

Start to Link, a practical POI approach

Track: Linked Data in Practice

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Session: Start to Link, a practical POI approach

In this session we stay away from more specialized concepts like RDF and N3 notations. The case discussed shows a step-up model for implementing linked data based on URI's. At the same time the case acts as reference implementation for the Flemish Meta-SDI. To facilitate the use and access of geographical information, a POI model based on the draft W3C POI Core is used to publish data from the Flemish government. Within this POI model, unique and meaningful URI identifiers are used to identify the POI resource and reference data related to this POI resource. Based on this simplified and straightforward approach towards linking data, we discuss the idea of a resource-oriented resolver service that resolves restful requests to different flavors of web service interfaces.

Overview

- The POI model
 - More than points
 - Requirements
 - POI model selection
- In practice: The POI Use Case
 - Linking Data with Meta-SDI identifiers
 - POI-related Meta-SDI identifiers
 - POI as data integrator
 - POI and other Information objects
 - Demo



POI : More Than Points

- There is an increased demand for location based services from policy makers and the public.
- Traditional GIS is layer-oriented and aggregates by stacking layers. POI have an object approach that allows aggregating various data in one POI layer.
- Broadening the geometric definition of a POI (point, line polygon), allows for extending the offering (parcels, hikes, rivers, buildings, ...).
- POI allow for describing different data sources in a unified model and for accessing through a unified interface

Requirements

- We were looking for a model that:
 - Is easy to use;
 - Allows modelling of events (road works, festivals, ...);
 - Allows categorizing hierarchically (Thema – Category – Type);
 - Supports points, lines and polygons;
 - Allows multiple geometries (pinpoint, entrance, trajectory, zone)
 - Can be exported towards common GPS formats
 - Supports linking to other resources (linked data)

Model Selection

- Candidates
 - W3C POI WG (Draft POI Core)
 - ISO 14825: Geographic Data Files (GDF) - Feature Theme “Services” (POIs)
 - Identification of Fixed Objects in Public Transport (IFOPT), POI submodel
 - ISO 19112 and OGC OpenLS ADTs were dropped early in the selection process, because they clearly didn’t meet the requirements.
- Winner: W3C POI Core draft
 - Extensible classification
 - Multiple geometries
 - Entrance model available
 - Lifespan attributes

Example: Linking with Meta-SDI identifiers

The POI Use Case

```
<Perceel>
  <code>987620</code>
  <locatie href="http://mgdi.agiv.be/data/poi/agiv-be/8911110"/>
</Perceel>

<poi id="http://www.geopunt.be/poi/8911110" xml:lang="nl-BE" xml:base="http://mgdi.agiv.be/data/poi/agiv-be/8911110">
  <category term="kadastraalPerceel" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/category"/>
  <link term="Perceel" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/grbgis-perceel/agiv-be/987620"/>
  <link term="POI-huisAdres" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/poi/agiv-be/1209873"/>
  <link term="Kunstpatrimonium" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/kunstpatrimonium/erfgoedplus-be/987620"/>
  <location>
    <polygon term="area" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/polygon">
      <SimplePolygon srsName="http://www.opengis.net/def/crs/EPSSG/0/4326">
        <posList>42.360890561289295 -71.09139204025269 42.361176 -71.09018 42.36272976137689 -71.09049081802368 42.36318955298668 -71.0967779159
2.363617631805496 -71.101562976883716 42.360890561289295 -71.09139204025269</posList>
      </SimplePolygon>
    </polygon>
    <relationship targetPOI="http://mgdi.agiv.be/data/poi/agiv-be/8911456" term="touches" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/spatialRelationship"/>
  </location>
</poi>
```

