
**Information technology — Multimedia
application format (MPEG-A) —**

**Part 3:
MPEG photo player application format**

*Technologies de l'information — Format pour application multimédia
(MPEG-A) —*

Partie 3: Format pour application "MPEG photo player"



Reference number
ISO/IEC 23000-3:2007(E)

AVA Documents
Document Sharing Hub
© ISO/IEC 2007

PDF disclaimer

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

Adobe is a trademark of Adobe Systems Incorporated.

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



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2007

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

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

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Abbreviated terms	2
5 File format	3
6 Resource	4
7 Metadata	4
7.1 General.....	4
7.2 Collection level descriptive metadata.....	5
7.3 Item level descriptive metadata.....	15
8 Conformance testing	26
8.1 File format conformance points	26
8.2 Photo-player device conformance points	27
Annex A (normative) Schemas	29
Annex B (informative) Relevant technologies to create photo-player metadata	57
Annex C (informative) Examples of collection structure	60
Annex D (informative) Classification schemes	66
Annex E (informative) Binary syntax	67
Bibliography	91

Foreword

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

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

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

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

ISO/IEC 23000-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

ISO/IEC 23000 consists of the following parts, under the general title *Information technology — Multimedia application format (MPEG-A)*:

- *Part 1: Purpose for multimedia application formats* [Technical Report]
- *Part 2: MPEG music player application format*
- *Part 3: MPEG photo player application format*
- *Part 4: Musical slide show application format*

Introduction

ISO/IEC 23000 (also known as “MPEG-A”) serves specific market needs by facilitating the swift development of innovative multimedia applications and services. Each part of the MPEG-A standard is created by combining selected existing technologies from the published MPEG standards into a multimedia application format (MAF). These are normative specifications of multimedia formats along with reference software implementations, allowing interoperability at the application level.

ISO/IEC 23000-3:2007 specifies a solution for digital photo-library applications. It was developed in response to the need for persistent and interoperable linking of digital image collections with metadata in order to support advanced access to content.

ISO/IEC 23000-3:2007 draws on three principal standards: JPEG for image-coding; MPEG-7 for metadata, and MPEG-4 file format for encapsulation. From these, it derives a flexible but simple structure to package images and their associated metadata. This allows users to annotate and organize images just as they could with proprietary software (or photo-sharing websites) but in a standard format which is interoperable across devices and platforms. It also allows conforming devices to support rich, content-enhanced functionality, including intelligent browsing, content-based search and automatic categorization.

Information technology — Multimedia application format (MPEG-A) —

Part 3: MPEG photo player application format

1 Scope

This part of ISO/IEC 23000, also known as “photo player MAF”, specifies a file format for digital photo library applications. It establishes a standardized solution for the carriage of images and associated metadata, to facilitate simple and fully interoperable exchange across different devices and platforms. The set of metadata includes MPEG-7 visual content descriptions, as well as acquisition-based metadata (such as date, time and camera settings). This allows compliant devices to support new, content-enhanced functionality, such as intelligent browsing, content-based search or automatic categorization.

2 Normative references

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

ISO/IEC 10918-1, *Information technology — Digital compression and coding of continuous-tone still images: Requirements and guidelines*

ISO/IEC 10918-2, *Information technology — Digital compression and coding of continuous-tone still images: Compliance testing*

ISO/IEC 14496-12, *Information technology — Coding of audio-visual objects — Part 12: ISO base media file format*

ISO/IEC 14496-14, *Information technology — Coding of audio-visual objects — Part 14: MP4 file format*

ISO/IEC 15938-1, *Information technology — Multimedia content description interface — Part 1: Systems*

ISO/IEC 15938-2, *Information technology — Multimedia content description interface — Part 2: Description definition language*

ISO/IEC 15938-3, *Information technology — Multimedia content description interface — Part 3: Visual*

ISO/IEC 15938-5:2003, *Information technology — Multimedia content description interface — Part 5: Multimedia description schemes*

ISO/IEC 15938-10, *Information technology — Multimedia content description interface — Part 10: Schema definition*

ISO/IEC 21000-17, *Information technology — Multimedia framework (MPEG-21) — Part 17: Fragment Identification of MPEG Resources*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 15938-5 and the following apply.

- 3.1**
JPEG
image coding format defined in ISO/IEC 10918-1
- 3.2**
MPEG-7
multimedia content description interface defined in ISO/IEC 15938
- 3.3**
MPEG-7 schema
schema defined in ISO/IEC 15938-10
- 3.4**
collection
grouping, consisting of image resources and/or nested collections, described by an instance of the MPEG-7 ContentCollection description scheme
- 3.5**
root collection
collection element directly beneath the mpeg7 root element in the photo-player collection-level metadata
- 3.6**
RoleCS
classification scheme defined in ISO/IEC 15938-5:2003, B.2.29
- 3.7**
resource
encoded image bitstream
- 3.8**
primary resource
authoritative instance of a resource
- 3.9**
internal resource
resource included in the current file
- 3.10**
external resource
resource which is available outside of the current file
- 3.11**
codestream
entity of a resource
- 3.12**
BiM
binary MPEG format for XML, defined in ISO/IEC 15938-1

4 Abbreviated terms

- CS Classification Scheme
- DS Description Scheme

mp4	MPEG-4 (file format)
XSD	XML Schema Definition
XML	eXtensible Markup Language

5 File format

Photo-player file format shall use the MPEG-4 (mp4) file format (ISO/IEC 14496-14) to carry both JPEG resources and their associated metadata. Figure 1 shows the basic structure of the mp4 file format for a photo collection. Internal JPEG resources shall be stored in the media data box and their associated metadata shall be stored in the movie box. The linking between metadata and each corresponding internal resource (/codestream) shall be specified by media box. Linkage information to external resources can be specified in the metadata contained in the meta box of each track box.

The identification of the MAF type in the file format shall use the brand mechanism defined by the ISO base media file format (ISO/IEC 14496-12). The brand "MPPL" identifies the photo player MAF and shall appear in the compatible-brands list in the file-type box (ftyp).

In the mp4 file, descriptive metadata shall be stored using a "bxml box" inside a "meta box", which can be instantiated in a movie box or track boxes. The meta box in the movie box shall be used to annotate collection level information and those in the track boxes shall be used for item level information. All the descriptive metadata shall be stored using MPEG-7 BiM, therefore, meta-boxes shall have "mp7b" handler-type.

