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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

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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



Geoscience for a sustainable Earth

brgm

BRGM on the rocks © cocktail



4. *User interface*

3. *Identifier & resolver*

2. *SOS*

1. *WFS App Schema*

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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**

**Performance
and scalability**

Tool installation




**Update
and maintainability**

Database modelling

WFS App Schema > Tools used in BRGM



WFS App Schema > Current uses cases

Data type	Model	BRGM associated project	Implementations		
					
Geologic units, faults and boreholes	INSPIRE Geology + GeoSciML v4	EPOS / EGDI			X
Water level piezometers	INSPIRE Environmental Monitoring Facility & Network	Pôle INSIDE			X
Shoreline	INSPIRE Sea Region	EnergicOD			X
Aquifer units	GroundWaterML v2	Pôle INSIDE	X		POC
Mineral resources	EarthResourceML	Minerals4EU		X	POC

WFS App Schema > Subjective feedback

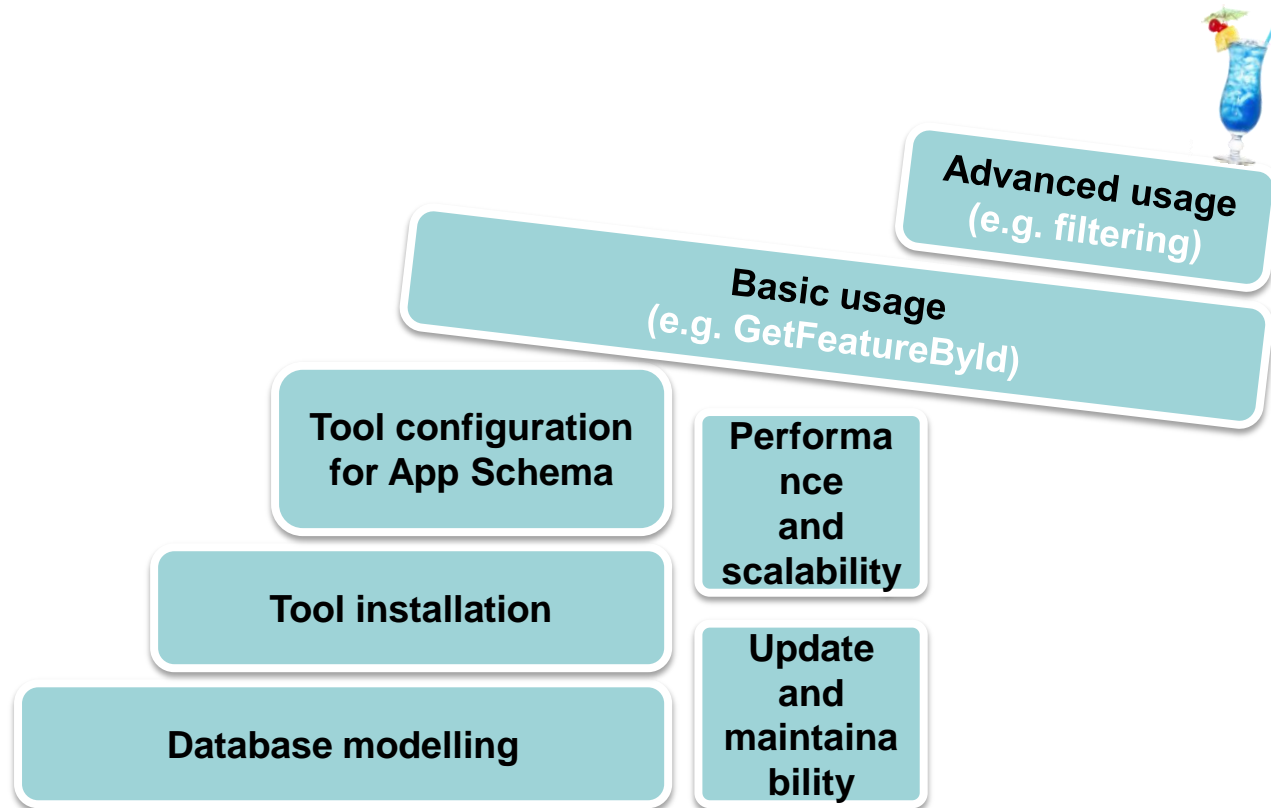
> No totally satisfying implementation

- 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

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

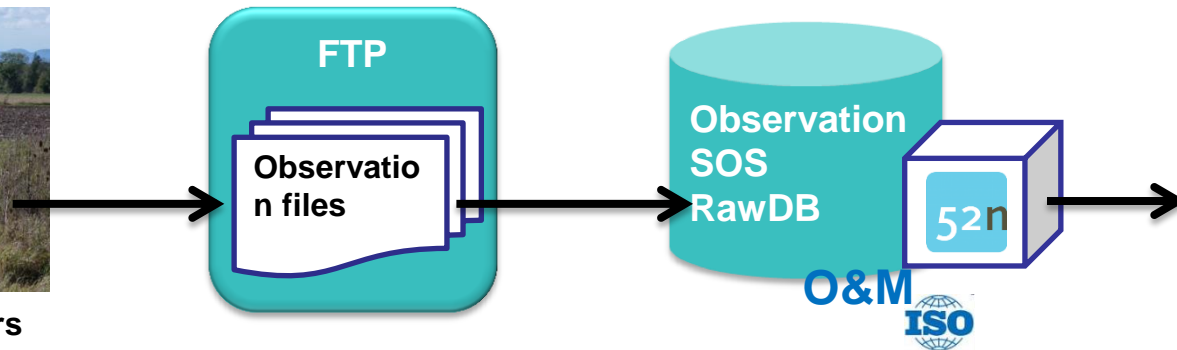
SOS > Current use cases

Data type	Profile	BRGM associated project	Status
Groundwater levels (raw observations)	INSPIRE PointTimeSeriesObs°	Pôle INSIDE	X
Groundwater levels (validated data)	INSPIRE PointTimeSeriesObs°	Pôle INSIDE	WIP
Groundwater quality (validated data)	Under discussion	Pôle INSIDE	Specified
Borehole logs	GWML2 (GeologyLogCoverage)	EPOS	Specified
Geothermy properties	INSPIRE PointTimeSeriesObs°	BRGM ADEME platform	WIP
Coastline erosion observation (CitizenScience)	Under discussion	EnergicOD	Under discussion

SOS > Focus on Groundwater RawData Levels



GPRS Piezometers



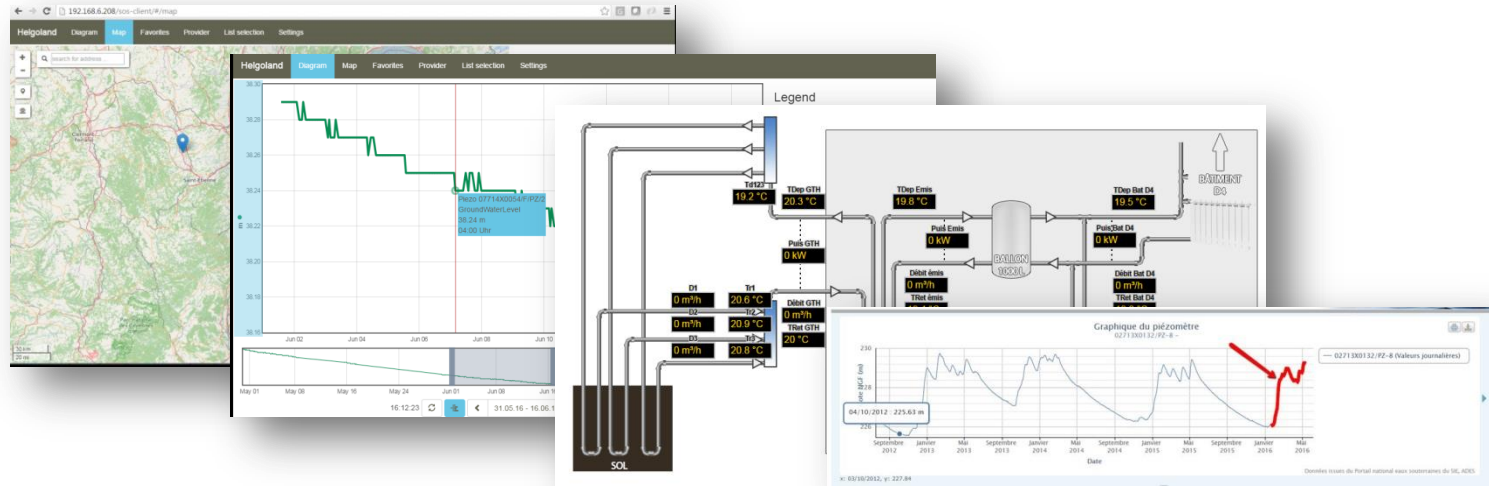
> Some examples:

- Latest GroundWaterLevel observation from one piezometer:
 - WaterML 2.0 format: <http://ressource.brgm-rec.fr/obs/RawOfferingPiezo/00463X0036/H1.2&responseFormat=http://www.opengis.net/waterml/2.0&temporalFilter=om%3AphenomenonTime%2Clatest>
 - JSON format: <http://ressource.brgm-rec.fr/obs/RawOfferingPiezo/00463X0036/H1.2&responseFormat=application/json&temporalFilter=om%3AphenomenonTime%2Clatest>

SOS > Positive feedback

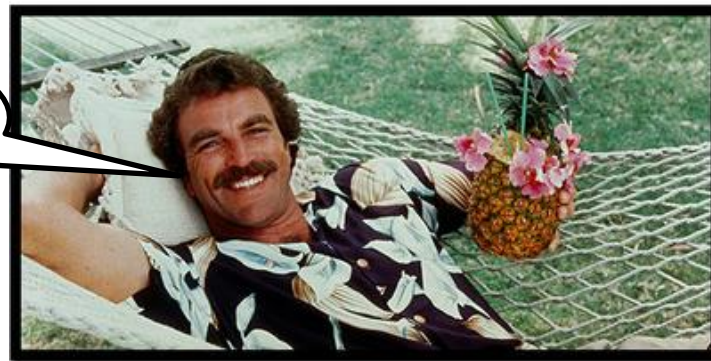
> It's worth the effort!

- 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

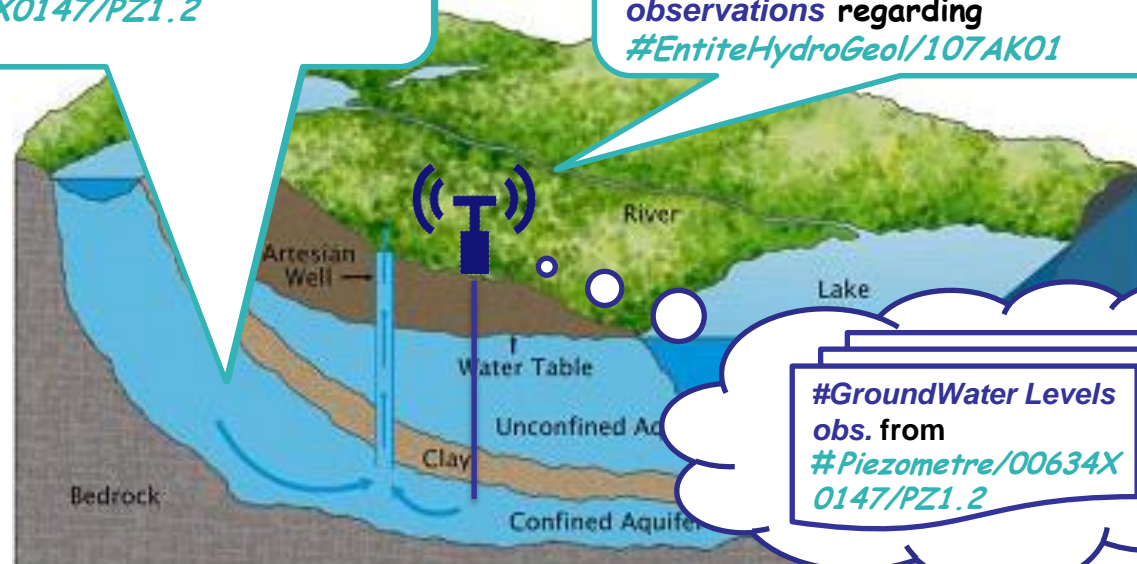
- To provide stable and resolvable links to resources
- To allow reference / data citation
- Independant from underlying technologies used to provide data

