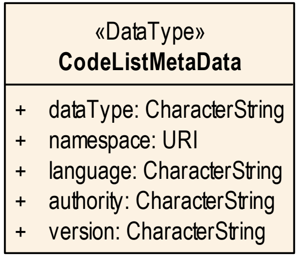
Chair of Geoinformatics
Department of Aerospace and Geodesy
Technical University of Munich

GML encoding of metadata for code lists

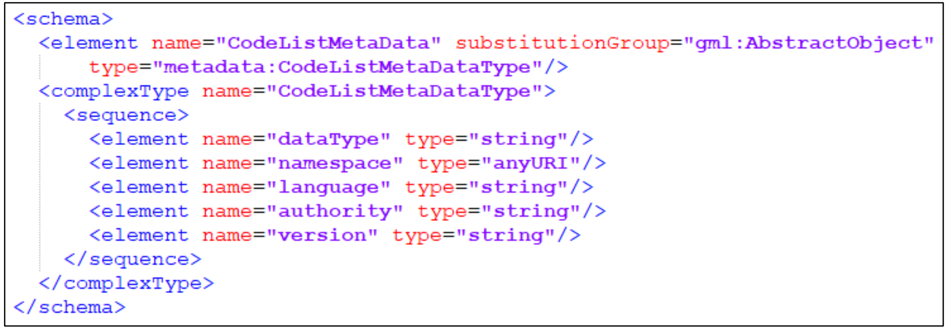
Adding metadata to code lists – Option 1

Option 1 makes use of the element <gml:GenericMetaData> that is provided by the GML standard. This element can be used as container for any metadata elements defined in external XML schemas.

1) A UML class is defined for the metadata

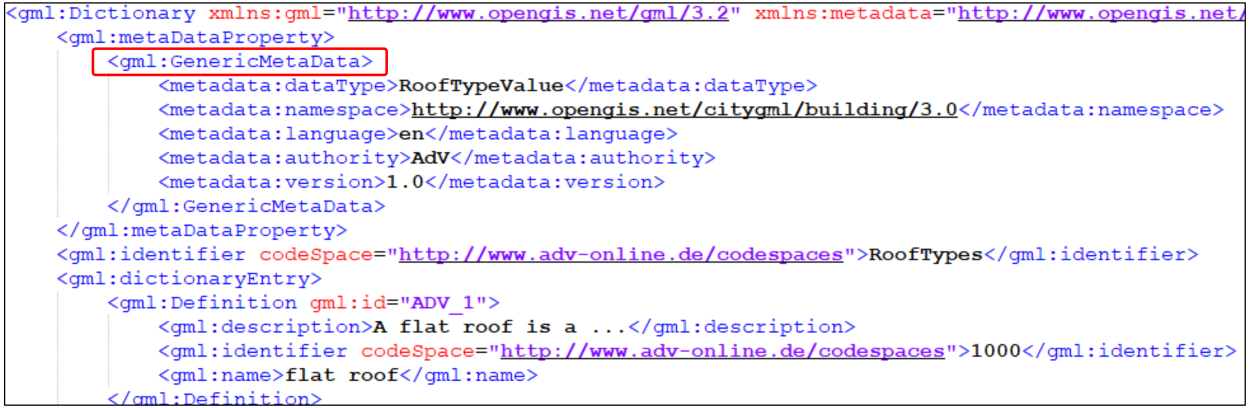

«DataType»
CodeListMetaData
+ dataType: CharacterString
+ namespace: URI
+ language: CharacterString
+ authority: CharacterString
+ version: CharacterString

2) An XML schema is derived from the UML class



```
<schema>
  <element name="CodeListMetaData" substitutionGroup="gml:AbstractObject"
      type="metadata:CodeListMetaDataType"/>
  <complexType name="CodeListMetaDataType">
    <sequence>
      <element name="dataType" type="string"/>
      <element name="namespace" type="anyURI"/>
      <element name="language" type="string"/>
      <element name="authority" type="string"/>
      <element name="version" type="string"/>
    </sequence>
  </complexType>
</schema>
```

