Supporting GML application compliant complex features in QGIS and beyond

Developments needed to break the circle
“no data / no software to use the data”

Presenters

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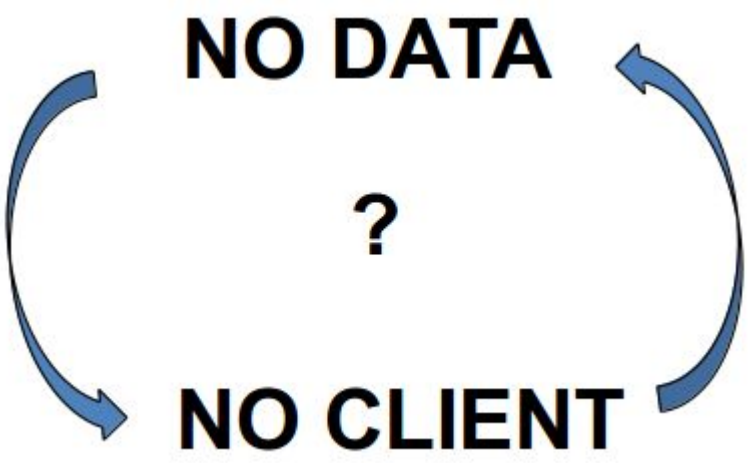
Break the circle "no data / no software to use the data"

« another approach to demonstrate the usefuleness of interoperable standards »

or

« having something to show to those who consider XML is not sexy »



Quick history

2015

INSPIRE Data Specification Working groups

2016

Study on how to improve GML support in QGIS ?

Scenario 1
Read GML

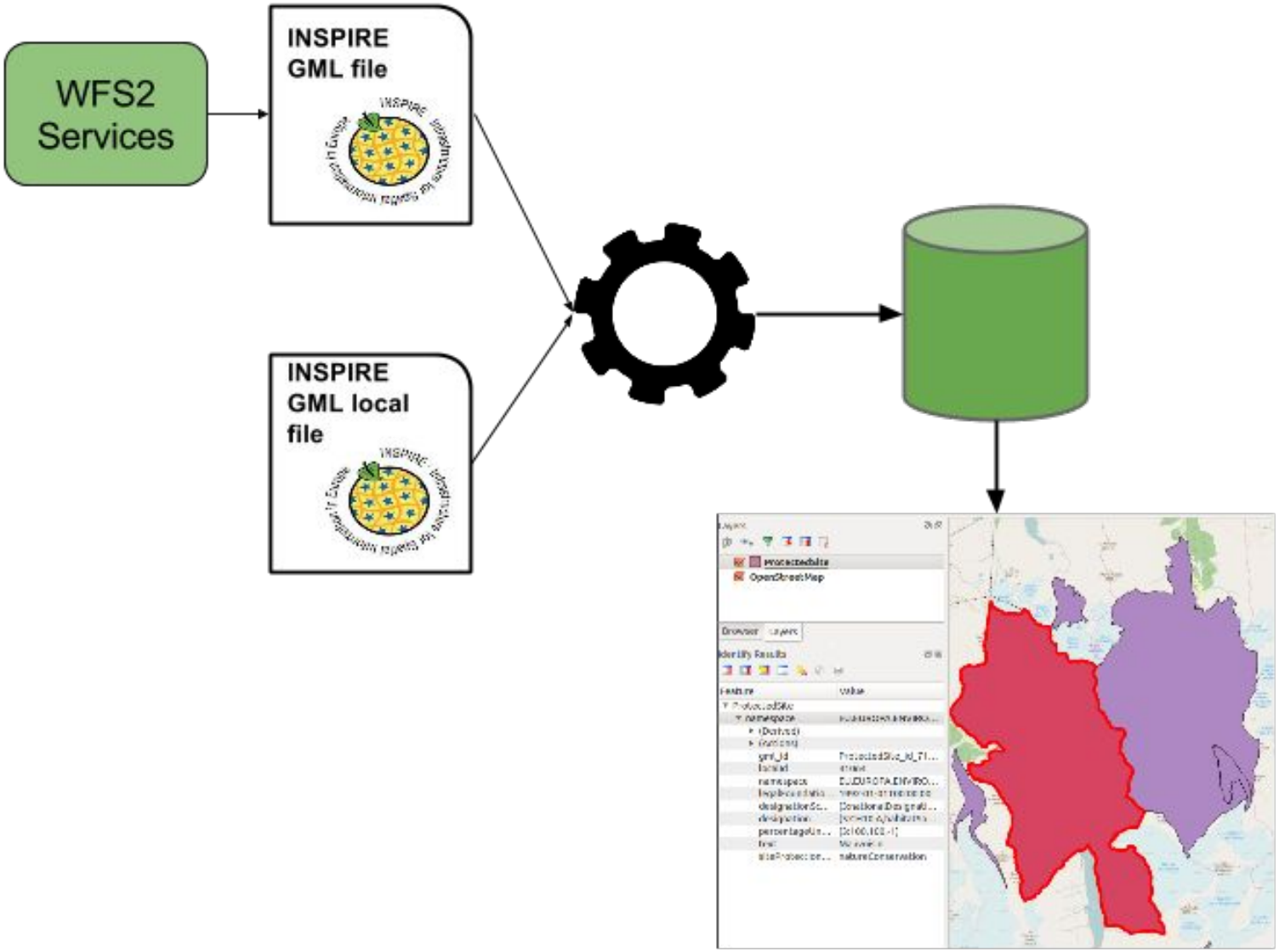
Scenario 2
Convert to DB

2017

POC QGIS Plugin

GML App Schema OGR Driver and QGIS integration

Workflow


WFS2 Services
INSPIRE GML file
INSPIRE GML local file
OpenStreetMap

Technological challenges

Create database structure based on specification (XSD) … keeping in mind to have something usable

Reusable work (eg. avoid hardcoded configurations, identify core functionalities)