I am [#EntiteHydroGeol/107AK01](#)

I am monitored by
[#Piezometre/00634X0147/PZ1.2](#)

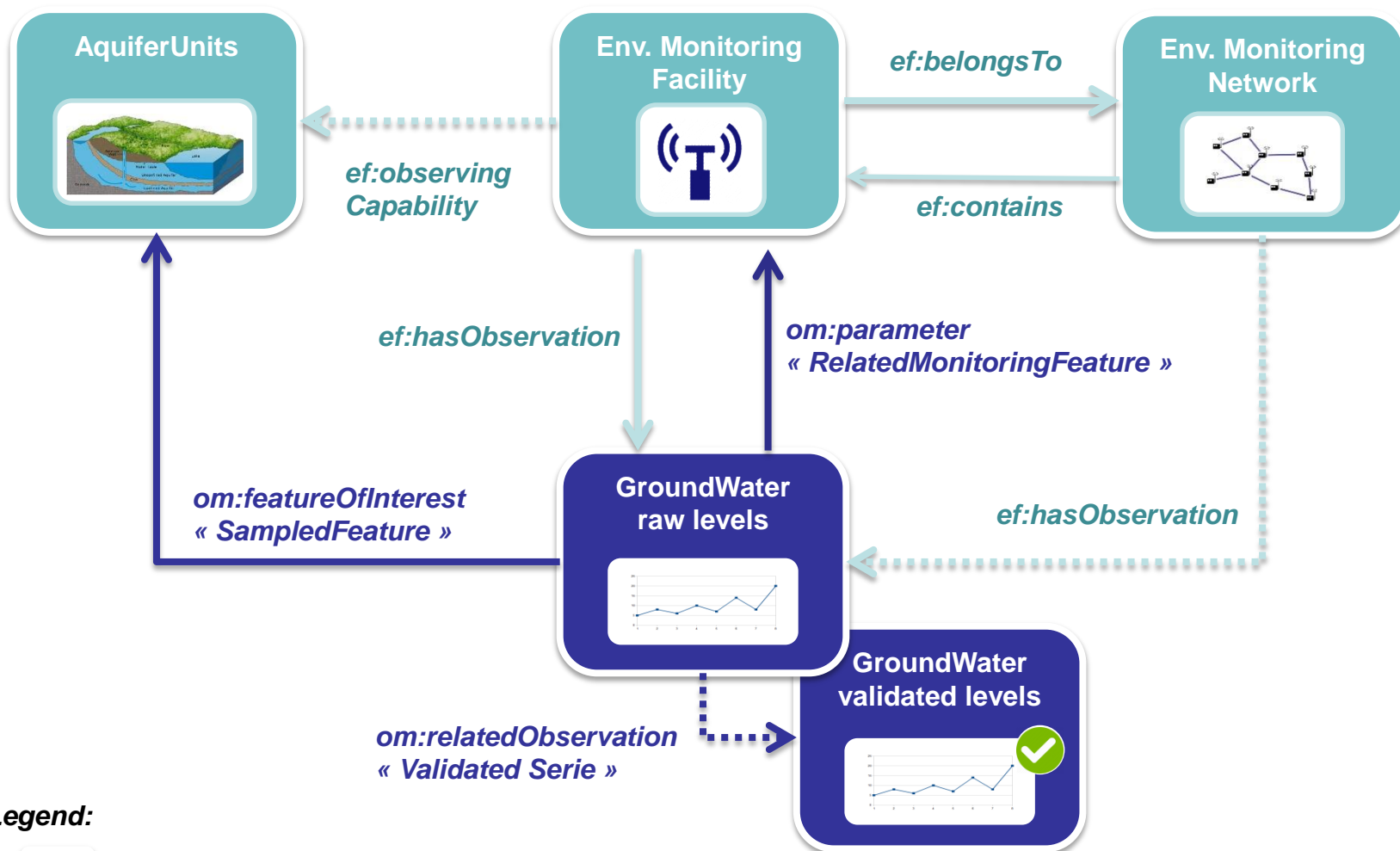
I am [#Piezometre/00634X0147/PZ1.2](#)

