Better Data, Better Tools
The ELF data harmonization and geo-processing

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Agenda

1. ELF project
2. ELF principles for providing better data
3. ELF principles for providing better tools
4. Conclusions
1. ELF project: [www.elfproject.eu](http://www.elfproject.eu) -> Open EL
ELF Data: Objectives

To provide ELF data specifications based on INSPIRE specifications
To provide data maintenance and processing specifications for the geo-tools
To provide product and service specifications for the ELF services
2. ELF principles for providing better data

• To provide **national authoritative reference data**
• To provide **cross-border harmonised data** at European level
• To **meet users needs** (European)
• To insure **sustainable maintenance** and updates of the data
• To adopt a **standard** dedicated to data exchange and used by the geoprocessing tools
2. ELF principles for better data: defining data interoperability levels

This graduated scale indicates a step by step approach to achieve the highest degree of interoperability.
2.1 Core data content: INSPIRE and more
2.2 Well defined LoD in selection and resolution criteria

<table>
<thead>
<tr>
<th>LoD</th>
<th>Scale range</th>
<th>Thematic scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Level 0</td>
<td>Larger than 5k</td>
<td>Cadastral Parcels, Buildings, Addresses</td>
</tr>
<tr>
<td>Master Level 1</td>
<td>5k – &lt; 25k</td>
<td>ELF Topo (Admin Units, Hydro, Transport, Elevation, GeoNames, etc.)</td>
</tr>
<tr>
<td>Master Level 2</td>
<td>25k – &lt; 100k</td>
<td>ELF Topo generalised (1:50K)</td>
</tr>
<tr>
<td>Regional</td>
<td>100k – 500k</td>
<td>ELF Regional themes</td>
</tr>
<tr>
<td>Global</td>
<td>&gt; 500k</td>
<td>ELF Global themes</td>
</tr>
</tbody>
</table>

- Master 0/1: prioritize the existing most detailed LoDs of NMCAs, **no harmonization so far**
- Master 2: **Generic rules**: common resolution and selection criteria based on what are the most commonly applied criteria among NMCAs.
- Regional/global: **mature level**
2.3 Edge-matching

- Use of
  - Connecting features
  - Agreed international boundaries

- Pros
  - Recodring edge matching case
  - No need of neighbouring data

- EM processing guidelines and specifications
2.4 European wide codification

Roads classification (national criteria)

Roads classification for mapping purpose (European harmonisation)
## 2.5 Pan-European features

- **Definition**: located on the international boundaries -> duplication
- **Task**: unique feature

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>F_CODE</td>
<td>BH502</td>
</tr>
<tr>
<td>FCsubtype</td>
<td>Watercourse</td>
</tr>
<tr>
<td>HOC</td>
<td>Natural</td>
</tr>
<tr>
<td>HydroID</td>
<td>E.EG.WATRCRS.000009 unique value (European Uid)</td>
</tr>
<tr>
<td>HYP</td>
<td>Perennial/Permanent</td>
</tr>
<tr>
<td>ICC</td>
<td>DE#FR Combined ICC Values (the feature belongs to two countries)</td>
</tr>
<tr>
<td>LDV</td>
<td>inDirection</td>
</tr>
<tr>
<td>LEN</td>
<td>2.598898</td>
</tr>
<tr>
<td>LOC</td>
<td>Fictitious axis through water area</td>
</tr>
<tr>
<td>NAMA1</td>
<td>Rhein Name (in German) put into alphabetic order according to NLN attribute value</td>
</tr>
<tr>
<td>NAMA2</td>
<td>Le Rhin Name (in French) put into alphabetic order according to NLN1 and NLN2 attribute value</td>
</tr>
<tr>
<td>NAMN1</td>
<td>Rhein</td>
</tr>
<tr>
<td>NAMN2</td>
<td>Le Rhin</td>
</tr>
<tr>
<td>NHI</td>
<td>20000000000000000000000000000000#A--- Combined national values (DE#FR)</td>
</tr>
</tbody>
</table>

Combining national properties

Unique geometry

A European UID
2.6 Meeting users needs: Users must contribute to the harmonisation process

- Identifying user needs from the beginning
- Prioritise the sectors and use cases (not too restrictive) and identify customers for dialoguing
- Approach: **Negociated process (looping process)**

- Time consuming (years) with sustainable data maintenance
3. ELF principles for providing better tools: Data maintenance and processing guidelines

Using INSPIRE/GML standard,
3.1 Geo-processing guidelines and tools (test implementation)

<table>
<thead>
<tr>
<th>Tools</th>
<th>Tool developers</th>
<th>Used Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data quality Validation</td>
<td>ESRI</td>
<td>ArcGIS</td>
</tr>
<tr>
<td></td>
<td>1Spatial</td>
<td>1Spatial Cloud</td>
</tr>
<tr>
<td></td>
<td>Delft University</td>
<td>prepair and pprepair</td>
</tr>
<tr>
<td>Change Detection</td>
<td>IGNF</td>
<td>C++ libraries</td>
</tr>
<tr>
<td>Edge-Matching</td>
<td>ESRI</td>
<td>ArcGIS</td>
</tr>
<tr>
<td></td>
<td>1Spatial</td>
<td>Local installation of 1integrate with ELF Edge Matching Rules</td>
</tr>
<tr>
<td></td>
<td>Delft University</td>
<td>prepair and pprepair</td>
</tr>
<tr>
<td>Generalization (Regional-Global)</td>
<td>IGNF</td>
<td>C++ programming based on IGN-F internal libraries</td>
</tr>
<tr>
<td>Generalization (master LoD1-master LoD2)</td>
<td>1Spatial</td>
<td>Local installation of 1Generalise with specific Flowline</td>
</tr>
<tr>
<td>Generic level</td>
<td>Delft University</td>
<td>tGAP builder (prototype implemented in Python)</td>
</tr>
<tr>
<td>Transformation</td>
<td>Snowflake</td>
<td>GO Loader and GO Publisher</td>
</tr>
<tr>
<td></td>
<td>KadasterNL</td>
<td>ESRI ArcGIS</td>
</tr>
</tbody>
</table>
3.2 Lessons learnt after test implementation

**Gap** between (complex) INSPIRE schemas and what current tools can support

1. Complexity of INSPIRE data schema (too advanced) for easy transformation (Oracle, PostgreSQL, Geodatabase)
   - Used their own flattened rules for decoding INSPIRE/GML
   - Limited to simple features
   - Some applications (view, maps) require simple features.

2. Handling GML file size

3. Not so «easy going» at first implementation
3.3 Which encoding rules for better data geo-processing: discussion

**Scenario 1:** INSPIRE/GML is the obligated standard, pushing and support vendors for better use of INSPIRE/GML

**Scenario 2:** looking to **alternate encodings** with simplified flattened data structure (refer to MIG action 2017.2), already adopted by vendors
4. Conclusions

Better data:
• Data harmonisation should progress beyond INSPIRE, adopting a step by step approach in the level of interoperability

Better tools:
• Support vendors implementation by providing geo-processing guidelines and decoding rules
• Reduce the data schema complexity

Fit for purpose:
• Users are key stakeholders in the improvement
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