Technological choices

Based on open source projects

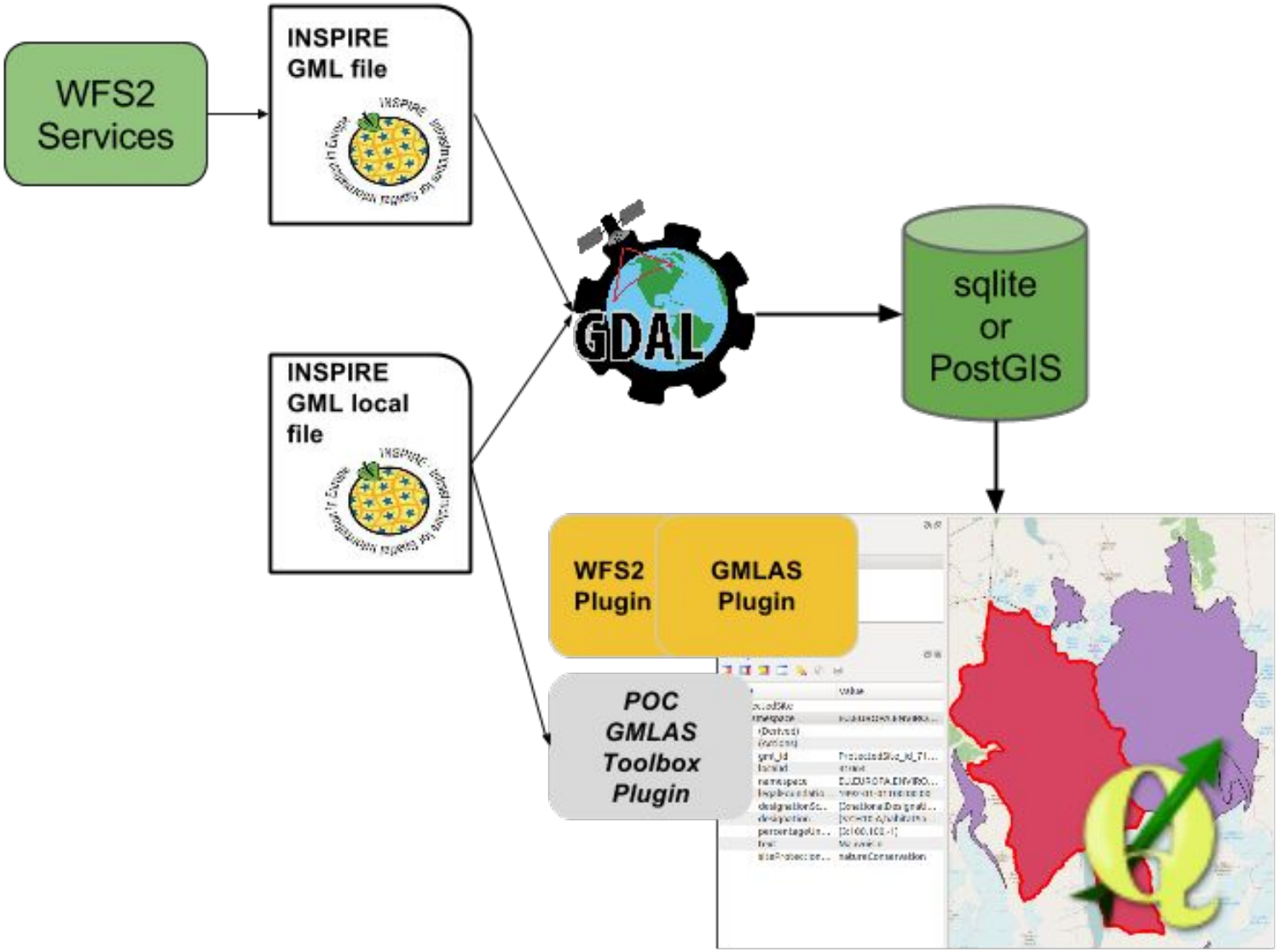
Create reader and writer for GML App Schema in a well-known and used library: **GDAL**

Use the GML App Schema driver in a desktop GIS: **QGIS**

Identify generic GIS/DB concepts which could be reused: Improve table join support, Add array types, Add custom editing widgets

Create a plugin dedicated to specialized tasks: Convert INSPIRE GML to DB

Technological choices



A new driver (GMLAS) in GDAL

Reading GML App Schema

A new driver added to GDAL OGR: [GMLAS driver]

- How-to list GML file feature types?

```
ogrinfo -ro GMLAS:cddaDesignatedArea.gml
INFO: Open of `GMLAS:cddaDesignatedArea.gml'
      using driver `GMLAS' successful.
1: DesignatedArea (Unknown (any), Point)
2: DesignatedArea_metaDataProperty (None)
3: DesignatedArea_name (None)
4: DesignatedArea_legalFoundationDocument_CI_Citation_alternateTitle (None)
```

- How-to convert from GML to spatialite?

```
ogr2ogr cdda.sqlite GMLAS:cddaDesignatedArea.gml \
      -f sqlite -dsco spatialite=yes  -oo EXPOSE_METADATA_LAYERS=YES
```

Reading GML App Schema

XSD > Object model conversion based on Xerces

- Respect application schema type
- Model simplification eg. use Array db types
- Exclude unused elements eg. xlink:role

XSD caching

XML validation : well-formed and/or XSD

GML geometry parsing (OGR)