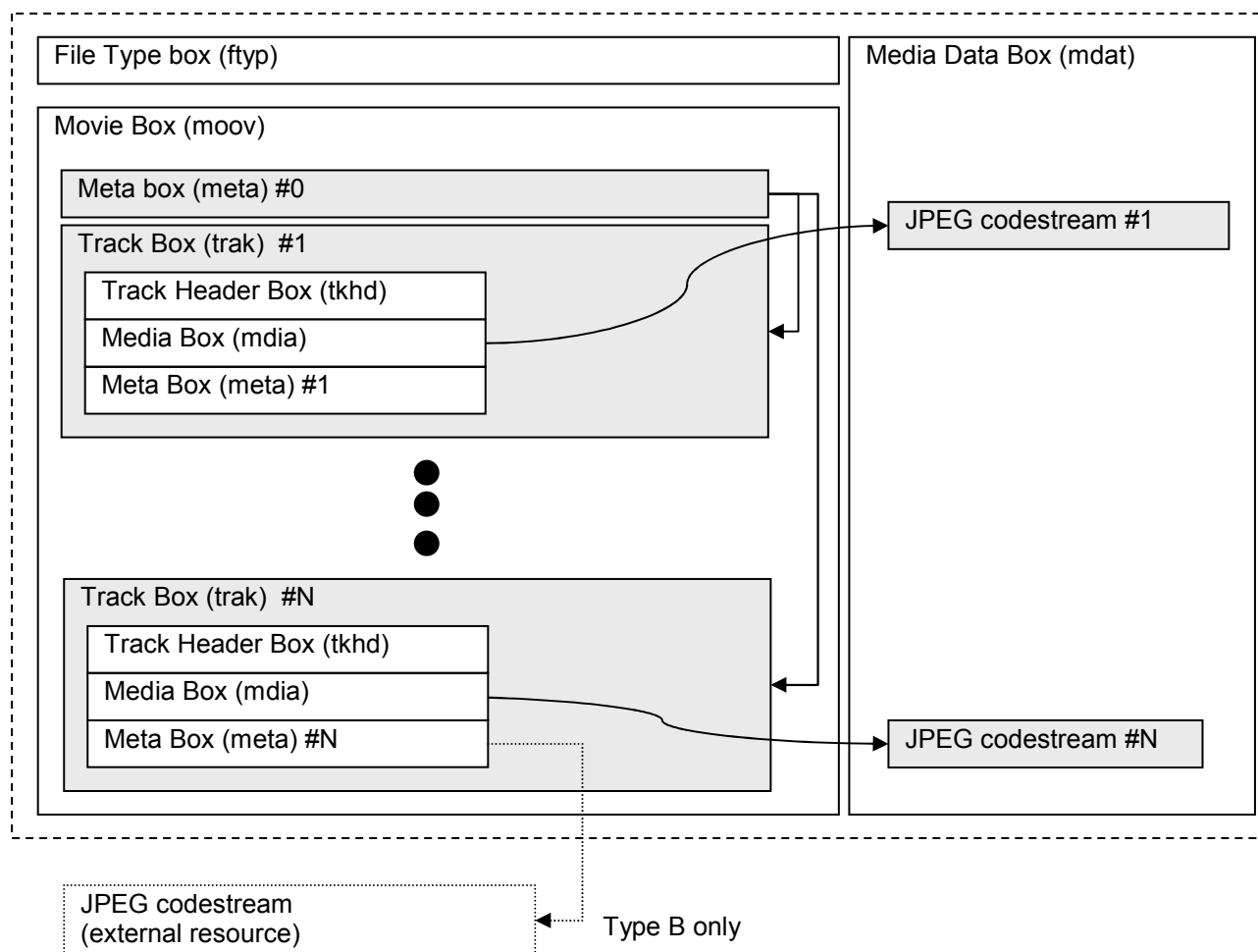


Figure 1 — Basic structure of MPEG photo player application format

The number of meta-boxes for collection-level descriptive metadata shall be exactly one, while the number of meta-boxes for item-level descriptive metadata shall be the same as the number of resources in a file.

6 Resource

Only JPEG-conforming code-streams may be used as internal or primary external resources. Two different types of file format shall exist:

Type A:

All the primary resources shall be stored inside the file. Type A files can therefore be identified by the absence of any MediaInstance elements which reference JPEG resources.

Type B:

At least one primary (JPEG) resource shall exist outside of the file. To identify the primary resource location, a MediaInstance element shall be used in the corresponding item-level descriptive metadata (See subclause 7.3). Type B files can therefore be identified by the presence of a MediaInstance element which references a JPEG resource. For each item, if such an external JPEG resource is referenced, then that is the primary resource; if not, the primary resource is internal. In the case of an external primary resource, the internal resource data in the Media Data Box shall contain an alternative image to the primary resource. This may be, for example, a thumbnail picture which can be useful for rendering.

In files of either type, locations of supplementary resources can be specified by means of MediaInstance elements (in additional MediaProfiles). To avoid confusion with the primary resource, such supplementary resources cannot be JPEG images – they may be stored in any other format, analogue or digital. This will allow links to be maintained with, for example, uncompressed original images when JPEG compressed (primary) versions are incorporated (internally or externally) in a photo-player file. Note that there is no requirement for photo-player conforming devices to be able to decode (or even be able to access) such supplementary resources.

7 Metadata

7.1 General

This clause specifies the MPEG-7 metadata which is supported by the photo-player format. The metadata shall be stored as binary XML in the bxml boxes, inside the respective meta boxes, for the collection-level and item-level. Two different subsets of MPEG-7 metadata are specified in the following subclauses, for this purpose. Each subset shall be binarised according to MPEG-7 BiM, using a corresponding simplified version of the MPEG-7 schema (ISO/IEC 15938-10).

The full normative specification of the metadata subsets is given in subclauses 7.2.2 and 7.3.2. These subclauses also define the simplified schemas, as modifications with respect to the MPEG-7 Schema. Annex A contains explicit schema definitions, in XSD form, generated by implementing the specified modifications.

Annex E is for information only. It contains explicit binary syntax for collection-level and item-level metadata. This syntax corresponds to encoding the metadata according to the BiM, by using the respective simplified schemas.

NOTE Photo-player devices can be implemented with either a fixed binary encoder/decoder, according to a syntax like that in Annex E, or can include a full BiM encoder/decoder, which infers the binary syntax from the XML Schema. An implementation using fixed syntax might be less complex, whereas a BiM-based solution might allow for more flexibility, for compatibility with potential future extensions.

The metadata subsets and simplified schemas are designed to be compatible with MPEG-7, in the sense that (textual) XML instance documents which conform to either of the photo-player metadata subsets will also be valid to MPEG-7 schema.

7.2 Collection level descriptive metadata

7.2.1 Overview

A BiM encoded ContentCollection DS shall be used to represent collection-level descriptive metadata. Figure 2 shows an overview of the metadata and Table 1 summarizes the semantics of available tools. The normative specification of all semantics is given in ISO/IEC 15938-2 and ISO/IEC 15938-5.

