

Title:	An Application Profile which combines Dublin Core and MPEG-7 Metadata Terms for Simple Video Description
Creator:	Jane Hunter DSTC
Date Issued:	2002-02-12
Identifier:	http://metadata.net/harmony/video_appln_profile.html/
Latest Version:	http://metadata.net/harmony/video_appln_profile.html/
Status of Document:	Draft
Description of Document:	This document describes a simple application profile which combines Dublin Core and MPEG-7 elements for generic video description.

1. Introduction

The Dublin Core Metadata Element Set [1] is a simple content description metadata model which originated in the library community. It is primarily used by formal resource description communities such as museums, libraries, government agencies, and commercial organizations for the resource discovery of electronic resources. The central feature of the Dublin Core is the building of an interdisciplinary, international consensus around a core element set (currently 15 elements). Although it is possible to describe non-bibliographic attributes of non-textual resources (such as the structural and formatting attributes of video) through qualification of the Dublin Core elements, such an approach adversely effects semantic interoperability.

MPEG-7, the Multimedia Content Description Interface standard [2], developed by the ISO/IEC Moving Pictures Experts Group (MPEG), has been designed to provide detailed formatting information and fine-grained descriptions of the structural, and low-level audio, visual and audiovisual features of multimedia content. The goal of MPEG-7 is to provide a rich set of standardized tools to enable both humans and machines to generate and understand audiovisual descriptions which can be used to enable fast efficient retrieval from digital archives (pull applications) as well as filtering of streamed audiovisual broadcasts on the Internet (push applications).

Although it is possible to determine mappings between the Dublin Core elements and MPEG-7 Descriptors, the mapping is complex. There is no simple one-to-one mapping corresponding to each DC element and many of the MPEG-7 descriptors are embedded at a low level within the MPEG-7 Description Schemes (DSs). Table 1 in the next section illustrates the complexity of the mappings between the Dublin Core elements and MPEG-7.

Frequently-accessed, core metadata such as the DC elements should be clearly identifiable and quickly and easily retrievable. Because it is so difficult to dynamically retrieve the Dublin Core elements from an MPEG-7 description, we propose a hybrid approach which combines both Dublin Core (for cross-domain media-independent resource discovery of atomic objects) with MPEG-7 (for fine-grained, content-based search and retrieval of multimedia content) in an application profile optimized for fast, efficient video resource discovery.

2. Mapping between Dublin Core and MPEG-7

Table 1 below illustrates the mappings between the Dublin Core Metadata Element Set, Version 1.1 [1] and the MPEG-7 Multimedia Description Schemes (ISO/IEC 15398-5) [3], using XPath [4] expressions to represent the equivalent MPEG-7 descriptors.

DC Element	Definition	MPEG-7 Path
Title	A name given to a resource.	CreationInformation/Creation/Title[@type="main"]
Creator	An entity primarily responsible for making the content of the resource	CreationInformation/Creation/Creator[Role/Name="creator"]/Agent/Name
Subject	The topic of the content of the resource	CreationInformation/Classification/Subject
Description	An account of the content of the resource	CreationInformation/Creation/Abstract
Publisher	An entity responsible for making the resource available	CreationInformation/Creation/Creator[Role/Name="Publisher"]/Agent/Name UsageInformation/Availability/Dissemination/Disseminator[Role="Publisher"]/Agent/Name
Contributor	An entity responsible for making contributions to the content of the resource	CreationInformation/Creation/Creator[Role/Name="contributor"]/Agent/Name
Date	A date associated with an event in the life cycle of the resource	CreationInformation/Creation/CreationCoordinates/Date CreationInformation/Classification/Release[@date] DescriptionMetadata/CreationTime (date at which MPEG-7 metadata description was created) UsageInformation/Availability/AvailabilityPeriod (date, time and duration of broadcast or date of publication if availability is persistent.)
Type	The nature or genre of the content of the resource	CreationInformation/Classification/Genre
Format	The physical or digital manifestation of the resource e.g., file format or mime type	MediaInformation/MediaProfile/MediaFormat/FileFormat
Identifier	An unambiguous reference to the resource within a given context	MediaInformation/MediaIdentification/EntityIdentifier MediaInformation/MediaProfile/MediaInstance/InstanceIdentifier MediaInformation/MediaProfile/MediaInstance/MediaLocator/MediaUri
Source	A Reference to a resource from which the present resource is derived	Variation/Source/Video/MediaLocator/MediaUri VariationSet/Source/Video/MediaLocator/MediaUri MediaInformation/MediaIdentification/EntityIdentifier MediaInformation/MediaProfile[@master="true"]/MediaInstance/MediaLocator/MediaUri
Language	A language of the intellectual content of the resource	CreationInformation/Classification/Language[@type="original" "dubbed" "background"]; CreationInformation/Classification/CaptionLanguage
Relation	A reference to a related resource	CreationInformation/RelatedMaterial/MediaLocator/MediaUri MediaInformation/MediaProfile/MediaInstance/MediaLocator/MediaUri VariationSet/Variation/VariationRelationship
Coverage	The extent or scope of the content of the resource	SemanticBase[@xsi:type="SemanticTimeType"]/Time SemanticBase[@xsi:type="SemanticPlaceType"]/Place
Rights	Information about rights held in and over the resource	CreationInformation/Creation/CopyrightString UsageInformation/Rights/RightsID

