AGH UNIVERSITY OF SCIENCE AND TECHNOLOGY

GML – A Real Standard?

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Geography Markup Language (GML)

- The standard for coding, spreading and collecting geographical information
- ISO standard (ISO 19136:2007)
- The implementation of XML (eXtensible Markup Language)

Used software and data

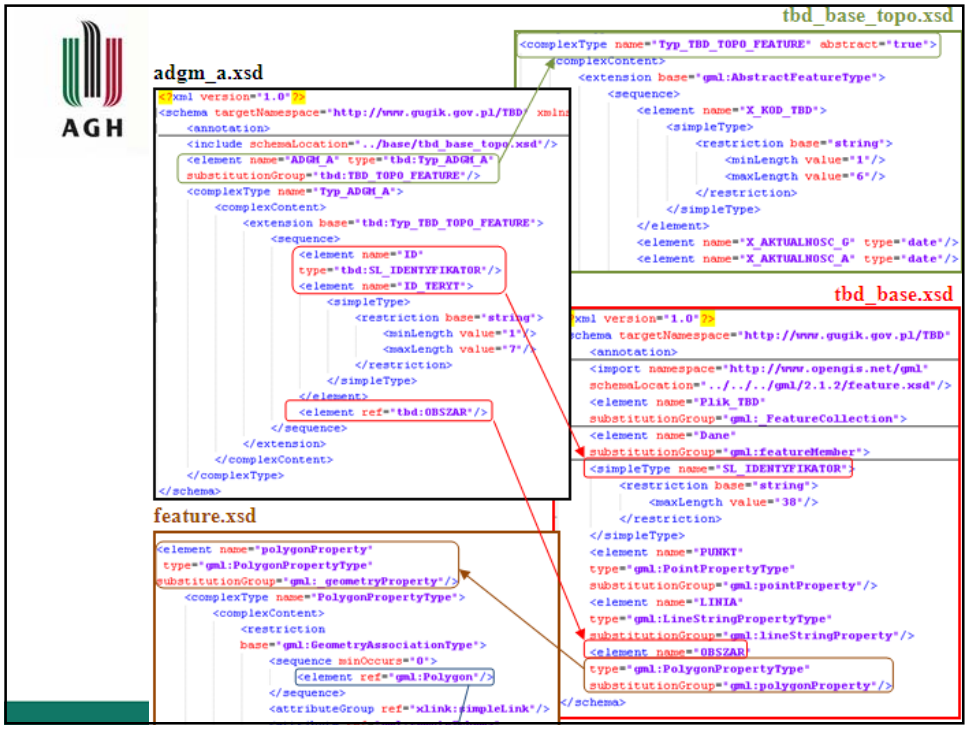
- Software:
  - ArcGIS
  - OpenJUMP
  - Quantum GIS
- Data:
  - Polish Topographical Database (TBD)
  - several dozen files, each containing information about one thematic layer
  - publicly accessible schema files

GML example

```
<?xml version="1.0" encoding="utf-8"?>
<Plik_TBD xmlns="http://www.gugik.gov.pl/TBD"
 xmlns:gml="http://www.opengis.net/gml"
 xmlns:xlink="http://www.w3.org/1999/xlink"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.gugik.gov.pl/TBD TBDGML_ver1_34.xsd">
    <Metadane>
    <Dane>
        <ADGM_A>
            <X_KOD_TBD>ADPA01</X_KOD_TBD>
            <X_AKTUALNOSC_G>2006-02-28</X_AKTUALNOSC_G>
            <X_AKTUALNOSC_A>2006-02-28</X_AKTUALNOSC_A>
            <X_KAT_DOKL_GEOM>2</X_KAT_DOKL_GEOM>
            <X_ZRODLO_DANYCH_G>PRG</X_ZRODLO_DANYCH_G>
            <X_ZRODLO_DANYCH_A>PRG</X_ZRODLO_DANYCH_A>
            <X_KAT_ISTNIENIA>1</X_KAT_ISTNIENIA>
            <X_RODZAJ_REPR_GEOM>ZU</X_RODZAJ_REPR_GEOM>
            <X_DATA_UTWORZENIA>2006-11-21</X_DATA_UTWORZENIA>
            <X_DATA_MODYFIKACJI>2006-03-07</X_DATA_MODYFIKACJI>
            <ID>1</ID>
            <ID_TERYT>3064011</ID_TERYT>
            <NAZWA>M. Poznan</NAZWA>
            <ID_POWIATU>3064</ID_POWIATU>
            <OBSZAR>
                <gml:Polygon>
                    <gml:outerBoundaryIs>
                        <gml:LinearRing>
                            <gml:coord>
                                <gml:X>364025.18</gml:X>
                                <gml:Y>507520.82</gml:Y>
                            </gml:coord>
                            ...
                            <gml:coord>
                                <gml:X>375466.77</gml:X>
                                <gml:Y>508450.76</gml:Y>
                            </gml:coord>
                        </gml:LinearRing>
                    </gml:outerBoundaryIs>
                </gml:Polygon>
            </OBSZAR>
        </ADGM_A>
    </Dane>
</Plik_TBD>
```

