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Title: **Proposal for the Integration of DublinCore and MPEG-7**

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1 Introduction

The Dublin Core Element Set [1] is a simple content description metadata model for the resource discovery of electronic resources. It is being used by formal resource description communities such as museums, libraries, government agencies, and commercial organizations. The building of an interdisciplinary, international consensus around a core element set (currently 15 elements) is the central feature of the Dublin Core.

MPEG-7, on the other hand, has been designed to provide detailed and often highly structured descriptions of multimedia content data. A document submission, M6160 [2] to the 53rd MPEG meeting in Beijing, described the complexity of the mapping between MPEG-7 and Dublin Core. Many of the MPEG-7 descriptors which are equivalent to the Dublin Core elements, are embedded at a low level within MPEG-7 description schemes.

The following table lists the 15 DC elements, their definition and the MPEG-7 path to the equivalent MPEG-7 descriptor.

| | DC Element | Definition | MPEG-7 Path |
|---|-------------|--|---|
| 1 | Title | A name given to the resource | CreationMetaInformation.Creation.Title.TitleText (TitleType="original") |
| 2 | Creator | An entity primarily responsible for making the content of the resource | CreationMetaInformation.Creation.Creator (role="creator") |
| 3 | Subject | The topic of the content of the resource | CreationMetaInformation.Classification.PackagedType |
| 4 | Description | An account of the content of the resource | CreationMetaInformation.Creation.CreationDescription |

| | | | |
|----|-------------|---|---|
| 5 | Publisher | An entity responsible for making the resource available | UsageMetaInformation.Publication.Publisher <i>or</i> CreationMetaInformation.Creation.Creator (role="publisher") |
| 6 | Contributor | An entity responsible for making contributions to the content of the resource | CreationMetaInformation.Creation.Creator (role="contributor") |
| 7 | Date | A date associated with an event in the life cycle of the resource | CreationMetaInformation.Creation.CreationDate |
| 8 | Type | The nature or genre of the content of the resource | CreationMetaInformation.Classification.Genre |
| 9 | Format | File format or mime type (MPEG-1, QuickTime, RealVideo...) | MediaInformation.MediaProfile.MediaFormat.FileFormat |
| 10 | Identifier | An unambiguous reference to the resource within a given context | MediaInformation.MediaIdentification.Identifier |
| 11 | Source | A Reference to a resource from which the present resource is derived | MediaInformation.MediaProfile.MediaInstance.Identifier |
| 12 | Language | A language of the intellectual content of the resource | CreationMetaInformation.Classification.Language.LanguageCode <i>or</i> MediaInformation.MediaProfile.MediaFormat.AudioLanguage |
| 13 | Relation | A reference to a related resource | CreationMetaInformation.RelatedMaterial.MediaLocator.MediaURL |
| 14 | Coverage | The extent or scope of the content of the resource | CreationMetaInformation.Creation.CreationLocation.PlaceName <i>or</i> CreationMetaInformation.Classification.Country CreationMetaInformation.Creation.Date |
| 15 | Rights | Information about rights held in and over the resource | UsageMetaInformation.Rights.RightsID |

Frequently-accessed and core metadata such as the DC elements should be quickly and easily accessible. However using the current hierarchical MPEG-7 structures, DC terms such as 'subject' and 'format' are at the fourth level of Description Schemes.e.g,

DC:format = MPEG7:MediaInformation.MediaProfile.MediaFormat.FileFormat
DC:subject=MPEG7:CreationMetaInformation.Classification.PackagedType

Rather than duplicating the DC elements by introducing a MPEG-7 Dublin Core Description Scheme or attempting to use XSLT to implement the mappings, we propose an integration method based on XML Namespaces [3]. Using XML Namespaces, users can inport elements from both the Dublin Core and MPEG-7 namespaces and combine them into description schemes (or "application profiles") which will satisfy both simple Dublin Core-based resource discovery as well as fine-grained content-based search and retrieval.of audiovisual content using MPEG-7.

2 Proposal

In the remainder of this document we propose the integration and combination of multi-domain metadata vocabularies using XML Schemas and the XML Namespace mechanism. This approach requires each of the domain-specific metadata element sets from which the application profile intends drawing, to be defined in their respective namespaces using XML Schema. For example, to enable an XML Schema application profile to draw on Dublin Core elements, it needs an XML Schema representation of the Dublin Core Element Set to be defined in the DCMES namespace.

2.1 An XML Schema for the DCMES

Appendix A contains a draft XML Schema for the Dublin Core Metadata Element Set (DCMES) version 1.1. It represents the XML Schema equivalent of the draft XML DTD which can be found at <http://purl.org/dc/schemas/dcmes-xml-20000714.dtd>.

