

# VIMCOX - Virtual Museum and Cultural Object Exchange Format

Specification of the XML-Schema vimcox-1.0.xsd

Version 1.0

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***Abstract:*** This specification reports the metadata element set VIMCOX. It is for describing digitized cultural objects and virtual museums. VIMCOX based on several international standards. Digital representations of virtual museums and cultural objects must be stored in a adequate data structure. This serves to digital preservation and ensure the quality of the digitized data. The implementation of the metadata element set VIMCOX are described.

***Keywords:*** Metadata element set, XML Schema, Cultural Heritage, Virtual Museum, Metadata Standard

# Contents

<b>1</b>	<b>Introduction</b>	<b>8</b>
<b>2</b>	<b>Virtual Museum</b>	<b>10</b>
<b>3</b>	<b>Existing Metadata Standards</b>	<b>11</b>
3.1	DCMES . . . . .	11
3.2	CDWA Lite . . . . .	11
3.3	museumdat . . . . .	11
3.4	SPECTRUM . . . . .	12
3.5	LIDO . . . . .	12
3.6	VRA Core . . . . .	12
<b>4</b>	<b>VIMCOX Elements</b>	<b>13</b>
4.1	Administrative Metadata . . . . .	14
4.1.1	title . . . . .	14
4.1.2	creator . . . . .	14
4.1.3	date_created . . . . .	15
4.1.4	rights . . . . .	15
4.1.5	date_modified . . . . .	16
4.2	Deskriptive Metadata . . . . .	18
4.2.1	descriptiveNote . . . . .	18
4.2.2	creator . . . . .	18
4.2.3	measurements . . . . .	19
4.2.4	creation_date . . . . .	19
4.2.5	displayCreationLocation . . . . .	20
4.2.6	style . . . . .	20
4.2.7	displayMaterialsTech . . . . .	20
4.2.8	material_set . . . . .	21
4.2.9	production_period . . . . .	22

---

4.2.10	type	22
4.3	Museum Metadata	22
4.3.1	administrative_museum_metadata	23
4.3.1.1	company	23
4.3.2	descriptive_museum_metadata	23
4.3.2.1	abbreviation	24
4.3.2.2	contact_information	24
4.3.2.3	history	28
4.3.2.4	statistic	29
4.3.2.5	address	29
4.3.2.6	coordinates	30
4.4	Building Metadata	32
4.4.1	id	32
4.4.2	administrative_building_metadata	32
4.4.3	descriptive_building_metadata	33
4.4.3.1	barrier_free	33
4.4.3.2	exhibition_space	33
4.4.3.3	dating	34
4.4.3.4	outside_world_textur	34
4.4.3.5	year_of_construction	35
4.4.3.6	number_of_levels	35
4.4.3.7	level	36
4.4.3.8	last_change	40
4.5	Room Metadata	41
4.5.1	id	41
4.5.2	administrative_room_metadata	41
4.5.2.1	textures	41
4.5.2.2	source_folder	42
4.5.2.3	view_direction	42
4.5.3	descriptive_room_metadata	43
4.5.3.1	threshold	43
4.5.3.2	mainentrance	45
4.5.3.3	mainentrance_absolute_coordinates	45
4.5.3.4	outdoor	45
4.5.3.5	object	46
4.6	Object Metadata	47
4.6.1	id	48
4.7	Image Metadata	48

---

4.7.1	administrative_image_metadata . . . . .	48
4.7.1.1	texturesource . . . . .	48
4.7.1.2	x3dsource . . . . .	49
4.7.1.3	thumbnailsource . . . . .	49
4.7.1.4	passepourt_size . . . . .	49
4.7.1.5	frame_size . . . . .	50
4.7.2	descriptive_image_metadata . . . . .	51
4.7.2.1	production_method . . . . .	51
4.7.2.2	resolution . . . . .	51
4.7.2.3	compression_method . . . . .	52
4.7.2.4	color_depth . . . . .	52
4.7.2.5	lom_interaction . . . . .	52
4.7.2.6	audio_clip_id . . . . .	53
4.8	Sculpture Metadata . . . . .	54
4.8.1	administrative_sculpture_metadata . . . . .	54
4.8.1.1	texturesource . . . . .	54
4.8.1.2	x3dsource . . . . .	54
4.8.1.3	thumbnailsource . . . . .	54
4.8.1.4	descriptive_sculpture_metadata . . . . .	55
4.8.1.5	production_method . . . . .	55
4.8.1.6	lom_interaction . . . . .	55
4.9	Interaction Canvas Metadata . . . . .	55
4.9.1	administrative_interaction_canvas_metadata . . . . .	56
4.9.1.1	thumbnailsource . . . . .	56
4.9.1.2	resolution . . . . .	56
4.9.1.3	sensor_size . . . . .	57
4.9.1.4	fps . . . . .	57
4.9.1.5	descriptive_interaction_canvas_metadata . . . . .	58
4.9.1.6	production_method . . . . .	58
4.9.1.7	lom_interaction . . . . .	58
4.10	Door Metadata . . . . .	58
4.10.1	administrative_door_metadata . . . . .	59
4.10.1.1	texture . . . . .	59
4.10.1.2	x3dsource . . . . .	60
4.10.1.3	thumbnailsource . . . . .	60
4.10.1.4	frame . . . . .	60
4.10.2	descriptive_door_metadata . . . . .	61
4.11	Window Metadata . . . . .	61

---

4.12	Media Metadata . . . . .	61
4.13	Audio Metadata . . . . .	61
4.13.1	administrative_audio_metadata . . . . .	62
4.13.1.1	path . . . . .	62
4.13.2	descriptive_audio_metadata . . . . .	62
4.13.2.1	album . . . . .	63
4.13.2.2	genre . . . . .	63
4.13.2.3	year . . . . .	64
4.13.2.4	filesize . . . . .	64
4.13.2.5	bit_rate . . . . .	64
4.13.2.6	duration . . . . .	65
4.13.2.7	format . . . . .	65
4.14	Video Metadata . . . . .	65
4.14.1	administrative_video_metadata . . . . .	65
4.14.1.1	path . . . . .	66
4.14.2	descriptive_video_metadata . . . . .	66
4.14.2.1	filesize . . . . .	66
4.14.2.2	duration . . . . .	66
4.14.2.3	format . . . . .	67
4.14.2.4	subject . . . . .	67
4.14.2.5	resolution . . . . .	67
4.15	Interior Metadata . . . . .	67
4.15.1	administrative_interior_object_metadata . . . . .	68
4.15.1.1	textures . . . . .	68
4.15.1.2	x3dsouce . . . . .	68
4.15.1.3	thumbnailsouce . . . . .	68
4.15.2	descriptive_interior_object_metadata . . . . .	68
4.16	Furniture Metadata . . . . .	69
4.16.1	administrative_furniture_metadata . . . . .	69
4.16.2	descriptive_furniture_metadata . . . . .	70
4.17	Light Source Metadata . . . . .	70
4.17.1	administrative_light_source_metadata . . . . .	70
4.17.2	descriptive_light_source_metadata . . . . .	71
4.18	Plant Metadata . . . . .	71
4.18.1	administrative_plant_metadata . . . . .	71
4.18.2	descriptive_plant_metadata . . . . .	72
4.18.2.1	origin . . . . .	72
4.18.2.2	plant_family . . . . .	72

4.19 Any Type Interior Metadata . . . . .	73
4.19.1 name . . . . .	73
4.19.2 administrative_any_metadata . . . . .	73
4.19.3 descriptive_any_metadata . . . . .	74
<b>5 Conclusion</b>	<b>75</b>

# Chapter 1

## Introduction

New developments in information and communication technologies are emerging more and more opportunities for museums to present their cultural heritage objects and provide informations. The traditional form of presentation of museum objects is an exhibit in a museum. Visitors have the opportunity to go at the opening times to the exhibition to see the cultural objects.

This form of presentation is stationary and required from interested parties to go to the museum. Due to various obstacles, such a long way, can not all interested parties visit the museum exhibition.

Usually only a part of a collection of a museum are in a exhibition. This may be because of the small exhibition space of a museum and also because of the fragile nature of cultural objects.

In a virtual museum in the World Wide Web can cultural objects exhibited and made available to everyone. In addition to a single cultural object may also exhibitions from museum collections or the whole museum represented virtually. In a virtual museum is not as in the traditional museum, the real object but the information about the real object in the foreground.

With the global distribution of virtual museums emerge more data on digitized cultural objects. These digitized informations must be described in a useful data structure which defines the rules for the uniform storage. For the describing digitized museum objects exists different metadata standards. These metadata standards do not include any description for a whole digitized museum.