Schema

- A model of information structure description
- Describes allowed positions of tags and text in structurally correct document
- What can occur in a given context is defined by a rule
- Two types of rules:
  - content model rules describe the order of element occurrences
  - data type rules describe valid data units
- GML is a schema



Software - ArcGIS

- Data Interoperability extension
  - allows to convert files from one format to another
  - also allows to choose suitable schema files

Software - OpenJUMP

- Template file instead of schema file
  - deep knowledge of the data recorded in GML file is required to create it

OpenJUMP's template

```
<Dane>
    <ADGM_A>
        <X_KOD_TBD>ADPA01</X_KOD_TBD>
        <X_AKTUALNOSC_G>2006-02-28</X_AKTUALNOSC_G>
        <X_AKTUALNOSC_A>2006-02-28</X_AKTUALNOSC_A>
        <X_KAT_DOKL_GEOM>2</X_KAT_DOKL_GEOM>
        <X_ZRODLO_DANYCH_G>PRG</X_ZRODLO_DANYCH_G>
        <X_ZRODLO_DANYCH_A>PRG</X_ZRODLO_DANYCH_A>
        <X_KAT_ISTNIENIA>1</X_KAT_ISTNIENIA>
        <X_RODZAJ_REPR_GEOM>2U</X_RODZAJ_REPR_GEOM>
        <X_DATA_UTWORZENIA>2006-11-21</X_DATA_UTWORZENIA>
        <X_DATA_MODYFIKACJI>2006-03-07</X_DATA_MODYFIKACJI>
        <ID>1</ID>
        <ID_TERYT>3064011</ID_TERYT>
        <NAZWA>M. Poznan</NAZWA>
        <ID_POWIATU>3064</ID_POWIATU>
        <OBSZAR>
            <gml:Polygon>
                <gml:outerBoundaryIs>
                    <gml:LinearRing>
                        <gml:coord>
                            <gml:X>364025.18</gml:X>
                            <gml:Y>507520.82</gml:Y>
                        </gml:coord>
                        ...
```

```
<?xml version='1.0' encoding='UTF-8'?>

<JCSGMLInputTemplate>
<CollectionElement>Dane</CollectionElement>
<FeatureElement>ADGM_A</FeatureElement>

<ColumnDefinitions>
  <column>
    <name>X_KOD_TBD</name>
    <type>STRING</type>
    <valueElement elementName="X_KOD_TBD"/>
    <valueLocation position="body"/>
  </column>
  <column>
    <name>X_AKTUALNOSC_G</name>
    <type>DATE</type>
    <valueElement elementName="X_AKTUALNOSC_G"/>
    <valueLocation position="body"/>
  </column>
...
</ColumnDefinitions>
<GeometryElement>OBSZAR</GeometryElement>
</JCSGMLInputTemplate>
```

Software – Quantum GIS

- Uses the OGR Simple Features Library to import GML files
  - it makes no effort to read the schema file
  - instead it attempts to "guess" GML file structure
- TBD file "is not a valid or recognized data source"

Other GML files

- AAA-NAS (Germany)
- Ordnance Survey MasterMap (Great Britain)
- TOP10NL (Netherlands)

- ArcGIS +
- Quantum GIS +/-

.gfs file

```
<GMLFeatureClassList>
  <GMLFeatureClass>
    <Name>AX_Fahrwegachse</Name>
    <ElementPath>AX_Fahrwegachse</ElementPath>
    <DatasetSpecificInfo>
      <FeatureCount>1350</FeatureCount>
    </DatasetSpecificInfo>
    <PropertyDefn>
      <Name>breiteDesVerkehrsweges</Name>
      <ElementPath>breiteDesVerkehrsweges</ElementPath>
      <Type>Integer</Type>
    </PropertyDefn>
    <PropertyDefn>
      <Name>funktion</Name>
      <ElementPath>funktion</ElementPath>
      <Type>Integer</Type>
    </PropertyDefn>
    <PropertyDefn>
      <Name>hatDirektUnten</Name>
      <ElementPath>hatDirektUnten</ElementPath>
      <Type>Untyped</Type>
    </PropertyDefn>
  </GMLFeatureClass>
</GMLFeatureClassList>
```

Conclusion

- Although GML formally exists for several years it never gained the appropriate place among GIS users
- More and more programs advertise themselves as being able to read GML files, but only some of them allow to simultaneously specify the file to read and its corresponding schema
- Other approaches (simplified schema, attempt to guess the file structure) can also give positive results but they require user to have knowledge of at least basics of GML
- We should wish ourselves creation of freely accessible application allowing loading of GML files along with schemas