I have a lot of [#GroundWater Levels](#)
[observations](#) regarding
[#EntiteHydroGeol/107AK01](#)





[#GroundWater Levels](#)
[obs. from](#)
[#Piezometre/00634X](#)
[0147/PZ1.2](#)

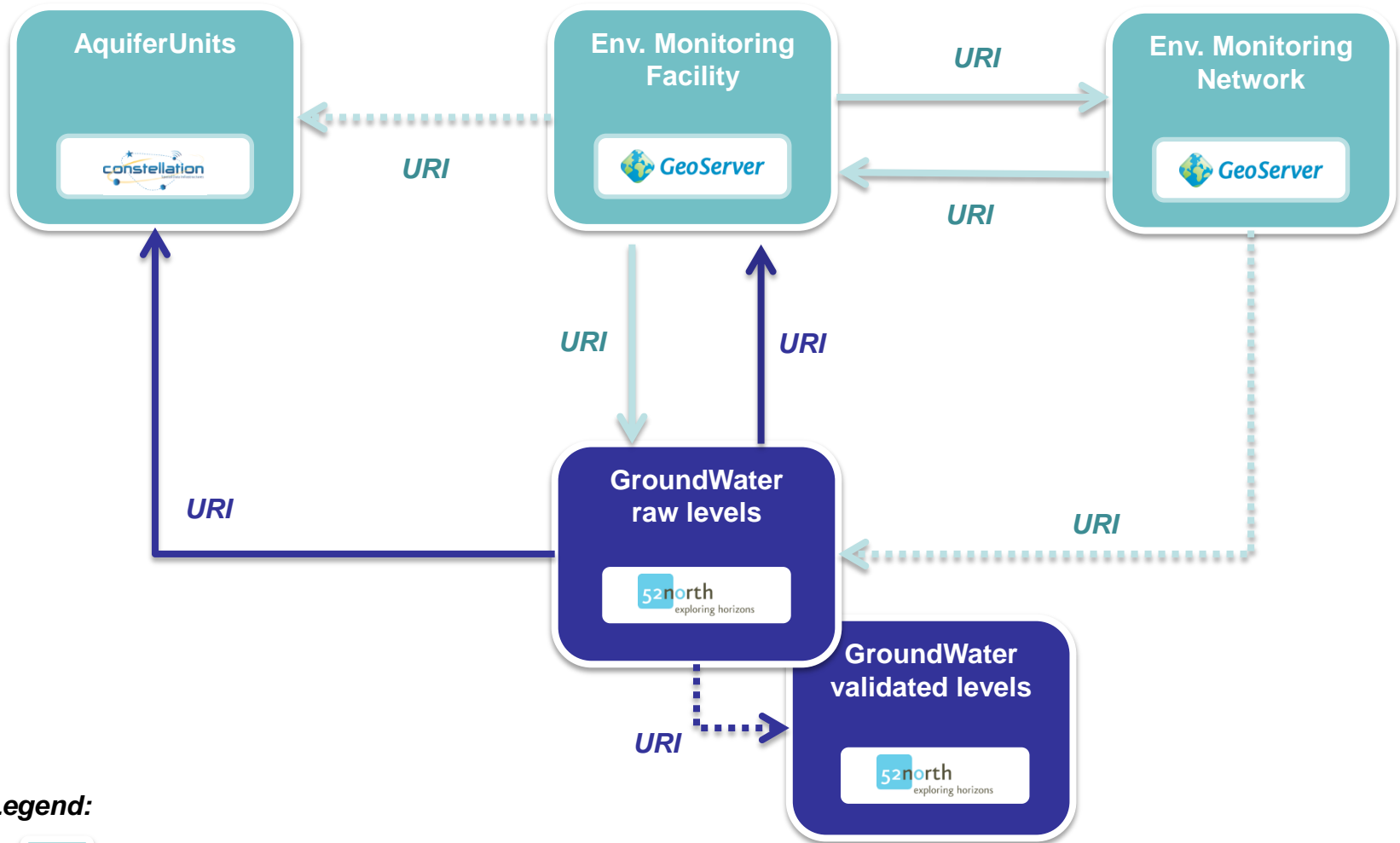
URIs > Groundwater Levels use case: model view