XLink support

Reading GML

Configuration …

```
<Configuration xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
               xsi:noNamespaceSchemaLocation="gmlasconf.xsd">

    <AllowRemoteSchemaDownload>true</AllowRemoteSchemaDownload>
    <SchemaCache enabled="true">
        <Directory/> <!-- empty: use $HOME/.gdal/gmlas_xsd_cache by default -->
    </SchemaCache>
    <Validation enabled="false">
        <FailIfError>false</FailIfError>
    </Validation>
    <ExposeMetadataLayers>false</ExposeMetadataLayers>
    <LayerBuildingRules>
        <UseArrays>true</UseArrays>
        <GML>
            <IncludeGeometryXML>true</IncludeGeometryXML>
            <InstantiateGMLFeaturesOnly>true</InstantiateGMLFeaturesOnly>
        </GML>
    </LayerBuildingRules>

    <IgnoredXPaths>
        <WarnIfIgnoredXPathFoundInDocInstance>true</WarnIfIgnoredXPathFoundInDocInstance>
        <Namespaces>
            <Namespace prefix="gml" uri="http://www.opengis.net/gml"/>
            <Namespace prefix="gml32" uri="http://www.opengis.net/gml/3.2"/>
        </Namespaces>
        <XPath warnIfIgnoredXPathFoundInDocInstance="false">gml:boundedBy</XPath>
        <XPath warnIfIgnoredXPathFoundInDocInstance="false">gml32:boundedBy</XPath>
        <XPath>gml:priorityLocation</XPath>
        <XPath>gml32:priorityLocation</XPath>
        <XPath>gml32:descriptionReference/@owns</XPath>
        <XPath>@xlink:show</XPath>
        <XPath>@xlink:type</XPath>
        <XPath>@xlink:role</XPath>
        <XPath>@xlink:arcrole</XPath>
        <XPath>@xlink:actuate</XPath>
        <XPath>@gml:remoteSchema</XPath>
```

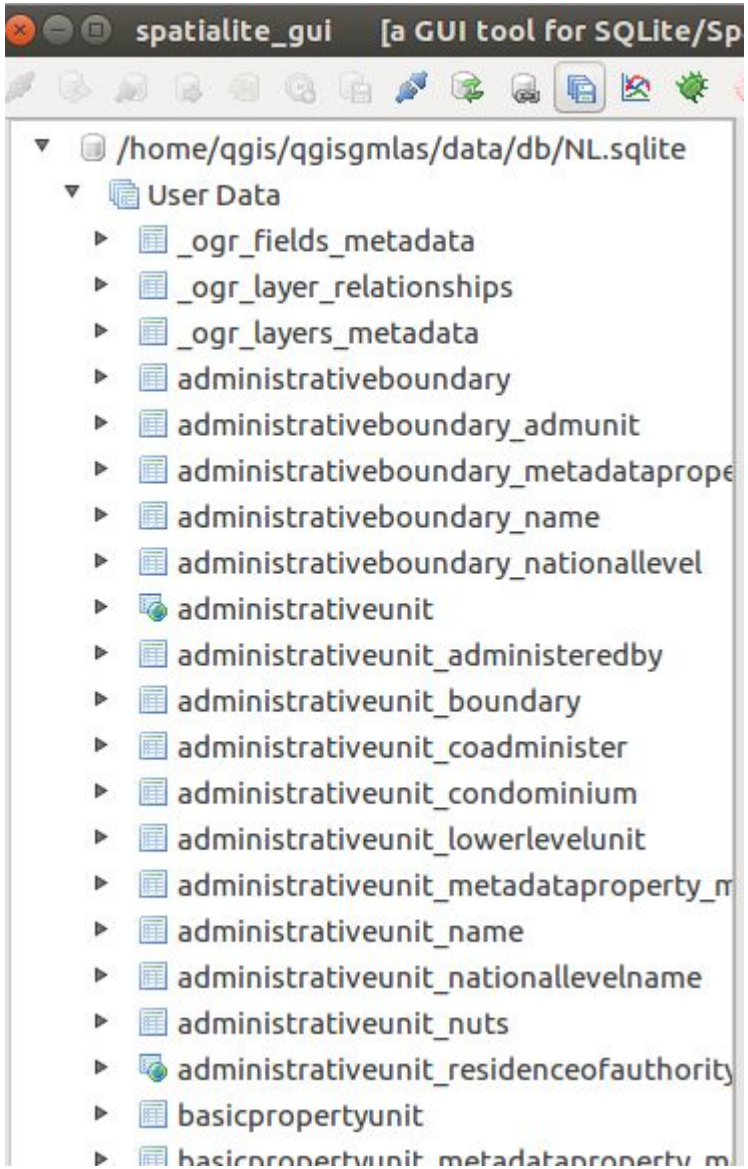
All applications using GDAL can benefit from this.