Table 1. Dublin Core to MPEG-7 Mappings

Table 1 reveals that although it is possible to determine mappings between the Dublin Core elements and MPEG-7 Descriptors, the mapping is complex and the MPEG-7 Descriptors corresponding to each DC element:

- are distributed across a range of Description Schemes (DSs);
- are embedded at a low level within nested XML descriptions;
- often occur in multiple alternative Description Schemes/contexts. There is often no simple or obvious one-to-one mapping or exact semantic equivalent within MPEG-7 to the Dublin Core elements.

3. A Comparison of DC and MPEG-7 through an Example

To further clarify the difference between a Dublin Core metadata description of a video and an MPEG-7 description, consider the following example. Below is a Dublin Core description of an MPEG-1 video file of the evening news program broadcast by SBS-TV.

```
<?xml version="1.0"?>
<!DOCTYPE rdf:RDF SYSTEM "http://purl.org/dc/schemas/dcmes-xml-20000714.dtd">
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:dcterms="http://purl.org/dc/terms/">
  <rdf:Description rdf:about="file://disk/news_12_02_02.mpg">
    <dc:title>World News Tonight</dc:title>
    <dc:creator>Special Broadcasting Service</dc:creator>
    <dc:subject>International news events</dc:subject>
    <dc:description>Comprehensive coverage of global and national events,
      presented by Anton Enus. </dc:description>
    <dc:publisher>SBS-TV</dc:publisher>
    <dc:contributor>Anton Enus</dc:contributor>
    <dcterms:created>2002-02-12</dcterms:created>
    <dcterms:issued>2002-02-12</dcterms:issued>
    <dc:type>image</dc:type>
    <dc:format>
      <dcterms:IMT rdf:value="video/mpg" rdfs:label="MPEG video">
        </dcterms:IMT>
    </dc:format>
    <dcterms:extent>30 mins</dcterms:extent>
    <dc:identifier>news_12_02_02</dc:identifier>
    <dc:language>
      <dcterms:RFC1766>
        <rdf:value>EN</rdf:value>
        <rdfs:label>English</rdfs:label>
      </dcterms:RFC1766>
    </dc:language>
    <dc:relation>http://www.theworldnews.com.au</dc:relation>
    <dcterms:spatial>world</dcterms:spatial>
    <dcterms:temporal>2002-02-12</dcterms:temporal>
    <dc:rights>all content © SBS 2000</dc:rights>
  </rdf:Description>
</rdf:RDF>
```

Below is an MPEG-7 description of the same resource. There are three main MPEG-7 description schemes used in this description:

- CreationInformationDS:
 - CreationDS - information about the creation and production of multimedia content;
 - ClassificationDS - information related to the classification of the content (target audience, style, genre, rating etc.);
 - RelatedMaterialDS - information about material related to the multimedia content.
- MediaInformationDS - information about the file format, storage and encoding parameters;
- TemporalDecompositionDS - describes the temporal decomposition of multimedia content into segments;

In the example below, the TemporalDecompositionDS is used to temporally segment the 30 minute video into three ten-minute segments. Associated with each segment is a textual description, a key frame represented by a GIF image and a short representative RealMedia clip.

```
<?xml version="1.0" encoding="iso-8859-1"?>
<Mpeg7 xmlns="urn:mpeg:mpeg7:schema:2001"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xsi:schemaLocation="urn:mpeg:mpeg7:schema:2001 .\Mpeg7-2001.xsd">
  <Description xsi:type="ContentEntityType">
    <MultimediaContent xsi:type="VideoType">
      <Video>
        <MediaLocator>
          <MediaUri>file://disk/news_12_02_02.mpg</MediaUri>
        </MediaLocator>
        <MediaTime>
          <MediaTimePoint>T00:00:00</MediaTimePoint>
          <MediaDuration>PT30M00S</MediaDuration>
        </MediaTime>
        <CreationInformation>
          <Creation>
            <Title xml:lang="en" type="main">World News Tonight</Title>
            <Creator>
              <Role href="urn:mpeg:mpeg7:cs:RoleCS:2001:PUBLISHER"/>
              <Agent xsi:type="OrganizationType">
                <Name>SBS-TV</Name>
              </Agent>
            </Creator>
            <Creator>
              <Role href="urn:mpeg:mpeg7:cs:RoleCS:2001:ANCHOR"/>
              <Agent xsi:type="PersonType">
                <Name>
                  <GivenName>Anton</GivenName>
                  <FamilyName>Enus</FamilyName>
                </Name>
              </Agent>
            </Creator>
            <Abstract>
              <FreeTextAnnotation>
                Comprehensive coverage of global and national events,
                presented by Anton Enus.
              </FreeTextAnnotation>
            </Abstract>
            <CreationCoordinates>
              <Location>
                <Name>Sydney</Name>
                <Region>au</Region>
              </Location>
            </CreationCoordinates>
          </CreationInformation>
        </Video>
      </MultimediaContent>
    </Description>
  </Mpeg7>
```

```

    </Location>
    <Date>
      <TimePoint>2002-02-12T21:30+01:00</TimePoint>
    </Date>
  </CreationCoordinates>

  <CopyrightString>all content © SBS 2000</CopyrightString>
</Creation>

<Classification>
  <Form href="urn:mpeg:mpeg7:cs:FormatCS:2001:1.1">
    <Name xml:lang="en">Bulletin</Name>
  </Form>
  <Genre href="urn:mpeg:mpeg7:cs:ContentCS:2001:1.3.1">
    <Name xml:lang="en">Daily news</Name>
  </Genre>
  <Subject>
    <FreeTextAnnotation>International news events</FreeTextAnnotation>
  </Subject>
  <Language type="original">en</Language>
  <Release date="2002-02-12T21:30+01:00">
    <Region>au</Region>
  </Release>
</Classification>

<RelatedMaterial>
  <MaterialType>
    <Name xml:lang="en">Broadcaster Web Page</Name>
  </MaterialType>
  <MediaLocator>
    <MediaUri>http://www.theworldnews.com.au</MediaUri>
  </MediaLocator>
</RelatedMaterial>
</CreationInformation>

<MediaInformation>
  <MediaProfile>
    <MediaFormat>
      <Content href="urn:mpeg:mpeg7:cs:ContentCS:2001:2">
        <Name>audiovisual</Name>
      </Content>
      <Medium href="urn:mpeg:mpeg7:cs:MediumCS:2001:2.1.1">
        <Name xml:lang="en">HD</Name>
      </Medium>
      <FileFormat href="urn:mpeg:mpeg7:cs:FileFormatCS:2001:3">
        <Name xml:lang="en">mpeg</Name>
      </FileFormat>
      <FileSize>666478608</FileSize>
      <VisualCoding>
        <Format href="urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:1" colorDomain="color">
          <Name xml:lang="en">MPEG-1 Video</Name>
        </Format>
        <Pixel aspectRatio="0.75" bitsPer="8"/>
        <Frame height="288" width="352" rate="25"/>
      </VisualCoding>
    </MediaFormat>
  </MediaProfile>
</MediaInformation>

<TemporalDecomposition gap="false" overlap="false">
  <VideoSegment id="segment1">
    <MediaTime>
      <MediaTimePoint>T00:00:00</MediaTimePoint>
      <MediaDuration>PT10M00S</MediaDuration>
    </MediaTime>
    <TextAnnotation>
      <FreeTextAnnotation>Pressure Mounts on Yasser Arafat</FreeTextAnnotation>
    </TextAnnotation>
    <Relation type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:key" target="file://disk/news_12_02_02/key1.gif"/>
    <Relation type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:representedBy" target="file://disk/news_12_02_02/segment1.rm"/>
  </VideoSegment>
  <VideoSegment id="segment2">
    <MediaTime>
      <MediaTimePoint>T00:10:00</MediaTimePoint>
      <MediaDuration>PT10M00S</MediaDuration>
    </MediaTime>
    <TextAnnotation>
      <FreeTextAnnotation>Milosevic Prepares for Trial</FreeTextAnnotation>
    </TextAnnotation>
    <Relation type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:key" target="file://disk/news_12_02_02/key2.gif"/>
    <Relation type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:representedBy" target="file://disk/news_12_02_02/segment2.rm"/>
  </VideoSegment>
  <VideoSegment id="segment3">
    <MediaTime>
      <MediaTimePoint>T00:20:00</MediaTimePoint>
      <MediaDuration>PT10M00S</MediaDuration>
    </MediaTime>
    <TextAnnotation>
      <FreeTextAnnotation>Iran's Anti-US Protests</FreeTextAnnotation>
    </TextAnnotation>
    <Relation type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:key" target="file://disk/news_12_02_02/key3.gif"/>
    <Relation type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:representedBy" target="file://disk/news_12_02_02/segment3.rm"/>
  </VideoSegment>
</TemporalDecomposition>

</Video>
</MultimediaContent>
</Description>
</Mpeg7>

