resource=”http://openurc.org/res/devices/basic-thermostat.
uis#incrTargetTemp”/>
         <eltRef resource=”http://openurc.org/res/devices/basic-thermostat.
uis#decrTargetTemp”/>
         <groupRef resource=”http://openurc.org/res/devices/basic-thermostat.
gsheet#programGroup”/>
      </Group>
      <Group about=”http://openurc.org/res/devices/basic-thermostat.gsheet#programGroup”>
         <cohesion>normal</cohesion>
         <setRef resource=”http://openurc.org/res/devices/basic-thermostat.uis#program”/>
         <eltRef resource=”http://openurc.org/res/devices/basic-thermostat.
uis#resetProgram”/>
      </Group>
      <Group about=”http://openurc.org/res/devices/basic-thermostat.
gsheet#resetNotifyGroup”>
         <forNotify resource=”http://openurc.org/res/devices/basic-thermostat.
uis#confirmReset”/>
      </Group>
      <Group about=”http://openurc.org/res/devices/basic-thermostat.
gsheet#connectionErrorGroup”>
         <forNotify resource=”http://openurc.org/res/devices/basic-thermostat.
uis#connectionError”/>
      </Group>
   </groups>
</Grouping>
```


8.2 The 'about' attribute

A <Grouping> element may have an 'about' attribute, specifying an unambiguous identifier of a grouping. This shall be a globally unique identifier in the form of a Uniform Resource Identifier (URI, as specified in IETF RFC 3986), including a trailing fragment identifier. The URI may or may not be resolvable.

NOTE 1 Target manufacturers and resource providers are encouraged to make groupings publicly available by posting the grouping at the URI specified by the 'about' attribute.

NOTE 2 A good practice is to use as identifier the identifier (URI) of the grouping sheet that contains the grouping, followed by a hash sign '#', followed by a fragment identifier that is unique within the grouping sheet (see example above).

If the 'about' attribute is not present, the pertaining grouping is called "anonymous grouping".

A grouping should be stable as much as possible. If a grouping needs to be changed after it was made available to URCs or resource services, either its identifier ('about' attribute value) or the latest modification date of the containing grouping sheet (see 9.3) should be changed.

NOTE 3 The identifier as a value of the attribute about conforms to the Dublin Core metadata element identifier, http://purl.org/dc/elements/1.1/identifier

8.3 The <forDomain> element

The <forDomain> element may occur one or multiple times as subelement of <Grouping>. It is used to specify the domain(s) of the user interface elements that occur as the leaves of the group tree described by the grouping.

Each <forDomain> element shall have a URI (as specified in IETF RFC 3986) as element content, referencing a UI socket or UIID by its name. However, the URI shall not have a fragment identifier.

EXAMPLE 1 The following code specifies that the grouping references elements of the socket http://example.com/bigapplication/socket:

<forDomain>http://example.com/bigapplication/socket</forDomain>

EXAMPLE 2 The following code specifies that the grouping references elements from two different sockets (http://example.com/bigapplication/socket and http://example.com/anotherapplication/socket):

<forDomain>http://example.com/bigapplication/socket</forDomain>

<forDomain>http://example.com/anotherapplication/socket</forDomain>

If a <Grouping> element has no <forDomain> subelement, it inherits the domain URI(s) that is/are specified for the encompassing <GrpSheet> element (see 9.6.2).

8.4 The <forLang> element

The <forLang> element may occur one or multiple times within a <Grouping> element. If specified multiple times with different values (language identifiers), the grouping can be applied in multiple language contexts.

<forLang> describes the general language context in which the grouping can be applied. <forLang> shall contain a language identifier as text content, or be empty. The format and coding schema of the language identifier is the same as for the 'xml:lang' attribute (see 6.3.5.2). In addition, an empty <forLang> element indicates that the grouping is language-independent.

EXAMPLE A grouping intended to be used as part of an English user interface could be specified as: <forLang>en</forLang>

If a <Grouping> element has no <forLang> subelement, it inherits the language values that are specified for the encompassing <GrpSheet> element (see 9.6.3), if any.

8.5 Elements from DCMI

Any element and element refinement from the Dublin Core Metadata Initiative (DCMI) Metadata Terms document (see ISO 15836) may be used to annotate a grouping, if appropriate. Each of them may occur multiple times as subelement of <Grouping>.

