

Implementing INSPIRE: the BRGM road trip INSPIRE Conference

Mickaël Beaufils, Sylvain Grellet

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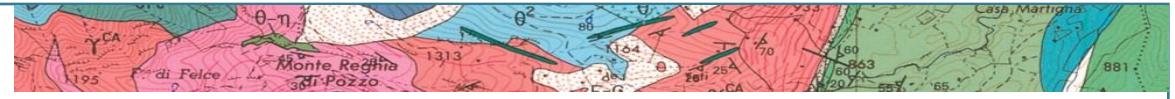
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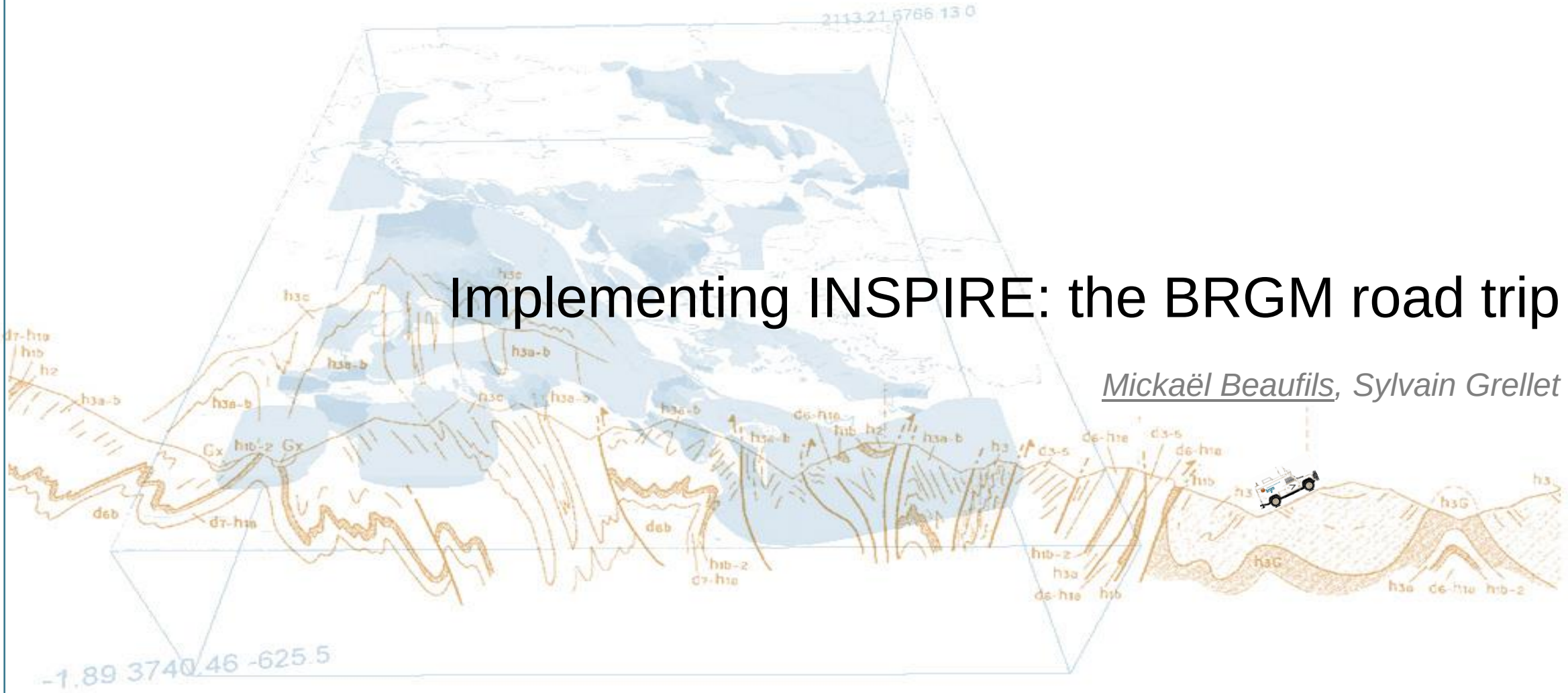
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Implementing INSPIRE: the BRGM road trip

Mickaël Beaufils, Sylvain Grellet



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INSPIRE Conference

Strasbourg, Wednesday September 6th, 2017

BRGM in one slide

Geoscience for a sustainable Earth

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- French Geological Survey
- 1000 people in 5 main departements: water, georessources, natural risks assessment, laboratories & IT
- An active contributor for interoperability in the geosciences



OGC®
Making location count.

INSPIRE Infrastructure for Spatial Information in Europe

ONE Geology



EGDI

Main use case: understanding the subsurface

Legend: Features Observations

Real world

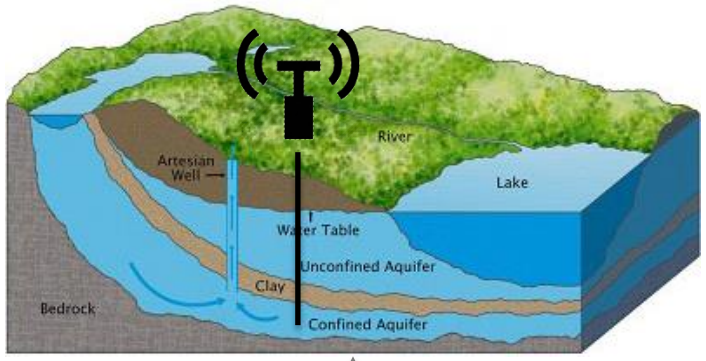
Modeled world

Gathering evidence

- Field observations
- Borehole logs
- GeoRessource (water, ore,…)
- Geophysics Measurements
- …

Human actions

- Observation Campaign
- Boreholes
- Env. Monitoring Facilities
- …



- Geologic Units
- Aquifers
- Geologic Structures
- Hazard areas
- Geomorphologic Features
- …

Interpretation

- Models

?