```

These examples illustrate the respective strengths and weaknesses of Dublin Core and MPEG-7.

Dublin Core provides a relatively simple, light-weight and concise method for resource discovery of composite resources over the Internet. It is not designed to describe the temporal, spatial or spatio-temporal aspects or the visual or audio features associated with multimedia resources.

In comparison, MPEG-7 provides a rather heavy-weight approach to describing the creation and classification properties of an audiovisual resource. MPEG-7's strengths lie in its ability to specify detailed media-specific formatting and encoding information, and its fine-grained descriptions of temporal, spatial and spatio-temporal components of audiovisual content and their associated audio and visual features.

Rather than duplicating the DC elements within MPEG-7 (by introducing a MPEG-7 Dublin Core Description Scheme) or using programmatic code or XSLT to implement dynamic mappings, we propose a hybrid approach which combines the complementary aspects of the DC and MPEG-7 metadata schemes in an application profile.

Providing there is an XML Schema [5-7] representation of each vocabulary, defined in their own domain-specific namespaces [8], then implementors can import elements from both the Dublin Core and MPEG-7 namespaces and combine them into a single description scheme (or "application profile") capable of supporting both cross-domain (Dublin Core-based) resource discovery as well as fine-grained, content-based, search, retrieval and presentation of audiovisual content (using MPEG-7).

4. An Application Profile for Generic Video Description

Application profiles are schemas which consist of metadata elements drawn from one or more namespaces, combined together by implementers and optimised for a particular local application [9]. In this section, we define a generic application profile for describing video content. Figure 1 below illustrates the metadata model of the proposed application profile which draws on the namespaces of both Dublin Core and MPEG-7. There are 5 main metadata components:

1. DCMES - to specify the bibliographic information associated with the resource;
2. MPEG-7 MediaLocator Descriptor - to define the location of the resource;
3. MPEG-7 MediaTime Descriptor - to define the temporal attributes (start time and duration) associated with the resource;
4. MPEG-7 MediaFormat Descriptor - to specify the formatting and encoding information associated with the resource;
5. MPEG-7 TemporalDecomposition Description Scheme - to describe the temporal components (segments) of the video.

