

Making OpenStreetMap data interoperable in the context of a INSPIRE based SDI

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Goal

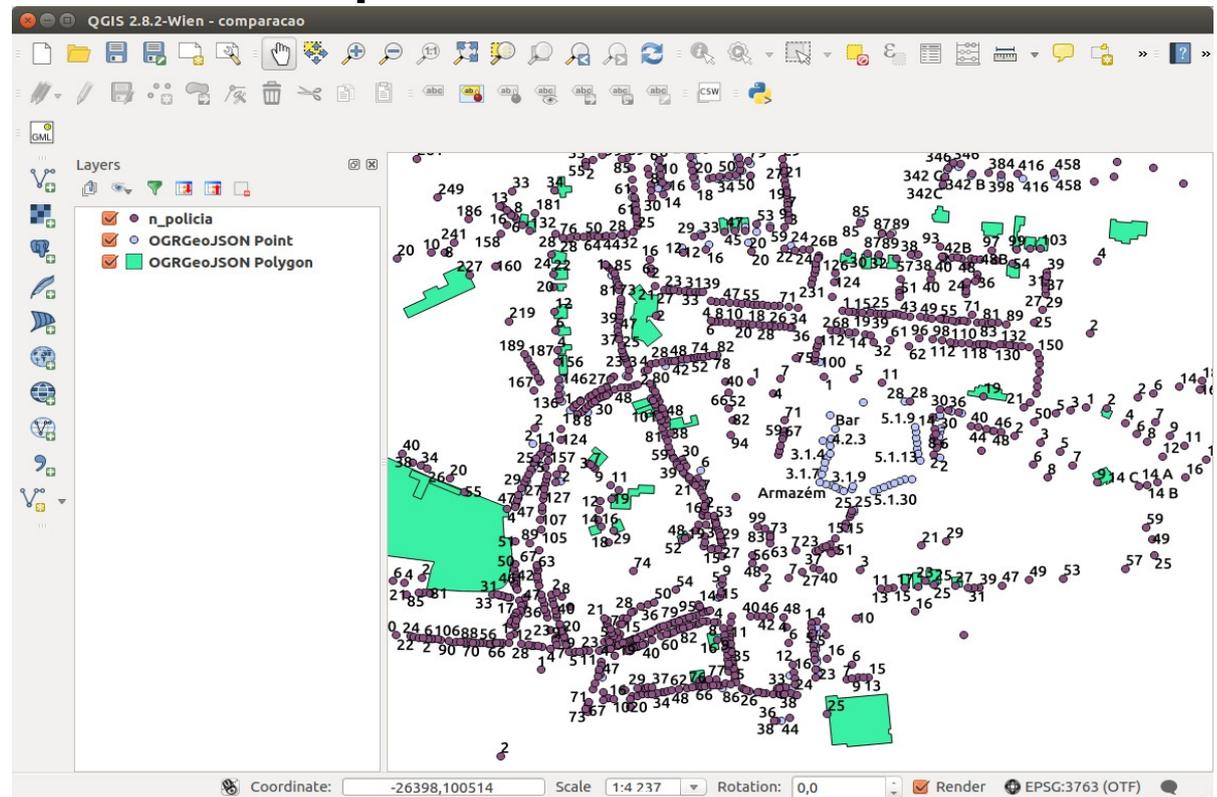
- Make OSM data more useful to the local administration
- Improve local administration SDI to take advantage of OSM data

Syntactic approach

- Use local administration dataset
- Use a OSM extract
- Visual/human based comparison

<http://overpass-turbo.eu/>

```
[out:json];  
(  
  node  
  ["addr:housenumber"]  
  (40.495,-8.558,40.694,-8.245);  
  way  
  ["addr:housenumber"]  
  (40.495,-8.558,40.694,-8.245);  
>;  
);  
out body;  
>;  
out skel qt;
```



Semantic interoperability

- Make OSM data more useful to the local administration
- Improve local administration SDI to take advantage of OSM data
- Using a semantic approach:
 - “Enrich” OSM data model to make interoperable with administrative/institutional data
 - Enable machine based processing