POI-related Meta-SDI identifiers

- <http://mgdi.agiv.be/cl/poi-term/agiv-be/time-start>
- <http://mgdi.agiv.be/cl/poi-term/agiv-be/relationship-within>
- <http://mgdi.agiv.be/cl/poi-term/agiv-be/author-primary>
- <http://mgdi.agiv.be/cl/relation-term/iana-org/copyright>
- <http://mgdi.agiv.be/cl/mime-term/iana-org/application-json>
- <http://mgdi.agiv.be/data/poi/brusselsairport-be/0003> (e.g. entrance)
- <http://mgdi.agiv.be/data/poi/agiv-be/1209873> (e.g. address, parcel)
- <http://mgdi.agiv.be/data/poi/vmw-be/34528> (e.g. water cock)
- <http://mgdi.agiv.be/data/poi/erfgoedplus-be/0937> (e.g. museum, museum entrance)
- <http://mgdi.agiv.be/cl/xsns-term/agiv-be/POI/V0.9>
- <http://mgdi.agiv.be/dms/poi-xsd/agiv-be/agiv-extensie/V.01>
- <http://mgdi.agiv.be/dms/poi-xsd/agiv-be/w3c/V.1.0>

POI as data integrator

- *“One could argue that just as Web pages obtain most of their value by the links between them, a **POI's value is directly related to the number of links between it and others.**”*
- *“Links in POIs are perhaps even more important than links in Web pages or Atom feeds, as POIs are inherently **place-based objects with natural relationships in space and time** that should be expressed.”*
- *“Those spatial relationships are mostly covered by the Relationship primitive described below, which is in many ways a specialization of the generic Link. But there are many more semi-spatial and non-spatial relationships that can be expressed using Link.”*
- **Linking through POI allows for associating all kinds of information objects based on location, affinity and/or relationship.**

POI and other information objects

■ POI:

- **POI address:** <http://mgdi.agiv.be/data/poi/agiv-be/1209873>
- **POI postal zone:** <http://mgdi.agiv.be/data/poi/agiv-be/670921>
- **POI cadastral parcel:** <http://mgdi.agiv.be/data/poi/agiv-be/8911110>
- **POI lake:** <http://mgdi.agiv.be/data/poi/agiv-be/8911456>

■ Other Information Objects:

- **Address (CRAB):** <http://mgdi.agiv.be/data/crab-adres/agiv-be/019918>
- **Postal Zone (NIS):** <http://mgdi.agiv.be/data/nis-postcode/statbel-be/3000>
- **Parcel (GRB):** <http://mgdi.agiv.be/data/grbgis-perceel/agiv-be/875>
- **Cultural Heritage (Erfgoedplus):** <http://mgdi.agiv.be/data/kunstpatrimonium/erfgoedplus-be/987620>
- **Nature:** <http://mgdi.agiv.be/data/natuurgebied/agiv-be/66322>

POI and other information objects

```
<Adres>
  <id>019918</id>
  <straatnaam>Herseltsebaan</straatnaam>
  <postcode>3000</postcode>
  <huisnummer>30</huisnummer>
  <ingang href="http://mgdi.agiv.be/data/poi/agiv-be/1209873"/>
</Adres>

<poi id="http://www.geopunt.be/poi/1209873" xml:lang="nl-BE" xml:base="http://mgdi.agiv.be/data/poi/agiv-be/1209873">
  <label term="primair" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/label">Herseltsebaan 30, 3000 Leuven</label>
  <category term="huisAdres" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/category"/>
  <link term="Adres" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/crab-adres/agiv-be/019918"/>
  <link term="POI-postcodeGebied" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/poi/agiv-be/670921"/>
  <link term="POI-kadastraalPerceel" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/poi/agiv-be/8911110"/>
  <link term="Postcode" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/nis-postcode/statbel-be/3000"/>
  <link term="Kunstpatrimonium" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/kunstpatrimonium/erfgoedplus-be/987620"/>
  <location>
    <point term="ingang" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/point">
      <Point srsName="http://www.opengis.net/def/crs/EPSSG/0/4326">
        <posList>42.358 -71.06</posList>
      </Point>
    </point>
  </location>
</poi>
```