Both types and elements have been defined for each of the DCMES. If an application profile wants to use a DC element as specified in the DCMES namespace, then it can refer to a DC element definition. However if the application profile wants to extend, restrict or redefine one of the DC elements, then a named type is required. Here we have used *string* as the base type for the DCMES. However if we wanted to leave the element content completely unconstrained and entirely up to the application profile, then the XML Schema datatype *anyType* could be used.

2.2 Combining Dublin Core Elements and MPEG-7 Description Schemes

Given the XML Schema representation of the DCMES and the MPEG-7 namespace and MPEG-7 MDS then it is possible to define new application-specific profiles which import and combine (and possibly further refine, restrict or extend) types or elements from each of the namespaces.

Below is a simple example defined in the DSTC namespace which imports the Dublin Core *Title*, *Creator* and *Subject* elements and combines them with the MPEG-7 *UsageMetaInformation* DS. This schema also applies its own local cardinality constraints on the imported elements.

```
<schema xmlns="http://www.w3.org/1999/XMLSchema"
  targetNamespace="http://www.dstc.edu.au"
  xmlns:dstc="http://www.dstc.edu.au"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:mpeg7="http://www.mpeg.org/MPEG7/2000/">

  <import namespace="http://purl.org/dc/elements/1.1/">
  <import namespace="http://www.mpeg.org/MPEG7/2000/">

  <element name="myDescription">
    <complexType>
      <sequence>
        <element ref="dc:title" minOccurs="1" maxOccurs="2">
        <element ref="dc:creator" minOccurs="1" maxOccurs="3">
        <element ref="dc:subject" minOccurs="0" maxOccurs="10">

        <element ref="mpeg7:UsageMetaInformation"
          minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </complexType>
  </element>
```

```

    <attribute name="about" type="uriReference"/>
  </element>
</schema>

```

Below is an instantiation of the XML Schema defined above.

```

<?xml version="1.0"?>
<myDescription xmlns="http://www.dstc.edu.au"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:mpeg7="http://www.mpeg.org/MPEG7/2000/"
  xmlns:xsi="http://www.w3.org/2000/10/XMLSchema-instance"
  xsi:schemaLocation="http://www.dstc.edu.au [URL1]
    http://purl.org/dc/elements/1.1/ [URL2]
    http://www.mpeg.org/MPEG7/2000/ [URL3]"
  about="urn:isbn:0-89887-113-1">

  <dc:title>Where the Wild Things Are</dc:title>
  <dc:creator>Maurice Sendak</dc:creator>
  <dc:subject>Child's Dream</dc:subject>

  <mpeg7:UsageMetaInformation>
    <mpeg7:Rights>
      <mpeg7:RightsIdIdOrganization="TVE" IDName="TVE_rights">
        tve:19980618:td2
      <mpeg7:/RightsId>
    </mpeg7:Rights>

    <mpeg7:UsageRecord>
      <mpeg7:Type CSName="MPEG_UsageType_CS" CSTermId="7">
        <mpeg7:Label xml:lang="es">Broadcast</mpeg7:Label>
      </mpeg7:Type>
      <mpeg7:Channel CSName="MPEG_Channel_CS" CSTermId="47">
        <mpeg7:Label xml:lang="es">TVE:ES</mpeg7:Label>
      </mpeg7:Channel>
      <mpeg7:Place>
        <mpeg7:Country>es</mpeg7:Country>
      </mpeg7:Place>
      <mpeg7>Date>1998-06-16T16:30+01:00</mpeg7>Date>
      <mpeg7:Audience>2345747</mpeg7:Audience>
    </mpeg7:UsageRecord>
  </mpeg7:UsageMetaInformation>

</myDescription>

```

3 Conclusions

This approach to integrating metadata from different domains will not be applicable in all situations. However for certain applications or scenarios (e.g. MPEG-21) which require combining and mixing the most appropriate or complementary metadata components from different schemas/namespaces, this approach will provide definite synergistic advantages over single domain metadata descriptions.

4 References

- [1] Dublin Core Metadata Initiative, <http://purl.org/DC>.
 - [2] J. Hunter, J. Martinez, E. Oltmans, "MPEG-7 Harmonization with Dublin Core: Current Status and Concerns.", m6160, 53rd MPEG meeting, Beijing, July 2000
 - [3] Namespaces in XML, W3C Recommendation 14 January, 1999
<http://www.w3.org/TR/REC-xml-names>
 - [4] AHG on Metadata Integration, w3482.doc, 53rd MPEG Meeting, Beijing, July 2000
 - [5] XML Schema Part 0: Primer, W3C Working Draft, 22 September 2000.
 - [6] XML Schema Part 1: Structures, W3C Working Draft, 22 September 2000.
 - [7] XML Schema Part 2: Datatypes, W3C Working Draft, 22 September 2000.
-