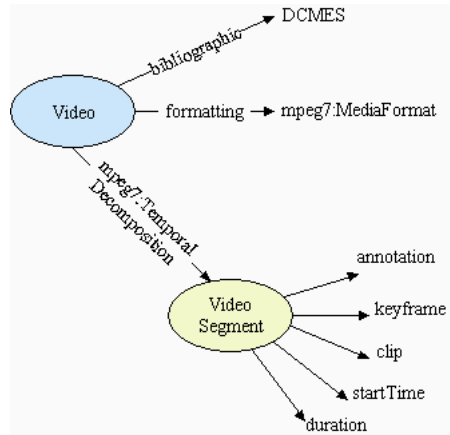


Figure 1 - A Generic Descriptive Metadata Model for Moving Image

This approach requires each of the domain-specific metadata vocabularies to have an XML Schema [5-7] representation of their elements in their respective namespaces [8].

Currently there is only a draft XML Schema developed for Dublin Core, in Appendix B of [10]. This schema includes RDF-specific elements which we believe should be in a separate schema. Appendix A contains a draft XML Schema for the Dublin Core Metadata Element Set (DCMES) version 1.1 with the RDF-specific elements removed. In this schema, 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 the 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. The content for both the elements and types in this schema is completely unconstrained.

In the application profile described below, we assume that an XML Schema for the DCMES has been defined in the DC namespace:

```
xmlns:dc="http://purl.org/dc/elements/1.1/"
```

We also assume that an XML Schema for the DC qualifiers has been defined in the *dcterms* namespace:

```
xmlns:dcterms="http://purl.org/dc/terms/"
```

The MPEG-7 Multimedia Description Schemes XML Schema [11] is defined in the MPEG-7 namespace:

```
xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001"
```

Given these XML Schema representations of the Dublin Core and MPEG-7 vocabularies, it then becomes possible to define new application-specific profiles which import and combine (and possibly further refine, restrict or extend) types or elements from each of these namespaces.

Below is a simple application profile, *generic_video.xsd*, which has been designed specifically for generic video description and defined in the Harmony namespace (<http://metadata.net/harmony>). It imports the Dublin Core elements plus some DC qualifiers and combines them with elements based on the MPEG-7 MediaLocator, MediaTime, MediaFormat and VideoSegmentTemporalDecomposition types. This schema also applies its own local cardinality constraints on the imported elements using *minOccurs* and *maxOccurs*.