Two approaches

- “Semantic web” based approach
 - Make OSM as RDF resources
 - Previous/ongoing work:
 - LinkedGeoData.org, OSM Semantic Network, etc
- Using INSPIRE as the common representation
 - Local administration is moving to INSPIRE
 - Enforced by law
 - Make OSM data available at the same level of conceptualization
 - Previous/ongoing work:
 - [INSPIRE-FOSS](#) Project

INSPIRE vs Semantic Web

- INSPIRE started earlier than the Semantic Web
 - Wikipedia, OpenStreetMap, etc are newer
- INSPIRE has specific implementation rules that can help local administration to follow consistent data models
- INSPIRE can provide persistent datasets, with interesting “persistent” ID/URI

Challenges

- Data models;
 - OSM data model;
 - INSPIRE data model;
- Data inconsistencies;
 - OSM data inconsistencies;
- Data semantics;
- Bidirectionally

OSM data covered by INSPIRE

- Addresses
- Geographical names
- Buildings
- Transport networks

OSM addresses encoded in GML

The image shows a screenshot of an XML Editor window titled "addresses-jgr.xml [/home/jgr/GIS/INSPIRE/addresses-jgr.xml] - <Oxygen/> XML Editor (Academic use only)". The editor displays XML code for a GML SpatialDataSet. The code includes namespace declarations for gml, base, and xsi, and defines a boundedBy envelope with coordinates for a bounding box in EPSG:3763. The address text is: "Avenida Nossa Senhora da Saúde, 187, RC B 3830-460 Gafanha da Encarnação Portugal". The XML also includes metadata and member information for the address.