Legend:

-  Feature(s)
-  Observation(s)

URIs > Groundwater Levels use case: service view



Legend:

-  Feature(s)
-  Observation(s)

URIs > 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

- <http://ressource.brgm-rec.fr/> to centralize BRGM data resources
 - **./data** for data objects (e.g. geologic units, piezometers, ...)
 - **./obs** for observations (e.g. groundwater levels, ...)
 - **./vocabs** for controlled 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

http://gwml2poc.brgm-rec.fr/WS/wfs/BRGM:GWML2?service=WFS&version=2.0.0&request=GetFeature&typeName=gwml-main:GW_Aquifer&storedQuery_Id=urn:ogc:def:query:OGC-WFS::GetFeatureById&id=EntiteHydroGeol.107AK01

> 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

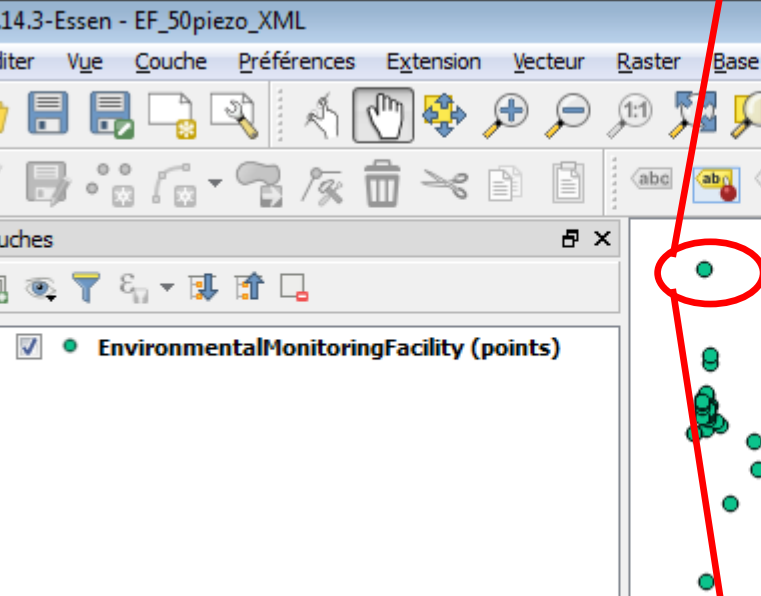
> QGIS GML Application Schema Toolbox



- Funded by BRGM and developed by Oslandia
- Available for download on QGIS plugin store
- Developed for QGIS v2.14 +

Teaser to Wednesday

> XML Mode (W)