Although the *MediaLocator* and *MediaTime* elements duplicate information already specified in the *about* attribute and *dcterms:extent*, they are included as a reference point for the TemporalDecomposition information.

```
<?xml version="1.0" encoding="UTF-8" ?>
<schema xmlns="http://www.w3.org/1999/XMLSchema"
  targetNamespace="http://metadata.net/harmony/"
  xmlns:harmony="http://metadata.net/harmony/"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:dcterms="http://purl.org/dc/terms/"
  xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001">

  <import namespace="http://purl.org/dc/elements/1.1/" />
  <import namespace="http://purl.org/dc/terms/" />
  <import namespace="urn:mpeg:mpeg7:schema:2001" />

  <element name="myVideoDescription">
    <complexType>
      <sequence>
        <element ref="dc:title" minOccurs="1" maxOccurs="1">
        <element ref="dc:creator" minOccurs="0" maxOccurs="unbounded">
        <element ref="dc:subject" minOccurs="0" maxOccurs="unbounded">
        <element ref="dc:description" minOccurs="1" maxOccurs="1">
        <element ref="dc:publisher" minOccurs="0" maxOccurs="unbounded">
        <element ref="dc:contributor" minOccurs="0" maxOccurs="unbounded">
        <element ref="dcterms:created" minOccurs="0" maxOccurs="1">
        <element ref="dcterms:issued" minOccurs="0" maxOccurs="1">
        <element ref="dc:format" minOccurs="0" maxOccurs="1">
        <element ref="dcterms:extent" minOccurs="0" maxOccurs="1">
        <element ref="dc:identifier" minOccurs="0" maxOccurs="1">
        <element ref="dc:language" minOccurs="0" maxOccurs="1">
        <element ref="dc:relation" minOccurs="0" maxOccurs="unbounded">
        <element ref="dcterms:spatial" minOccurs="0" maxOccurs="1">
        <element ref="dcterms:temporal" minOccurs="0" maxOccurs="1">
        <element ref="dc:rights" minOccurs="0" maxOccurs="1">
      </sequence>
    </complexType>
  </element>
</schema>
```

```

<element name="MediaLocator" type="mpeg7:MediaLocatorType"/>
  minOccurs="1" maxOccurs="1"/>
<element name="MediaTime" type="mpeg7:MediaTimeType"/>
  minOccurs="0" maxOccurs="1"/>
<element name="MediaFormat" type="mpeg7:MediaFormatType"
  minOccurs="0" maxOccurs="1"/>
  <element name="TemporalDecomposition" type="mpeg7:VideoSegmentTemporalDecompositionType" minOccurs="0" maxOccurs="1"/>
</sequence>
</complexType>
<attribute name="about" type="uriReference"/>
</element>
</schema>