3) The metadata properties are added to the codelist through the element <gml:GenericMetaData>

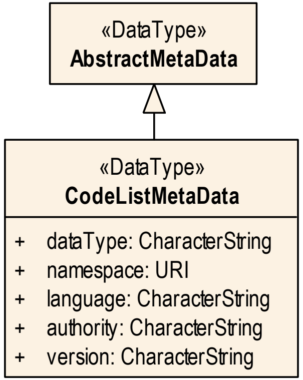


```
<gml:Dictionary xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:metadata="http://www.opengis.net/
    <gml:metaDataProperty>
        <gml:GenericMetaData>
            <metadata:dataType>RoofTypeValue</metadata:dataType>
            <metadata:namespace>http://www.opengis.net/citygml/building/3.0</metadata:namespace>
            <metadata:language>en</metadata:language>
            <metadata:authority>AdV</metadata:authority>
            <metadata:version>1.0</metadata:version>
        </gml:GenericMetaData>
    </gml:metaDataProperty>
    <gml:identifier codeSpace="http://www.adv-online.de/codespaces">RoofTypes</gml:identifier>
    <gml:dictionaryEntry>
        <gml:Definition gml:id="ADV_1">
            <gml:description>A flat roof is a ...</gml:description>
            <gml:identifier codeSpace="http://www.adv-online.de/codespaces">1000</gml:identifier>
            <gml:name>flat roof</gml:name>
        </gml:Definition>
```

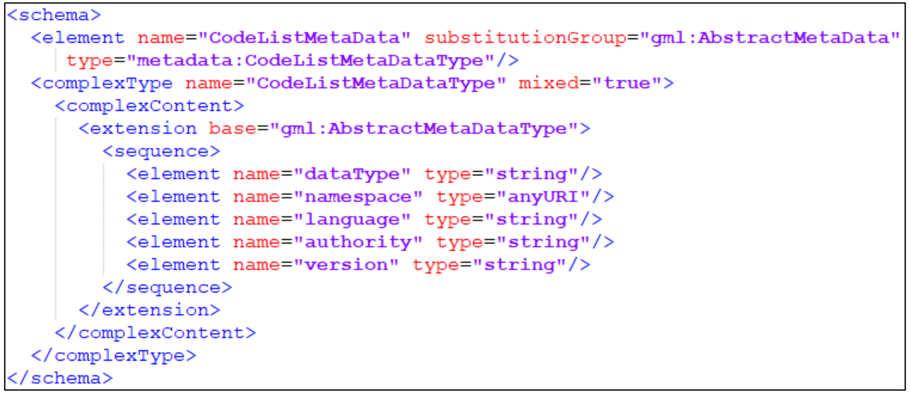
Adding metadata to code lists – Option 2

Option 2 derives a new container element from <gml:AbstractMetaData> that is defined in the GML standard. The new container element can then be used to add the metadata.