Feature Identification

id <http://ressource.brgm.fr/data/Piezometre/1.01418X0001/F>

Element	Value
@gml:id	Piezometre.1.01418X0001-F
gml:description	Water well from national BSS (Banque du Sous-Sol) Data database. Piezometer monitoring ground water level
gml:identifier	http://ressource.brgm.fr/data/Piezometre/1.01418X0001/F
@codeSpace	http://www.ietf.org/rfc/rfc2616
ef:inspireId	
base:Identifier	
base:localId	1.01418X0001/F
base:namespace	http://ressource.brgm.fr/data/Piezometre/
base:versionId	
ef:name	Grès du Trias inférieur (GTI) à WALDHOUSE
ef:additionalDescription	
ef:mediaMonitored	
@xlink:href	http://inspire.ec.europa.eu/codelist/MediaValue/water
@xlink:title	water
ef:legalBackground	
ef:geometry	
gml:Point	
@srsName	urn:ogc:def:crs:EPSG:4326
@gml:id	Piezometre.geom.1.01418X0001-F
@srsDimension	2
gml:pos	49.1457899460854 7.46857315544213
ef:onlineResource	http://fichebseau.brgm.fr/bss_eau/fiche.jsf?code=01418X0001/F
ef:purpose	
@xlink:href	http://www.sandre.eaufrance.fr/Purn=urn:sandre:donnees:148::CdElement:2::referentiel:3:1.xml
@xlink:title	Mesure quantité (piézométrie)
ef:observingCapability	
ef:broader	
ef:supersedes	
ef:supersededBy	
ef:reportedTo	
@nilReason	unpopulated
@xsi:nil	true
ef:hasObservation	
@xlink:href	http://ressource.brgm.fr/obs/ChroniquePiezometrique/xxx
@xlink:title	ChroniquePiézométrique xxx
ef:involvedIn	
ef:representativePoint	
gml:Point	
@srsName	urn:ogc:def:crs:EPSG:4326
@gml:id	Piezometre.geom.1.01418X0001-F
@srsDimension	2
gml:pos	49.1457899460854 7.46857315544213