Table 1 — Semantics of tools in collection-level descriptive metadata

Tag Name		Semantics
DescriptionMetadata/ Creator	Optional	The author of the collection definition. The term "Author" (registered in RoleCS) shall be used as his/her role.
DescriptionMetadata/ CreationTime	Optional	The time stamp when the collection definition was created.
DescriptionMetadata/ LastUpdate	Mandatory	The time stamp of the most recent change to the collection definition.
ContentCollection/ name (attribute)	Optional	The name of (i.e., title for) the collection.
ContentCollection/ CreationInformation/ Creation/ Title	Mandatory	A title of (all) the photos in the collection. Note that this is not the title of the collection itself, which is expressed by ContentCollection/name above.
ContentCollection/ CreationInformation/ Creation/ TitleMedia/ TitleImage	Optional	A representative thumbnail picture for the collection. The image coding format for thumbnails shall be either JPEG or one of the uncompressed formats supported by Exif headers – that is, Baseline TIFF Rev. 6.0 RGB Full Color and TIFF Rev. 6.0 Extension YCbCr Image.
ContentCollection/ CreationInformation/ Creation/ TitleMedia/ TitleImage/ InlineMedia/ type (Attribute)	Mandatory (if InlineMedia is present)	Describing the format of the thumbnail image data. This shall be one of the MIME types "image/jpeg" or "image/tiff".
ContentCollection/ CreationInformation/ Creation/ Creator	Optional	Describing a person or organization who relates to the creation process of the images in the collection, such as photographer, publisher and so on. Their roles should be described using RoleCS. A variety of methods can be used to identify the Creators, including electronic address elements such as url or email. If the Role is set to "Actor", this field shall describe the identity of persons who appear in the images in the collection.
ContentCollection/ CreationInformation/ Creation/ Date	Optional	The time (or period in time) when the photos in the collection were captured. The creation time of photos in any sub-collections should be included within the time period for the current collection.
ContentCollection/ CreationInformation/ Creation/ Location	Optional	The location where the photos in the collection were captured.
ContentCollection/ TextAnnotation/ FreeTextAnnotation	Optional	Summary text about the collection.
ContentCollection/ TextAnnotation/ KeywordAnnotation	Optional	Any keywords of the collection. The reserved terms of classification scheme "CollectionTypeCS" (Annex D.1) should be used to specify the collection type.
ContentCollection/ ContentRef	Mandatory	The photos which are included in the collection. URL reference shall be employed with MPEG-21 Fragment Identifier compliant format, defined in ISO/IEC 21000-17.
ContentCollection/ ContentCollection	Optional	The sub-collections. Note that the root collection shall include all of the photos in the file. Hierarchical representation of collections is allowed.

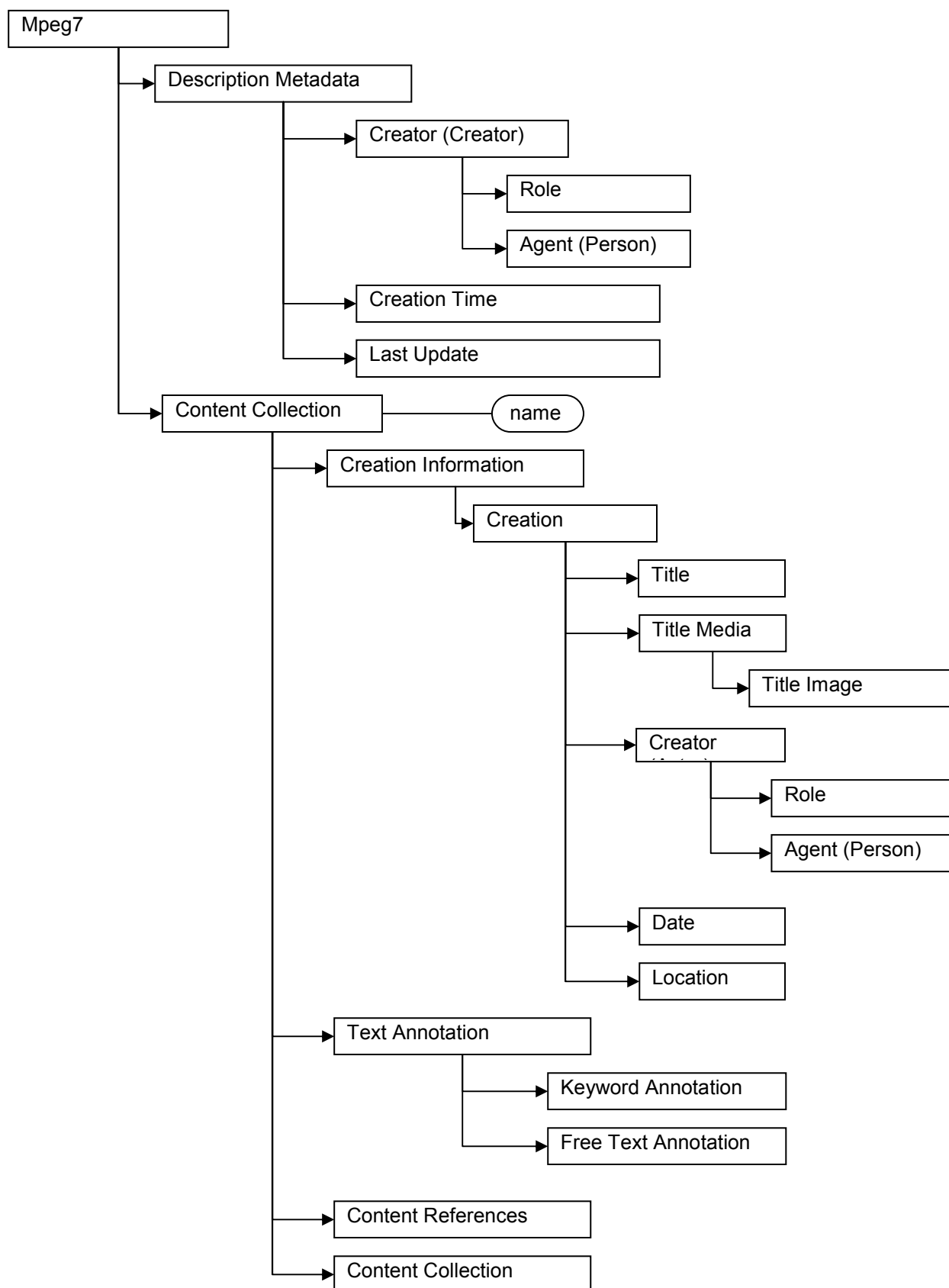


Figure 2 — Overview of collection level descriptive metadata

7.2.2 Constraints to MPEG-7 Schema

The collection-level photo-player schema is defined with respect to the Version 2 schema as specified in ISO/IEC 15938-10. The namespace of the Version 2 schema providing a basis for the photo-player collection-level schema is "urn:mpeg:mpeg7:schema:2004". The following table lists the ISO/IEC 15938 description tools (global elements, global attributes, attribute groups, complexTypes and simpleTypes) selected to be included and any further constraints imposed on these description tools for the collection-level metadata schema. The interpretation of the Table is as follows:

- "element/attribute/attributeGroup excluded" – this MPEG-7 metadata shall not be instantiated in the collection-level metadata of a photo-player compliant file;
- `xsi:type="[TypeName]"` – the element shall have this attribute, when instantiated in the collection-level metadata. Therefore, it shall only be instantiated with type [TypeName];
- `minOccurs="n"` – no fewer than *n* occurrences of the element shall be instantiated in the collection-level metadata;
- `maxOccurs="m"` – no more than *m* occurrences of the element shall be instantiated in the collection-level metadata.

Where no constraint is listed, the metadata elements/attributes shall be instantiated in accordance with ISO/IEC 15938-10.

Table 2 — Collection-level MPEG-7 metadata (normative)

Global Elements	Name	Constraint
Mpeg7	DescriptionUnit Description	<code>xsi:type="ContentCollectionType"</code> element excluded
Complex Types	Element/Attribute Name	Constraint
Mpeg7BaseType		
DSType	Header id timePropertyGrp mediaTimePropertyGrp	element excluded attributeGroup excluded attributeGroup excluded
HeaderType	id	
DescriptionMetadataType	Confidence Version LastUpdate Comment PublicIdentifier PrivateIdentifier Creator CreationLocation CreationTime Instrument Rights Package	element excluded element excluded minOccurs="1" element excluded element excluded element excluded element excluded element excluded element excluded element excluded
Mpeg7Type	DescriptionProfile DescriptionMetadata xml:lang timePropertyGrp mediaTimePropertyGrp	minOccurs="1" attributeGroup excluded attributeGroup excluded

CollectionType	CreationInformation CreationInformationRef UsageInformation UsageInformationRef TextAnnotation name	minOccurs="0" element excluded element excluded element excluded
ContentCollectionType	VisualFeature GofGopFeature AudioFeature Content ContentRef ContentCollection ContentCollectionRef	element excluded element excluded element excluded element excluded minOccurs="0" minOccurs="0" element excluded
CreationInformationType	Creation Classification RelatedMaterial	element excluded element excluded
CreationType	Title TitleMedia Abstract Creator CreationCoordinates Location Date CreationTool CopyrightString	maxOccurs="1" element excluded maxOccurs="1" element excluded element excluded
TimeType	TimePoint RelTimePoint RelIncrTimePoint Duration Incr Duration	element excluded element excluded minOccurs="0" element excluded
PlaceType	Name NameTerm PlaceDescription Role GeographicPosition Point datum AstronomicalBody Region AdministrativeUnit PostalAddress AddressLine PostingIdentifier xml:lang StructuredPostalAddress InternalCoordinates StructuredInternalCoordinates ElectronicAddress xml:lang	element excluded element excluded element excluded element excluded element excluded element excluded element excluded element excluded element excluded attribute excluded
GeographicPointType	longitude latitude altitude	
TitleType	type	attribute excluded

TitleMediaType	TitleImage TitleVideo TitleAudio	element excluded element excluded
TextAnnotationType	KeywordAnnotation FreeTextAnnotation StructuredAnnotation DependencyStructure relevance confidence xml:lang	element excluded element excluded attribute excluded attribute excluded
KeywordAnnotationType	Keyword type xml:lang	
CreatorType	Character Instrument	element excluded element excluded
PersonNameType	GivenName FamilyName Title Numeration LinkingName Salutation dateFrom dateTo type xml:lang	attribute excluded attribute excluded attribute excluded
NameComponentType	initial abbrev	attribute excluded attribute excluded
MediaAgentType	Role Agent AgentRef	element excluded
InlineTermDefinitionType	Name preferred Definition Term	maxOccurs="1" attribute excluded element excluded element excluded
ControlledTermUseType	href	
AgentType	Icon	element excluded
PersonType	Name NameTerm Affiliation Organization OrganizationRef PersonGroup PersonGroupRef Citizenship Address AddressRef ElectronicAddress PersonDescription Nationality	maxOccurs="1" element excluded element excluded element excluded element excluded element excluded minOccurs="0" element excluded element excluded element excluded
OrganizationType	Name type NameTerm Kind	attribute excluded element excluded element excluded

	Contact ContactRef Jurisdiction JurisdictionRef Address AddressRef ElectronicAddress	element excluded element excluded element excluded element excluded minOccurs="0" element excluded
ElectronicAddressType	Telephone type Fax Email Url	attribute excluded
TextualBaseType	xml:lang phoneticTranscription phoneticAlphabet	attribute excluded attribute excluded
ImageLocatorType	MediaTimePoint MediaRelTimePoint MediaRelIncrTimePoint BytePosition	element excluded element excluded element excluded element excluded
InlineMediaType	MediaData16 MediaData64 type	
MediaLocatorType	MediaURI InlineMedia StreamID	element excluded minOccurs="0" element excluded
DescriptionProfileType	profileAndLevelIndication	
ReferenceType	mpeg7:referenceGroup	
TextualType		
Simple Types	Element/Attribute Name	Constraints
termURIReferenceType		
termAliasReferenceType		
termReferenceType		
basicDurationType		
durationType		
mimeType		
basicTimePointType		
timePointType		
Attribute Groups	Attribute Name	Constraints
referenceGrp	idref xpath href	attribute excluded attribute excluded

7.2.3 Instantiation examples (informative)

```

<Mpeg7>
<DescriptionMetadata>
  <LastUpdate>2006-11-06T19:20:25+00:00</LastUpdate>
  <Creator>