In this specification the metadata standard VIMCOX is defined by which an whole museum



can be described virtual. This includes a description of buildings, rooms and cultural objects. VIMCOX defines the metadata elements whose hierarchical structure and its importance. The metadata elements in VIMCOX are, if possible, adopted from existing metadata element sets. This is to avoid a partial overlap with existing metadata standards.

## Chapter 2

# Virtual Museum

Virtual museums are location and time independent. They can be visited at any time and from anywhere in the world in a cost-effective manner over the Internet.

Virtual museums know no geographic boundaries. They have always enough storage space and enough exhibition space. Therefore, in a virtual museum, all objects of a museum collection can be exhibited.

Objects that may be considered in a real museum from a distance, can be viewed in a virtual museum from near. Of a object come details to light which would have seen a visitor in a real museum never or hardly.

For educational purposes a virtual museum can be used as a medium of information and knowledge. As a learning museum it serves through the use of various media such as audio or video to the public for inspiration, learning and fun.

The digitization of cultural objects creates a series of museum collections that are stored in different places. Museum objects from different collections can be linked and presented in a virtual exhibition. In reality, this would not be possible because the objects are in different places and the bring together would be associated with high cost. The data collections of all museums can be combined and presented in a virtual "world museum". To achieve this, the digitized cultural objects must be stored in a common format. A common exchange format ensures that the digitized objects can be archived and reused.

# Chapter 3

## Existing Metadata Standards

### 3.1 DCMES

The DCMES (*Dublin Core Metadata Element Set*) is a vocabulary for describing resources of any kind on the World Wide Web. It was developed and released by the open organization DCMI (*Dublin Core Metadata Initiative*). DCMES contains fifteen key elements for use in resource description. [DCMI 2010]

### 3.2 CDWA Lite

CDWA Lite (*Categories for the Description of Works of Art Lite*) is one of the Getty Research Institute developed metadata standard that is used to describe objects of fine art. It contains 22 elements and is based on CDWA (*Categories for the Description of Works of Art*) and CCO (*Cataloging Cultural Objects*). With CDWA Lite, the metadata of a work of art as an XML-based Harvestingformat can be saved. It is optimized for use via OAI-PMH (*Open Archives Initiatives Protocol for Metadata Harvesting*). CDWA Lite includes both administrative and descriptive metadata [CDWA Lite 2005].

### 3.3 museumdat

Museumdat is a metadata standard that was developed in the professional group for "the documentation in German Museums Association". Museumdat is a generalization of the metadata standard CDWA Lite for the use of different collection types, such as natural history or cultural history. Additionally museumdat is compatible to the CIDOC (*International Committee for Documentation*) Conceptual Reference Model [ICOM-CIDOC 2006].

The goal of museumdat is to act as a central exchange format for museum objects between museum portals in Germany. Museumdat contains 23 elements, which belongs to a part of the administrative metadata and a part of the descriptive Metadata [DMB 2009].

### 3.4 SPECTRUM

SPECTRUM is a British standard for the documentation and management of a museum collection. It is published and coordinated by the British organization of museum collections and standards mda ( textit Museum Documentation Assosiation). SPECTRUM was developed from a collaboration of over 100 experts from the museum area. It is a universal format for the exchange of museum object data between different administrative systems for museum collections, which is used internationally [SPECTRUM 2007].

### 3.5 LIDO

The metadata standard LIDO (*Lightweight Information Describing Objects*) is a Harvestingformat for providing of core data of museum objects. It is used in many areas of the collection, such as archaeological museums or cultural history museums. LIDO is a joint initiative by the developers of CDWA Lite, museumdat and SPECTRUM, and integrates the publication relevant concepts of these metadata standards [LIDO 2010].

### 3.6 VRA Core

VRA Core is a data standard for the description of works of visual culture. It is managed and published by the Visual Resources Association Data Standards Committee. VRA Core is used to transfer and exchange of object data in the field of cultural heritage. VRA Core contains both administrative and descriptive metadata for the description of a work, an image or a collection of images [VRA 2007].

# Chapter 4

## VIMCOX Elements

To describe the elements of a virtual museum can be defined metadata. Metadata is data that describes other data. Metadata is structured data that can describe an information resource. An information resource can be anything that has its own identity. These can be digital or not digital.

Gilliland-Swetland introduced the different categories of metadata. These are Administrative Metadata, Descriptive Metadata, Preservation Metadata, Technical Metadata, and Use Metadata.

The Elements in the VIMCOX metadata element set are categorised in Administrative Metadata and Descriptive Metadata.

The Administrative Metadata used in managing and administering information resources. For example, when and how the resource was created or the location where the data is stored. Also, the rights management falls under the Administrative Metadata. The Administrative Metadata are the minimal set for the description of a resource.

Descriptive Metadata used to describe a resource. With them, a resource may be located and identified. Descriptive Metadata can include elements such as title, author or date of creation of a digital resource [Gilliland 2000].

If the administrative and descriptive metadata are stored completely, is that the maximum information about a resource.

## 4.1 Administrative Metadata

For the administrative metadata, an abstract class (abstract complex type) is defined. There are all the basic administrative metadata contained. Each item which derive from the abstract class inherit all of its elements. Extensions that in all items must be present, must be defined only once in the abstract class.

Each item can be extended by additional elements.

### 4.1.1 title

Titles, identifying phrases, or names given to a work of art, architecture, or material culture. For complex works, series, or collections, the title may refer to a discrete unit within the larger entity (a print from a series, a photograph in a collection, a panel from a fresco cycle, a building within a temple complex) or it may identify only the larger entity (series, collection, cycle) itself.

Element tag	<museumdat:title>
Type	string
Required	yes
Repeatable	no

**Example:**

```
<museumdat:title>Poncho_de_nudos</museumdat:title>
```

### 4.1.2 creator

The name of the creator of the metadata.

Element tag	<dc:creator>
Type	string
Required	yes
Repeatable	no

**Example:**

```
<dc:creator>Valentin Wolf</dc:creator>
```

### 4.1.3 date\_created

A concise description of the creation date of the metadata element set..

Element tag	<vimcox:date_created>
Type	dateTime
Required	yes
Repeatable	no

#### Example:

```
<vimcox:date_created>2010-10-09T15:06:58</vimcox:date_created>
```

### 4.1.4 rights

Information about the holder of the rights, the start and end date of the copyright, the type of the copyright, a URL with information about the rights of a work / object.

Element tag	<vimcox:rights>
Required	no
Repeatable	no
Attributes	start_date, end_date
Subelements	rights_holder, descriptiveNote, url, type

#### start\_date, end\_date

Information about the start date and end date of the copyright of a work / object.

Element tag	<vimcox:start_date>, <vimcox:end_date>
Type	string
Required	no
Repeatable	no

#### rights\_holder

Information about the holder of the rights of a work / object.

Element tag	<vimcox:rights_holder>
Type	string
Required	yes
Repeatable	no

**descriptiveNote**

Information about the the rights of a work / object. The specification of the element is in chapter 4.2.1

**url**

A URL may contain information about the rights of a work / object.

Element tag	<vimcox:url>
Type	uri
Required	no
Repeatable	no

**Example:**

```
<vimcox:rights vimcox:start_date='2008-01-01'
  vimcox:end_date='2008-07-01'>
  <vimcox:rights_holder>Valentin Wolf</vimcox:rights_holder>
  <dc:description>Rights information about the image 'poncho de nudos'.
  </dc:description>
  <vimcox:url>http:\\www.uni-due.de\rights.txt</vimcox:url>
</vimcox:rights>
```

**4.1.5 date\_modified**

Information about modification of the metadata element set.



Element tag	<vimcox:date_modified>
Data type	date
Required	no
Repeatable	no
Attributes	name, version, path

**name**

Name of the person who has changed the metadata element set.

Element tag	<vimcox:name>
Data type	string
Required	yes
Repeatable	no

**version**

Version of the previous metadata element set.

Element tag	<vimcox:version>
Data type	string
Required	yes
Repeatable	no

**path**

Path where the previous metadata element set is.