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <base:SpatialDataSet gml:id="PT.CM-ILHAVO.ADDRESS"
3   xmlns:base="urn:x-inspire:specification:gmlas:BaseTypes:3.2"
4   xmlns:ad="urn:x-inspire:specification:gmlas:Addresses:3.0"
5   xmlns:gn="urn:x-inspire:specification:gmlas:GeographicalNames:3.0"
6   xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
7   xmlns:gml="http://www.opengis.net/gml/3.2"
8   xsi:schemaLocation="urn:x-inspire:specification:gmlas:Addresses:3.0 http://inspire.ec.europa.eu/inspire/gmlas/Addresses/3.0/Addresses.xsd"
9 >
10 <gml:boundedBy>
11   <gml:Envelope srsName="EPSG:3763">
12     <!-- Bounding from CAOP -->
13     <gml:lowerCorner>-119191.4075 -300404.804</gml:lowerCorner>
14     <gml:upperCorner>162129.0811 276083.7674</gml:upperCorner>
15   </gml:Envelope>
16 </gml:boundedBy>
17 <base:identifier>
18   <base:Identifier>
19     <base:localId>1</base:localId>
20     <base:namespace>PT.CM-ILHAVO.ADDRESS</base:namespace>
21   </base:Identifier>
22 </base:identifier>
23 <!--
24 Avenida Nossa Senhora da Saúde, 187, RC B
25 3830-460 Gafanha da Encarnação
26 Portugal
27 -->
28 <base:metadata xsi:nil="true"/>
29 <base:member>
30   <ad:Address gml:id="PT.CM-ILHAVO.ADDRESS.1">
31     <ad:inspireId>
32       <base:Identifier>
33         <base:localId>1</base:localId>
34         <base:namespace>PT.CM-ILHAVO.ADDRESS</base:namespace>
35       </base:Identifier>
36     </ad:inspireId>
37   </ad:Address>
38 </base:member>
39 </base:SpatialDataSet>
```

The left sidebar shows a project tree with files like "inspire.xpr", "A.ES.SDGC.AD.29069.gml", "addresses-deegree.xml", "addresses-jgr.xml", "addresses-netherlands.xml", "addresses-nl.gml", "addresses.xml", "Addresses.xsd", "administrativeunits.xml", "AdministrativeUnits.xsd", "caop10000.gml", and "caop32-1000.gml". A notification states "The Master Files support is disabled" with "Enable" and "Read more" buttons. The Outline pane shows the element name filter and a tree structure: "ad:GeographicPosition" (expanded) containing "ad:geometry", "ad:specification entrance", "ad:method byOtherParty", and "ad:default true". Below this is "locator" and "validFrom" and "validTo" dates.

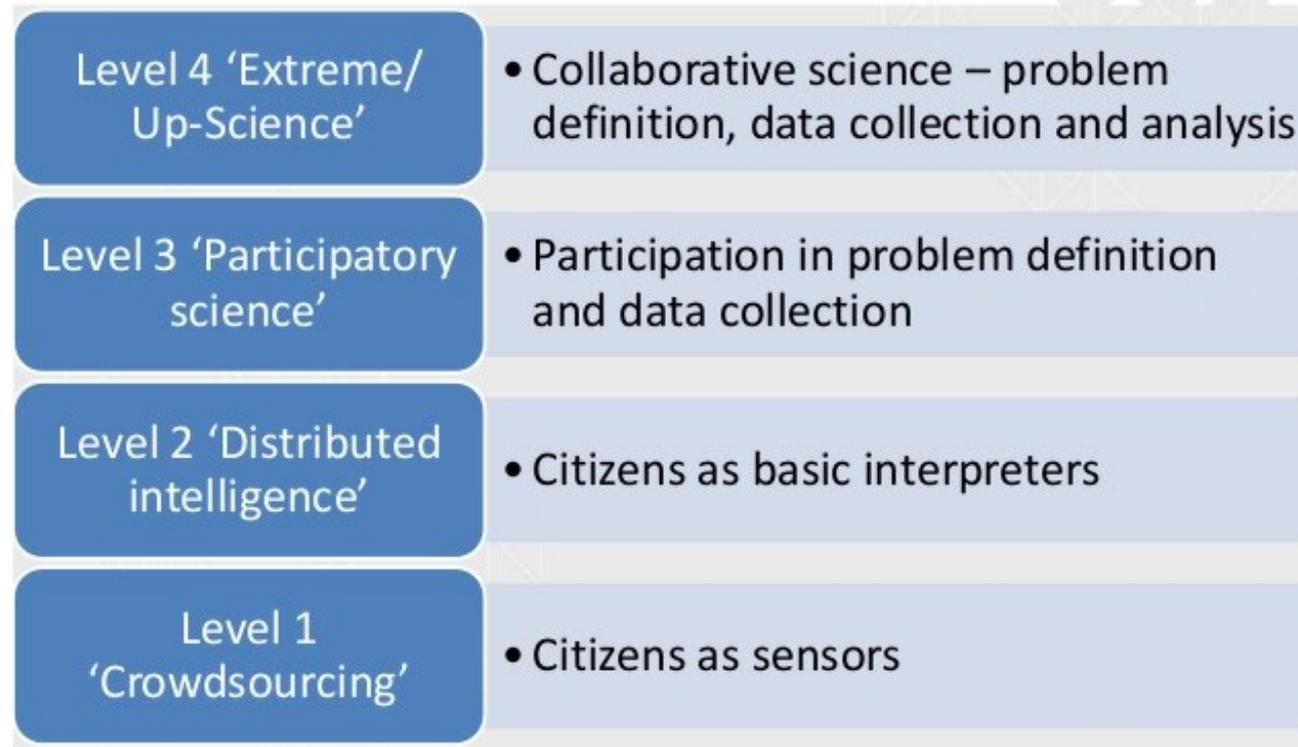
Difficulties

- The differences between datasets make it hard to put it side by side
- Even with datasets in GML, we lack tools to do automated analysis
- Involve the community in this process:
 - The community is not only “sensors”
 - The community can participate and develop solutions
 - “upscience”

“Upscience”

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 - The community is not only “sensors”
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 - “upscience”

Participation in citizen science



Haklay, 2013. Citizen Science and volunteered geographic information: Overview and typology of participation, *Crowdsourcing Geographic Knowledge*



“Upscience”

- OSM already has external links
 - Links to Wikipedia
 - Nodes 234 641
 - Ways 168 578
 - Relations 184 858
 - Fewer links to wikidata and wikimedia_commons
 - Large discussion on OSM mailing list about linking with Wikidata

Discussion

- The community can do more than “crowd source”
 - Stimulate and improve the conceptual/semantic discussions on OSM
- INSPIRE and Web Semantic technologies are good candidates to go forward
 - Alignment of INSPIRE and Linked Data
- How should we enrich OSM data?
 - Putting everything in OSM?
 - Linking to external sources?
 - Maintaining this alignment in an external source or with additional tags in OSM?