```

Below is an instantiation of the XML Schema defined above, applied to the same video example used in Section 3.

```

<?xml version="1.0"?>
<myVideoDescription xmlns="http://metadata.net/harmony/"
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:dcterms="http://purl.org/dc/terms"
  xmlns:mpeg7="http://www.mpeg.org/MPEG7/2000/"
  xmlns:xsi="http://www.w3.org/2000/10/XMLSchema-instance"
  xsi:schemaLocation="http://metadata.net/harmony/ [URL1]
    http://purl.org/dc/elements/1.1/ [URL2]
    http://purl.org/dc/terms/ [URL3]
    http://www.mpeg.org/MPEG7/2000/ [URL4]"

  about="file://disk/news_12_02_02.mpg">

  <dc:title>World News Tonight</dc:title>
  <dc:creator>Special Broadcasting Service</dc:creator>
  <dc:subject>International news events</dc:subject>
  <dc:description>Comprehensive coverage of global and national events,
    presented by Anton Enus. </dc:description>
  <dc:publisher>SBS-TV</dc:publisher>
  <dc:contributor>Anton Enus</dc:contributor>
  <dcterms:created>2002-02-12</dcterms:created>
  <dcterms:issued>2002-02-12</dcterms:issued>
  <dc:type>image</dc:type>
  <dc:format>video/mpg</dc:format>
  <dcterms:extent>30 mins</dcterms:extent>
  <dc:identifier>news_2002-02-12</dc:identifier>
  <dc:language>EN</dc:language>
  <dc:relation>http://www.theworldnews.com.au</dc:relation>
  <dcterms:spatial>world</dcterms:spatial>
  <dcterms:temporal>2002-02-12</dcterms:temporal>
  <dc:rights>all content © SBS 2000</dc:rights>

  <MediaLocator>
    <mpeg7:MediaUri>file://disk/news_12_02_02.mpg</mpeg7:MediaUri>
  </MediaLocator>

  <MediaTime>
    <mpeg7:MediaTimePoint>T00:00:00</mpeg7:MediaTimePoint>
    <mpeg7:MediaDuration>PT30M00S</mpeg7:MediaDuration>
  </MediaTime>

  <MediaFormat>
    <mpeg7:Content mpeg7:href="urn:mpeg:mpeg7:cs:ContentCS:2001:2">
      <mpeg7:Name>audiovisual</mpeg7:Name>
    </mpeg7:Content>
    <mpeg7:Medium mpeg7:href="urn:mpeg:mpeg7:cs:MediumCS:2001:2.1.1">
      <mpeg7:Name xml:lang="en">HD</mpeg7:Name>
    </mpeg7:Medium>
    <mpeg7:FileFormat mpeg7:href="urn:mpeg:mpeg7:cs:FileFormatCS:2001:3">
      <mpeg7:Name xml:lang="en">mpeg</mpeg7:Name>
    </mpeg7:FileFormat>
    <mpeg7:FileSize>666478608</mpeg7:FileSize>
    <mpeg7:VisualCoding>
      <mpeg7:Format mpeg7:href="urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:1" colorDomain="color">
        <mpeg7:Name xml:lang="en">MPEG-1 Video</mpeg7:Name>
      </mpeg7:Format>
      <mpeg7:Pixel mpeg7:aspectRatio="0.75" mpeg7:bitsPer="8"/>
      <mpeg7:Frame mpeg7:height="288" mpeg7:width="352" mpeg7:rate="25"/>
    </mpeg7:VisualCoding>
  </MediaFormat>

  <TemporalDecomposition mpeg7:gap="false" mpeg7:overlap="false">
    <mpeg7:VideoSegment mpeg7:id="segment1">
      <mpeg7:MediaTime>
        <mpeg7:MediaTimePoint>T00:00:00</mpeg7:MediaTimePoint>
        <mpeg7:MediaDuration>PT10M00S</mpeg7:MediaDuration>
      </mpeg7:MediaTime>
      <mpeg7:TextAnnotation>
        <mpeg7:FreeTextAnnotation>Pressure Mounts on Yasser Arafat</mpeg7:FreeTextAnnotation>
      </mpeg7:TextAnnotation>
      <mpeg7:Relation mpeg7:type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:key" mpeg7:target="file://disk/news_12_02_02/key1.gif"/>
      <mpeg7:Relation mpeg7:type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:representedBy" mpeg7:target="file://disk/news_12_02_02/segment1.rm"/>
    </mpeg7:VideoSegment>
    <mpeg7:VideoSegment mpeg7:id="segment2">
      <mpeg7:MediaTime>
        <mpeg7:MediaTimePoint>T00:10:00</mpeg7:MediaTimePoint>
        <mpeg7:MediaDuration>PT10M00S</mpeg7:MediaDuration>
      </mpeg7:MediaTime>
      <mpeg7:TextAnnotation>
        <mpeg7:FreeTextAnnotation>Milosevic Prepares for Trial</mpeg7:FreeTextAnnotation>
      </mpeg7:TextAnnotation>
      <mpeg7:Relation mpeg7:type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:key" mpeg7:target="file://disk/news_12_02_02/key2.gif"/>
      <mpeg7:Relation mpeg7:type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:representedBy" mpeg7:target="file://disk/news_12_02_02/segment2.rm"/>
    </mpeg7:VideoSegment>
    <mpeg7:VideoSegment mpeg7:id="segment3">
      <mpeg7:MediaTime>
        <mpeg7:MediaTimePoint>T00:20:00</mpeg7:MediaTimePoint>
        <mpeg7:MediaDuration>PT10M00S</mpeg7:MediaDuration>
      </mpeg7:MediaTime>
      <mpeg7:TextAnnotation>
        <mpeg7:FreeTextAnnotation>Iran's Anti-US Protests</mpeg7:FreeTextAnnotation>
      </mpeg7:TextAnnotation>
      <mpeg7:Relation mpeg7:type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:key" mpeg7:target="file://disk/news_12_02_02/key3.gif"/>
      <mpeg7:Relation mpeg7:type="urn:mpeg:mpeg7:cs:SemanticRelationCS:2001:representedBy" mpeg7:target="file://disk/news_12_02_02/segment3.rm"/>
    </mpeg7:VideoSegment>
  </mpeg7:TemporalDecomposition>
</myVideoDescription>

```

5. Conclusions

This document is a draft proposal for an application profile for the resource discovery of video documents. The proposed schema combines metadata elements from both Dublin Core and MPEG-7 in order to support both cross-domain, media-independent, resource discovery of atomic video objects as well as fine-grained retrieval and delivery of relevant video segments.