Element tag	<vimcox:path>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<vimcox:date_modified vimcox:name='Valentin Wolf'
  vimcox:path='http://www.uni-due.de/cg/MAC.xml'
  vimcox:version="String">1967-08-13
```

```
</vimcox:date_modified>
```

## 4.2 Deskriptive Metadata

Also for the descriptive metadata, an abstract class (abstract complex type) is defined. There are all the basic descriptive metadata contained. Each item which derive from the abstract class inherit all of its elements. Extensions that in all items must be present, must be defined only once in the abstract class. Each item can be extended by additional elements.

### 4.2.1 descriptiveNote

A relatively brief essay-like text that describes the content and context of the work, including comments and an interpretation that may supplement, qualify, or explain the physical characteristics, subject, circumstances of creation or discovery, or other information about the work.

Element tag	<museumdat:descriptiveNote>
Data type	string
Required	no
Repeatable	no

#### Example:

```
<museumdat:descriptiveNote>The title of this image is  
Poncho de nudos.</museumdat:descriptiveNote>
```

### 4.2.2 creator

The name of the creator of a work / object.

Element tag	<dc:creator>
Type	string
Required	no
Repeatable	no

#### Example:

```
<dc:creator>Valentin Wolf</dc:creator>
```

### 4.2.3 measurements

Information about the dimensions, width, length, height of a work / object.

Element tag	<vimcox:measurements>
Required	no
Repeatable	no
Subelements	length, width, height

#### length, width, height

Information about the length, width and height.

Element tag	<vimcox:length>, <vimcox:width>, <vimcox:height>
Type	decimal
Required	no
Repeatable	no

#### Example:

```
<vimcox:measurements>
  <vimcox:length>3.40</vimcox:length>
  <vimcox:width>1.62</vimcox:width>
  <vimcox:height>2.36</vimcox:height>
</vimcox:measurements>
```

### 4.2.4 creation\_date

Information about the date of creation, design, production, construction of the work/object or its components.

Element tag	<vimcox:creation_date>
Data type	date
Required	no
Repeatable	no

#### Example:

```
<vimcox:creation_date>2000-01-01</vimcox:creation_date>
```

### 4.2.5 displayCreationLocation

Information about the location of creation of a work / object.

Element tag	<museumdat:displayCreationLocation>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<museumdat:displayCreationLocation> Santiago – Chile
</museumdat:displayCreationLocation>
```

### 4.2.6 style

Term that identifies the named, defined style, historical or artistic period, movement, group, or school whose characteristics are represented in the work being cataloged.

Element tag	<museumdat:style>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<museumdat:style>expressionismus</museumdat:style>
```

### 4.2.7 displayMaterialsTech

An indication of the substances or materials used in the creation of a work, as well as any implements, production or manufacturing techniques, processes, or methods incorporated in its fabrication, presented in a syntax suitable for display to the end-user and including any necessary indications of uncertainty, ambiguity, and nuance. For works on paper, descriptions of watermarks may also be included. (For marks applied to the work or support by the artist or subsequently by another person, see Inscriptions.)

Element tag	<museumdat:displayMaterialsTech>
Data type	string
Format	Text
Required	no
Repeatable	no

**Example:**

```
<museumdat:displayMaterialsTech>brush , canvas , paint
</museumdat:displayMaterialsTech>
```

**4.2.8 material\_set**

Information about the substances from which the work / object is composed.

Element tag	<vimcox:material_set>
Required	no
Repeatable	no
Subelements	material

**material**

Substance from which a work / object is composed..

Element tag	<vimcox:material>
Data type	string
Required	yes
Repeatable	yes

**Example:**

```
<vimcox:material_set>
  <vimcox:material>oil paint </vimcox:material>
</vimcox:material_set>
```

### 4.2.9 production\_period

Information about the production period when the element is created.

Element tag	<vimcox:production_period>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<vimcox:production_period>Barock</vimcox:production_period>
```

### 4.2.10 type

Information about the type of the work / object.

Element tag	<dc:type>
Data type	any
Required	no
Repeatable	no

**Example:**

```
<dc:type>a345</dc:type>
```

## 4.3 Museum Metadata

The root element "museum" contain the information about a whole virtual museum.

Element tag	<vimcox:museum>
Required	yes
Repeatable	no
Sub elements	administrative_museum_metadata, vimcox:descriptive_museum_metadata, buildings, rooms and objects

### 4.3.1 administrative\_museum\_metadata

The element "administrative\_museum\_metadata" contain the administrative metadata of a museum. It derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_museum_metadata>
Required	no
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, company

The definitions of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.

#### 4.3.1.1 company

Information about the company which is responsible for the provided metadata.

Element tag	<vimcox:company>
Data type	string
Required	no
Repeatable	no

#### Example:

```
<vimcox:company>University of Duisburg–Essen</vimcox:company>
```

### 4.3.2 descriptive\_museum\_metadata

The element "descriptive\_museum\_metadata" contain the descriptive metadata of a museum. It derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_museum_metadata>
Required	no
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type, abbreviation, contact_information, history, statistic, address, coordinates

The definitions of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

#### 4.3.2.1 abbreviation

Information about the abbreviation of the building.

Element tag	<vimcox:abbreviation>
Data type	string
Required	no
Repeatable	no

#### Example:

<abbreviation>MAC</abbreviation>

#### 4.3.2.2 contact\_information

Information about the contact persons of a museum.

Element tag	<vimcox:contact_information>
Data type	string
Required	no
Repeatable	yes
Sub elements	name, address

#### name

The Name of a contact person.

Element tag	<vimcox:name>
Data type	string
Required	yes
Repeatable	no

#### address



Information about the address of a museum.

Element tag	<vimcox:address>
Data type	string
Required	yes
Repeatable	no
Sub elements	email, fax, postcode, telephone, url, street_name, house_number, city, state, country

### **email**

Information about a e-mail address.

Element tag	<vimcox:email>
Data type	string
Required	no
Repeatable	no

### **fax**

Information about a fax number.

Element tag	<vimcox:fax>
Data type	string
Required	no
Repeatable	no

### **postcode**

Information about a postcode.

Element tag	<vimcox:postcode>
Data type	string
Required	no
Repeatable	no

### **telephone**

Information about a telephone number.

Element tag	<vimcox:telephone>
Data type	string
Required	no
Repeatable	no

### **url**

Information about any url.

Element tag	<vimcox:url>
Data type	anyUri
Required	no
Repeatable	no

### **street\_name**

Information about a street name.

Element tag	<vimcox:street_name>
Data type	string
Required	yes
Repeatable	no

### **house\_number**

Information about a house number.

Element tag	<vimcox:house_number>
Data type	integer
Required	yes
Repeatable	no

### **city**

Information about a city.

Element tag	<vimcox:city>
Data type	string
Required	yes
Repeatable	no

### state

Information about a state.

Element tag	<vimcox:state>
Data type	string
Required	no
Repeatable	no

### country

Information about a country.

Element tag	<vimcox:country>
Data type	string
Required	no
Repeatable	no

### Example:

```
<vimcox:contact_information>
  <vimcox:name>Valentin Wolf</vimcox:name>
  <vimcox:address>
    <vimcox:email>testmail@uni-due.de</vimcox:email>
    <vimcox:fax>020344466677</vimcox:fax>
    <vimcox:postcode>47054</vimcox:postcode>
    <vimcox:telephone>02034477889</vimcox:telephone>
    <vimcox:url>www.uni-due.de</vimcox:url>
    <vimcox:street_name>Lotharstrasse</vimcox:street_name>
    <vimcox:house_number>78</vimcox:house_number>
    <vimcox:city>Duisburg</vimcox:city>
```

```
<vimcox:state>Nordrhein–Westfalen</vimcox:state>  
<vimcox:country>Deutschland</vimcox:country>  
</vimcox:address>  
</vimcox:contact_information>
```

### 4.3.2.3 history

Information about the founder and the inauguration of the building.

Element tag	<history>
Required	no
Repeatable	no
Subelements	founder, inauguration

#### founder

Information about the founder of a museum.

Element tag	<vimcox:founder>
Data type	string
Required	yes
Repeatable	no

#### inauguration

Information about the inauguration of a museum.

Element tag	<vimcox:inauguration>
Data type	gYear
Required	yes
Repeatable	no

#### Example:

```
<vimcox:history>  
  <vimcox:founder>Universidad de Chile</vimcox:founder>  
  <vimcox:inauguration>1947</vimcox:inauguration>  
</vimcox:history>
```

#### 4.3.2.4 statistic

Information about the average number of visitors of the virtual museum in a year.

Element tag	<vimcox:statistic>
Required	no
Repeatable	no
Subelements	year, average_attendance

#### year

Information about the average number of visitors.

Element tag	<vimcox:year>
Data type	gYear
Required	yes
Repeatable	yes

#### average\_attendance

Information about the average number of visitors.