```

```

<Role href="urn:mpeg:mpeg7:cs:RoleCS:2001:AUTHOR">
  <Name>Author</Name>
</Role>
<Agent xsi:type="PersonType">
  <Name>
    <GivenName>Akio</GivenName>
    <FamilyName>Yamada</FamilyName>
  </Name>
</Agent>
</Creator>
<CreationTime>2006-11-06T19:20:25+00:00</CreationTime>
</DescriptionMetadata>
<DescriptionUnit xsi:type="ContentCollectionType" name="Yuto's 6th birthday">
  <!-- ##### ROOT COLLECTION - (AN EVENTCOLLECTION) ##### !-->
  <CreationInformation>
    <Creation>
      <Title>
      </Title>
      <TitleMedia>
        <TitleImage>
          <!-- Thumbnail image (<InlineMedia>) here -->
        </TitleImage>
      </TitleMedia>
      <CreationCoordinates>
        <Date>
          <TimePoint>2006-11-05T16:14+00:00</TimePoint>
          <Duration>PT6H33M</Duration>
        </Date>
      </CreationCoordinates>
    </Creation>
  </CreationInformation>
  <TextAnnotation>
    <FreeTextAnnotation>Birthday Party</FreeTextAnnotation>
    <KeywordAnnotation>
      <Keyword>EventCollection</Keyword>
    </KeywordAnnotation>
  </TextAnnotation>
  <ContentRef href="#ffp(track_ID=1)" />
  <ContentRef href="#ffp(track_ID=2)" />
  <ContentRef href="#ffp(track_ID=3)" />
  <ContentRef href="#ffp(track_ID=4)" />
  <ContentRef href="#ffp(track_ID=5)" />
  <ContentRef href="#ffp(track_ID=6)" />
  <ContentRef href="#ffp(track_ID=7)" />
  <ContentRef href="#ffp(track_ID=8)" />
  <ContentRef href="#ffp(track_ID=9)" />
  <ContentRef href="#ffp(track_ID=10)" />
  <ContentRef href="#ffp(track_ID=11)" />
  <ContentRef href="#ffp(track_ID=12)" />
  <!-- ..... -->
  <ContentRef href="#ffp(track_ID=15)" />
  <ContentRef href="#ffp(track_ID=16)" />
  <ContentRef href="#ffp(track_ID=17)" />
  <ContentRef href="#ffp(track_ID=18)" />
  <!-- ..... -->
  <ContentRef href="#ffp(track_ID=22)" />
  <ContentCollection name="Indoors at the Birthday party">
    <!-- ##### CATEGORYCOLLECTION 1 ##### !-->
    <CreationInformation>
      <Creation>
        <Title>

```

```

        </Title>
        <TitleMedia>
            <TitleImage>
                <!-- Thumbnail image (<InlineMedia>) here -->
            </TitleImage>
        </TitleMedia>
    </Creation>
</CreationInformation>
<TextAnnotation>
    <FreeTextAnnotation>Yuto and his friends in the kitchen
</FreeTextAnnotation>
    <KeywordAnnotation>
        <Keyword>CategoryCollection</Keyword>
    </KeywordAnnotation>
    <KeywordAnnotation>
        <Keyword>Indoor</Keyword>
    </KeywordAnnotation>
    <KeywordAnnotation>
        <Keyword>Party</Keyword>
    </KeywordAnnotation>
</TextAnnotation>
<ContentCollection name="Blowing out the candles">
    <!-- ##### EVENT COLLECTION 1.1 ##### !-->
    <CreationInformation>
        <Creation>
            <Title>
            </Title>
            <CreationCoordinates>
                <Date>
                    <TimePoint>2006-11-05T16:14+00:00</TimePoint>
                    <Duration>PT7M</Duration>
                </Date>
            </CreationCoordinates>
        </Creation>
    </CreationInformation>
    <TextAnnotation>
        <KeywordAnnotation>
            <Keyword>Candles</Keyword>
        </KeywordAnnotation>
        <KeywordAnnotation>
            <Keyword>Birthday cake</Keyword>
        </KeywordAnnotation>
        <KeywordAnnotation>
            <Keyword>EventCollection</Keyword>
        </KeywordAnnotation>
        <FreeTextAnnotation>Yuto blew out all the candles in one
go!</FreeTextAnnotation>
    </TextAnnotation>
    <ContentRef href="#ffp(track_ID=1)" />
    <ContentRef href="#ffp(track_ID=2)" />
    <ContentRef href="#ffp(track_ID=3)" />
</ContentCollection>
<ContentCollection name="Opening presents">
    <!-- ##### EVENT COLLECTION 1.2 ##### !-->
    <CreationInformation>
        <Creation>
            <Title>
            </Title>
            <CreationCoordinates>
                <Date>
                    <TimePoint>2006-11-05T16:25+00:00</TimePoint>

```

```

        <Duration>PT16M31S</Duration>
    </Date>
</CreationCoordinates>
</Creation>
</CreationInformation>
<TextAnnotation>
    <KeywordAnnotation>
        <Keyword>EventCollection</Keyword>
    </KeywordAnnotation>
    <FreeTextAnnotation>Lots of presents to open - wrapping paper
everywhere!</FreeTextAnnotation>
</TextAnnotation>
    <ContentRef href="#ffp(track_ID=4)" />
    <ContentRef href="#ffp(track_ID=5)" />
    <ContentRef href="#ffp(track_ID=6)" />
    <ContentRef href="#ffp(track_ID=7)" />
</ContentCollection>
</ContentCollection>
<ContentCollection name="Outdoors at the Birthday party">
    <!-- ##### CATEGORYCOLLECTION 2 ##### !-->
    <CreationInformation>
        <Creation>
            <Title>
            </Title>
            <CreationCoordinates>
                <Location>
                    <PlaceDescription>The garden of our house</PlaceDescription>
                </Location>
            </CreationCoordinates>
        </Creation>
    </CreationInformation>
    <TextAnnotation>
        <FreeTextAnnotation>Outdoor</FreeTextAnnotation>
        <FreeTextAnnotation>Party</FreeTextAnnotation>
        <KeywordAnnotation>
            <Keyword>CategoryCollection</Keyword>
        </KeywordAnnotation>
    </TextAnnotation>
    <ContentCollection name="Night time">
        <!-- ##### CATEGORYCOLLECTION 2.1 ##### !-->
        <TextAnnotation>
            <KeywordAnnotation>
                <Keyword>Outdoor</Keyword>
            </KeywordAnnotation>
            <KeywordAnnotation>
                <Keyword>Night</Keyword>
            </KeywordAnnotation>
            <KeywordAnnotation>
                <Keyword>CategoryCollection</Keyword>
            </KeywordAnnotation>
        </TextAnnotation>
        <ContentRef href="#ffp(track_ID=8)" />
        <ContentRef href="#ffp(track_ID=9)" />
        <ContentCollection name="A small fireworks display">
            <!-- ##### EVENTCOLLECTION 2.1.1 ##### !-->
            <CreationInformation>
                <Creation>
                    <Title>
                    </Title>
                    <CreationCoordinates>
                    <Date>