ef:name Grès du Trias inférieur (GTI) à WALDHOUSE

ef:additionalDescription

ef:mediaMonitored

 @xlink:href <http://inspire.ec.europa.eu/codelist/MediaValue/water>

 @xlink:title

ef:legalBackground

ef:geometry

 gml:Point

 @srsName urn:ogc:def:crs:EPSG:4326

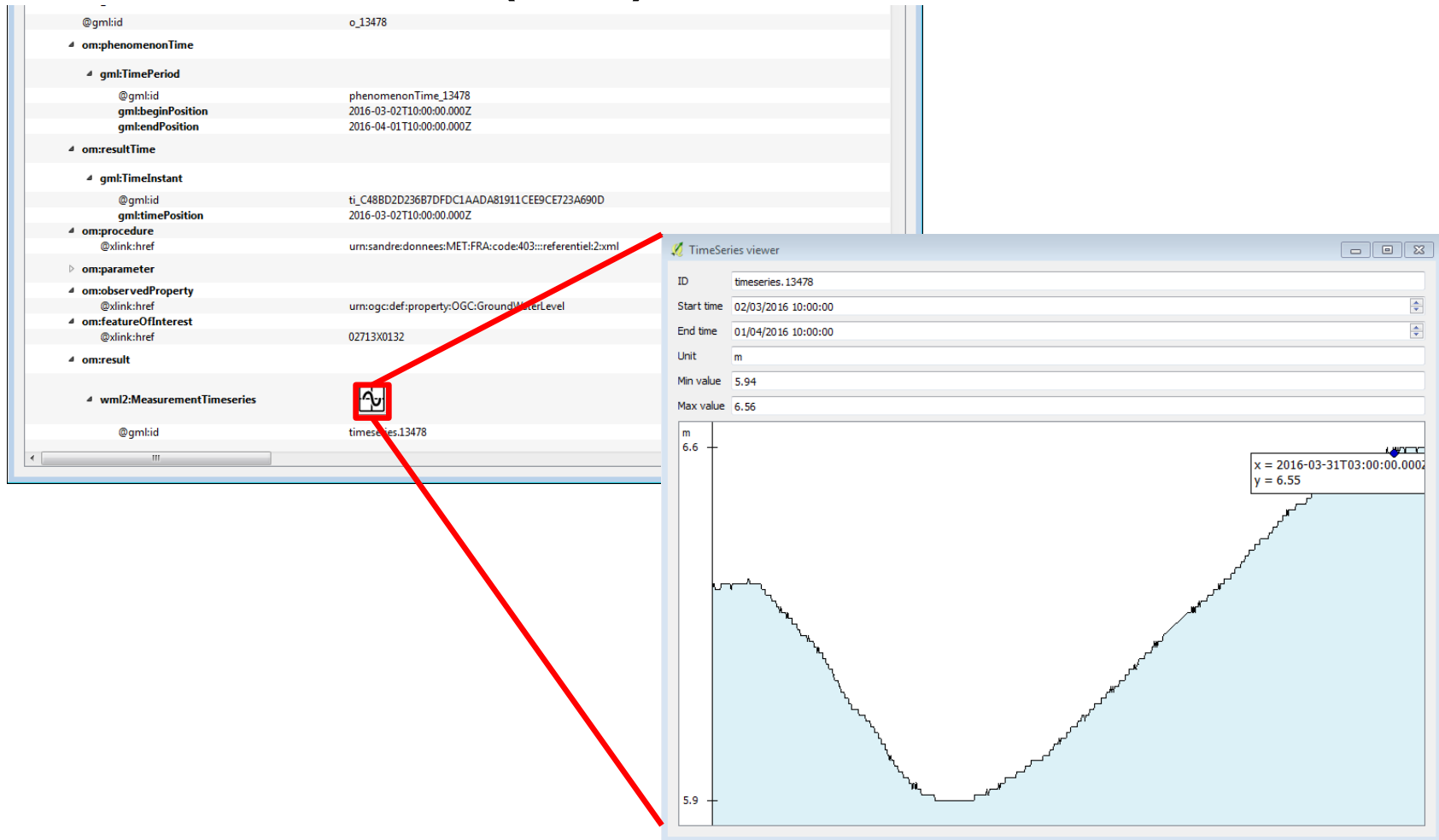
 @gml:id Piezometre.geom.1.01418X0001-F

 @srsDimension 2

- Copy value
- Copy XPath
- Resolve external
 - Embedded
 - As a new layer
 - Add to layer
 - EnvironmentalMonitoring

Teaser to Wednesday 28th presentation

> XML Mode (SOS)



Teaser to Wednesday 28th presentation

> Relational mode

Attribute editor layout: Drag and drop designer Python Init function

Fields

Id	Name	Edit widget	Alias	Type
123 7	mobile	Text Edit		qlonglor
abc 8	specialisedEMFType_href	Text Edit		QString
abc 9	identifier	Text Edit		QString
abc 10	inspireId_Identifier_localId	Text Edit		QString
123 11	geometry_Point_id	Relation Reference		qlonglor
123 12	representativePoint_Point_id	Relation Reference		qlonglor

Relations

Name	Layer	Field
EnvironmentalMonitoringFacility_belongsTo	EnvironmentalM...	Environn
EnvironmentalMonitoringFacility_hasObservation	EnvironmentalM...	Environn
EnvironmentalMonitoringFacility_involvedIn	EnvironmentalM...	Environn
EnvironmentalMonitoringFacility_legalBackground	EnvironmentalM...	Environn
EnvironmentalMonitoringFacility_mediaMonitored	EnvironmentalM...	Environn
EnvironmentalMonitoringFacility_name	EnvironmentalM...	Environn

Label

Columns

- measurementRegime_title
- measurementRegime_href
- id
- identifier_codeSpace
- description
- inspireId_Identifier_namespace
- specialisedEMFType_title
- mobile
- specialisedEMFType_href
- identifier
- inspireId_Identifier_localId
- geometry_Point_id
- representativePoint_Point_id

1:N Links

- EnvironmentalMonitoringFacility_operationalActivityPeriod
- EnvironmentalMonitoringFacility_relatedTo
- EnvironmentalMonitoringFacility_supersededBy
- EnvironmentalMonitoringFacility_involvedIn
- EnvironmentalMonitoringFacility_resultAcquisitionSource
- EnvironmentalMonitoringFacility_legalBackground
- EnvironmentalMonitoringFacility_belongsTo
- EnvironmentalMonitoringFacility_observingCapability
- EnvironmentalMonitoringFacility_reportedTo
- EnvironmentalMonitoringFacility_purpose
- EnvironmentalMonitoringFacility_name
- EnvironmentalMonitoringFacility_mediaMonitored

Suppress attribute form pop-up after feature creation Default

Help Style Apply Cancel OK

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

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