Element tag	<vimcox:average_attendance>
Data type	integer
Required	yes
Repeatable	yes

#### Example:

```
<vimcox:statistic>  
  <vimcox:year>2009</vimcox:year>  
  <vimcox:average_attendance>35695</vimcox:average_attendance>  
</vimcox:statistic>
```

#### 4.3.2.5 address

Information about the address of the museum.

The element is specified in "contact\_information" in Section 4.3.2.2.

**4.3.2.6 coordinates**

Information about the coordinates of the building in the co-ordinate system WGS84.

Element tag	<vimcox:coordinates>
Required	no
Repeatable	no
Subelements	origin, rotation_matrix

**origin**

Information about the origin of the museum in the co-ordinate system WGS84.

Element tag	<vimcox:origin>
Required	yes
Repeatable	no
Subelements	x, y, z

**x, y, z**

Information about the x-axis, y-axis and z-axis direction.

Element tag	<vimcox:x>, <vimcox:y>, <vimcox:z>
Data type	decimal
Required	yes
Repeatable	no

**rotation\_matrix**

Information about the rotation matrix of the museum with regard to the earth co-ordinate system in the co-ordinate system WGS84.

Element tag	<vimcox:rotation_matrix>
Required	yes
Repeatable	no
Subelements	row1, row2, row3, row4

**row1, row2, row3, row4**

Information about the row1, row2, row3, row4 of the rotations matrix in the co-ordinate system WGS84.

Element tag	<vimcox:row1>, <vimcox:row2>, <vimcox:row3>, <vimcox:row4>
Required	yes
Repeatable	no
Attribute	w, x, y, z

**w, x, y, z** Information about the x-axis, y-axis, z-axis direction and w in the co-ordinate system WGS84.

Element tag	<vimcox:x>, <vimcox:y>, <vimcox:z>, <vimcox:w>
Data Type	decimal
Required	yes
Repeatable	no

**Example:**

```
<vimcox:coordinates>
  <vimcox:origin>
    <vimcox:x>2.54</vimcox:x>
    <vimcox:y>1.43</vimcox:y>
    <vimcox:z>3.56</vimcox:z>
  </vimcox:origin>
  <vimcox:rotation_matrix>
    <vimcox:row1 vimcox:w="1.0" vimcox:x="0.0" vimcox:y="0.0"
      vimcox:z="0.0"/>
    <vimcox:row2 vimcox:w="0.0" vimcox:x="1.0" vimcox:y="0.0"
      vimcox:z="0.0"/>
    <vimcox:row3 vimcox:w="0.0" vimcox:x="0.0" vimcox:y="1.0"
      vimcox:z="0.0"/>
    <vimcox:row4 vimcox:w="0.0" vimcox:x="0.0" vimcox:y="0.0"
      vimcox:z="1.0"/>
  </vimcox:rotation_matrix>
</vimcox:coordinates>
```

## 4.4 Building Metadata

The Information about a building is in the element "building". It is the root-Element of the building metadata.

Element tag	<vimcox:building>
Required	no
Repeatable	yes
Attributes	id
Subelements	administrative_building_metadata, descriptive_building_metadata

### 4.4.1 id

Id of a resource.

Element tag	<vimcox:id>
Data type	string
Required	yes
Repeatable	no

#### Example:

```
<vimcox:building vimcox:id="buil01"/>
```

### 4.4.2 administrative\_building\_metadata

Information about the administrative metadata of a building.

It derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_building_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified

The definitions of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.



### 4.4.3 descriptive\_building\_metadata

The element "descriptive\_building\_metadata" contain the descriptive metadata of a building. It derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_museum_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type, barrier_free, exhibition_space, dating, outside_world_texture, year_of_construction, number_of_levels, levels, last_change

The definition of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

#### 4.4.3.1 barrier\_free

Information about the accessibility of a building.

Element tag	<vimcox:barrier_free>
Data type	boolean
Required	no
Repeatable	no

#### Example:

```
<vimcox:barrier_free>true</vimcox:barrier_free>
```

#### 4.4.3.2 exhibition\_space

Information about the whole exhibition area of a building.

Element tag	<vimcox:exhibition_space>
Data type	integer
Required	no
Repeatable	no

**Example:**

```
<vimcox:exhibition_space>3054</vimcox:exhibition_space>
```

**4.4.3.3 dating**

Information about the period of time of arise of a building.

Element tag	<vimcox:dating>
Data type	year
Required	no
Repeatable	no

**Example:**

```
<vimcox:dating>1910</vimcox:dating>
```

**4.4.3.4 outside\_world\_textur**

Information about the outside texture of a building.

Element tag	<vimcox:outside_world_textur>
Required	no
Repeatable	no
Subelements	back_texture, bottom_texture, front_texture, left_texture, right_texture, top_texture

**back\_texture, bottom\_texture, front\_texture, left\_texture, right\_texture, top\_texture**

Gives the path of the back, bottom, front, left, right and top textures of a building.

Element tag	<vimcox:back_textur>, <vimcox:bottom_textur>, <vimcox:front_textur>, <vimcox:left_textur>, <vimcox:right_textur>, <vimcox:top_textur>
Data type	string
Required	no
Repeatable	no
Attribute	name

**name**

Name/label/material of the texture. The specification is in chapter 4.3.2.2.

**Example:**

```
<vimcox:outside_world_texture >  
  <vimcox:back_texture vimcox:name="hor">C:/horizont1.jpg  
  </vimcox:back_texture >  
  <vimcox:bottom_texture vimcox:name="hor">C:/horizont2.jpg  
  </vimcox:bottom_texture >  
  <vimcox:front_texture vimcox:name="hor">C:/horizont3.jpg  
  </vimcox:front_texture >  
  <vimcox:left_texture vimcox:name="hor">C:/horizont4.jpg  
  </vimcox:left_texture >  
  <vimcox:right_texture vimcox:name="hor">C:/horizont5.jpg  
  </vimcox:right_texture >  
  <vimcox:top_texture vimcox:name="hor">C:/horizont6.jpg  
  </vimcox:top_texture >  
</vimcox:outside_world_texture >
```

**4.4.3.5 year\_of\_construction**

Information about the year of construction of a building.

Element tag	<vimcox:year_of_construction>
Data type	year
Required	no
Repeatable	no

**Example:**

```
<vimcox:year_of_construction >1916</vimcox:year_of_construction >
```

**4.4.3.6 number\_of\_levels**

Information about the number of levels a building has.

Element tag	<vimcox:number_of_levels>
Data type	integer
Required	no
Repeatable	no

**Example:**

```
<vimcox:number_of_levels>3</vimcox:number_of_levels>
```

**4.4.3.7 level**

Information about the levels of a building.

Element tag	<vimcox:level>
Required	no
Repeatable	yes
Attributes	number
Subelements	title, descriptiveNote, entrance_hall, rooms

**number**

Information about the number of a level.

Element tag	<number>
Required	yes
Repeatable	no

**title**

Title / name of the level.

The specification of the element is in chapter 4.1.1.

**descriptiveNote**

Description of a level.

The specification of the element is in chapter 4.2.1.

### **entrance\_hall**

Information about the entrance hall of a level.

A entrance hall is defined as a room. Its specification is in chapter 4.5. Additionally is the sub element "connectors" defined.

### **connector**

Information about the connectors of a entrance hall. A connector is a vertical connection between two entrance halls and can be for example a elevator or a staircase.

Element tag	<vimcox:connector>
Required	no
Repeatable	yes
Attributes	id, linked_entrancehall, linked_connector
Subelements	type, descriptiveNote, location_in_entrancehall

### **id**

Id of a resource.

The attribute is specified in chapter 4.4.1.

### **linked\_entrancehall**

Information about the linked entrance hall.

Element tag	<vimcox:linked_entrancehall>
Data type	string
Required	no
Repeatable	no

### **linked\_connector**

Information about the linked connector.

Element tag	<vimcox:linked_connector>
Data type	string
Required	no
Repeatable	no

### **type**

Information about the type of the connector.

The element is specified in Chapter 4.2.10.

### **descriptiveNote**

The description of a connector.

The element is specified in Chapter 4.2.1.

### **location\_in\_entrancehall**

Information about the location of the connector in a entrance hall.

Element tag	<vimcox:location_in_entrancehall>
Required	no
Repeatable	no
Subelements	wall, x, y, z

### **wall**

Information on which wall of a room the object is.

Element tag	<vimcox:wall>
Data type	string
Required	yes
Repeatable	no

**x, y, z**

Information about the x-axis, y-axis and z-axis direction.  
The specification is in chapter 4.3.2.6.

**room**

Information about the rooms of a level.