```

```

        <TimePoint>2006-11-05T20:43+00:00</TimePoint>
        <Duration>PT9M</Duration>
    </Date>
    </CreationCoordinates>
</Creation>
</CreationInformation>
<TextAnnotation>
    <KeywordAnnotation>
        <Keyword>Night</Keyword>
    </KeywordAnnotation>
    <KeywordAnnotation>
        <Keyword>Fireworks</Keyword>
    </KeywordAnnotation>
    <KeywordAnnotation>
        <Keyword>CategoryCollection</Keyword>
    </KeywordAnnotation>
</TextAnnotation>
    <ContentRef href="#ffp(track_ID=11)" />
    <ContentRef href="#ffp(track_ID=12)" />
    <!-- ..... -->
    <ContentRef href="#ffp(track_ID=15)" />
</ContentCollection>
</ContentCollection>
</ContentCollection>
<ContentCollection name="Pictures of Yuto">
    <!-- ##### PERSONCOLLECTION 3 ##### !-->
    <CreationInformation>
        <Creation>
            <Title>
            </Title>
            <Creator>
                <Role href="urn:mpeg:mpeg7:cs:RoleCS:2001:ACTOR" />
                <Agent xsi:type="PersonType">
                    <Name>
                        <GivenName>Yuto</GivenName>
                        <FamilyName>Yamada</FamilyName>
                    </Name>
                </Agent>
            </Creator>
        </Creation>
    </CreationInformation>
    <TextAnnotation>
        <KeywordAnnotation>
            <Keyword>PersonCollection</Keyword>
        </KeywordAnnotation>
    </TextAnnotation>
    <ContentRef href="#ffp(track_ID=11)" />
    <ContentRef href="#ffp(track_ID=5)" />
    <ContentRef href="#ffp(track_ID=1)" />
    <ContentRef href="#ffp(track_ID=2)" />
    <ContentRef href="#ffp(track_ID=17)" />
    <ContentRef href="#ffp(track_ID=21)" />
    <ContentRef href="#ffp(track_ID=22)" />
</ContentCollection>
</DescriptionUnit>
</Mpeg7>

```

7.3 Item level descriptive metadata

7.3.1 Overview

A BiM encoded Image DS shall be used to represent item-level descriptive metadata. Figure 3 shows an overview of the metadata and Table 3 summarizes the semantics of available tools. The normative specification of all semantics is given in ISO/IEC 15938-2, ISO/IEC 15938-3 and ISO/IEC 15938-5.

Table 3 — Semantics of tools in item-level descriptive metadata

Tag Name		Semantics
DescriptionMetadata/ Creator	Optional	An author of the item description. The term "Author" (registered in RoleCS) shall be used as his/her role.
DescriptionMetadata/ CreationTime	Optional	The time stamp when the item description was created.
DescriptionMetadata/ LastUpdate	Mandatory	The time stamp of the most recent change to the item description.
DescriptionUnit/ Image/ MediaInformation/ MediaProfile/ MediaFormat	Optional	File properties of a resource. Here resource refers to an external resource if the MediaInstance element is instantiated and the internal resource if not; When appropriate, the FileSize and VisualCoding/Frame child elements should be used to specify the size of code-stream and pixel dimensions of the image, respectively.
DescriptionUnit/ Image/ MediaInformation/ MediaProfile/ MediaFormat/ Content	Mandatory (if MediaFormat is instantiated)	Describing the media. The term "Image" (registered in ContentCS) shall be used
DescriptionUnit/ Image/ MediaInformation/ MediaProfile/ MediaFormat/ FileFormat	Optional	If the resource is external, this element shall be used to specify the format of the image. The terms from FileFormatCS should be used for this purpose.
DescriptionUnit/ Image/ MediaInformation/ MediaProfile/ MediaInstance	Optional	Indicating the location of an external resource. Not more than one instance shall be instantiated in any given MediaProfile. Note that this is an optional element. In the case that no external resource exists, this element shall not be instantiated.
DescriptionUnit Image/ CreationInformation/ Creation/ Title	Mandatory	The title of the resource. It may be obtained by referring to corresponding Exif tags of the resource.
DescriptionUnit Image/ CreationInformation/ Creation/ Creator	Optional	Describing a person or organization who relates to the creation process of the resource, such as photographer, publisher and so on. Their roles should be described using RoleCS. A variety of methods can be used to identify the Creators, including electronic address elements such as url or email. Regarding the photographer, such information may be obtained by referring to corresponding Exif tags of the resource. If the Role is set to "Actor", this field shall describe the identity of persons who appear in the image.
DescriptionUnit/ Image/ TextAnnotation	Optional	Summary text of the resource. It may be obtained by referring to corresponding Exif tags of the resource.

DescriptionUnit/ Image/ CreationInformation/ Creation/ Location	Optional	The location where the resource was captured. GPS location information may be obtained by referring to corresponding Exif tags of the resource.
DescriptionUnit/ Image/ CreationInformation/ Creation/ Date	Optional	The time when the resource was captured. This may be obtained by referring to corresponding Exif tags of the resource.
DescriptionUnit/ Image/ VisualDescriptionScheme	Optional	Signal-level characteristics of the resource. Several elements may be instantiated. Suggestions appropriate to certain applications are given in Annex C.