POI and other information objects

```
<Postcode>
  <nis-naam>Leuven</nis-naam>
  <nummer>3000</nummer>
  <gebied href="http://mgdi.agiv.be/data/poi/agiv-be/670921"/>
</Postcode>

<poi id="http://www.geopunt.be/poi/670921" xml:lang="nl-BE" xml:base="http://mgdi.agiv.be/data/poi/agiv-be/670921">
  <label term="postcodeGebied" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/label">Leuven, 3000</label>
  <category term="postcodeGebied" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/category"/>
  <link term="Postcode" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/nis-postcode/statbel-be/3000"/>
  <location>
    <polygon term="area" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/polygon">
      <SimplePolygon srsName="http://www.opengis.net/def/crs/EPSSG/0/4326">
        <posList>42.360890561289295 -71.09139204025269 42.361176 -71.09018 42.36272976137689 -71.09049081802368 42.36318955298668 -71.0967779
2.363617631805496 -71.10156297683716 42.360890561289295 -71.09139204025269</posList>
      </SimplePolygon>
    </polygon>
  </location>
</poi>
```

POI and other information objects

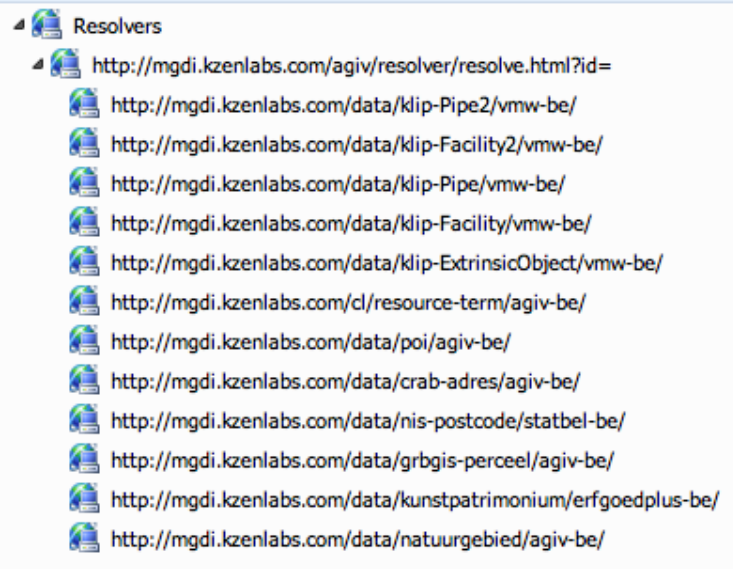
```
<Perceel>
  <code>987620</code>
  <locatie href="http://mgdi.agiv.be/data/poi/agiv-be/8911110"/>
</Perceel>

<poi id="http://www.geopunt.be/poi/8911110" xml:lang="nl-BE" xml:base="http://mgdi.agiv.be/data/poi/agiv-be/8911110">
  <category term="kadastraalPerceel" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/category"/>
  <link term="Perceel" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/grbgis-perceel/agiv-be/987620"/>
  <link term="POI-huisAdres" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/poi/agiv-be/1209873"/>
  <link term="Kunstpatrimonium" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/kunstpatrimonium/erfgoedplus-be/987620"/>
  <location>
    <polygon term="area" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/polygon">
      <SimplePolygon srsName="http://www.opengis.net/def/crs/EPSG/0/4326">
        <posList>42.360890561289295 -71.09139204025269 42.361176 -71.09018 42.36272976137689 -71.09049081802368 42.36318955298668 -71.0967779159
2.363617631805496 -71.10156297683716 42.360890561289295 -71.09139204025269</posList>
      </SimplePolygon>
    </polygon>
    <relationship targetPOI="http://mgdi.agiv.be/data/poi/agiv-be/8911456" term="touches" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/spatialRelationship"/>
  </location>
</poi>
```