A new driver (GMLAS) in GDAL

INSPIREd database

Database

INSPIRE
GML file

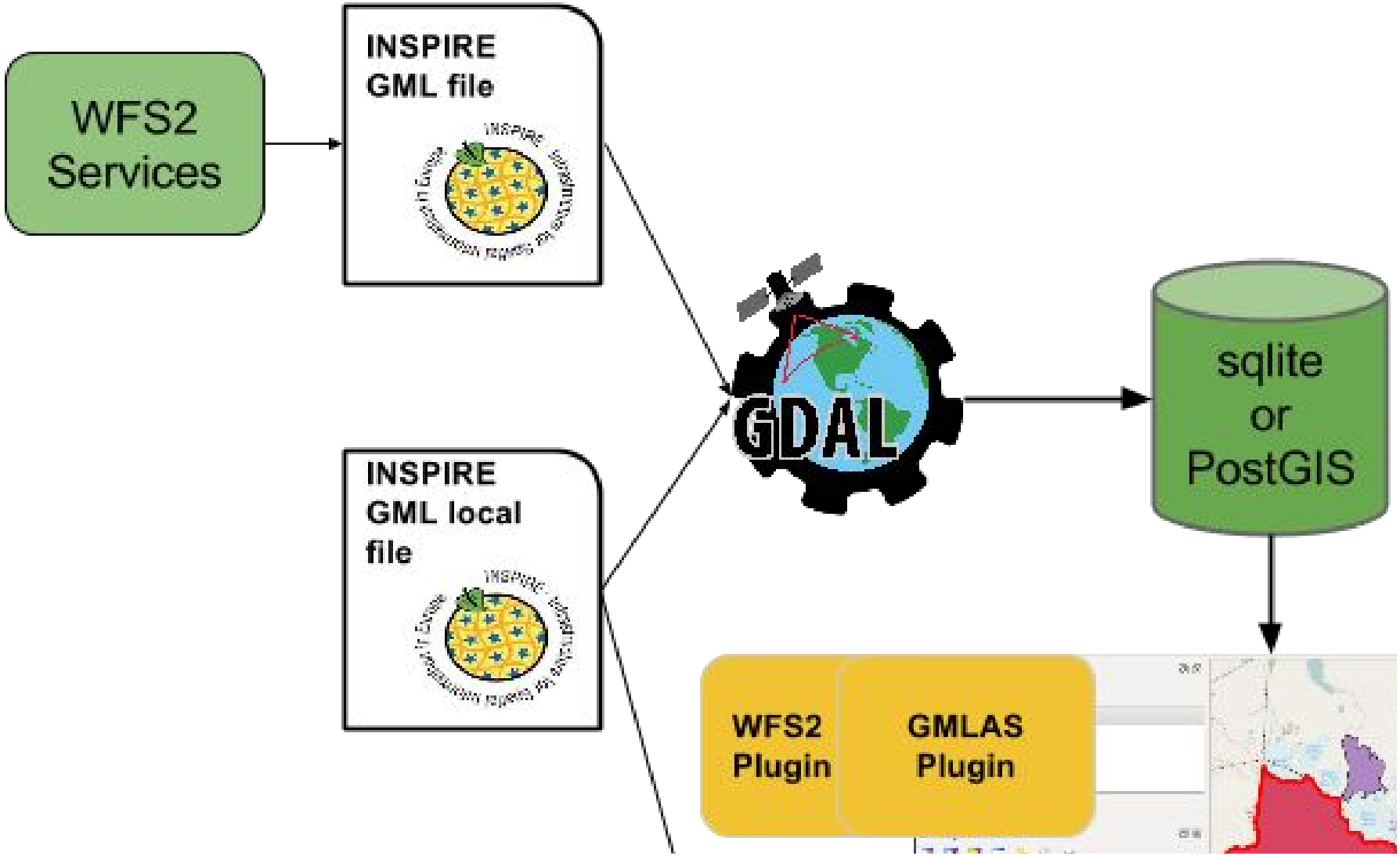


A new driver (GMLAS) in GDAL

INSPIREd database

Used in

Usage in QGIS



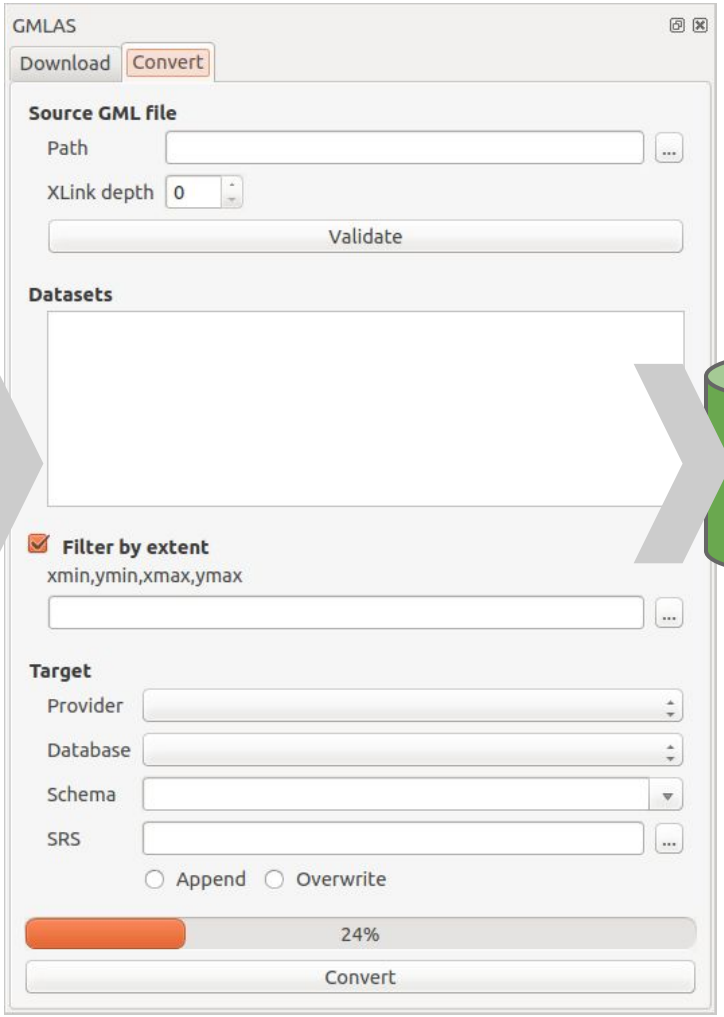
Usage in QGIS / Download and convert

(optional) Download from WFS

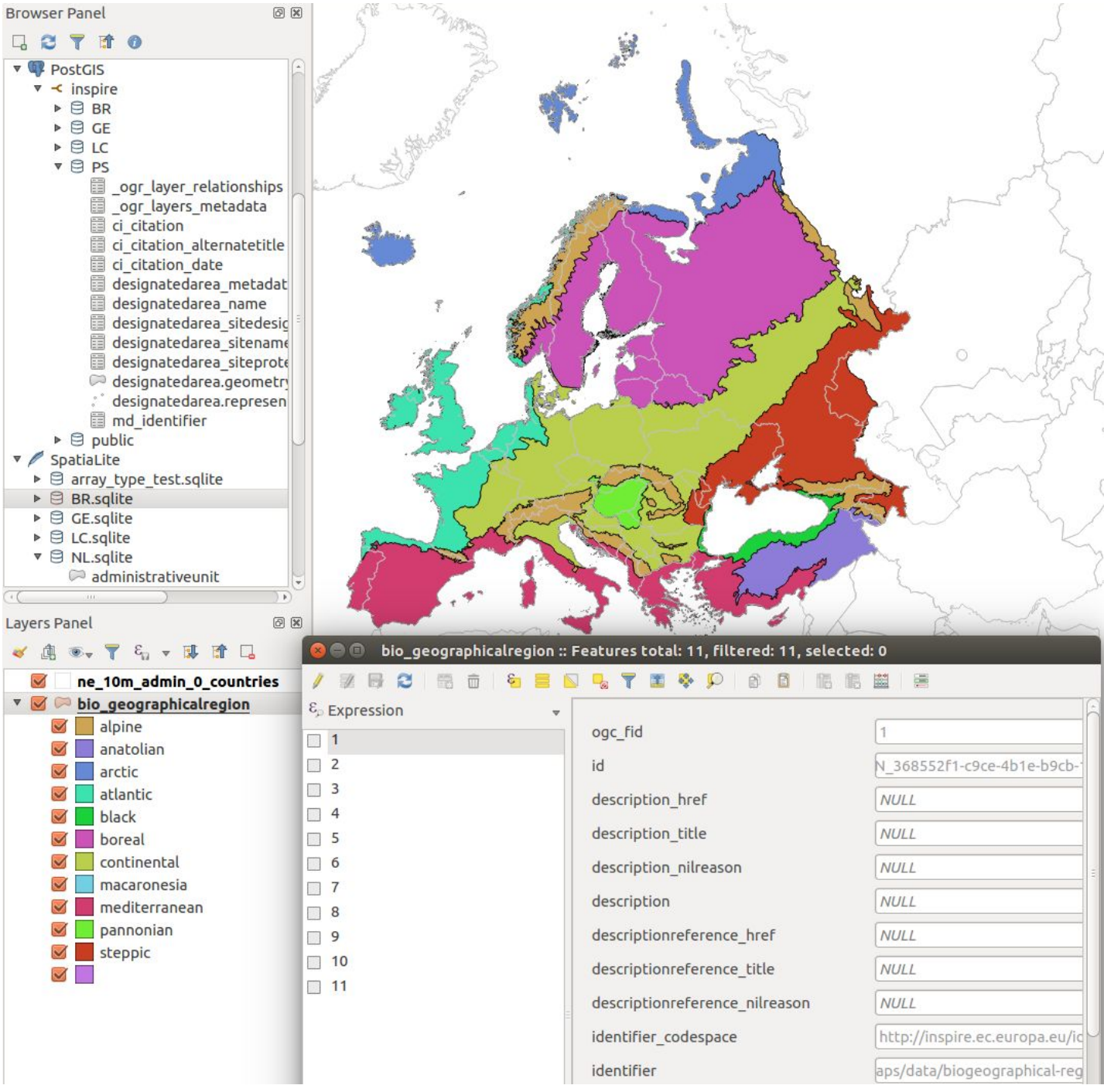
(based on WFS2 plugin made by Juergen Weichand)

INSPIRE GML file

Convert to database

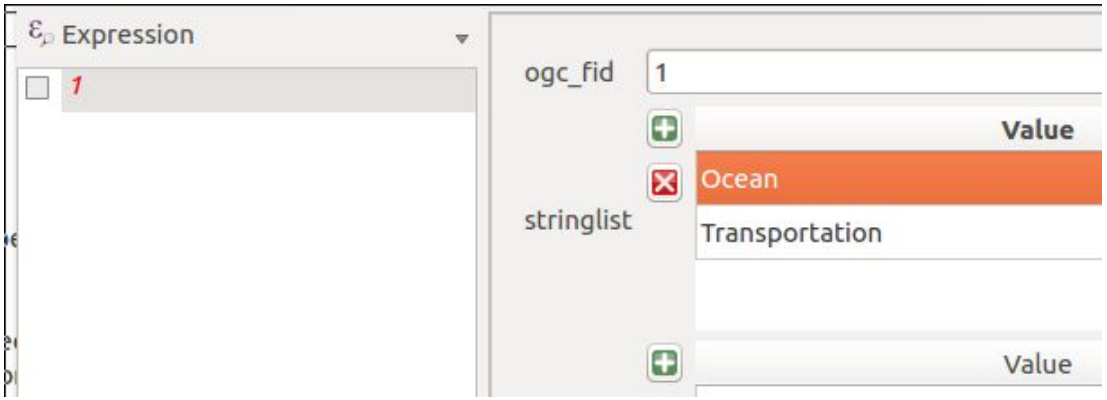


sqlite or PostGIS


Browser Panel
PostGIS
inspire
BR
GE
LC
PS
_ogr_layer_relationships
_ogr_layers_metadata
ci_citation
ci_citation_alternatetitle
ci_citation_date
designatedarea_metadat
designatedarea_name
designatedarea_sitedesig
designatedarea_sitename
designatedarea_siteprote
designatedarea.geometry
designatedarea.represen
md_identifier
public
SpatiaLite
array_type_test.sqlite
BR.sqlite
GE.sqlite
LC.sqlite
NL.sqlite
administrativeunit
Layers Panel
ne_10m_admin_0_countries
bio_geographicalregion
alpine
anatolian
arctic
atlantic
black
boreal
continental
macaronesia
mediterranean
pannonian
steppic
bio_geographicalregion :: Features total: 11, filtered: 11, selected: 0
Expression
1
2
3
4
5
6
7
8
9
10
11
ogc_fid
1
id
N_368552f1-c9ce-4b1e-b9cb-
description_href
NULL
description_title
NULL
description_nilreason
NULL
description
NULL
descriptionreference_href
NULL
descriptionreference_title
NULL
descriptionreference_nilreason
NULL
identifier_codespace
http://inspire.ec.europa.eu/ic
identifier
aps/data/biogeographical-reg