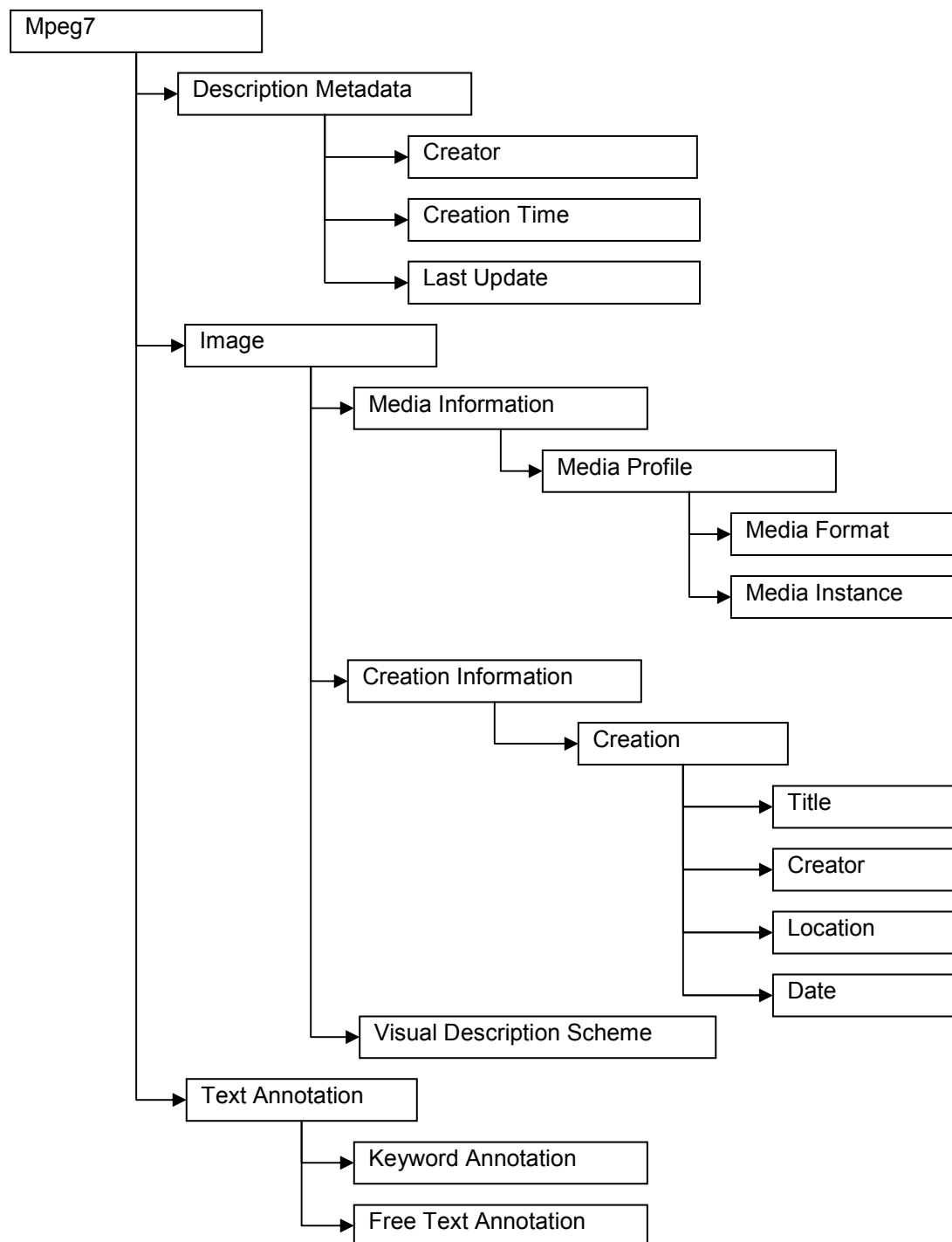


Figure 3 — Overview of collection level descriptive metadata

7.3.2 Constraints to MPEG-7 Schema

The item-level photo-player schema is defined with respect to the Version 2 schema as specified in ISO/IEC 15938-10. The namespace of the Version 2 schema providing a basis for the photo-player item-level schema is “urn:mpeg:mpeg7:schema:2004”. The following table lists the ISO/IEC 15938 description tools (global elements, global attributes, attribute groups, complexTypes and simpleTypes) selected to be included

and any further constraints imposed on these description tools for the item-level metadata schema. The interpretation of the Table is as follows:

- “element/attribute/attributeGroup excluded” – this MPEG-7 metadata shall not be instantiated in the item-level metadata of a photo-player compliant file;
- `xsi:type="[TypeName]"` – the element shall have this attribute, when instantiated in the item-level metadata. Therefore, it shall only be instantiated with type `[TypeName]`;
- `minOccurs="n"` – at least *n* occurrences of the element shall be instantiated in the item-level metadata;
- `maxOccurs="m"` – no more than *m* occurrences of the element shall be instantiated in the item-level metadata.

Where no constraint is listed, the metadata elements/attributes shall be instantiated in accordance with ISO/IEC 15938-10.

Table 4 — Item-level MPEG-7 metadata (normative)

Global Elements	Name	Constraint
Mpeg7	DescriptionUnit Description	<code>xsi:type="ImageType"</code> element excluded
Complex Types	Element/Attribute Name	Constraint
Mpeg7BaseType		
DType		
DSType	Header id timePropertyGrp mediaTimePropertyGrp	element excluded attributeGroup excluded attributeGroup excluded
HeaderType	id	
DescriptionMetadataType	Confidence Version LastUpdate Comment PublicIdentifier PrivateIdentifier Creator CreationLocation CreationTime Instrument Rights Package	element excluded element excluded minOccurs="1" element excluded element excluded element excluded element excluded element excluded element excluded element excluded
Mpeg7Type	DescriptionProfile DescriptionMetadata xml:lang timePropertyGrp mediaTimePropertyGrp	minOccurs="1" attributeGroup excluded attributeGroup excluded
DescriptionProfileType	profileAndLevelIndication	
MultimediaContentType		
ImageType	Image	

SegmentType	MediaInformation MediaInformationRef MediaLocator StructuralUnit CreationInformation CreationInformationRef UsageInformation UsageInformationRef TextAnnotation type Semantic SemanticRef MatchingHint PointOfView Relation	minOccurs="0" element excluded element excluded element excluded minOccurs="0" element excluded element excluded element excluded attribute excluded element excluded element excluded element excluded element excluded element excluded
MediaInformationType	MediaIdentification MediaProfile	element excluded
MediaProfileType	ComponentMediaProfile MediaFormat MediaTranscodingHints MediaQuality MediaInstance master	element excluded element excluded element excluded maxOccurs="1" attribute excluded
MediaFormatType	Content Medium FileFormat FileSize System Bandwidth BitRate TargetChannelBitRate ScalableCoding VisualCoding Format Pixel Frame height width aspectRatio rate structure ColorSampling AudioCoding SceneCodingFormat GraphicsCodingFormat OtherCodingFormat	element excluded element excluded element excluded element excluded element excluded element excluded element excluded element excluded attribute excluded attribute excluded attribute excluded element excluded element excluded element excluded element excluded element excluded
MediaInstanceType	InstanceIdentifier MediaLocator LocationDescription	
UniqueIDType	type organization authority encoding	attribute excluded attribute excluded
MediaLocatorType	MediaUri InlineMedia StreamID	minOccurs="1" element excluded element excluded

StillRegionType	SpatialLocator SpatialMask MediaTimePoint MediaRelTimePoint MediaRelIncrTimePoint VisualDescriptor VisualDescriptionScheme GridLayoutDescriptors IlluminationInvariantColor MultipleView SpatialDecomposition	element excluded element excluded element excluded element excluded element excluded element excluded xsi:type="StillRegionFeatureType", maxOccurs="1" element excluded element excluded element excluded element excluded
VisualIDType		
VisualIDSType		
StillRegionFeatureType	DominantColor ScalableColor ColorStructure ColorLayout ColorTemperature IlluminationCompensatedColor Edge HomogeneousPattern TextureBrowsing ShapeMask Contour	element excluded element excluded element excluded element excluded element excluded
DominantColorType	ColorSpace ColorQuantization SpatialCoherency Value Percentage Index ColorVariance	element excluded element excluded
ScalableColor	Coeff numOfCoeff numOfBitplanesDiscarded	
ColorStructure	Values colorQuant	
ColorLayoutType	YDCCoeff CbDCCoeff CrDCCoeff YACCoeff2 YACCoeff5 YACCoeff9 YACCoeff14 YACCoeff20 YACCoeff27 YACCoeff63 CrACCoeff2 CrACCoeff5 CrACCoeff9 CrACCoeff14 CrACCoeff20 CrACCoeff27 CrACCoeff63 CbACCoeff2	element excluded element excluded element excluded