For any of these elements, the 'xsi:type' attribute may be used to identify a datatype (given as QName) used for the coding of the contained literal.

NOTE Groupings can contain DCMI properties in the same way as atomic resource descriptions can. See 6.8 through 6.17 for examples.

For any DCMI Metadata Term that is not present on a <Grouping> element, but present on its encompassing <GrpSheet> element (see 9.6.4), the <Grouping> element shall inherit all values from the encompassing <GrpSheet> element.

8.6 The <mainGroup> element

The <mainGroup> element shall occur exactly once as subelement of <Grouping>. It specifies the main (i.e. all encompassing) group for the described grouping.

The main group shall be referenced by its URI (as specified in IETF RFC 3986) which shall be coded as the value of a 'resource' attribute which shall occur once.

NOTE The group referenced as main group can be internal (i.e. defined inside the same <Grouping> element or external (i.e. defined in a different <Grouping> element which may or may not be in the same file).

8.7 The <modalGroup> element

The <modalGroup> element may occur any number of times as subelement of <Grouping>. It specifies a group to be used as a modal dialog, triggered by a specified socket notification.

A modal dialog group shall be referenced by its URI (as specified in IETF RFC 3986) and shall be coded as the value of an 'resource' attribute which shall occur once.

NOTE 1 The group referenced as modal dialog group can be internal (i.e. defined inside the same <Grouping> element or external (i.e. defined in a different <Grouping> element which may or may not be in the same file).

Any socket notification that is not included in a grouping by way of the <modalGroup> and <forNotify> elements, shall be deemed as not being part of the grouping.

NOTE 2 Typically, a group that is used as modal dialog would not be referenced from the main dialog or any of its descendants, since it would not be triggered by a target-initiated notification rather than by user-initiated navigation.

8.8 The <groups> element

8.8.1 General

The <groups> element may occur once as subelement of <Grouping>.

8.8.2 The <Group> element

The <Group> element may occur one or more times as subelement of <groups>. If present, it defines a group with a specified identifier ('about' attribute, see 8.8.2.1).

The order of <groupRef> elements (see 8.8.2.3) occurring within the same <Group> element is significant.

EXAMPLE The order of the <groupRef> elements may be used for navigation, for example when a user presses the TAB key to traverse through a hierarchy of groups in linear order.

NOTE 1 The grouping does not contain explicit information on linear navigation, such as provided by the 'tabindex' attribute of HTML. When linear navigation is provided to the user, implementers are encouraged to traverse the tree of groups and elements in a depth-first manner, following the order of the <groupRef>, <eltRef> and <setRef> elements under the same <Group> element.

NOTE 2 Part 1 of this International Standard requires that label resources be provided for all <Group> elements of the one required grouping per socket.

NOTE 3 The structure of the presentational groups and their number of entries is an important aspect of user interface design, and should be chosen carefully. While user interface design is out of scope for this International Standard, a menu size of 5-7 elements has been found to be suitable for many use situations.

8.8.2.1 The 'about' attribute

An 'about' attribute shall be present on the <Group> element. It specifies an unambiguous identifier for a group. This shall be a globally unique identifier in the form of a Uniform Resource Identifier (URI, see IETF RFC 3986), including a trailing fragment identifier. The URI may or may not be resolvable.

NOTE 1 A group can be referenced by its URI from <mainGroup> or <groupRef> elements which may be part of the same or other <Grouping> elements.

NOTE 2 A good practice is to use as identifier the identifier (URI) of the grouping that contains the group, followed by a hash sign '#', followed by a fragment identifier that is unique within the grouping.

8.8.2.2 The <cohesion> element

A <cohesion> element may occur once as subelement of <Group>.

It specifies the level of cohesion of the group, i.e. how strongly the group's elements cohere to each other relative to their coherence to the siblings of the group. The siblings are determined by following the hierarchical structure of the pertinent <Grouping> element in a top-down fashion; siblings are all other <Group> elements that are referenced by <groupRef> from the parent of the group.