Element tag	<vimcox:room>
Required	no
Repeatable	yes
Attributes	id
Subelements	source

**id**

Id of a resource.  
The attribute is specified in chapter 4.4.1.

**source**

Information about the path of the XML file of the linked room.

Element tag	<vimcox:source>
Data type	anyUri
Required	yes
Repeatable	no

**Example:**

```
<vimcox:level vimcox:number="2">  
  <museumdat:title>Level nr 2</museumdat:title>  
  <museumdat:descriptiveNote>The level number 2  
  </museumdat:descriptiveNote>  
  <vimcox:entrance_hall vimcox:id="en231">
```

```

<vimcox:connectors>
  <vimcox:connector vimcox:linked_entrancehall="en231" vimcox:id="con21"
  vimcox:linked_connector="con25">
    <dc:type>Elevator</dc:type>
    <museumdat:descriptiveNote>Elevator with 2 doors.
  </museumdat:descriptiveNote>
  <vimcox:location_in_entrancehall>
    <vimcox:wall>N</vimcox:wall>
    <vimcox:x>1.0</vimcox:x>
    <vimcox:y>0.24</vimcox:y>
    <vimcox:z>2.0</vimcox:z>
  </vimcox:location_in_entrancehall>
</vimcox:connector>
</vimcox:connectors>
</vimcox:entrance_hall>
<vimcox:rooms>
  <vimcox:room vimcox:id="rom81">
    <vimcox:source>C\Room81\room.xml>
  </vimcox:room>
</vimcox:rooms>
</vimcox:level>

```

#### 4.4.3.8 last\_change

Information about the date of the last modification of a building.

Element tag	<vimcox:last_change>
Data type	date
Required	no
Repeatable	no
Attribute	name

#### name

Information about the person who has at last changed the building.  
The specification of the element is in chapter 4.3.2.2.

#### Example:



```
<last_change name="Peter Mueller">2010-06-04</last_change>
```

## 4.5 Room Metadata

A room is in the element "room" described. It is the root-element of the room metadata.

Element tag	<vimcox:room>
Data type	date
Required	no
Repeatable	yes
Attribute	id
Subelements	administrative_room_metadata, descriptive_room_metadata

### 4.5.1 id

Id of a resource.

The specification of the element is in chapter 4.4.1.

### 4.5.2 administrative\_room\_metadata

Information about the administrative metadata of a room

It derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_room_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, textures, source_folder, view_direction

The specification of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.

#### 4.5.2.1 textures

Information about the textures of a room.

Element tag	<vimcox:textures>
Required	no
Repeatable	no
Subelements	wall_textur_path, bottom_textur_path, top_textur_path

### wall\_textur\_path, bottom\_textur\_path, top\_textur\_path

Information about the source folder of the wall, floor and bottom textures.  
The elements are specified in Chapter 4.4.3.4.

#### Example:

```
<vimcox:textures>
  <vimcox:wall_texture_path
    vimcox:name="paint">C:/paper1.jpg</vimcox:wall_texture_path>
  <vimcox:bottom_texture_path
    vimcox:name="parquet">C:/parquet1.jpg</vimcox:bottom_texture_path>
  <vimcox:top_texture_path
    vimcox:name="paint">C:/paper1.jpg</vimcox:top_texture_path>
</vimcox:textures>
```

### 4.5.2.2 source\_folder

Information about the source folder of the XML file of a room.  
The element is specified in Chapter 4.4.3.7.

### 4.5.2.3 view\_direction

Information about the view direction by entering the main entrance of a room.

Element tag	<vimcox:view_direction>
Data type	string
Required	no
Repeatable	no

#### Example:

```
<vimcox:view_direction>N</vimcox:view_direction>
```

### 4.5.3 descriptive\_room\_metadata

Information about the descriptive metadata of a room.

It derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_room_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type, thresholds, mainentrance, mainentrance_absolute_coordinates, outdoor, objects

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

#### 4.5.3.1 threshold

Information about the thresholds/entrances of a room. A threshold is a horizontal connection between two rooms and can be for example a door or a gateway.

Element tag	<threshold>
Required	no
Repeatable	yes
Attributes	id, linked_room, linked_threshold
Subelements	type, descriptiveNote, location_in_room

#### id

Id of a resource.

The attribute is specified in chapter 4.4.1.

#### linked\_room

Information about the linked room of a threshold.

The element has the same specification like "linked\_entrancehall" in "connector" in chapter

4.4.3.7.

### **linked\_threshold**

Information about the linked threshold of a threshold.

The element has the same specification like "linked\_connector" in "connector" in chapter 4.4.3.7.

### **type**

Information about the type of a thresholds.

Das Element hat die gleiche Definition wie unter "connector" in Section 4.2.10.

### **descriptiveNote**

Gibt eine Beschreibung "uber einen Threshold an.

The element is specified in Chapter 4.2.1.

**location\_in\_room** Information about the location of the threshold in a room.

The element has the same specification like "location\_in\_entrancehall" in Chapter 4.4.3.7.

### **Example:**

```
<vimcox:threshold vimcox:linked_room="room231" vimcox:id="thre28"  
  vimcox:linked_threshold="thre29">  
  <dc:type>Door</dc:type>  
  <museumdat:descriptiveNote>Door.  
</museumdat:descriptiveNote>  
  <vimcox:location_in_room>  
    <vimcox:wall>N</vimcox:wall>  
    <vimcox:x>1.0</vimcox:x>  
    <vimcox:y>0.24</vimcox:y>  
    <vimcox:z>2.0</vimcox:z>  
  </vimcox:location_in_room>  
</vimcox:threshold>
```

**4.5.3.2 mainentrance**

Information about the main entrance of a room.

Element tag	<vimcox:mainentrance>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<vimcox:mainentrance>N</vimcox:mainentrance>
```

**4.5.3.3 mainentrance\_absolute\_coordinates**

Information about the coordinates of the main entrance of a room.

Element tag	<vimcox:mainentrance_absolute_coordinates>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<vimcox:mainentrance_absolute_coordinates> 33o26'6.44"S; 70o38'39.79"W
</vimcox:mainentrance_absolute_coordinates>
```

**4.5.3.4 outdoor**

Information about the outdoor area of a room.

Element tag	<vimcox:outdoor>
Data type	boolean
Required	no
Repeatable	no
Subelements	outdoor_area, outdoor_texture

**outdoor\_area**

Information about whether an outdoor area is defined to a room.

Element tag	<vimcox:outdoor_area>
Data type	boolean
Required	no
Repeatable	no

### **outdoor\_textur**

Information about the paths of the outdoor textures of a room. The element has the same specification like "outside\_world\_texture" in chapter 4.4.3.4.

#### **Example:**

```
<vimcox:outdoor>
  <vimcox:outdoor_area>true</vimcox:outdoor_area>
  <vimcox:outdoor_texture>
    <vimcox:back_textur vimcox:name="hor">C:/horizont1.jpg
    </vimcox:back_textur>
    <vimcox:bottom_textur vimcox:name="hor">C:/horizont2.jpg
    </vimcox:bottom_textur>
    <vimcox:front_textur vimcox:name="hor">C:/horizont3.jpg
    </vimcox:front_textur>
    <vimcox:left_textur vimcox:name="hor">C:/horizont4.jpg
    </vimcox:left_textur>
    <vimcox:right_textur vimcox:name="hor">C:/horizont5.jpg
    </vimcox:right_textur>
    <vimcox:top_textur vimcox:name="hor">C:/horizont6.jpg
    </vimcox:top_textur>
  </vimcox:outdoor_texture>
</vimcox:outdoor>
```

#### **4.5.3.5 object**

Information about the linked objects of a room.

Element tag	<vimcox:object>
Required	no
Repeatable	no
Attributes	id
Subelements	location_in_room

**id**

Id of the object.

The element is specified in Chapter 4.4.1.

**location\_in\_room**

Information about the location of an object in a room.

The element has the same specification like "location\_in\_entrancehall" in Chapter 4.4.3.7.

**Example:**

```
<vimcox:object>
  <vimcox:id>ob03</vimcox:id>
  <vimcox:location_in_room>
    <vimcox:wall>N</vimcox:wall>
    <vimcox:x>1.0</vimcox:x>
    <vimcox:y>0.24</vimcox:y>
    <vimcox:z>2.0</vimcox:z>
  </vimcox:location_in_room>
</vimcox:object>
```

## 4.6 Object Metadata

Information about an object are described in the element "object". It is the root-element of the object metadata.

Element tag	<vimcox:object>
Required	no
Repeatable	yes
Attributes	id
Subelements	image, sculpture, interaction_Canvas, interior, door, window, media

### 4.6.1 id

Id of a resource.