	CbACCcoeff5 CbACCcoeff9 CbACCcoeff14 CbACCcoeff20 CbACCcoeff27 CbACCcoeff63	
HomogeneousTextureType	Average StandardDeviation Energy EnergyDeviation	
EdgeHistogramType	BinCounts	
CreationInformationType	Creation Classification RelatedMaterial	element excluded element excluded
CreationType	Title TitleMedia Abstract Creator CreationCoordinates Location Date CreationTool CopyrightString	maxOccurs="1" element excluded element excluded maxOccurs="1" element excluded element excluded
TextAnnotationType	KeywordAnnotation FreeTextAnnotation StructuredAnnotation DependencyStructure relevance confidence xml:lang	element excluded element excluded attribute excluded attribute excluded
KeywordAnnotationType	Keyword type xml:lang	
PlaceType	Name NameTerm PlaceDescription Role GeographicPosition Point datum AstronomicalBody Region AdministrativeUnit PostalAddress AddressLine PostingIdentifier xml:lang StructuredPostalAddress InternalCoordinates StructuredInternalCoordinates ElectronicAddress xml:lang	element excluded element excluded element excluded element excluded element excluded element excluded element excluded element excluded attribute excluded
GeographicPointType	Longitude Latitude altitude	

TitleType	type	attribute excluded
CreatorType	Character Instrument	element excluded element excluded
PersonNameType	GivenName FamilyName Title Numeration LinkingName Salutation dateFrom dateTo type xml:lang	attribute excluded attribute excluded attribute excluded
NameComponentType	Initial abbrev	attribute excluded attribute excluded
MediaAgentType	Role Agent AgentRef	element excluded
InlineTermDefinitionType	Name preferred Definition Term	maxOccurs="1" attribute excluded element excluded element excluded
ControlledTermUseType	href	
AgentType	Icon	element excluded
PersonType	Name NameTerm Affiliation Organization OrganizationRef PersonGroup PersonGroupRef Citizenship Address AddressRef ElectronicAddress PersonDescription Nationality	maxOccurs="1" element excluded element excluded element excluded element excluded element excluded minOccurs="0" element excluded element excluded element excluded
OrganizationType	Name type NameTerm Kind Contact ContactRef Jurisdiction JurisdictionRef Address AddressRef ElectronicAddress	attribute excluded element excluded element excluded element excluded element excluded element excluded element excluded minOccurs="0" element excluded
ElectronicAddressType	Telephone type Fax Email Url	attribute excluded

TextualBaseType	xml:lang phoneticTranscription phoneticAlphabet	attribute excluded attribute excluded
TextualType		
TimeType	TimePoint RelTimePoint RelIncrTimePoint Duration Incr Duration	element excluded element excluded element excluded element excluded
Simple Types	Element/Attribute Name	Constraints
termURIReferenceType		
termAliasReferenceType		
termReferenceType		
textureListType		
basicTimePointType		
timePointType		
unsigned1		
unsigned3		
unsigned5		
unsigned6		
unsigned8		
unsigned12		
integerVector		

7.3.3 Instantiation examples (informative)

```

<Mpeg7>
<DescriptionMetadata>
  <LastUpdate>2001-09-20T03:20:25+09:00</LastUpdate>
  <Creator>
    <Role href="urn:mpeg:mpeg7:cs:RoleCS:2001:AUTHOR">
      <Name>Author</Name>
    </Role>
    <Agent xsi:type="PersonType">
      <Name>
        <GivenName>Akio</GivenName>
        <FamilyName>Yamada</FamilyName>
      </Name>
    </Agent>
  </Creator>
  <CreationTime>2001-09-19T15:10:37+09:00</CreationTime>
</DescriptionMetadata>
<DescriptionUnit xsi:type="ImageType">
  <Image>
    <MediaInformation>
      <MediaProfile>
        <!-- PRIMARY RESOURCE -->
      <MediaFormat>
        <Content href="urn:mpeg:mpeg7:cs:ContentCS:2001:4.1">

```

```

        <Name>Image</Name>
    </Content>
    <FileFormat href="urn:mpeg:mpeg7:cs:FileFormatCS:2001:1">
        <Name>jpeg</Name>
    </FileFormat>
    <FileSize>138474</FileSize>
    <VisualCoding><Frame height="320" width="240"/></VisualCoding>
</MediaFormat>
<MediaInstance>
    <InstanceIdentifier></InstanceIdentifier>
    <MediaLocator>
        <MediaUri>http://www.nec.com/fig1.jpg</MediaUri>
    </MediaLocator>
</MediaInstance>
</MediaProfile>
<MediaProfile>
    <!-- SUPPLEMENTARY RESOURCE -->
    <MediaFormat>
        <Content href="urn:mpeg:mpeg7:cs:ContentCS:2001:4.1">
            <Name>Image</Name>
        </Content>
        <FileFormat href="urn:mpeg:mpeg7:cs:FileFormatCS:2001:18">
            <Name>tiff</Name>
        </FileFormat>
        <FileSize>960512</FileSize>
        <VisualCoding><Frame height="1280" width="960"/></VisualCoding>
    </MediaFormat>
    <MediaInstance>
        <InstanceIdentifier></InstanceIdentifier>
        <MediaLocator>
            <MediaUri>http://www.nec.com/fig1.tif</MediaUri>
        </MediaLocator>
    </MediaInstance>
</MediaProfile>
<MediaProfile>
    <!-- INTERNAL RESOURCE (a thumbnail, in this case) -->
    <MediaFormat>
        <Content href="urn:mpeg:mpeg7:cs:ContentCS:2001:4.1">
            <Name>Image</Name>
        </Content>
        <VisualCoding><Frame height="60" width="40"/></VisualCoding>
    </MediaFormat>
</MediaProfile>
</MediaInformation>
<CreationInformation>
    <Creation>
        <Title>John at the beach</Title>
        <Creator>
            <!-- Person appearing in the photo -->
            <Role href="urn:mpeg:mpeg7:cs:RoleCS:2001:ACTOR"/>
            <Agent xsi:type="PersonType">
                <Name>
                    <GivenName>John</GivenName>
                    <FamilyName>Smith</FamilyName>
                </Name>
            </Agent>
        </Creator>
        <Creator>
            <!-- Photographer -->
            <Role href="urn:mpeg:mpeg7:cs:RoleCS:2001:AUTHOR"/>
            <Agent xsi:type="PersonType">

```