Implementing INSPIRE WFS and SOS for geoscience data: the technological cocktail to quench the user’s thirst for data
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To cite this version:
Mickaël Beaufils, Sylvain Grellet, François Tertre. Implementing INSPIRE WFS and SOS for geoscience data: the technological cocktail to quench the user’s thirst for data. INSPIRE 2016 Conference, Sep 2016, Barcelone, Spain. hal-01371864

HAL Id: hal-01371864
https://hal-brgm.archives-ouvertes.fr/hal-01371864
Submitted on 6 Oct 2016

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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
1. WFS App Schema

2. SOS

3. Identifier & resolver

4. User interface
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

degree
## 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>INSPRE 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>POC</td>
</tr>
<tr>
<td>Mineral resources</td>
<td>EarthResourceML</td>
<td>Minerals4EU</td>
<td>x</td>
</tr>
</tbody>
</table>

**Implementations:**
- constellation
- deegree
- GeoServer
- POC
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
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 raw observation 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)**
> 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 rewriting 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
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 28\textsuperscript{th} presentation

\textbf{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?**