References

- [1] Dublin Core Metadata Element Set, Version 1.1: Reference Description <http://dublincore.org/documents/1999/07/02/dces/>
- [2] J. Martinez, "Overview of the MPEG-7 Standard", MPEG Document: ISO/IEC JTC1/SC29/WG11 N4509 Pattaya, December 2001
<http://mpeg.telecomitalia.com/standards/mpeg-7/mpeg-7.htm>
- [3] ISO/IEC 15938-5 FDIS Information Technology - Multimedia Content Description Interface - Part 5: Multimedia Description Schemes, MPEG Document: ISO/IEC JTC1/SC29/WG11 Document W4242, July 2001, Sydney
- [4] XML Path Language (XPath) Version 1.0, W3C Recommendation 16 November 1999
<http://www.w3.org/TR/xpath>
- [5] XML Schema Part 0: Primer, W3C Recommendation, 2 May 2001.
<http://www.w3.org/TR/xmlschema-0/>
- [6] XML Schema Part 1: Structures, W3C Recommendation, 2 May 2001.
<http://www.w3.org/TR/xmlschema-1/>
- [7] XML Schema Part 2: Datatypes, W3C Recommendation, 2 May 2001.
<http://www.w3.org/TR/xmlschema-2/>
- [8] Namespaces in XML, W3C Recommendation 14 January, 1999.
<http://www.w3.org/TR/REC-xml-names>
- [9] R. Heery, M. Patel, "Application Profiles: mixing and matching metadata schemas", Ariadne Issue 25, September 2000. <http://www.ariadne.ac.uk/issue25/app-profiles/>
- [10] D. Beckett, E. Miller, D. Brickley, "Expressing Simple Dublin Core in RDF/XML", 28 November 2001
<http://www.dublincore.org/documents/2001/11/28/dcmes-xml/>
- [11] MPEG-7 Multimedia Description Schemes XML Schema.
<http://pmedia.i2.ibm.com:8000/mpeg7/schema/>
-

Appendix A : [XML Schema Representation of the DCMES](#)

```

<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE schema PUBLIC "-//W3C//DTD XMLSchema 200102//EN"
"http://www.w3.org/2001/XMLSchema.dtd" [
<!ENTITY % p ''>
<!ENTITY % s ''>
]>
<schema xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:dc="http://purl.org/dc/elements/1.1/"
targetNamespace="http://purl.org/dc/elements/1.1/">

<annotation>
  <documentation xml:lang="en"
    source="http://dublincore.org/documents/2001/11/28/dcmes-xml/">

XML Schema DRAFT
for the namespace http://purl.org/dc/elements/1.1/
based on
Dublin Core Metadata Element Set, Version 1.1: Reference Description
http://dublincore.org/documents/1999/07/02/dces/

This XML Schema is for information only and NON-NORMATIVE.

  </documentation>
</annotation>

<complexType name="dc:title" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:title" type="dc:title"/>

<complexType name="dc:creator" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:creator" type="dc:creator"/>

<complexType name="dc:subject" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:subject" type="dc:subject"/>

<complexType name="dc:description" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:description" type="dc:description"/>

<complexType name="dc:publisher" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:publisher" type="dc:publisher"/>

<complexType name="dc:contributor" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:contributor" type="dc:contributor"/>

<complexType name="dc:date" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>

```

```
</complexType>

<element name="dc:date" type="dc:date"/>

<complexType name="dc:type" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:type" type="dc:type"/>

<complexType name="dc:format" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:format" type="dc:format"/>

<complexType name="dc:identifier" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:identifier" type="dc:identifier"/>

<complexType name="dc:source" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:source" type="dc:source"/>

<complexType name="dc:language" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:language" type="dc:language"/>

<complexType name="dc:relation" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:relation" type="dc:relation"/>

<complexType name="dc:coverage" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:coverage" type="dc:coverage"/>

<complexType name="dc:rights" mixed="true">
  <sequence minOccurs="0" maxOccurs="unbounded">
    <any processContents="lax"/>
  </sequence>
  <anyAttribute processContents="lax"/>
</complexType>

<element name="dc:rights" type="dc:rights"/>

</schema>
```