The element is specified in Chapter 4.4.1.

## 4.7 Image Metadata

The element "image" contain the whole description about a image.

Element tag	<vimcox:image>
Required	no
Repeatable	no
Attributes	id
Subelements	administrative_image_metadata, descriptive_image_metadata

### 4.7.1 administrative\_image\_metadata

Information about the administrative metadata of a image.

It derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_image_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, texturesource, x3dsource, thumbnailsource, passepartout_size, frame_size

The specification of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.

#### 4.7.1.1 texturesource

Source folder of the image of a object (JPEG).

Element tag	<vimcox:texturesource>
Data type	anyUri
Required	yes
Repeatable	no



**Example:**

```
<vimcox:texturesource>C:/temp/ponchodenudos.jpg</vimcox:texturesource>
```

**4.7.1.2 x3dsource**

Source folder of the x3d file.

Element tag	<vimcox:x3dsource>
Data type	anyUri
Required	yes
Repeatable	no

**Example:**

```
<vimcox:x3dsource>C:/temp/ponchodenudos.x3d</vimcox:x3dsource>
```

**4.7.1.3 thumbnailsource**

Source folder of the thumbnail of a object (GIF).

Element tag	<vimcox:thumbnailsource>
Data type	anyUri
Required	yes
Repeatable	no

**Example:**

```
<vimcox:thumbnailsource>C:/temp/ponchodenudos_preview.gif</vimcox:thumbnailsource>
```

**4.7.1.4 passepartout\_size**

Information about the passepartout size of a image.

Element tag	<vimcox:passepartout_size>
Required	no
Repeatable	no
Subelements	height, width

**height, width**

Information about the hight. Information about the width.

Element tag	<vimcox:height>, <vimcox:width>
Data type	decimal
Required	yes
Repeatable	no

**Example:**

```
<vimcox: passepartout_size >  
  <vimcox: height >2.4</vimcox: height >  
  <vimcox: width >1.2</vimcox: width >  
</vimcox: passepartout_size >
```

**4.7.1.5 frame\_size**

Information aobut the frame size of a image.

Element tag	<vimcox:frame_size>
Required	no
Repeatable	no
Subelements	height, width

**height, width**

Information about the hight. Information about the width.  
The element is specified in Chapter 4.7.1.4.

**Example:**

```
<vimcox: frame_size >  
  <vimcox: height >8.4</vimcox: height >  
  <vimcox: width >7.2</vimcox: width >  
</vimcox: frame_size >
```

## 4.7.2 descriptive\_image\_metadata

Information about the descriptive metadata of a image. It derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_image_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type, production_method, resolution, compression_method, color_depth, lom_interaction, audio_clip_id

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

### 4.7.2.1 production\_method

The production or manufacturing processes, techniques, and methods incorporated in the fabrication or alteration of the work or image.

Element tag	<vimcox:production_method>
Data type	string
Required	no
Repeatable	no

#### Example:

```
<vimcox:production_method>Plasticina sobre madera
</vimcox:production_method>
```

### 4.7.2.2 resolution

Information about the resolution in dpi of a image.

Element tag	<vimcox:resolution>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<vimcox:resolution>200</vimcox:resolution>
```

**4.7.2.3 compression\_method**

Information about the compression method of a Image.

Element tag	<vimcox:compression_method>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<vimcox:compression_method>JPEG 2000</vimcox:compression_method>
```

**4.7.2.4 color\_depth**

Information about the color depth of a Image in bit.

Element tag	<vimcox:color_depth>
Data type	nonNegativeInteger
Required	no
Repeatable	no

**Example:**

```
<vimcox:color_depth>32</vimcox:color_depth>
```

**4.7.2.5 lom\_interaction**

Information about the lom interaction of a image.

Element tag	<vimcox:lom_interaction>
Required	no
Repeatable	no
Subelements	lom_interaction_type, lom_interaction_level

### lom\_interaction\_type, lom\_interaction\_level

Information about the lom interaction type and level.

Element tag	<vimcox:lom_interaction_type>, <vimcox:lom_interaction_level>
Data type	String
Required	yes
Repeatable	no

#### Example:

```
<vimcox:lom_interaction >
  <vimcox:lom_interaction_type>active</vimcox:lom_interaction_type >
  <vimcox:lom_interaction_level>medium</vimcox:lom_interaction_level >
</vimcox:lom_interaction >
```

#### 4.7.2.6 audio\_clip\_id

Information about a audio clip of a image. In x3d it is possible to let play a audio clip if the user click on a image.

Element tag	<vimcox:audio_clip_id>
Data type	string
Required	no
Repeatable	no

#### Example:

```
<vimcox:audio_clip_id>clip1</vimcox:audio_clip_id >
```

## 4.8 Sculpture Metadata

The element "sculpture" contain the information to describe a sculpture. Es hat die Subelemente "administrative\_sculpture\_metadata" und "descriptive\_sculpture\_metadata".

Element tag	<vimcox:sculpture>
Required	no
Repeatable	no
Subelements	administrative_sculpture_metadata, descriptive_sculpture_metadata

### 4.8.1 administrative\_sculpture\_metadata

Information about the administrative metadata of a sculpture.

It derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_sculpture_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, texturesource, x3dsource, thumbnailsource

The specification of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.

#### 4.8.1.1 texturesource

Source folder of the image of a object (JPEG).

The element is specified in Chapter 4.7.1.1.

#### 4.8.1.2 x3dsource

Source folder of the x3d file.

The element is specified in Chapter 4.7.1.2.

#### 4.8.1.3 thumbnailsource

Source folder of the thumbnail of a object (GIF).

The element is specified in Chapter 4.7.1.3.

#### 4.8.1.4 descriptive\_sculpture\_metadata

Information about the descriptive metadata of a sculpture.

It derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_sculpture_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type, production_method, lom_interaction

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

#### 4.8.1.5 production\_method

The production or manufacturing processes, techniques, and methods incorporated in the fabrication or alteration of the work or image.

The element is specified in Chapter 4.7.2.1.

#### 4.8.1.6 lom\_interaction

Information about the lom interaction of a sculpture.

The element is specified in Chapter 4.7.2.5.

## 4.9 Interaction Canvas Metadata

Information about the interaction canvas metadata.

Element tag	<vimcox:interaction_canvas>
Required	no
Repeatable	no
Subelements	administrative_interaction_canvas_metadata, descriptive_interaction_canvas_metadata

### 4.9.1 administrative\_interaction\_canvas\_metadata

Information about the administrative metadata of a interaction canvas.  
It derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_interaction_canvas_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, thumbnailsource, resolution, sensor_size, fps

The specification of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.

#### 4.9.1.1 thumbnailsource

Source folder of the thumbnail of a object (GIF).  
The element is specified in Chapter 4.7.1.3.

#### 4.9.1.2 resolution

Information about the resolution of the Java script node generated image content. (cf. [Lingemann 2010], Chapter 5.4.2).

Element tag	<vimcox:resolution>
Required	yes
Repeatable	no
Subelements	resolution_x, resolution_y

#### resolution\_x, resolution\_y

Information about the resolution in x-axis and y-axis.

Element tag	<vimcox:resolution_x>, <vimcox:resolution_y>
Required	yes
Repeatable	no

#### Example:



```

<vimcox:resolution>
  <vimcox:resolution_x>200</vimcox:resolution_x>
  <vimcox:resolution_y>300</vimcox:resolution_y>
</vimcox:resolution>

```

#### 4.9.1.3 sensor\_size

The size of the room placed Sensor for visitors localization.

Element tag	<vimcox:sensor_size>
Required	yes
Repeatable	no
Subelements	sensor_width, sensor_length

#### sensor\_width, sensor\_length

The width and length of the room placed Sensor for visitors localization.

Element tag	<vimcox:sensor_width>, <vimcox:sensor_length>
Data type	decimal
Required	yes
Repeatable	no

#### Example:

```

<vimcox:sensor_size>
  <vimcox:sensor_width>26.5</vimcox:sensor_width>
  <vimcox:sensor_length>15.4</vimcox:sensor_length>
</vimcox:sensor_size>

```

#### 4.9.1.4 fps

Information about the update rate of the canvas.

Element tag	<vimcox:fps>
Data type	integer
Required	no
Repeatable	no

**Example:**

```
<vimcox : fps >35</vimcox : fps >
```

**4.9.1.5 descriptive\_interaction\_canvas\_metadata**

Information about the descriptive metadata of a interaction canvas.

It derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_interaction_canvas_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type, production_method, lom_interaction

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

**4.9.1.6 production\_method**

The production or manufacturing processes, techniques, and methods incorporated in the fabrication or alteration of the work or image.

The element is specified in Chapter 4.7.2.1.

**4.9.1.7 lom\_interaction**

Information about the lom interaction of a interaction canvas.

The element is specified in Chapter 4.7.2.5.

**4.10 Door Metadata**

Information about the metadata of a door.

Element tag	<vimcox:door>
Required	no
Repeatable	no
Subelemente	administrative_door_metadata, descriptive_door_metadata

### 4.10.1 administrative\_door\_metadata

Information about the administrative metadata of a door.

It derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_door_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, texture, x3dsource, thumbnailsource, frame

The specification of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.

#### 4.10.1.1 texture

Source folder of a texture of a door.

Element tag	<vimcox:texture>
Required	no
Repeatable	no
Attribute	name

#### **name**

Name/label/material of the texture.

Element tag	<vimcox:texture>
Required	no
Repeatable	no

#### **Example:**

```
<vimcox:texture vimcox:name="wood">C:/temp/door_texture_wood01.jpg
```

`</vimcox:texture>`

#### 4.10.1.2 **x3dsource**

Source folder of the x3d file.

The element is specified in Chapter 4.7.1.2.

#### 4.10.1.3 **thumbnailsource**

Source folder of the thumbnail of a object (GIF).

The element is specified in Chapter 4.7.1.3.

#### 4.10.1.4 **frame**

Information about the frame.

Element tag	<code>&lt;vimcox:frame&gt;</code>
Required	yes
Repeatable	no
Subelements	thickness, texture

#### **thickness**

Information about the thickness of a frame.

Element tag	<code>&lt;vimcox:thickness&gt;</code>
Data type	decimal
Required	yes
Repeatable	no

#### **texture**

Source folder of a texture of a frame.

The element is specified in Chapter 4.10.1.1.

#### **Example:**

```
<vimcox:frame>  
  <vimcox:thickness>20</vimcox:thickness>
```

```

<vimcox:texture vimcox:name="wood">C:/temp/frame_texture_wood01.jpg
</vimcox:texture>
</vimcox:frame>

```

### 4.10.2 descriptive\_door\_metadata

Information about the descriptive metadata of a door. It derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_door_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type,

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

## 4.11 Window Metadata

Information about the window metadata.  
It derived from the class "door" (cf. chapter 4.10).

## 4.12 Media Metadata

Information about the metadata of a media object.

Element tag	<vimcox:media>
Required	no
Repeatable	no
Subelements	audio, video

## 4.13 Audio Metadata

Information about the audio metadata.

Element tag	<vimcox:audio>
Required	no
Repeatable	no
Subelements	administrative_audio_metadata, descriptive_audio_metadata

### 4.13.1 administrative\_audio\_metadata

Information about the administrative audio metadata.

It derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_audio_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, path

The specification of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.

#### 4.13.1.1 path

Information about the source folder of the audio file.

Element tag	<vimcox:path>
Data type	anyUri
Required	no
Repeatable	no

#### Example:

```
<vimcox:path>C:/temp/audio01.wave</vimcox:path>
```

### 4.13.2 descriptive\_audio\_metadata

Information about the descriptive audio metadata.

It derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_audio_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type, album, genre, year, filesize, bit_rate, duration, format

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

#### 4.13.2.1 album

Information about album in which the audio file is available.

Element tag	<vimcox:album>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<vimcox:album>The All-Time Greatest Hits</vimcox:album>
```

#### 4.13.2.2 genre

Information about the genre of a audio track.

Element tag	<vimcox:genre>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<vimcox:genre>Jazz</vimcox:genre>
```

### 4.13.2.3 year

Information about the year of the appearance of an audio track.

Element tag	<vimcox:year>
Data type	gYear
Required	no
Repeatable	no

**Example:**

```
<vimcox:year>1996</vimcox:year>
```

### 4.13.2.4 filesize

Information about the size in mb.

Element tag	<vimcox:filesize>
Data type	decimal
Required	no
Repeatable	no

**Example:**

```
<vimcox:filesize>25.54</vimcox:filesize>
```

### 4.13.2.5 bit\_rate

Information about the bit rate in kbps of an audio track.

Element tag	<vimcox:bit_rate>
Data type	integer
Required	no
Repeatable	no

**Example:**

```
<vimcox:bit_rate>128</vimcox:bit_rate>
```



#### 4.13.2.6 duration

Information about the length in minutes.

Element tag	<vimcox:duration>
Data type	decimal
Required	no
Repeatable	no

**Example:**

```
<vimcox:duration>2.54</vimcox:duration>
```

#### 4.13.2.7 format

Information about the file format.

Element tag	<dc:format>
Data type	string
Required	no
Repeatable	no

**Example:**

```
<dc:format>wave</dc:format>
```

## 4.14 Video Metadata

Information about the video metadata.

Element tag	<vimcox:video>
Required	yes
Repeatable	no
Subelements	administrative_video_metadata, descriptive_video_metadata

### 4.14.1 administrative\_video\_metadata

Information about the administrative video metadata.

It derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_video_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, path

The specification of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.

#### 4.14.1.1 path

Information about the source folder of the video file.

The element is specified in Chapter 4.13.1.1.

#### 4.14.2 descriptive\_video\_metadata

Information about the descriptive video metadata.

It derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_video_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type, filesize, duration, format, subject, resolution

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

##### 4.14.2.1 filesize

Information about the size in mb.

The element is specified in Chapter 4.13.2.4.

##### 4.14.2.2 duration

Information about the length in minutes.

The element is specified in Chapter 4.13.2.6.

#### 4.14.2.3 format

Information about the video format.

The element is specified in Chapter 4.13.2.7.

#### 4.14.2.4 subject

Information about the subjects of a video.

Element tag	<dc:subject>
Data type	string
Required	no
Repeatable	no

#### Example:

```
<dc:subject>Making of</dc:subject>
```

#### 4.14.2.5 resolution

Information about the resolution of a video.

Element tag	<vimcox:resolution>
Data type	string
Required	no
Repeatable	no

#### Example:

```
<vimcox:resolution>640 x 480</vimcox:resolution>
```

## 4.15 Interior Metadata

Information about the interior metadata.

Element tag	<vimcox:interior>
Required	no
Repeatable	no
Subelements	furniture, light_source, vegetation, any

For the sub elements of the interior element are the abstract class "administrative\_interior\_object\_metadata" and the abstract class "descriptive\_interior\_object\_metadata" defined. The sub elements of these abstract classes are to find in every interior object.

### 4.15.1 administrative\_interior\_object\_metadata

The element is a abstract class which is derived from the abstract class "administrative\_metadata" (cf. chapter 4.1).

Element tag	<vimcox:administrative_interior_object_metadata>
Sub elements	title, creator, date_created, rights, date_modified, textures, x3dsource, thumbnailsource

The specification of the elements title, creator, date\_created, rights and date\_modified is in chapter 4.1.

#### 4.15.1.1 textures

Source folders of the textures of a object.

The element has the same specification like "outside\_world\_textures" is specified in Chapter 4.4.3.4.

#### 4.15.1.2 x3dsource

Source folder of the x3d file.

The element is specified in Chapter 4.7.1.2.

#### 4.15.1.3 thumbnailsource

Source folder of the thumbnail of a object (GIF).

The element is specified in Chapter 4.7.1.3.

### 4.15.2 descriptive\_interior\_object\_metadata

The element is a abstract class which is derived from the abstract class "descriptive\_metadata" (cf. chapter. 4.2).

Element tag	<vimcox:descriptive_interior_object_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type,

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.2.

## 4.16 Furniture Metadata

Information about the metadata of a furniture.

Element tag	<vimcox:furniture>
Required	no
Repeatable	no
Subelements	administrative_furniture_metadata, descriptive_furniture_metadata

### 4.16.1 administrative\_furniture\_metadata

Information about the administrative metadata of a furniture.

It derived from the abstract class "administrative\_interior\_object\_metadata" (cf. chapter 4.15.1).

Element tag	<vimcox:administrative_furniture_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, textures, x3dsource, thumbnailsource

The specification of the elements title, creator, date\_created, rights, date\_modified, textures, x3dsource and thumbnailsource is to find in chapter 4.15.1.

### 4.16.2 descriptive\_furniture\_metadata

Information about the descriptive metadata of a furniture.

It derived from the abstract class "descriptive\_interior\_object\_metadata" (cf. chapter. 4.15.2).

Element tag	<vimcox:descriptive_furniture_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type,

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.15.2.