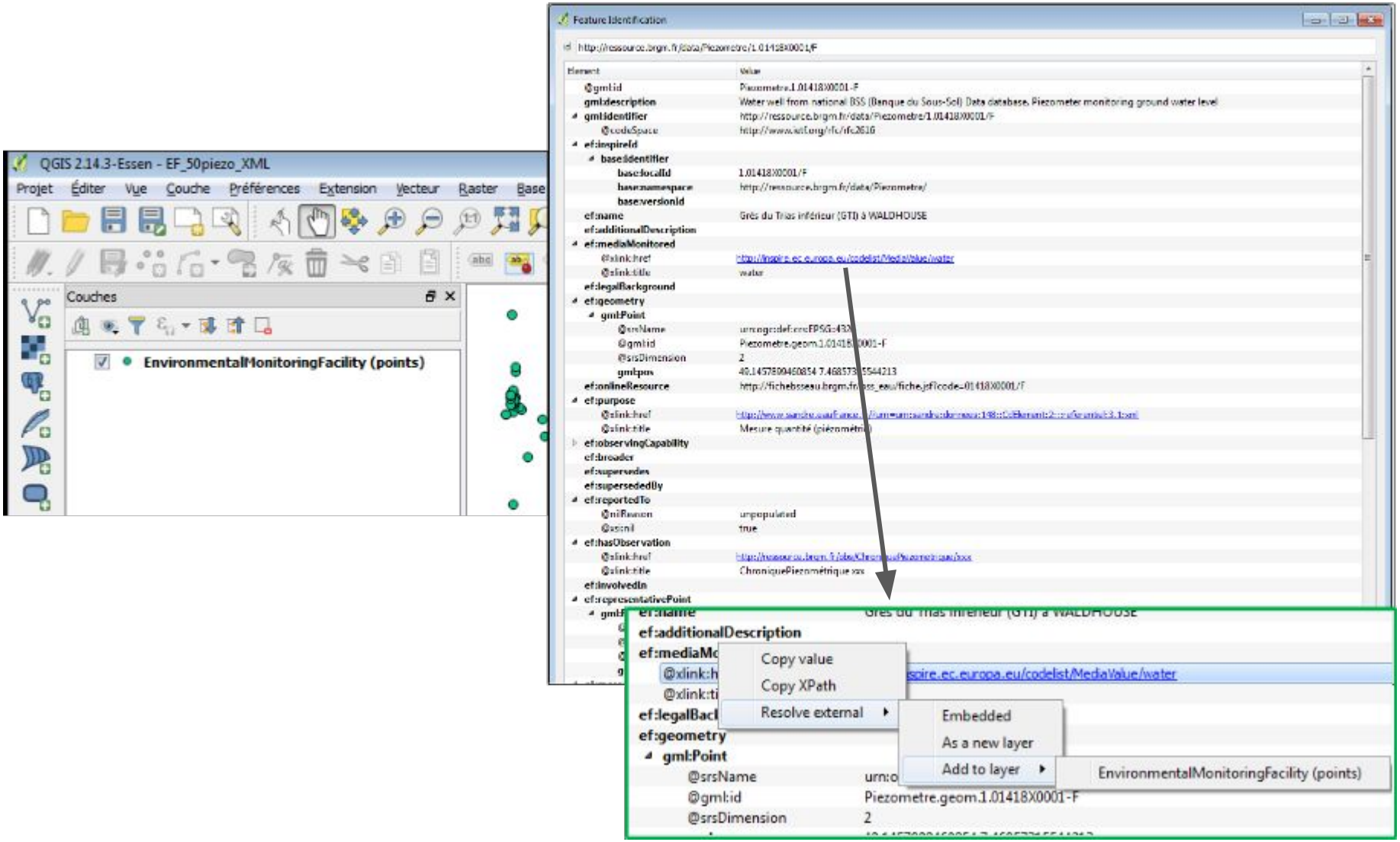
Usage in QGIS / coming work

- Plugin
  - Download and conversion processing
  - Predefined SQL views by INSPIRE themes to simplify database use
- QGIS Core
  - Autodiscover join between tables in db model
  - Navigation between related tables in attribute table mode