5 Appendix A : XML Schema Representation of the DCMES

```
<schema xmlns="http://www.w3.org/1999/XMLSchema"
  targetNamespace="http://purl.org/dc/elements/1.1/"
  xmlns:dc="http://purl.org/dc/elements/1.1/">

  <annotation>
    <documentation>
      Draft XML Schema for the Dublin Core Element Set, Version 1.1
    </documentation>
  </annotation>

  <simpleType name="title">
    <restriction base="string"/>
```

```
</simpleType>

<simpleType name="creator">
  <restriction base="string"/>
</simpleType>

<simpleType name="subject">
  <restriction base="string"/>
</simpleType>

<simpleType name="description">
  <restriction base="string"/>
</simpleType>

<simpleType name="publisher">
  <restriction base="string"/>
</simpleType>

<simpleType name="contributor">
  <restriction base="string"/>
</simpleType>

<simpleType name="date">
  <restriction base="string"/>
</simpleType>

<simpleType name="type">
  <restriction base="string"/>
</simpleType>

<simpleType name="format">
  <restriction base="string"/>
</simpleType>

<simpleType name="identifier">
  <restriction base="string"/>
</simpleType>

<simpleType name="source">
  <restriction base="string"/>
</simpleType>

<simpleType name="language">
  <restriction base="string"/>
</simpleType>

<simpleType name="relation">
  <restriction base="string"/>
</simpleType>

<simpleType name="coverage">
  <restriction base="string"/>
</simpleType>
```

```
<simpleType name="rights">
  <restriction base="string"/>
</simpleType>
```

```
<element name="title" type="title">
  <annotation>
    <documentation>
      The name given to the resource.
    </documentation>
  </annotation>
</element>
```

```
<element name="creator" type="creator">
  <annotation>
    <documentation>
      An entity primarily responsible for making the content of the resource.
    </documentation>
  </annotation>
</element>
```

```
<element name="subject" type="subject">
  <annotation>
    <documentation>
      The topic of the content of the resource.
    </documentation>
  </annotation>
</element>
```

```
<element name="description" type="description">
  <annotation>
    <documentation>
      An account of the content of the resource.
    </documentation>
  </annotation>
</element>
```

```
<element name="publisher" type="publisher">
  <annotation>
    <documentation>
      The entity responsible for making the resource available.
    </documentation>
  </annotation>
</element>
```

```
<element name="contributor" type="contributor">
  <annotation>
    <documentation>
      An entity responsible for making contributions to the content of
      the resource.
    </documentation>
  </annotation>
</element>
```

```
<element name="date" type="date">
  <annotation>
    <documentation>
      A date associated with an event in the life cycle of the resource.
    </documentation>
  </annotation>
</element>
```

```
<element name="type" type="type">
  <annotation>
    <documentation>
      The nature or genre of the content of the resource.
    </documentation>
  </annotation>
</element>
```

```
<element name="format" type="format">
  <annotation>
    <documentation>
      The physical or digital manifestation of the resource.
    </documentation>
  </annotation>
</element>
```

```
<element name="identifier" type="identifier">
  <annotation>
    <documentation>
      An unambiguous reference to the resource within a given context.
    </documentation>
  </annotation>
</element>
```

```
<element name="source" type="source">
  <annotation>
    <documentation>
      A reference to a resource from which the present resource is derived.
    </documentation>
  </annotation>
</element>
```

```
<element name="language" type="language">
  <annotation>
    <documentation>
      A language of the intellectual content of the resource.
    </documentation>
  </annotation>
</element>
```

```
<element name="relation" type="relation">
  <annotation>
    <documentation>
      A reference to a related resource.
    </documentation>
  </annotation>
</element>
```



```

    </documentation>
  </annotation>
</element>

<element name="coverage" type="coverage">
  <annotation>
    <documentation>
      The extent or scope of the content of the resource.
    </documentation>
  </annotation>
</element>

<element name="rights" type="rights">
  <annotation>
    <documentation>
      Information about rights held in and over the resource.
    </documentation>
  </annotation>
</element>

<element name="dces">
  <complexType>
    <choice minOccurs="0" maxOccurs="unbounded">
      <element ref="title"/>
      <element ref="creator"/>
      <element ref="subject"/>
      <element ref="description"/>
      <element ref="publisher"/>
      <element ref="contributor"/>
      <element ref="date"/>
      <element ref="type"/>
      <element ref="format"/>
      <element ref="identifier"/>
      <element ref="source"/>
      <element ref="language"/>
      <element ref="relation"/>
      <element ref="coverage"/>
      <element ref="rights"/>
    </choice>
  </complexType>
</element>

<element name="Description">
  <complexType>
    <all>
      <element ref="dces"/>
    </all>
  </complexType>
  <attribute name="about" type="uriReference"/>
</element>

</schema>

```

