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Title: **Report of CE on Metadata Adaptation - Integration**

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1 Introduction

This paper summarize the final results of the CE on MPEG-21 Digital Item Adaptation – Integration. The CE was started at the Shanghai meeting (see document N5182) and due to the fact that not all the expected goals were achieved the CE has been extended to the Pattaya meeting (see document N5362). In the original work plan definition, the principal objectives to better evaluate if the current DIA Metadata Adaptability tools can fully support the integration of multiple MPEG-7 descriptions of a given content. The main contribution of this CE is an enhanced implementation of the metadata integration engine presented in the previous CE report and the definition of syntax and semantic for a new MPEG-21 DIA MetadataAdaptability tool useful in a metadata integration processes.

2 CE Results

With respect to the objective achieved at the Awaji meeting (see document m9233) the following new goals have been reached:

- The "elementary unit" concept has been formalized defining a new tool named MetadataAdaptationIntegration DS.
- An improved version of the integration engine has been developed and more DIA Integration experiment has been performed.

3 Metadata Adaptation Integration DS

This DS can be considered as a complement of the currently available DIA Metadata Adaptability tools. It can be used to describe structural information of a descriptions such as, for example, an MPEG 7 Segment DS instance. As it can be seen in Figure 1 the DS allows to describe an average feature of a set of component; for example the average length of a group of VideoSegment DS. It can be used also to specify whether a DS instance value is invariant with respect to modification of the associated media; for example a global color histogram of a given image can be can be invariant to resizing.

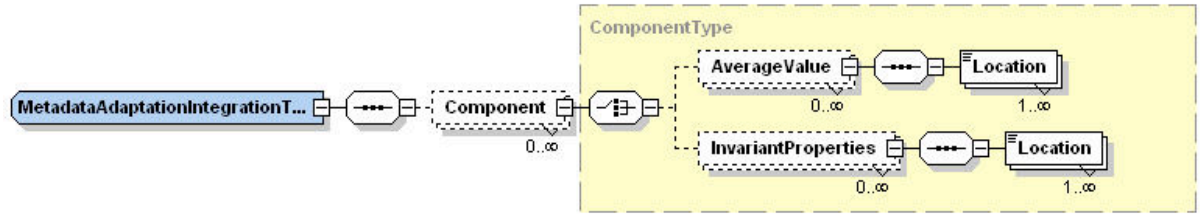

Figure 1: Graphical view of MetadataAdaptationIntegration type

Syntax of the MetadataAdaptationItegrationType:

```
<xs:complexType name="MetadataAdaptationIntegrationType">
 <xs:complexContent>
  <xs:extension base="DIADescriptionType">
   <xs:sequence>
    <xs:element name="Component" minOccurs="0" maxOccurs="unbounded">
     <xs:complexType>
      <xs:complexContent>
```

```
        <xs:extension base="ComponentType">
          <xs:attribute name="name" type="xs:QName" use="required"/>
        </xs:extension>
      </xs:complexContent>
    </xs:complexType>
   </xs:element>
  </xs:sequence>
  <xs:attribute name="instanceSchema" type="xs:anyURI" use="required"/>
  <xs:attribute name="instanceLocator" type="xs:anyURI" use="required"/>
  </xs:extension>
 </xs:complexContent>
</xs:complexType>

<xs:complexType name="ComponentType">
 <xs:complexContent>
  <xs:extension base="DIABaseType">
   <xs:choice>
    <xs:element name="AverageValue" minOccurs="0" maxOccurs="unbounded">
     <xs:complexType>
      <xs:complexContent>
       <xs:extension base="DIABaseType">
       <xs:sequence>
        <xs:element name="Location" maxOccurs="unbounded">
         <xs:complexType>
          <xs:simpleContent>
           <xs:extension base="xs:string">
            <xs:attribute name="type" type="xs:string" use="required"/>
           </xs:extension>
          </xs:simpleContent>
         </xs:complexType>
        </xs:element>
       </xs:sequence>
       <xs:attribute name="unitOfMeasure" type="xs:string" use="required"/>
       <xs:attribute name="value" type="xs:string" use="required"/>
      </xs:extension>
     </xs:complexContent>
    </xs:complexType>
   </xs:element>

   <xs:element name="InvariantProperties" minOccurs="0" maxOccurs="unbounded">
    <xs:complexType>
     <xs:complexContent>
      <xs:extension base="DIABaseType">
       <xs:sequence>
        <xs:element name="Location" maxOccurs="unbounded">
         <xs:complexType>
          <xs:simpleContent>
           <xs:extension base="xs:string">
            <xs:attribute name="type" type="xs:string" use="required"/>
           </xs:extension>
          </xs:simpleContent>
         </xs:complexType>
        </xs:element>
       </xs:sequence>
       <xs:attribute name="spatial" type="xs:boolean" use="optional"/>
       <xs:attribute name="temporal" type="xs:boolean" use="optional"/>
      </xs:extension>
     </xs:complexContent>
    </xs:complexType>
   </xs:element>
```

```
    </xs:choice>
  </xs:extension>
 </xs:complexContent>
</xs:complexType>
```

Semantics of the MetadataAdaptationItegrationType:

Name	*Definition*
`MetadataAdaptationIntegrationType`	Provides auxiliary information about an XML instance, useful in order to decrease the computational time and to improve the output quality in a metadata integration process.
`instanceSchema`	Describes the schema of the XML instance. (required)
`instanceLocator`	A pointer to the description instance the Metadata Adaptation Match is describing. (required)
`Component`	Describes the information about a component that is used in an XML instance.
`Name`	Identifies the name of a description tool that represents the component. (required)
`AverageValue`	Describe an average feature of a set of description tools components.
`Value`	Indicates the average value of the feature. (required)
`unitOfMeasure`	Identifies the features type. (required)
`InvariantProperties`	Give information about invariant properties of a description tool.
`spatial`	Indicates if the described tool instance value is invariant to spatial transformation of the content which it is describing. (optional)
`temporal`	Indicates if the described tool instance value is invariant to temporal transformation of the content which it is describing. (optional)
`Location`	Describes the location where the description tool can be described in the XML instance.
`Type`	Indicates the type of location. The following values shall be used. (required) • *TemporalDepth and SpatialDepth*: In case of tree like decomposition, identifies the relative spatio/temporal position, with respect to the root, of the considered set of components. to locate a set of description tools in a spatio/temporal decomposition • *listOfID*: `Location` can be represented as the list of ID.

Examples

In the following example the MetadataAdaptationIntegration DS is used to describe the average duration of a set of VideoSement DS instances. As can be seen the two available location methods has been used to identify the same set of tools.

```
<Description xsi:type="MetadataAdaptationIntegrationType"
             instanceSchema="urn:mpeg:mpeg7:schema:2001"
             instanceLocator="../../repository/descriptions/VS1.xml">
  <Component name="VideoSegmentDS">
     <AverageValue value="10" unitOfMeasure="MediaDuration">
         <Location type="listOfID">shot#1 shot#2... shot#10</Location>
     </AverageValue>
     <AverageValue value="10" unitOfMeasure="MediaDuration">
         <Location type="TemporalDepth">1</Location>
     </AverageValue>
  </Component>
</Description>
```

The following description has been used to describe the invariant properties of a ColorHistogram DS. The description says that the instance value is invariant to spatial variation of the associated media. This can be the case when for example, the global histogram associated to an image it is considered.

```
<Description xsi:type="MetadataAdaptationIntegrationType"
             instanceSchema="urn:mpeg:mpeg7:schema:2001"
             instanceLocator="../../repository/descriptions/VS1.xml">

 <Component name="ColorHistogramDS">
     <InvariantProperties spatial="true" temporal="false">
       <Location type="listOfID">ColH#1</Location>
     </InvariantProperties>
  </Component>

</Description>
```

4 Conclusion and recomendation

In this document the final result of the experiments about the integration of Metadata in the DI context. The results evaluation lead us to the conclusion that the DIA Metadata Adaptability tools defined in the current version of MPEG21 DIA CD are useful but not exhaustive in order to support adaptation operations such as metadata integration. For this reason a new Metadata Adaptability tool has been defined providing for it syntax and semantic. Hence the final recommendation of the CE is to include the MetadataAdaptationIntegration DS in the current version of the MPEG-21 DIA AM and use it as a base to improve the definition of the Metadata Adaptability DIA tools.

5 References

[1] N. Adami, M. Corvaglia, R. Leonardi, “CE on Metadata Adaptation – Integration of multiple descriptions”; ISO/IEC JTC1/SC29/WG11 M9024, Shanghai, October 2002.

[2] H.Nishikawa, “Report of CE on Metadata Adaptation”, ISO/IEC JTC1/SC29/WG11 M8589, Klagenfurt, Austria, July 2002

[3] K. Kazui: “Result of CE on Metadata Adaptation”, ISO/IEC JTC1/SC29/WG11 M8576, Klagenfurt, July 2002

[4] M. Sasaki: “Report and Study of CE on Metadata Adaptation”, ISO/IEC JTC1/SC29/WG11 M8560, Klagenfurt, July 2002

[5] N. Adami, R. Leonardi, “Content and Description Scalability Issues in a Home Network Environment”; ISO/IEC JTC1/SC29/WG11 M8693, Klagenfurt, July 2002.

[6] Description for Metadata Adaptation Hint, Mitsubishi, ISO/IEC JTC1/SC29/WG11 m8324, Fairfax, May 2002

[7] MPEG-21 Requirements on Digital Item Adaptation, ISO/IEC/JTC1/SC29/WG11 N4684, Jeju, March 2002

[8] Final Call for Proposals for Digital Item Adaptation, ISO/IEC/JTC1/SC29/WG11/N4683, Jeju, March 2002

[9] N. Adami, M. Corvaglia and R. Leonardi, "Comparing the quality of multiple descriptions of multimedia documents", *MMSP 2002 Workshop*, St. Thomas (US Virgin Islands), Dec. 2002

[10] N. Adami, “Work plan for CE on Metadata Adaptation – Integration”; ISO/IEC JTC1/SC29/WG11 N5182, Shanghai, October 2002.

[11] N. Adami, “Work plan for CE on Metadata Adaptation – Integration”; ISO/IEC JTC1/SC29/WG11 N5362, Awaji, December 2002.