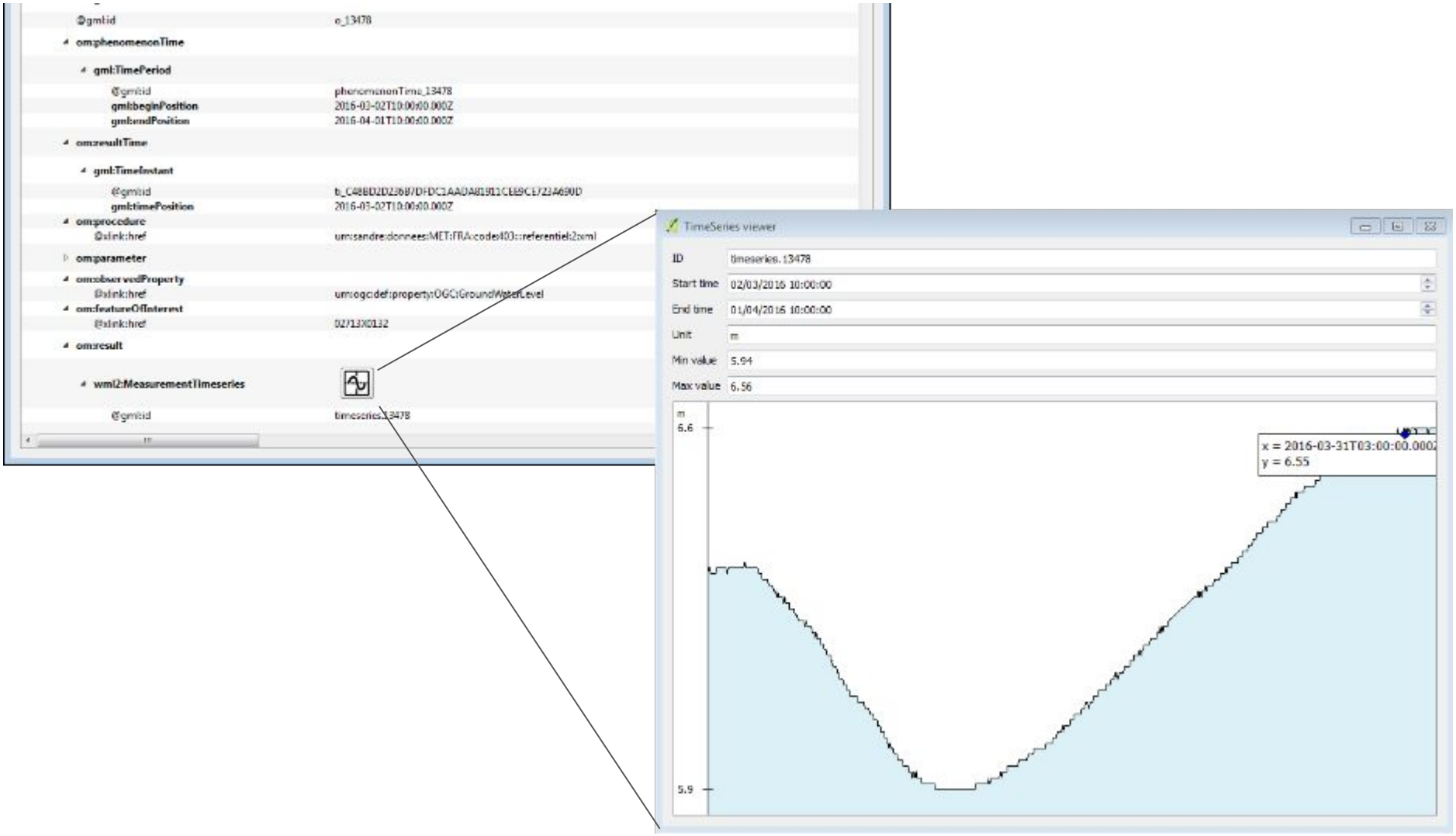


Additional features made in BRGM POC

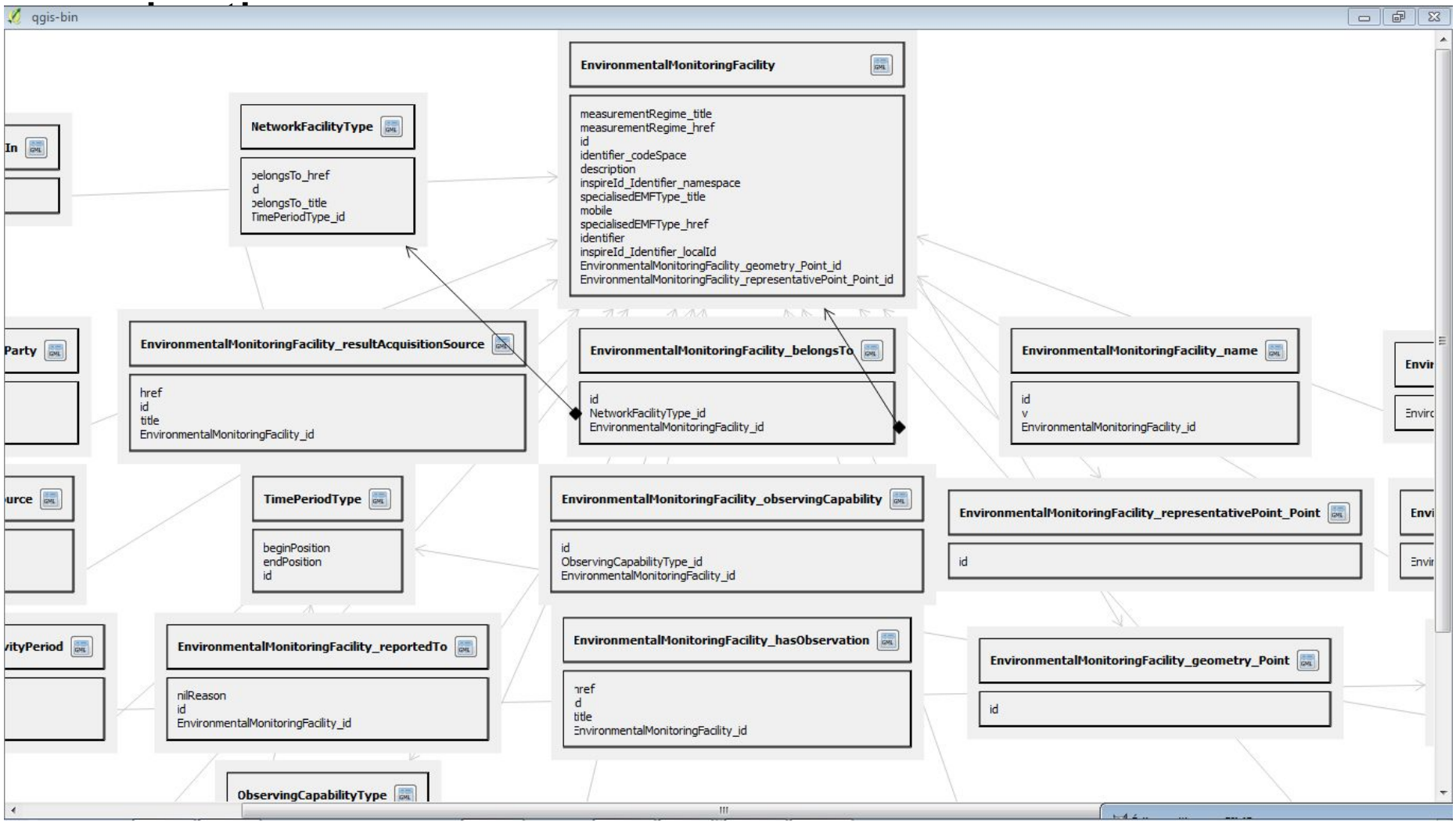
XML mode > WFS Flow



XML Mode > SOS Flow



Schema representation with QGIS to ease



What’s next ?