Voorbeeld POI's en andere objecten

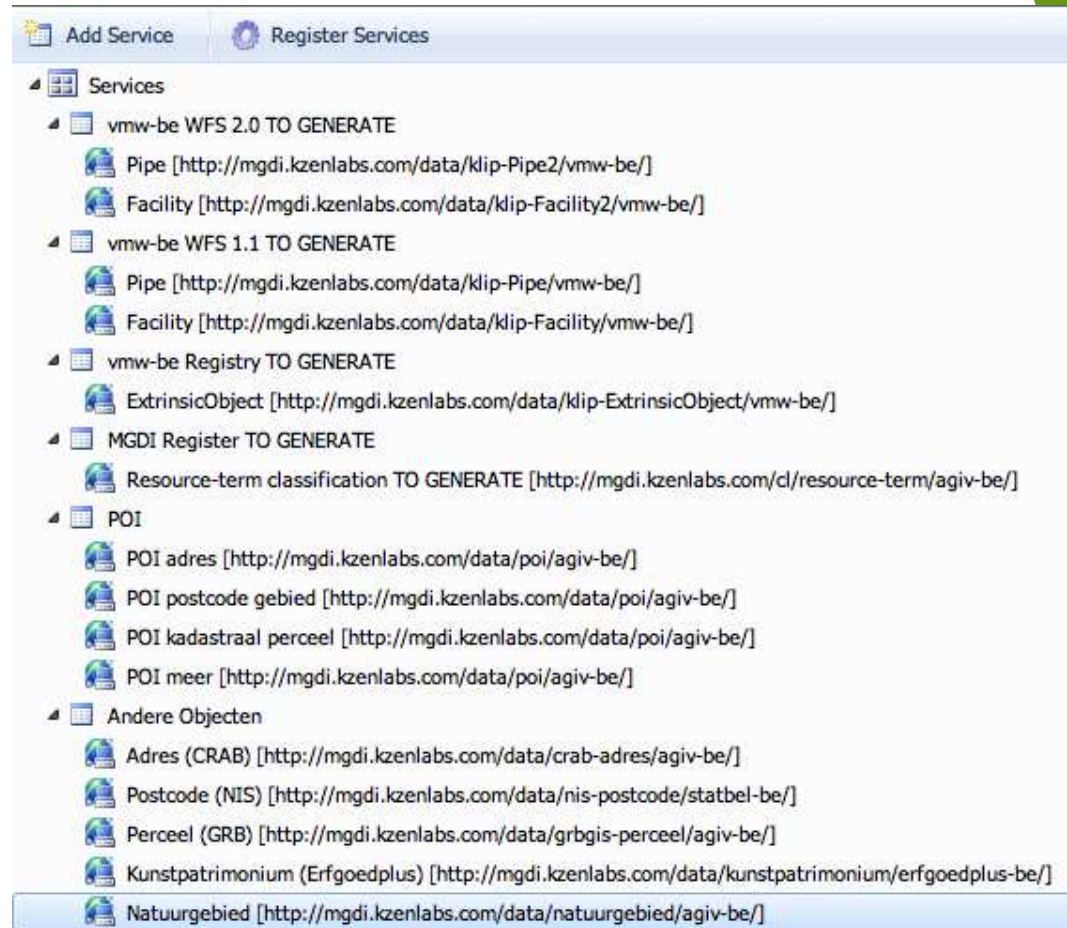
```
<Kunstpatrimonium>
  <id>987620</id>
  <naam>Museum Voor Wondermooie Kunsten</naam>
  <tentoonstelling>Taferelen van het Meer, 19de eeuw</tentoonstelling>
  <architect>Frans Grootjans</architect>
  <adres href="http://mgdi.agiv.be/data/poi/agiv-be/1209873"/>
</Kunstpatrimonium>
<Natuurgebied>
  <nummer>66322</nummer>
  <naam>Meer van Herselt</naam>
  <maximaleDiepte>10m</maximaleDiepte>
  <bevisbaar>ja</bevisbaar>
  <gebied href="http://mgdi.agiv.be/data/poi/agiv-be/8911456"/>
</Natuurgebied>
<poi id="http://www.geopunt.be/poi/8911456" xml:lang="nl-BE" xml:base="http://mgdi.agiv.be/data/poi/agiv-be/8911456">
  <label term="primair" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/label">Meer van Herselt, Leuven</label>
  <category term="meer" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/category"/>
  <link term="Natuurgebied" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/link" href="http://mgdi.agiv.be/data/natuurgebied/agiv-be/66322"/>
  <location>
    <polygon term="area" scheme="http://mgdi.agiv.be/cl/poi-term/agiv-be/polygon">
      <SimplePolygon srsName="http://www.opengis.net/def/crs/EPSSG/0/4326">
        <posList>42.360890561289295 -71.09139204025269 42.361176 -71.09018 42.36272976137689 -71.09049081802368 42.36318955298668 -71.09E
2.363617631805496 -71.10156297683716 42.360890561289295 -71.09139204025269</posList>
      </SimplePolygon>
    </polygon>
  </location>
</poi>
```

