Implementing INSPIRE WFS and SOS for geoscience data: the technological cocktail to quench the user’s thirst for data

Mickaël Beaufils, Sylvain Grellet, François Tertre

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Implementing INSPIRE WFS and SOS for geoscience data: the technological cocktail to quench the user’s thirst for data

Mickaël Beaufils, Sylvain Grellet & François Tertre
BRGM on the rocks © cocktail

1. WFS App Schema
2. SOS
3. Identifier & resolver
4. User interface

© Cheryloz
WFS Application Schema
WFS App Schema > Stairway to … interoperability

**User side**

- Advanced usage (e.g. filtering)
- Basic usage (e.g. GetFeatureById)

**Administrator side**

- Tool configuration for App Schema
- Tool installation
- Database modelling
- Performance and scalability
- Update and maintainability
WFS App Schema > Tools used in BRGM

- Constellation
- GeoServer
- deegree
## WFS App Schema > Current uses cases

<table>
<thead>
<tr>
<th>Data type</th>
<th>Model</th>
<th>BRGM associated project</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geologic units, faults and boreholes</td>
<td>INSPIRE Geology + GeoSciML v4</td>
<td>EPOS / EGDI</td>
<td>x</td>
</tr>
<tr>
<td>Water level piezometers</td>
<td>INSPIRE Environmental Monitoring Facility &amp; Network</td>
<td>Pôle INSIDE</td>
<td>x</td>
</tr>
<tr>
<td>Shoreline</td>
<td>INSPIRE Sea Region</td>
<td>EnergicOD</td>
<td>x</td>
</tr>
<tr>
<td>Aquifer units</td>
<td>GroundWaterML v2</td>
<td>Pôle INSIDE</td>
<td>x, POC</td>
</tr>
<tr>
<td>Mineral resources</td>
<td>EarthResourceML</td>
<td>Minerals4EU</td>
<td>x, POC</td>
</tr>
</tbody>
</table>
WFS App Schema > Subjective feedback

> **No totally satisfying implementation**

• Constellation
  — Difficult to configure and to update

• Deegree
  — Database structure must be close to diffusion schema
  — Filtering issues emphasized in 2015 (see Deegree Github)

• GeoServer
  — Still some bugs (e.g. ERML: IsMultipleIsTrue > data duplication)
  — Configuration of App Schema is tricky
  — Performances issues on complex features (all data are loaded by JAVA)

> **Positive aspect**

• GetFeatureById works
• Should we define stored queries and forbid other filter combinations?
WFS App Schema > Main conclusion & perspectives

Can we team up to finance necessary evolution?
SOS > Feedback from SOS implementation

> Topics of discussion during the implementation
  • Which SOS solution to deploy?
  • How to map to preexisting (non O&M compliant) databases?
  • How to design the rawobservation database?
  • How to link features to observations (at service level)?

> Choices:
  • 52 North solution
  • Raw observation schema database very close to O&M schema
    — Use of materialized views to bridge to raw database
  • One webapp is set up per use case
## SOS > Current use cases

<table>
<thead>
<tr>
<th>Data type</th>
<th>Profile</th>
<th>BRGM associated project</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater levels (raw observations)</td>
<td>INSPIRE PointTimeSeriesObs°</td>
<td>Pôle INSIDE</td>
<td>X</td>
</tr>
<tr>
<td>Groundwater levels (validated data)</td>
<td>INSPIRE PointTimeSeriesObs°</td>
<td>Pôle INSIDE</td>
<td>WIP</td>
</tr>
<tr>
<td>Groundwater quality (validated data)</td>
<td>Under discussion</td>
<td>Pôle INSIDE</td>
<td>Specified</td>
</tr>
<tr>
<td>Borehole logs</td>
<td>GWML2 (GeologyLogCoverage)</td>
<td>EPOS</td>
<td>Specified</td>
</tr>
<tr>
<td>Geothermy properties</td>
<td>INSPIRE PointTimeSeriesObs°</td>
<td>BRGM ADEME platform</td>
<td>WIP</td>
</tr>
<tr>
<td>Coastline erosion observation (CitizenScience)</td>
<td>Under discussion</td>
<td>EnergicOD</td>
<td>Under discussion</td>
</tr>
</tbody>
</table>
SOS > Focus on Groundwater RawData Levels

Some examples:

- Latest GroundWaterLevel observation from one piezometer:
SOS > Positive feedback

> It’s worth the effort!
  - Lot of reuse (websites, QGIS client plugin)
  - Our domain colleagues are happy!

Now I have a taste of INSPIRE!
Identifiers and resolvers
URIs to link data

> Objectives

- To provide stable and resolvable links to resources
- To allow reference / data citation
- Independant from underlying technologies used to provide data

I am #EntiteHydroGeol/107AK01
I am monitored by #Piezometre/00634X0147/PZ1.2
I have a lot of #GroundWater Levels observations regarding #EntiteHydroGeol/107AK01
URIs > Groundwater Levels use case: model view

Legend:
- Feature(s)
- Observation(s)
URIs > Groundwater Levels use case: service view

Legend:
- Feature(s)
- Observation(s)
URI > Implementation

> Topics of discussion
  - Identifier nomenclature (language, pluralism, separators)
  - When should we define specific identifiers?
    - Different representations of the same resource
    - Data versions
    - Data granularity

> Choice
    - ./data for data objects (e.g. geologic units, piezometers, …)
    - ./obs for observations (e.g. groundwater levels, …)
    - ./vocabs for controled vocabularies (e.g. groundwater sampling for quality analysis, …)
    - ./services for web services endpoint
  - POC Apache rewritting rules
URIs > Some examples of identifiers and resolvers

http://ressource.brgm-rec.fr/data/EntiteHydroGeol/107AK01

Rewrite in proxy mode


> Other examples:

• One piezometer: http://ressource.brgm-rec.fr/data/Piezometre/00634X0147/PZ1.2
• One GroundWaterLevel offering: http://ressource.brgm-rec.fr/obs/RawOfferingPiezo/00463X0036/H1.2&responseFormat=http://www.opengis.net/waterml/2.0
User interfaces
User interface

> Objectives
  • Enhance INSPIRE services readability
  • Emphasizes data connectivity
  • Break the No client <-> No data loop

> QGIS GML Application Schema Toolbox
  • Funded by BRGM and developed by Oslandia
  • Available for download on QGIS plugin store
  • Developed for QGIS v2.14+
Teaser to Wednesday 28th presentation

XML Mode (WFS)
Teaser to Wednesday 28th presentation

> XML Mode (SOS)
Teaser to Wednesday 28th presentation

> Relational mode
Conclusion
In a (coco)nutshell

> **Very encouraging points:**
> - WFS & SOS enable to provide data for basic usage
> - Identifiers and resolvers enable to link data
> - QGIS plugin increase data consumption pleasure
> - Domain colleagues can now taste INSPIRE (SOS)!

> **Challenges to overcome:**
> - Configuration of WFS App Schema is not really accessible
> - SOS implementation need one instance per use case
> - Scalability and performances must be enhanced to reach production mode

> **Can we can team up to finance it?**
Cheers!

m.beaufils@brgm.fr