1) A UML class is defined for the metadata as subclass of class AbstractMetaData

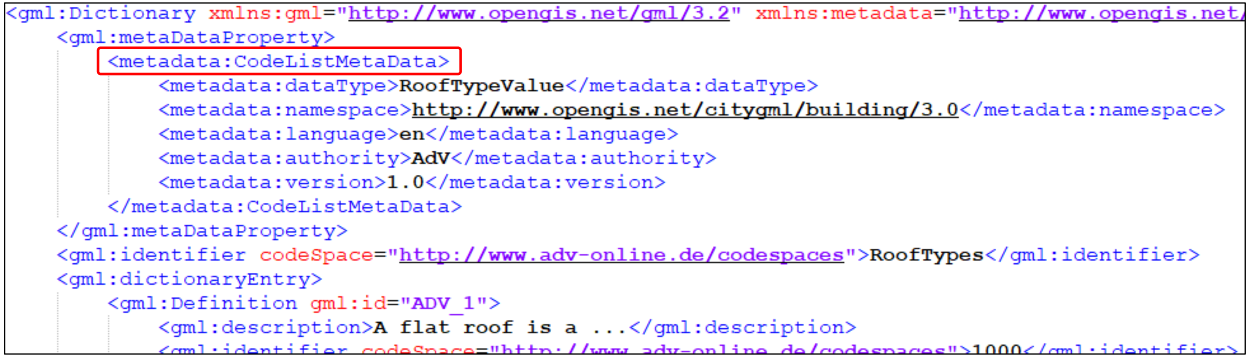

«DataType»
AbstractMetaData
«DataType»
CodeListMetaData
+ dataType: CharacterString
+ namespace: URI
+ language: CharacterString
+ authority: CharacterString
+ version: CharacterString

2) An XML schema is derived from the UML class



```
<schema>
  <element name="CodeListMetaData" substitutionGroup="gml:AbstractMetaData"
     type="metadata:CodeListMetaDataType"/>
  <complexType name="CodeListMetaDataType" mixed="true">
    <complexContent>
      <extension base="gml:AbstractMetaDataType">
        <sequence>
          <element name="dataType" type="string"/>
          <element name="namespace" type="anyURI"/>
          <element name="language" type="string"/>
          <element name="authority" type="string"/>
          <element name="version" type="string"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

3) The metadata properties are added to the codelist through the newly defined element <metadata:CodeListMetaData>



```
<gml:Dictionary xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:metadata="http://www.opengis.net/
    <gml:metaDataProperty>
        <metadata:CodeListMetaData>
            <metadata:dataType>RoofTypeValue</metadata:dataType>
            <metadata:namespace>http://www.opengis.net/citygml/building/3.0</metadata:namespace>
            <metadata:language>en</metadata:language>
            <metadata:authority>AdV</metadata:authority>
            <metadata:version>1.0</metadata:version>
        </metadata:CodeListMetaData>
    </gml:metaDataProperty>
    <gml:identifier codeSpace="http://www.adv-online.de/codespaces">RoofTypes</gml:identifier>
    <gml:dictionaryEntry>
        <gml:Definition gml:id="ADV_1">
            <gml:description>A flat roof is a ...</gml:description>
            <gml:identifier codeSpace="http://www.adv-online.de/codespaces">1000</gml:identifier>
```

Adding metadata to code lists

Option 1

- **Advantage**: The XML schema derived from the UML class using ShapeChange can be used directly without any modifications.

Option 2

- **Advantage**: A specific container element can be defined to add the metadata properties.
- **Disadvantage**: It does not seem possible to derive a valid XML schema from the UML class using ShapeChange. Manual corrections to the XML schema have been required.

Please note:

- According to Annex I.2.8 of the GML 3.2.1 standard, <gml:metaDataProperty> has been deprecated. This includes <gml:AbstractMetaData> and <gml:GenericMetaData>.
- However, it is not clear whether this only refers to metadata for features or also to metadata for dictionaries.
- In GML 3.2.1, the new approach for adding metadata requires defining specific property elements for each GML object to which metadata is to be added. This would mean that we need to define a new property element for <gml:Definition> which does not seem plausible, as we would need to define our own content model for <gml:Definition>.

Adding metadata to code lists

Questions and answers as discussed in the meeting on 15 December 2021:

- Should all metadata elements be mandatory?
  - Yes, if metadata is to be provided, values for all elements should be provided.
    Since the element <gml:metaDataProperty> is optional, metadata can also be fully omitted.
- Which name for the XML prefix do we choose? I currently used „metadata“ as prefix, which is a very long name.
  - Can be decided by the user, the prefixes „md“ or „cmd“ would be suitable.
- Which name do we give the XML schema file?
  - codeListMetaData.xsd
- Does the <identifier> element of the code list have the same semantics as the metadata element <dataType>?
  - <dataType> refers to the name of the data type defined in the UML model.
  - <identifier> identifies the code list document from a specific organisation.
- The <identifier> element contains the attribute „codeSpace“. Should we give a recommendation which value to provide here?
  - No, but examples would be useful.
  - The codeSpace of the dictionary and of the individual code list entries should have the same value.