Resolving Meta-SDI identifiers (demo)



Resolvers

- <http://mgdi.kzenlabs.com/agiv/resolver/resolve.html?id=http://mgdi.kzenlabs.com/data/klip-Pipe2/vmw-be/>
- <http://mgdi.kzenlabs.com/data/klip-Facility2/vmw-be/>
- <http://mgdi.kzenlabs.com/data/klip-Pipe/vmw-be/>
- <http://mgdi.kzenlabs.com/data/klip-Facility/vmw-be/>
- <http://mgdi.kzenlabs.com/data/klip-ExtrinsicObject/vmw-be/>
- <http://mgdi.kzenlabs.com/cl/resource-term/agiv-be/>
- <http://mgdi.kzenlabs.com/data/poi/agiv-be/>
- <http://mgdi.kzenlabs.com/data/crab-adres/agiv-be/>
- <http://mgdi.kzenlabs.com/data/nis-postcode/statbel-be/>
- <http://mgdi.kzenlabs.com/data/grbgis-perceel/agiv-be/>
- <http://mgdi.kzenlabs.com/data/kunstpatrimonium/erfgoedplus-be/>
- <http://mgdi.kzenlabs.com/data/natuurgebied/agiv-be/>



Add Service Register Services

Services

- vmw-be WFS 2.0 TO GENERATE
 - Pipe [<http://mgdi.kzenlabs.com/data/klip-Pipe2/vmw-be/>]
 - Facility [<http://mgdi.kzenlabs.com/data/klip-Facility2/vmw-be/>]
- vmw-be WFS 1.1 TO GENERATE
 - Pipe [<http://mgdi.kzenlabs.com/data/klip-Pipe/vmw-be/>]
 - Facility [<http://mgdi.kzenlabs.com/data/klip-Facility/vmw-be/>]
- vmw-be Registry TO GENERATE
 - ExtrinsicObject [<http://mgdi.kzenlabs.com/data/klip-ExtrinsicObject/vmw-be/>]
- MGDI Register TO GENERATE
 - Resource-term classification TO GENERATE [<http://mgdi.kzenlabs.com/cl/resource-term/agiv-be/>]
- POI
 - POI adres [<http://mgdi.kzenlabs.com/data/poi/agiv-be/>]
 - POI postcode gebied [<http://mgdi.kzenlabs.com/data/poi/agiv-be/>]
 - POI kadastraal perceel [<http://mgdi.kzenlabs.com/data/poi/agiv-be/>]
 - POI meer [<http://mgdi.kzenlabs.com/data/poi/agiv-be/>]
- Andere Objecten
 - Adres (CRAB) [<http://mgdi.kzenlabs.com/data/crab-adres/agiv-be/>]
 - Postcode (NIS) [<http://mgdi.kzenlabs.com/data/nis-postcode/statbel-be/>]
 - Perceel (GRB) [<http://mgdi.kzenlabs.com/data/grbgis-perceel/agiv-be/>]
 - Kunstpatrimonium (Erfgoedplus) [<http://mgdi.kzenlabs.com/data/kunstpatrimonium/erfgoedplus-be/>]
 - Natuurgebied [<http://mgdi.kzenlabs.com/data/natuurgebied/agiv-be/>]