Predictions

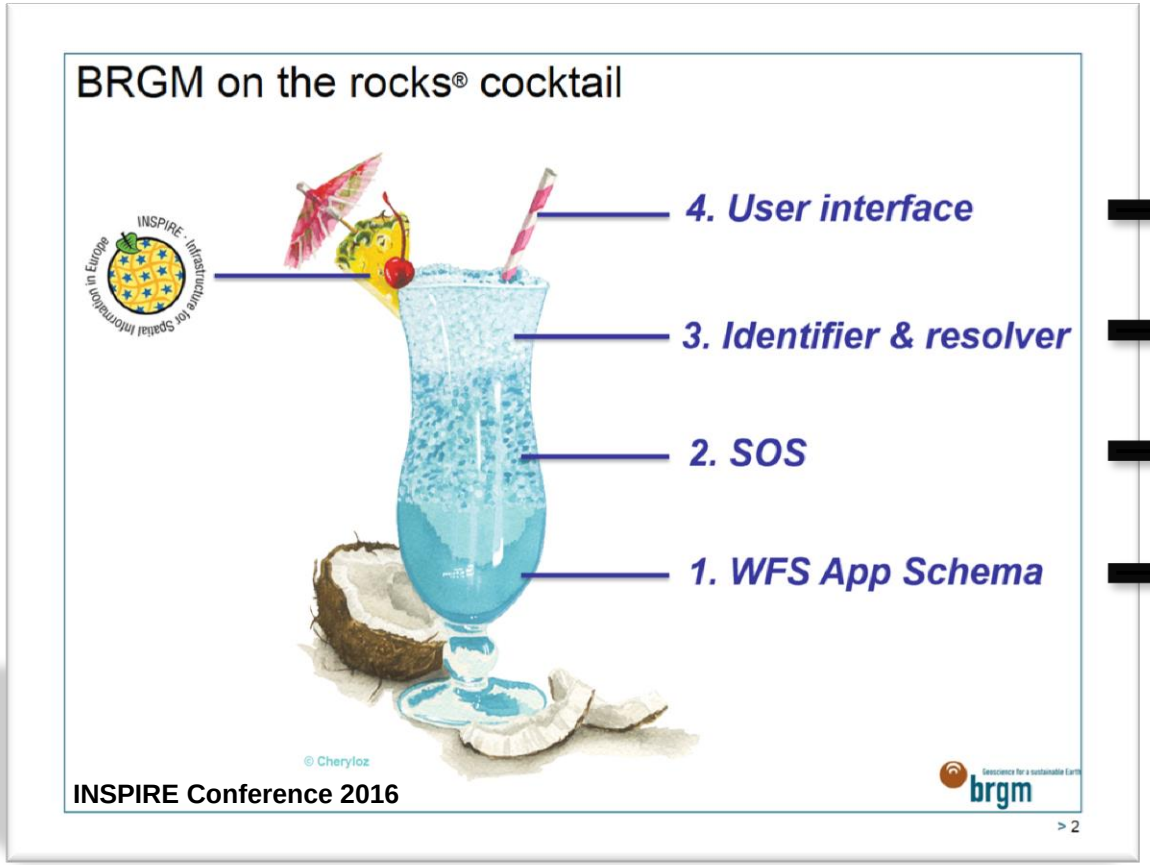
- Spatial representations (virtual logs, maps, …)
- Expected evolution (extrapolation)



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An Information System to fulfill that use case

- Serving data through interoperable web services (in conformance with INSPIRE)
- Linking data through derefferencable persistent identifiers
- Providing tools to work with those data

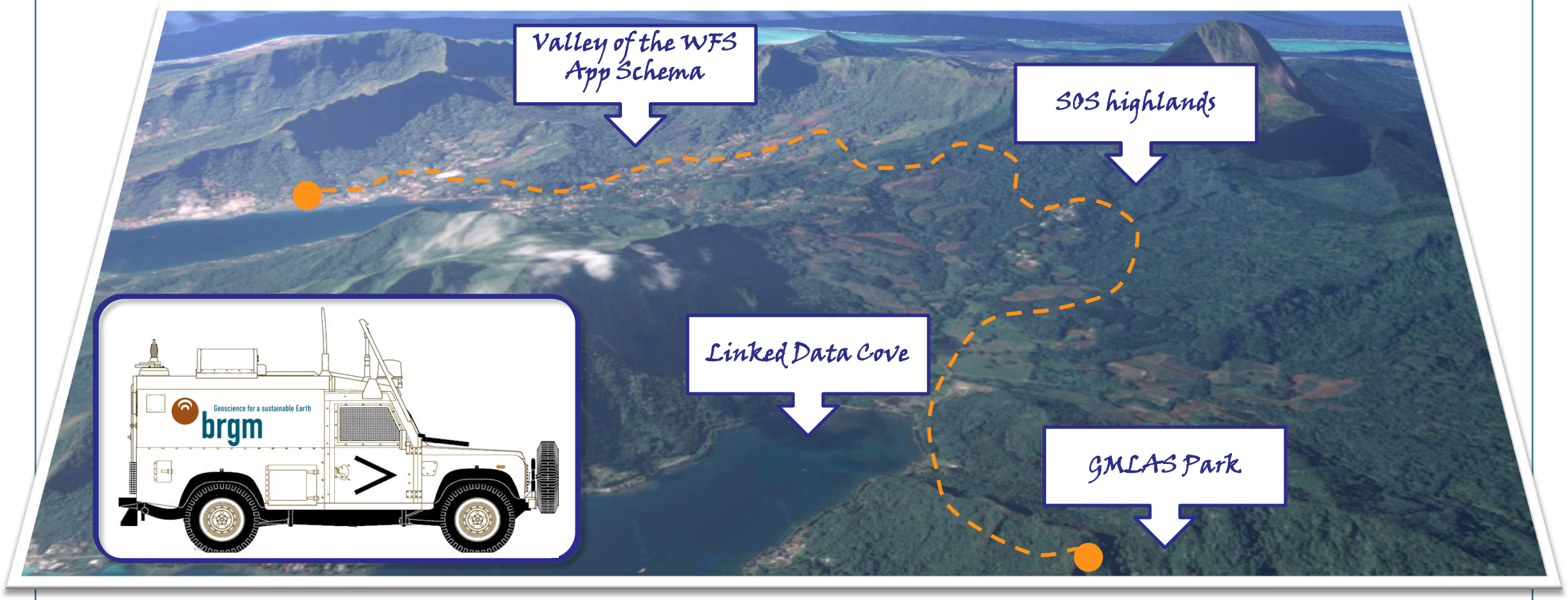


GDAL/QGIS GMLAS

Observations

Features

Roadmap of the trip



WFS App Schema to provide features

> Implementation

- Decision to use GeoServer and its AppSchema extension and to contribute to its enhancement

> Feedback

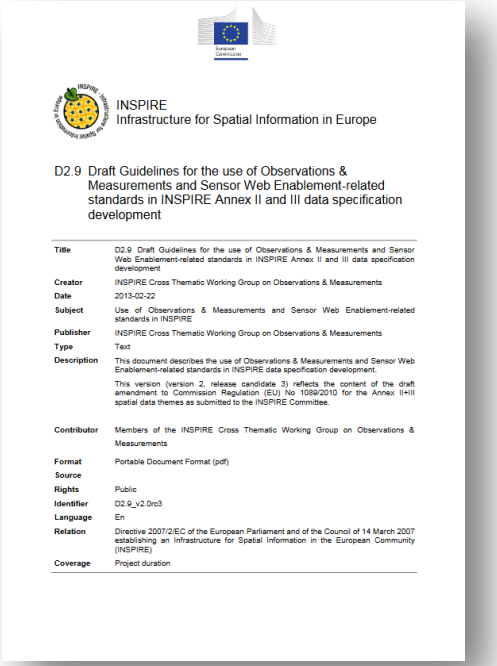
- AppSchema configuration is tricky
  - Diffusion of « HowTo » for Borehole abstract description in EPOS-IP H2020 Project
- GetFeatureByID is OK
  - But what is needed is a GetFeatureByIdentifier
- GetFeatures with filters is not satisfying
  - Very long response time (when not crashing)
- Performance issues
  - with on the fly mapping (eg. CONCAT)

    Workaround: specific tables are set for WFS AppSchema (however this is data duplication)
  - when serving millions of instances

    Workaround: currently planning to finance a connection to SolR index

SOS to provide O&M

- BRGM is editor of « D2.9 Guidelines for the uses of O&M + SWE in INSPIRE »


INSPIRE
Infrastructure for Spatial Information in Europe

D2.9 Draft Guidelines for the use of Observations & Measurements and Sensor Web Enablement-related standards in INSPIRE Annex II and III data specification development

Title	D2.9 Draft Guidelines for the use of Observations & Measurements and Sensor Web Enablement-related standards in INSPIRE Annex II and III data specification development
Creator	INSPIRE Cross Thematic Working Group on Observations & Measurements
Date	2013-02-22
Subject	Use of Observations & Measurements and Sensor Web Enablement-related standards in INSPIRE
Publisher	INSPIRE Cross Thematic Working Group on Observations & Measurements
Type	Text
Description	This document describes the use of Observations & Measurements and Sensor Web Enablement-related standards in INSPIRE data specification development. This version (version 2, release candidate 3) reflects the content of the draft amendment to Commission Regulation (EU) No 1089/2010 for the Annex II+III spatial data themes as submitted to the INSPIRE Committee.
Contributor	Members of the INSPIRE Cross Thematic Working Group on Observations & Measurements
Format	Portable Document Format (pdf)
Source	
Rights	Public
Identifier	D2.9_v2.0rc3
Language	En
Relation	Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)
Coverage	Project duration

- Implementation
  - Based on 52°North solution (with specific developments)
  - One webapp is deployed per observation property (groundwater levels, geologic logs, …)

- Feedback
  - 52°North solution has its own database schema
    - Data duplication from raw data base (yet MaterializedViews)
  - User feedback: Limitations with filters
    - Filter on result is not yet possible according of OGC specs (eg. GetBoreholeLogs that cross that lithology)
  - Reusing the REST API and JSON encoding for lot of applications

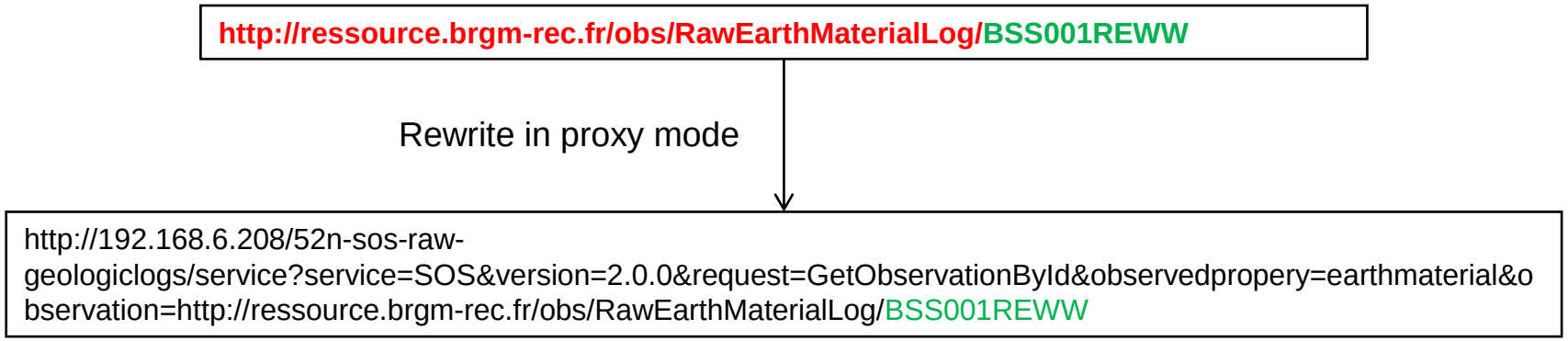
52north exploring horizons

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Identifiers and Linked Data

> Rationale

- Persistant identifiers on observation and domain features are the glue in an interoperable system
- Core idea is to put a URI as a first class element instead of the OGC getFeature/getObservation request



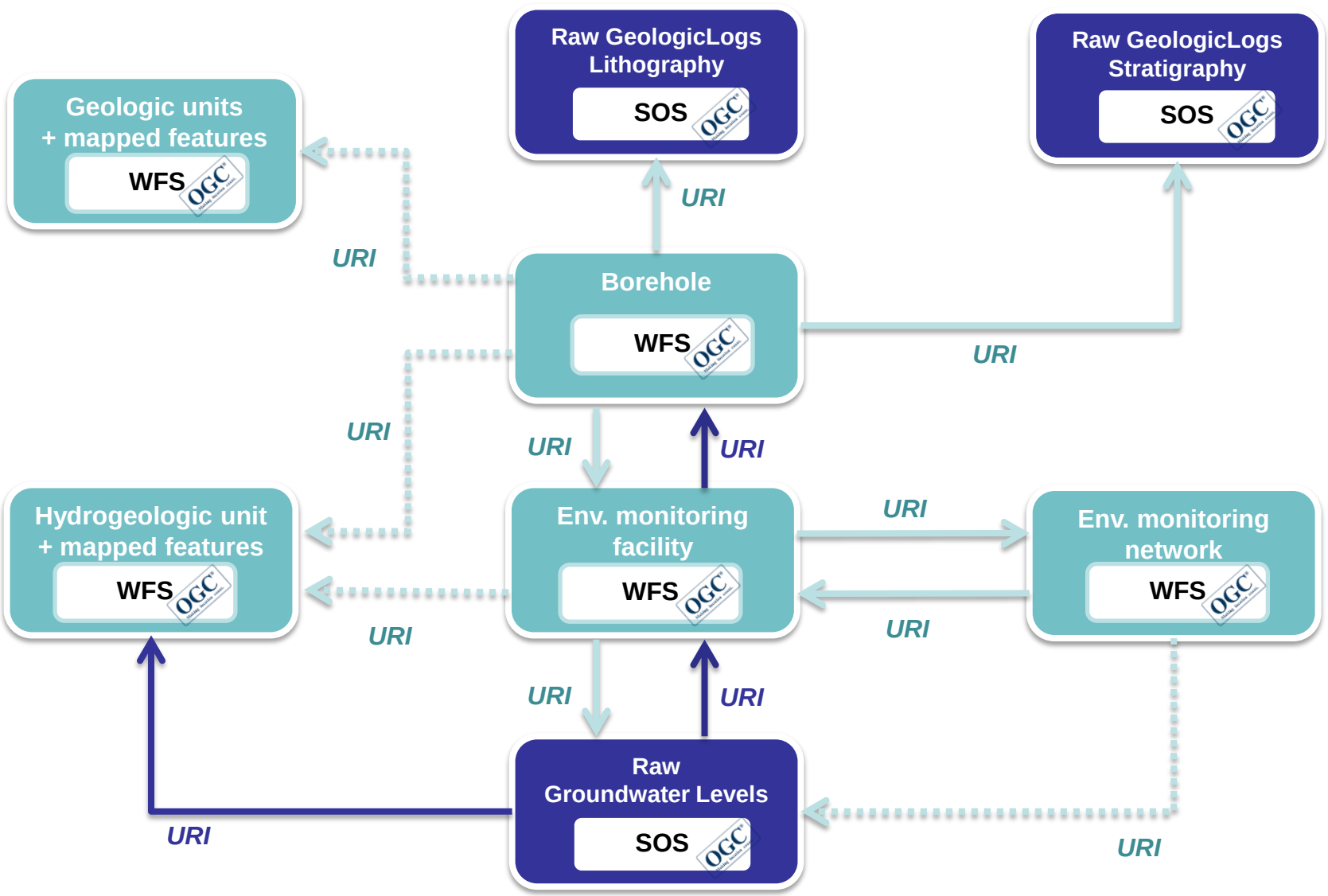
- This is too often overlooked in INSPIRE discussions (should resolve vs shall) !

> Implementation

- Apache mod_rewrite : to « translate » the URI in the OGC service requests

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BRGM data services (v2017)



GML Application Schema suite

> Funded by BRGM and European Environment Agency (Copernicus)

> GMLAS: the converter

- As part of GDAL
- Offer converting functionnalities developped to handle Complex Features
- (e.g. Convert GML App Schema files in PostGIS and SQLite format)

GMLAS

> GMLAS Toolbox: the client

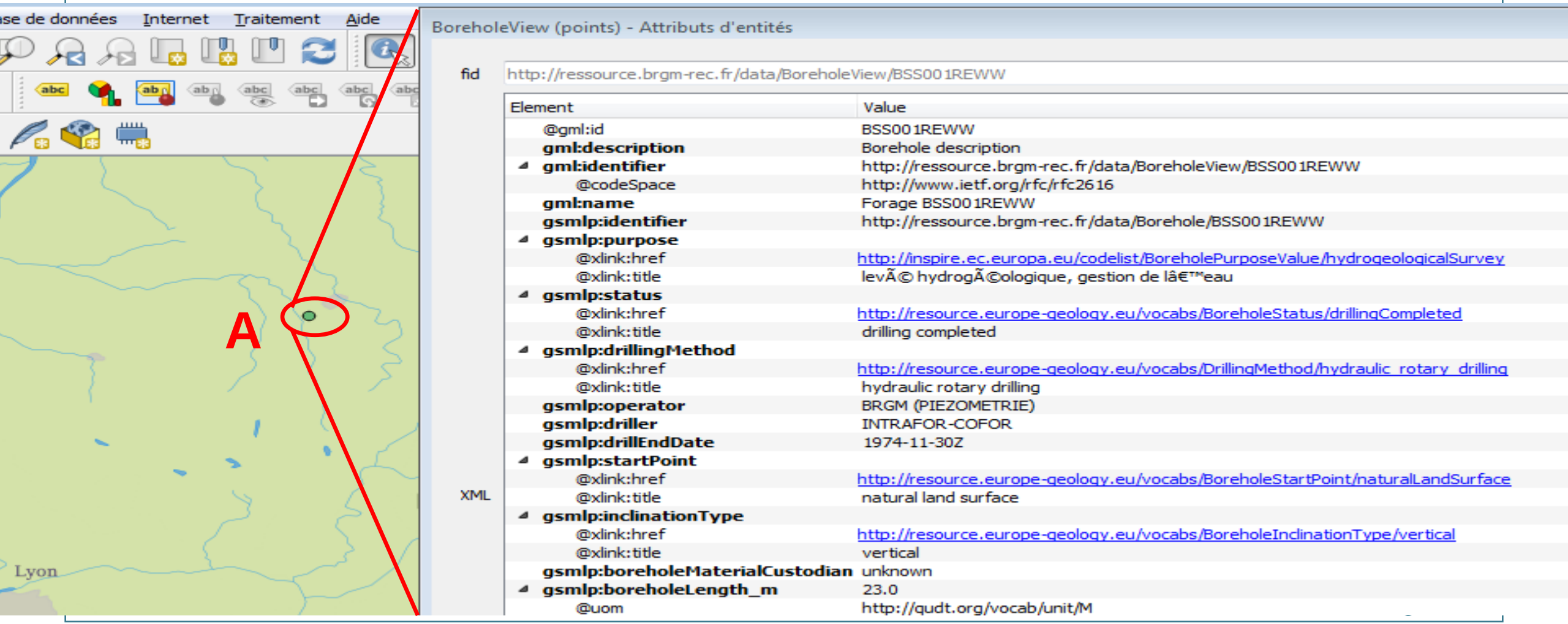
- A plugin for QGIS
- Available for testing through OSGEO4W (AdvancedInstall/qgis-dev 2.99)
- Github : https://github.com/BRGM/gml_application_schema_toolbox

GMLAS toobox

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QGIS GML Application Schema Toolbox

Borehole



Element	Value
@gml:id	BSS001REWW
gml:description	Borehole description
gml:identifier	http://ressource.brgm-rec.fr/data/BoreholeView/BSS001REWW
@codeSpace	http://www.ietf.org/rfc/rfc2616
gml:name	Forage BSS001REWW
gsmlp:identifier	http://ressource.brgm-rec.fr/data/Borehole/BSS001REWW
gsmlp:purpose	
@xlink:href	http://inspire.ec.europa.eu/codelist/BoreholePurposeValue/hydrogeologicalSurvey
@xlink:title	levÃ© hydrogÃ©ologique, gestion de lâ€™eau
gsmlp:status	
@xlink:href	http://resource.europe-geology.eu/vocabs/BoreholeStatus/drillingCompleted
@xlink:title	drilling completed
gsmlp:drillingMethod	
@xlink:href	http://resource.europe-geology.eu/vocabs/DrillingMethod/hydraulic_rotary_drilling
@xlink:title	hydraulic rotary drilling
gsmlp:operator	BRGM (PIEZOMETRIE)
gsmlp:driller	INTRAFOR-COFOR
gsmlp:drillEndDate	1974-11-30Z
gsmlp:startPoint	
@xlink:href	http://resource.europe-geology.eu/vocabs/BoreholeStartPoint/naturalLandSurface
@xlink:title	natural land surface
gsmlp:inclinationType	
@xlink:href	http://resource.europe-geology.eu/vocabs/BoreholeInclinationType/vertical
@xlink:title	vertical
gsmlp:boreholeMaterialCustodian	unknown
gsmlp:boreholeLength_m	23.0
@uom	http://qudt.org/vocab/unit/M

QGIS GML Application Schema Toolbox

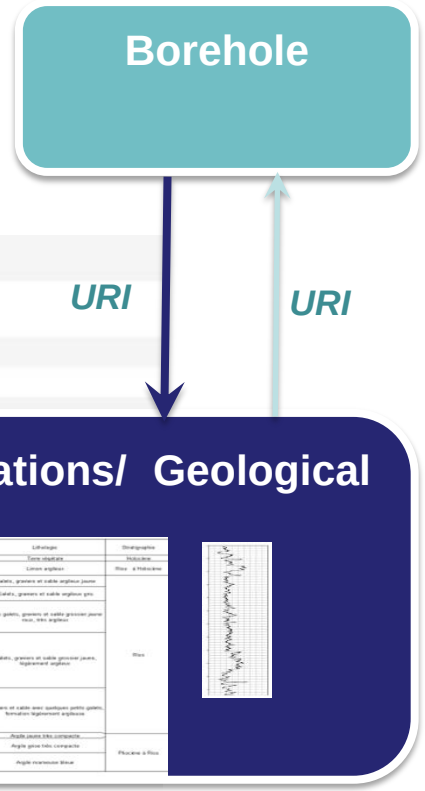
Borehole

http://ressource.brgm-rec.fr/data/BoreholeView/BSS001REWW

Element	Value
gsmlp:drillEndDate	1974-11-30Z
gsmlp:startPoint	
@xlink:href	http://resource.europe-geology.eu/vocabs/BoreholeStartPoint/naturalLandSurface
@xlink:title	natural land surface
gsmlp:inclinationType	
@xlink:href	http://resource.europe-geology.eu/vocabs/BoreholeInclinationType/vertical
@xlink:title	vertical
gsmlp:boreholeMaterialCustodian	unknown
gsmlp:boreholeLength_m	23.0
@uom	http://qudt.org/vocab/unit/M
gsmlp:elevation_m	223.87
@uom	http://qudt.org/vocab/unit/M
gsmlp:elevation_srs	http://www.opengis.net/def/crs/EPSG/0/5720
gsmlp:source	http://ficheinfoterre.brgm.fr/InfoterreFiche/ficheBss.action?id=06512X0037/STREMY
gsmlp:metadata_uri	http://www.geocatalogue.fr/Detail.do?fileIdentifier=BR_BSS_BAA
gsmlp:genericSymbolizer	Not provided
gsmlp:shape	
gml:Point	
@srsDimension	2
@srsName	urn:ogc:def:crs:EPSG::4326
@gml:id	gsmlp.shape.BSS001REWW
gml:pos	46.1909541655103 5.18713262971692
gsmlp:cored	false
gsmlp:accessToPhysicalDrillCore	false
gsmlp:boreholeUse	
@xlink:href	http://inspire.ec.europa.eu/codelist/BoreholePurposeValue/groundwaterLevelMonitoring
@xlink:title	surveillance du niveau de la nappe phrÃ©atique
gsmlp:detailedDescription	
@xlink:href	http://www.opengis.net/def/nil/OGC/0/template
@xlink:title	template
gsmlp:geophysicalLogs	
@xlink:href	http://www.opengis.net/def/nil/OGC/0/unknown
@xlink:title	unknown
gsmlp:geologicalDescription	
@xlink:href	http://ressource.brgm-rec.fr/obs/RawGeologicLogs/BSS001REWW
@xlink:title	Borehole BSS001REWW geologic log available.
gsmlp:groundWaterLevel	
@xlink:href	http://ressource.brgm-rec.fr/data/Piezometre/06512X0037/STREMY.2
@xlink:title	Description of Piezometer attached to BSS001REWW. Provides link to SensorObservationService offering

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QGIS GML Application Schema Toolbox



B

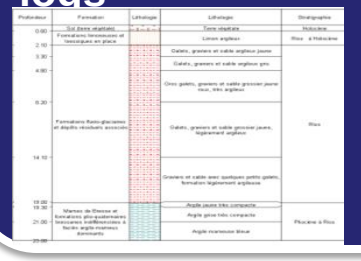
- gsmlp:shape
  - gml:Point
    - @srsDimension: 2
    - @srsName: urn:ogc:def:crs:EPSG::4326
    - @gml:id: gsmlp.shape.BSS001REWW
    - gml:pos: 46.1909541655103 5.18713262971692
  - gsmlp:cored: false
  - gsmlp:accessToPhysicalDrillCore: false
  - gsmlp:boreholeUse
    - @xlink:href: http://inspire.ec.europa.eu/codelist/BoreholePurposeValue/groundwaterLevelMonitorin
    - @xlink:title: surveillance du niveau de la nappe phrÃ©atique
  - gsmlp:detailedDescription
    - @xlink:href: http://www.opengis.net/def/nil/OGC/0/template
    - @xlink:title: template
  - gsmlp:geophysicalLogs
    - @xlink:href: http://www.opengis.net/def/nil/OGC/0/unknown
    - @xlink:title: unknown
  - gsmlp:geolo
    - @xlink:hre: /ressource.brgm-rec.fr/obs/RawGeologicLogs/BSS001REWW
    - @xlink:titl: hole BSS001REWW geologic log available.
  - gsmlp:grour
    - @xlink:hre: ata/Piezometre/06512X0037/STREMY.2
    - @xlink:title: Des hed to BSS001REWW. Provides link to SensorObservationService offering
  - gsmlp:groundWaterChemistry
    - @xlink:href: http /OGC/0/unknown
    - @xlink:title: unknown
  - gsmlp:rockGeochemistry
    - @xlink:href: http://www.opengis.net/def/nil/OGC/0/unknown
    - @xlink:title: unknown
  - gsmlp:poreGasChemistry
    - @xlink:href: http://www.opengis.net/def/nil/OGC/0/inapplicable
    - @xlink:title: inapplicable
  - gsmlp:geoTechnicalInfo
    - @xlink:href: http://www.opengis.net/def/nil/OGC/0/unknown
    - @xlink:title: unknown

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

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QGIS GML Application Schema Toolbox

Observations/ Geological logs



- sos:GetObservationResponse
  - @xlink:href — http://ressource.brgm-rec.fr/obs/RawGeologicl
  - @xlink:title — Borehole BSS001REWW geologic log available.
  - @xsi:schemaLocation — http://www.opengis.net/sos/2.0 http://schem
  - sos:observationData
    - om:OM_Observation
      - @gml:id — o_B8A57ECD13F439A702FBAD713F09AA17FC
      - gml:description — Lithologic observation for this level of borehole
      - gml:identifier — http://ressource.brgm-rec.fr/obs/RawEarthMa
      - gml:name — RawEarthMaterialLogObservation BSS001REW
      - om:type
      - om:phenomenonTime
      - om:resultTime
      - om:procedure
      - om:parameter
      - om:parameter
      - om:parameter
      - om:observedProperty
        - @xlink:href — http://www.opengis.net/def/qwml/2.0/observe
        - @xlink:title — Earth Material
      - om:featureOfInterest
      - om:result
  - sos:observationData
    - om:OM_Observation
- gsmlp:groundWaterLevel
  - @xlink:href — http://ressource.brgm-rec.fr/data/Piezometre/06512X0037/STREMY.2
  - @xlink:title — Description of Piezometer attached to BSS001REWW. Provides link to SensorObservationService offering

C

Geology log viewer

Description: Lithologic observation for this level of borel

0.0	SUPERF: TERRE
0.6	LIMON, ARGILEUX
2.1	MEL/GALET/GRAVIER/SABLE, ARGILEUX/
19.0	ARGILE, JAUNE COMPACT
19.3	ARGILE, GRIS COMPACT
21.0	ARGILE, BLEU
23.0	

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BRGM perspectives

- Continue implementing more and more feature types with the current solutions we identified
  - CSW with GeoNetwork
  - WMS with MapServer
  - WFS AppSchema with GeoServer
  - SOS with 52°North solution

- Yet, continue exploring new horizons and contribute in (financing) technologies improvements
  - GMLAS toolbox still being developed
  - GeoServer connection to solR index to handle huge volumes of data
  - Pub/Sub to notify users of updates in the system
  - SensorThings approach to facilitate sensor data integration

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Conclusion

> Building an information system is not a one-time process

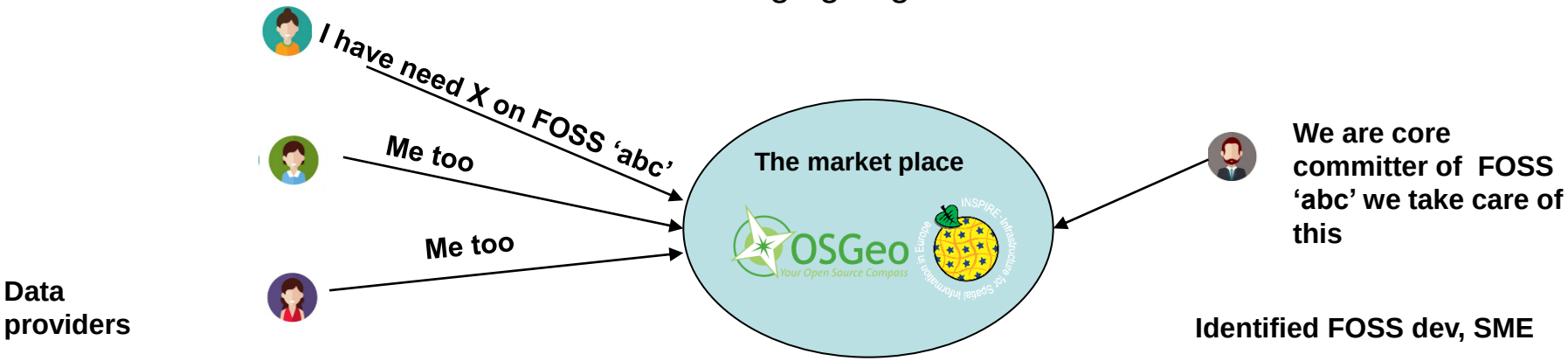
- Labs help testing things and get feedback from users
- Users participates in building the system, then it helps getting their support

> Technologies need improvements

- Yet a lot of things have been already done
- Technology providers are willing to help, but we have to feed their efforts (providing use cases, feedback and finance developments)

> We have common needs. Why don't we build a common solution?

- In order to share the efforts. Make things going faster.



GeoScience DWG

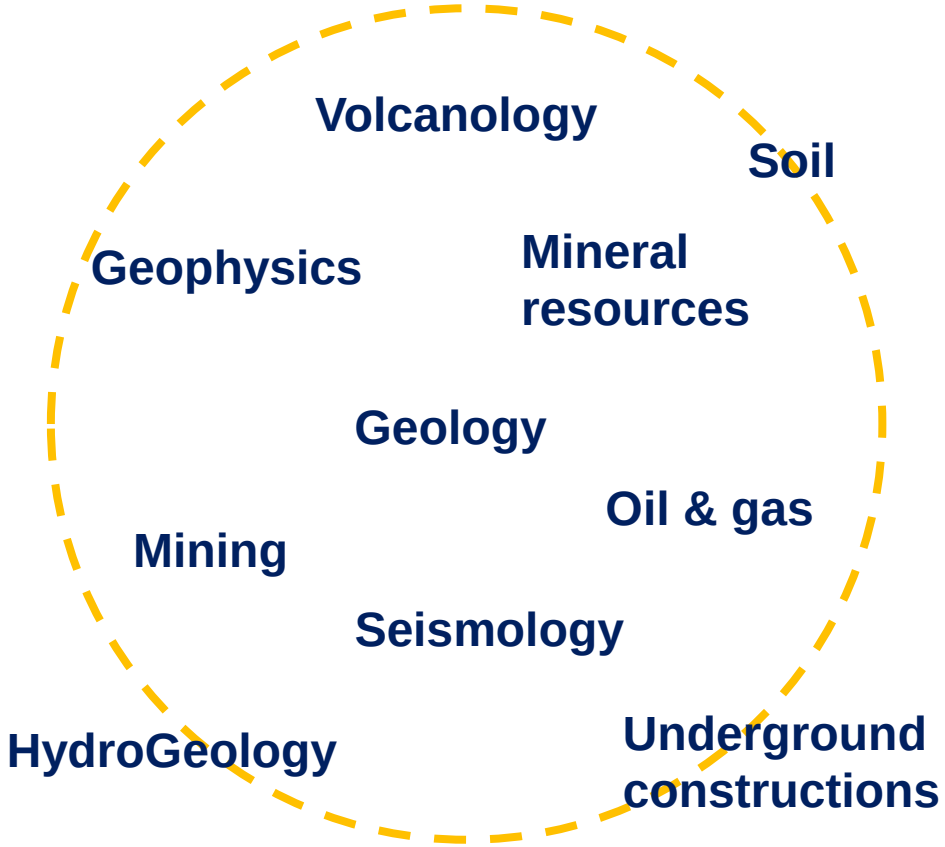
- A Domain Working Group especially dedicated to push GeoScience data interoperability

OGC® Making location count.

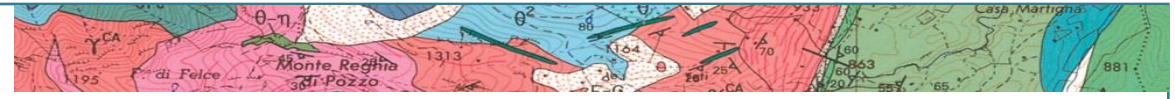
CGI Commission for the Management and Application of Geoscience Information

- First meeting next week in Southampton OGC TC
  - Thursday 14, 8AM-12AM (UK local time)
  - Discussion and action for:
    - Borehole description
    - 3d geological modelling
    - Urban geology and geotechnics

- Join us!



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Thanks for your attention

m.beaufils@brgm.fr

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