Testing

INSPIRE datasets, GeoSciML, ...

A virtual box is available with GDAL+GMLAS driver + QGIS3 + samples

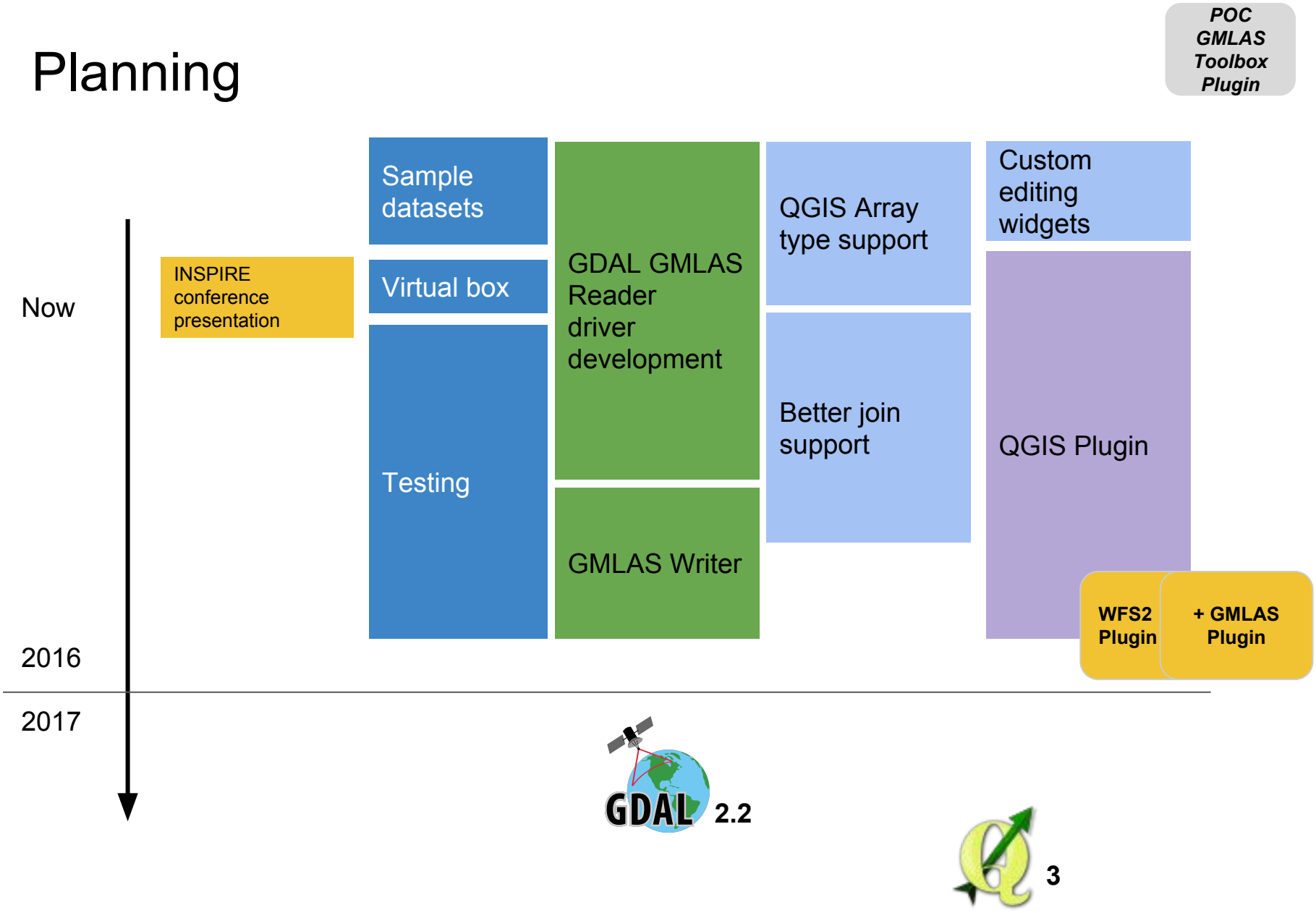
Open source projects version used and roadmap

GDAL 2.2 April 2017

QGIS 3 - 2017

- 2.x series is now a maintenance release (ie. no major changes).
- QGIS 3 was announced in February 2016
- Development will be supported on the long term
- No resources to duplicate the work in 2.x and 3.x series (major changes for Python and QT).
- Contributions to 3.x by adding core functionalities, testing it, migrating plugin (eg. WFS2), which will benefit for the QGIS community

Planning


POC GMLAS Toolbox Plugin
Now
2016
2017
INSPIRE conference presentation
Sample datasets
Virtual box
Testing
GDAL GMLAS Reader driver development
GMLAS Writer
QGIS Array type support
Better join support
Custom editing widgets
QGIS Plugin
WFS2 Plugin
+ GMLAS Plugin
GDAL 2.2
3

Next steps

Finalize the work (2016)

Support publication of GDAL2.2 and QGIS3 + QGIS plugins in QGIS official repository (BRGM POC is already available and work with QGIS2)

Develop a user and developer community

- Have people use it & report usage …

Enhance the work

- Combine work made in the POC and the current implementation
- Add domain useful widget (Hydrogeologists, …)
- This work is not INSPIRE specific so it can be useful to the overall OGC community

Links

https://github.com/rouault/gdal2/tree/gmlas

https://github.com/pvalsecc/QGIS/tree/gmlas

https://plugins.qgis.org/plugins/gml_application_schema_toolbox/
(BRGM POC)

https://github.com/INSPIRE-MIF/qgis-ogr-gmlas

http://files.titellus.net/vbox/ for testing