## 4.17 Light Source Metadata

Information about the metadata of a furniture.

Element tag	<vimcox:light_source>
Required	no
Repeatable	no
Subelements	administrative_light_source_metadata, descriptive_light_source_metadata

### 4.17.1 administrative\_light\_source\_metadata

Information about the administrative metadata of a furniture.

It derived from the abstract class "administrative\_interior\_object\_metadata" (cf. chapter 4.15.1).

Element tag	<vimcox:administrative_light_source_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, textures, x3dsource, thumbnailsource

The specification of the elements title, creator, date\_created, rights, date\_modified, textures, x3dsource and thumbnailsource is to find in chapter 4.15.1.

### 4.17.2 descriptive\_light\_source\_metadata

Information about the descriptive metadata of a furniture.

It derived from the abstract class "descriptive\_interior\_object\_metadata" (cf. chapter. 4.15.2).

Element tag	<vimcox:descriptive_light_source_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type,

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.15.2.

## 4.18 Plant Metadata

Information about the metadata of a plant.

Element tag	<vimcox:plant>
Required	no
Repeatable	no
Subelements	administrative_plant_metadata, descriptive_plant_metadata

### 4.18.1 administrative\_plant\_metadata

Information about the administrative metadata of a plant.

It derived from the abstract class "administrative\_interior\_object\_metadata" (cf. chapter 4.15.1).

Element tag	<vimcox:administrative_plant_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, textures, x3dsource, thumbnailsource

The specification of the elements title, creator, date\_created, rights, date\_modified, textures, x3dsource and thumbnailsource is to find in chapter 4.15.1.

### 4.18.2 descriptive\_plant\_metadata

Information about the descriptive metadata of a plant.

It derived from the abstract class "descriptive\_interior\_object\_metadata" (cf. chapter. 4.15.2).

Element tag	<vimcox:descriptive_plant_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type, origin, plant_family

The specification of the elements descriptiveNote, creator, measurements, creation\_date, displayCreationLocation, style, displayMaterialsTech, material\_set, production\_period and type, is in chapter 4.15.2.

#### 4.18.2.1 origin

Information about the origin of a plant.

Element tag	<vimcox:origin>
Data type	string
Required	no
Repeatable	no

#### Example:

```
<vimcox:origin>Sri Lanka</vimcox:origin>
```

#### 4.18.2.2 plant\_family

Information about the plant family of a plant.

Element tag	<vimcox:plant_family>
Data type	string
Required	no
Repeatable	no

#### Example:



```
<vimcox:plant_family>Lorbeergewaechse (Lauraceae)</vimcox:plant_family>
```

## 4.19 Any Type Interior Metadata

Information about the metadata of a any type interior object.

Element tag	<vimcox:any>
Required	no
Repeatable	no
Attributes	name
Subelements	administrative_any_metadata, descriptive_any_metadata

### 4.19.1 name

Information about the name of the object to be written.

Element tag	<vimcox:name>
Data type	string
Required	yes
Repeatable	no

#### Example:

```
<vimcox:any vimcox:name="heating"/>
```

### 4.19.2 administrative\_any\_metadata

Information about the administrative metadata of a any type interior object.

It derived from the abstract class "administrative\_interior\_object\_metadata" (cf. chapter 4.15.1).

Element tag	<vimcox:administrative_any_metadata>
Required	yes
Repeatable	no
Sub elements	title, creator, date_created, rights, date_modified, textures, x3dsource, thumbnailsource

The specification of the elements `title`, `creator`, `date_created`, `rights`, `date_modified`, `textures`, `x3dsource` and `thumbnailsource` is to find in chapter 4.15.1.

### 4.19.3 `descriptive_any_metadata`

Information about the descriptive metadata of a any type interior object.

It derived from the abstract class "descriptive\_interior\_object\_metadata" (cf. chapter. 4.15.2).

Element tag	<vimcox:descriptive_plant_metadata>
Required	yes
Repeatable	no
Subelements	descriptiveNote, creator, measurements, creation_date, displayCreationLocation, style, displayMaterialsTech, material_set, production_period, type

The specification of the elements `descriptiveNote`, `creator`, `measurements`, `creation_date`, `displayCreationLocation`, `style`, `displayMaterialsTech`, `material_set`, `production_period` and `type`, is in chapter 4.15.2.

# Chapter 5

## Conclusion

With the creation and dissemination of virtual museums arise digital data containing the description of cultural objects. These must be stored in an appropriate data format. It serves the data archive and reuse them.

We have presented the metadata element set VIMCOX, which serves both the description of cultural objects and the description of virtual museums as a whole.

The defined metadata were transferred to the defined hierarchical data structure to an XML schema file. The XML schema has been implemented including the existing standards.

The XML Schema "vimcox-1.0.xsd" fulfills the following requirements:

- The structure of the XML schema is constructed in a hierarchical form.
- The XML schema is modular and is thus extensible at any time. The elements and content models are reusable.
- The elements of the XML schemas have a description.
- The defined necessary elements are the minimal set of elements of a virtual museum.
- The XML schema includes some elements from different XML schemas, making it interoperable with them.

Until now there was no metadata standard, with which it is possible to describe a museum as a whole. This specification defines the metadata standard VIMCOX which can describe a museum as a whole. This includes a description of buildings, Rooms and objects of a museum.

# Bibliography

- [ARCO 2003] ARCO Konsortium, 2003, *ARCO - Augmentet Representation of Cultural Objects*  
<http://www.arco-web.org/TextVersion/Description/Description1.html>
- [BL 2009] Daniel Biella, Wolfram Luther, 2009, *TOWARDS A TEMPLATE-BASED GENERATION OF VIRTUAL 3D MUSEUM ENVIRONMENTS*  
Proceedings of the 5th International Conference on Web Information Systems and Technologies (WEBIST), 2009.
- [CDWA Lite 2005] The J. Paul Getty Trust, 2005, *Categories for the Description of Works of Art: CDWA Lite*  
[http://www.getty.edu/research/conducting\\_research/standards/cdwa/cdwalite.html](http://www.getty.edu/research/conducting_research/standards/cdwa/cdwalite.html)
- [DCMI 2010] Dublin Core Metadata Initiative, 2010, *Dublin Core Metadata Element Set, Version 1.1*  
<http://www.tei-c.org/index.xml>
- [DMB 2009] Fachgruppe Dokumentation des Deutschen Museumsbundes (DMB), 2009, *museumdat - XML Schema zur Bereitstellung von Kerndaten in museums"ubergreifenden Best"anden*  
<http://www.museumdat.org/>

- [Gilliland 2000] Anne J. Gilliland-Swetland, 2000, *Introduction to Metadata*  
[http://www.getty.edu/research/conducting\\_research/standards/intrometadata/](http://www.getty.edu/research/conducting_research/standards/intrometadata/)
- [ICOM 2007] ICOM - International Council of Museums, 2007, *Museum Definition*  
<http://icom.museum/who-we-are/the-vision/museum-definition.html>
- [ICOM-CIDOC 2006] The International Committee for Documentation of the International Council of Museums (ICOM-CIDOC), 2006, *The CIDOC Conceptual Reference Model*  
<http://www.cidoc-crm.org/>
- [ISO 2005] ISO - International Organization for Standardization, 2005, *Information technology – Metadata registries (MDR)*  
<http://standards.iso.org/ittf/PubliclyAvailableStandards/index.html>
- [LIDO 2010] CIDOC Working Group Data Harvesting and Integration, 2010, *LIDO - Lightweight Information Describing Objects*  
<http://www.lido-schema.org/schema/v0.9/lido-v0.9-specification.pdf>
- [Lingemann 2010] Andre Lingemann, 2010. *Erweiterung des ARCO-Museumsstandards um Interaktions- und Dialogelemente mit Anwendungen*
- [MPW 2006] Nicholaos Mourkoussis, Manjula Patel, Martin White, 2006, *A framework for the implementation of Application Profiles in XML Schemas*  
<http://journals.tdl.org/jodi/article/download/169/161>
- [Patel 2003] Manjula Patel, 2003, *Building Virtual Museum Exhibitions - Overview of ARCO Technology*  
<http://www.ukoln.ac.uk/metadata/arco/MACE03/mace-ukoln-2>

ppt

[SPECTRUM 2007] Collections Trust, 2007, *SPECTRUM XML Schema*  
<http://www.collectionstrust.org.uk/schema>

[VRA 2007] Visual Resources Association's Data Standards Committee, 2007,  
*VRA Core 4.0*  
<http://www.vraweb.org/projects/vracore4/>