The cohesion level shall be coded as element content. Valid cohesion levels are "strong", "normal" or "weak", with the following interpretations:

— "strong": Very strong cohesion, to the exclusion of all other groups. In other words, when dealing with this group, the user probably does not need to access other groups at all. It is recommended to use the group label when presenting this group. It is also recommended that only this group be included in a presentation, though a navigation route to reach the other available parts of the presentation shall be available.

— "normal": This is a group of items that fit logically together. It is recommended to use the group label when presenting this group.

— "weak": These items can be grouped together but need not be explicitly identified as a group.

The default value is "normal".

8.8.2.3 The <groupRef> element

The <groupRef> element may occur one or multiple times as subelement of <Group>, but only if <Group> does not include a <forNotify> element (see 8.8.2.6). It references a group to be used as subgroup of the described group. Thus multiple levels of groups can be defined in groupings.

<groupRef> shall have exactly one attribute 'resource'. The value of the 'resource' attribute shall reference a subgroup by its identifier (as given by the value of the subgroup's 'about' attribute).

Loops in grouping are not permitted, i.e. a group shall not reference itself nor any of its ancestor groups as subgroup.

NOTE This does not rule out that one group can have multiple parent groups, see 8.1.

8.8.2.4 The <eltRef> element

The <eltRef> element may occur one or multiple times as subelement of <Group>. It references a socket element (variable, constant or command) to be used as an element of the described group.

NOTE 1 Socket elements are the leaves of the grouping tree, as described by a grouping.

<eltRef> shall have exactly one attribute 'resource'. The value of the 'resource' attribute shall reference a socket element or UIID element by its identifier as URI (see IETF RFC 3986).

A <Group> element shall not have multiple <eltRef> elements with the same 'resource' value, i.e. one element shall not be referenced multiple times from the same group.

NOTE 2 This does not rule out that one socket element can be contained in multiple groups, see 8.1.

8.8.2.5 The <setRef> element

The <setRef> element may occur one or multiple times as subelement of <Group>. It references a set in a socket description. All variable and command elements (notifications are exempt) that are direct members of the referenced set shall be used as elements of the described group. Subsets of the referenced set and their members shall not be included in the described group.

NOTE 1 If <setRef> is the only subelement of a <Group>, labels and other atomic resources for the referenced set are also applicable to the group specified by the <Group> element, as a convention. However, more specific labels and atomic resources can be specified by referencing the 'about' value of the surrounding <Group> element.

NOTE 2 The group may add other elements not contained in the referenced set(s), by using the <eltRef> element.

<setRef> shall have exactly one attribute resource. The value of the 'resource' attribute references a <set> element of a socket description by its identifier (URI, see IETF RFC 3986).

A <Group> element shall not have multiple <setRef> elements with the same 'resource' value, i.e. one set shall not be referenced multiple times from the same group.

NOTE 3 This does not rule out that one set can be referenced from multiple groups, see 8.1.

8.8.2.6 The <forNotify> element

The <forNotify> element may occur one or more times inside a <Group> element, but only if the following is true: (1) The containing group does not include a <groupRef> element (see 8.8.2.3); and (2) the containing group is used in a modal fashion, i.e. is referenced by a <modalGroup> element (see 8.7). Otherwise it shall not occur.

The <forNotify> element specifies a socket notification element that the modal group is bound to, i.e. that triggers the presentation of the modal group. Multiple notify elements may trigger the presentation of one group.

The notify element reference is specified as value of the attribute 'resource' which shall be present. Its format shall be a URI (see IETF RFC 3986), followed by a pound sign '#' and a trailing fragment identifier.

NOTE 1 A notification is usually not part of the hierarchical navigation specified by the main group and its subgroups. In order to include it as a modal dialog to be triggered when the notification becomes active, an author needs to define a group for it (by the <Group> element, see 8.8.2), and reference the notification in the group by the <notifyFor> element.

NOTE 2 A modal group triggered by a notification can have additional references to socket elements (by the <eltRef> and <setRef> elements). In case of the notification becoming active, those referenced elements will be presented to the user as part of the modal dialog, in addition to the notification itself.

NOTE 3 Making <forNotify> a subelement of <Group> does not restrict the re-usability of a Group definition. For example, one could re-use a group definition in an external grouping definition by extending the external Group definition by the <forNotify> element, as shown in the following code fragment:

