



A unique Index to serve all INSPIRE data associated to a Borehole

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A unique Index to serve all INSPIRE data associated to a Borehole

INSPIRE conference 2017 – Strasbourg – 2017-09-07

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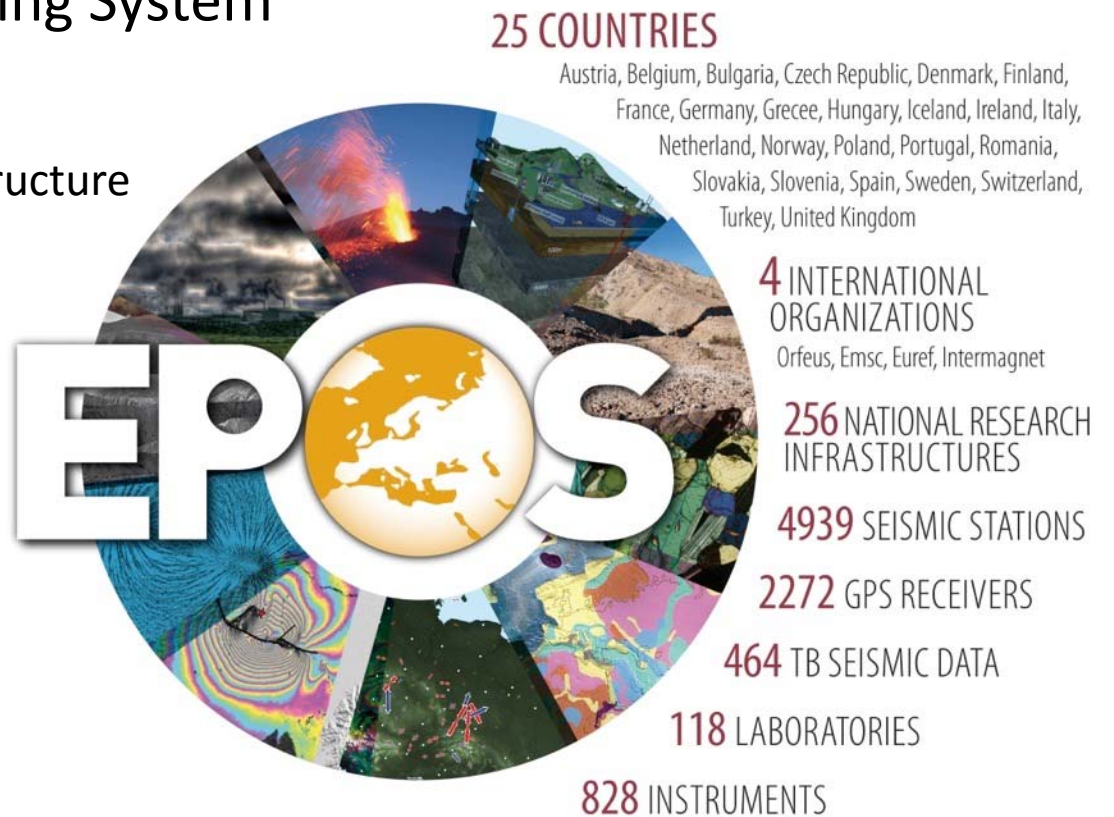
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EPOS in a nutshell

- European Plate Observing System

- www.epos-eu.org
- European research infrastructure on solid earth science
- Integrates the existing and future advanced European facilities into a single, distributed, sustainable infrastructure

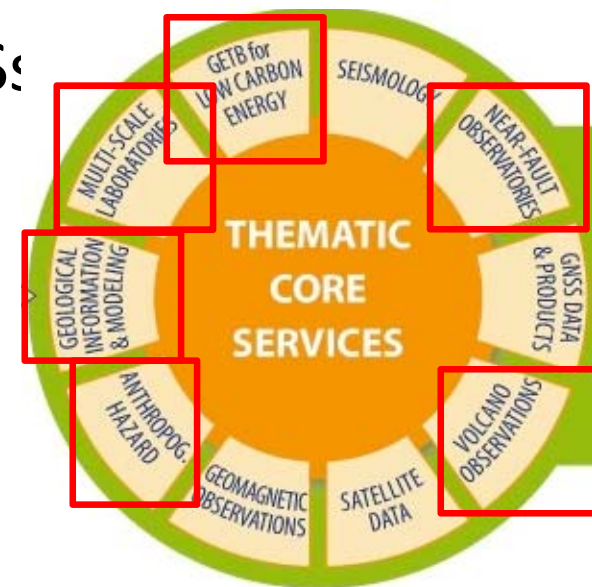


Several PetaBytes of solid Earth Science data will be available

Several thousands of users expected to access the infrastructure

Borehole in EPOS

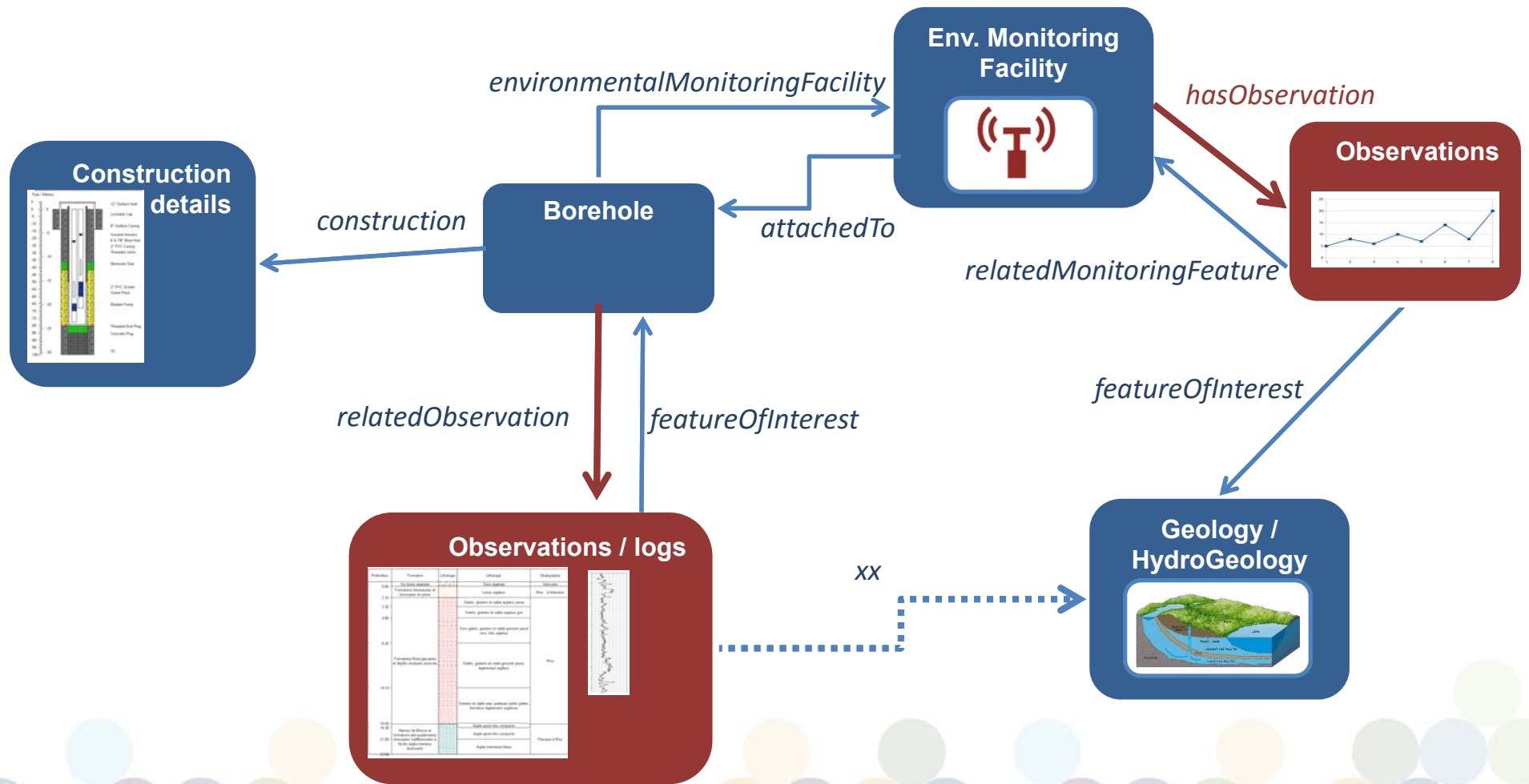
- Core notion for Thematic Core Service ‘Geological information and modelling’
- But also of interest for other TCSs:
 - Near fault observatories,
 - Volcano observation,
 - Anthropogenic Hazards,
 - Multiscale Laboratories,
 - Geo-Energy,
 - ...



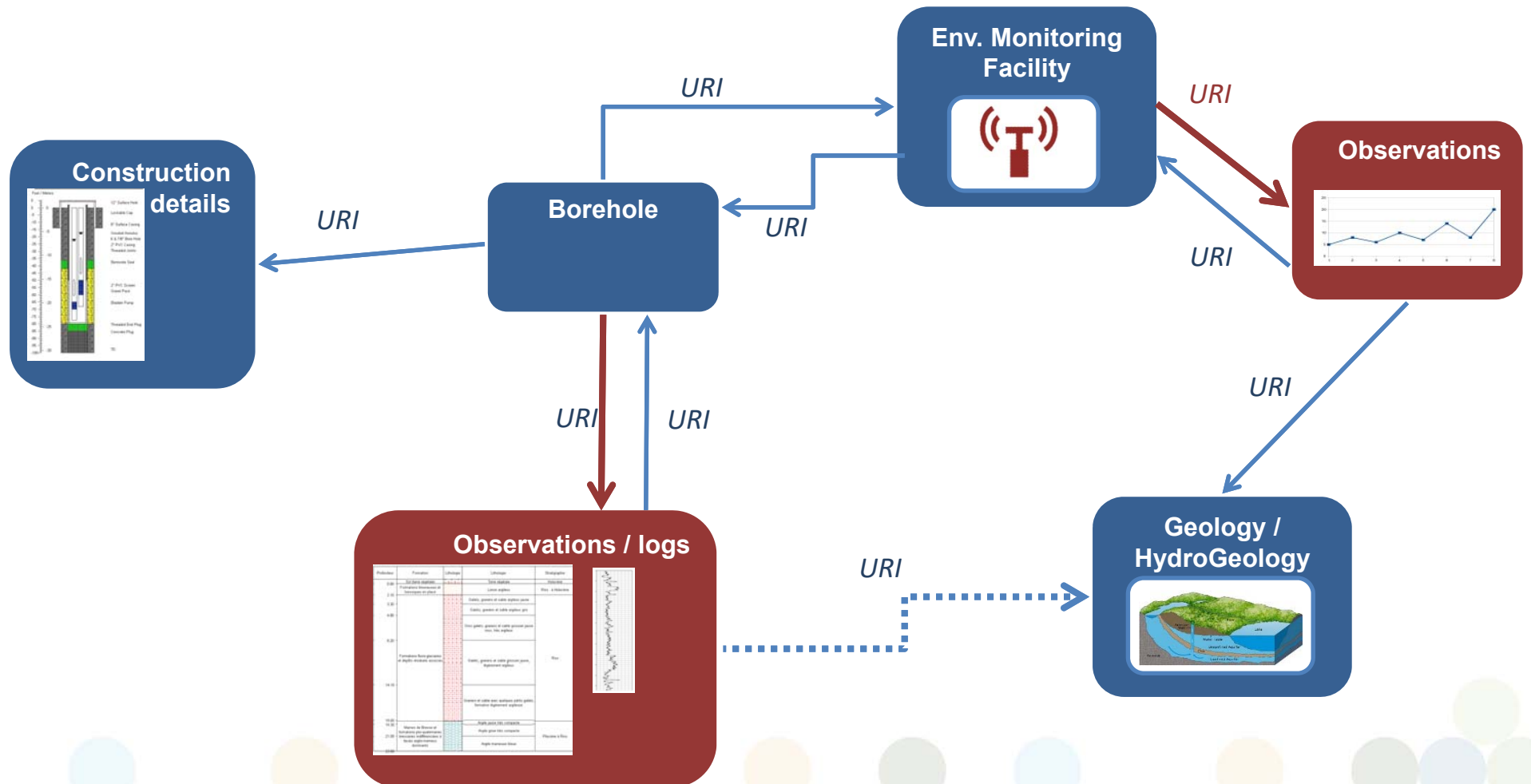
Borehole in EPOS

- Objective: to provide a unique EU access point to search for Boreholes
 - Using “Summary borehole information”
 - and providing link to richer structured information flows
- IT approach
 - Not re-invent the wheel, try to re-use / extend pre-existing initiatives..
 - GeoSciML 4.1 Borehole View was extended with couple fields (still is Simple Feature SF-0)

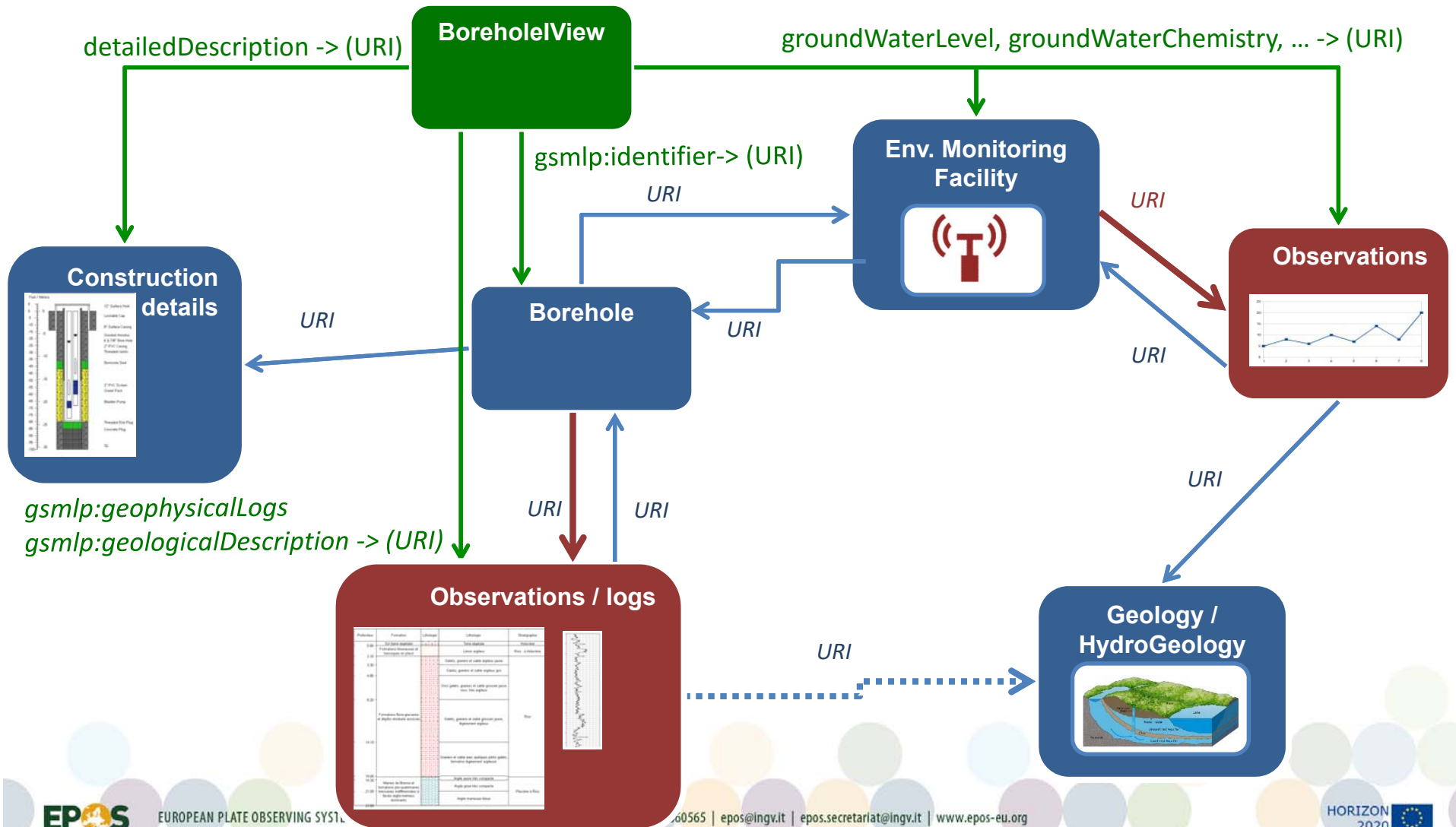
Borehole in EPOS – Model View



Borehole in EPOS – Resource View



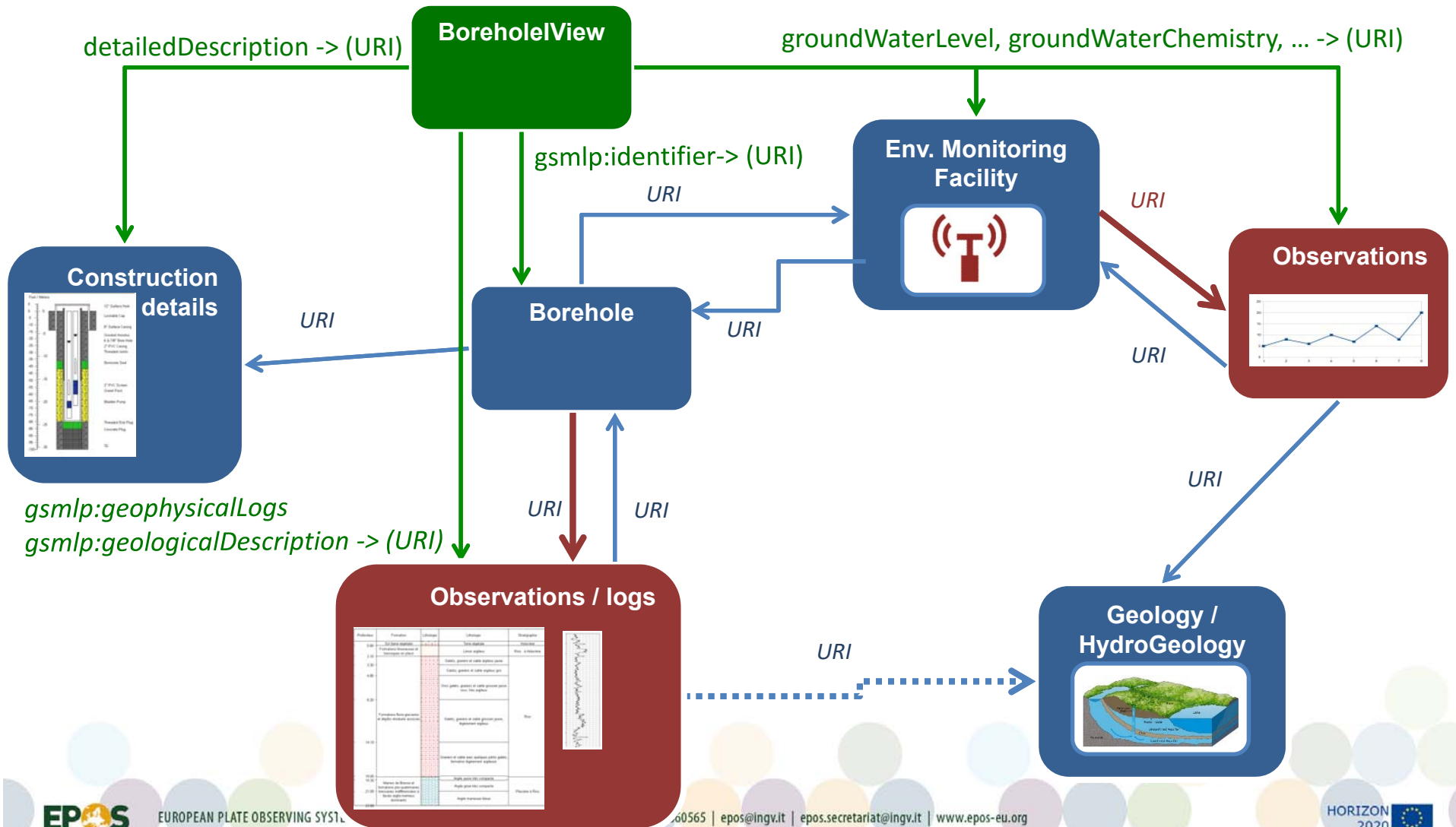
Using the index as a quick look-up and shortcut to data flows



Using the index as a quick look-up and shortcut to data flows

```
-<wfs:FeatureCollection numberMatched="unknown" numberReturned="1" timeStamp="2017-09-05T07:42:27.003Z" xsi:schemaLocation="http://www.opengis.net/gml/3.2 http://schemas.opengis.net/gml/3.2.1/gml.xsd http://www.opengis.net/schemas.opengis.net/wfs/2.0/wfs.xsd https://forge.brgm.fr/svnrepository/epos/trunk/schemas https://forge.brgm.fr/svnrepository/epos/trunk/schemas/epos-lite.xsd">
  -<wfs:member>
    -<gsmpl:BoreholeView gml:id="BSS001REWW">
      <gml:description>Borehole description</gml:description>
      -<gml:identifier codeSpace="http://www.ietf.org/rfc2616">
        http://ressource.brgm-rec.fr/data/BoreholeView/BSS001REWW
      </gml:identifier>
      <gml:name>Forage BSS001REWW</gml:name>
      -<gsmpl:identifier>
        http://ressource.brgm-rec.fr/data/Borehole/BSS001REWW
      </gsmpl:identifier>
      <gsmpl:purpose xlink:href="http://inspire.ec.europa.eu/codelist/BoreholePurposeValue/hydrogeologicalSurvey" xlink:title="levé hydrogéologique, gestion de l'eau"/>
      <gsmpl:status xlink:href="http://resource.europe-geology.eu/vocabs/BoreholeStatus/drillingCompleted" xlink:title="drilling completed"/>
      <gsmpl:drillingMethod xlink:href="http://resource.europe-geology.eu/vocabs/DrillingMethod/hydraulic_rotary_drilling" xlink:title="hydraulic rotary drilling"/>
      <gsmpl:operator>BRGM (PIEZOMETRIE)</gsmpl:operator>
      <gsmpl:driller>INTRAFOR-COFOR</gsmpl:driller>
      <gsmpl:drillEndDate>1974-11-30Z</gsmpl:drillEndDate>
      <gsmpl:startPoint xlink:href="http://resource.europe-geology.eu/vocabs/BoreholeStartPoint/naturalLandSurface" xlink:title="natural land surface"/>
      <gsmpl:inclinationType xlink:href="http://resource.europe-geology.eu/vocabs/BoreholeInclinationType/vertical" xlink:title="vertical"/>
      <gsmpl:boreholeMaterialCustodian>unknown</gsmpl:boreholeMaterialCustodian>
      <gsmpl:boreholeLength_m uom="http://qudt.org/vocab/unit/M">23.0</gsmpl:boreholeLength_m>
      <gsmpl:elevation_m uom="http://qudt.org/vocab/unit/M">223.87</gsmpl:elevation_m>
      <gsmpl:elevation_srs>http://www.opengis.net/def/crs/EPSG/0/5720</gsmpl:elevation_srs>
    -<gsmpl:source>
      http://ficheinfoterre.brgm.fr/InfoterreFiche/ficheBss.action?id=06512X0037/STREMY
    </gsmpl:source>
    -<gsmpl:metadata_uri>
      http://www.geocatalogue.fr/Detail.do?fileIdentifier=BR_BSS_BAA
    </gsmpl:metadata_uri>
    <gsmpl:genericSymbolizer>Not provided</gsmpl:genericSymbolizer>
    +<gsmpl:shape></gsmpl:shape>
    <gsmpl:cored>false</gsmpl:cored>
    <gsmpl:accessToPhysicalDrillCore>false</gsmpl:accessToPhysicalDrillCore>
    <gsmpl:boreholeUse xlink:href="http://inspire.ec.europa.eu/codelist/BoreholePurposeValue/groundwaterLevelMonitoring" xlink:title="surveillance du niveau de la nappe phréatique"/>
    <gsmpl:detailedDescription xlink:href="http://www.opengis.net/def/nil/OGC/0/template" xlink:title="template" />
    +<!--
      <gsmpl:geophysicalLogs xlink:href="http://www.opengis.net/def/nil/OGC/0/unknown" xlink:title="unknown"/>
      <gsmpl:geologicalDescription xlink:href="http://ressource.brgm-rec.fr/obs/RawGeologicLogs/BSS001REWW" xlink:title="Borehole BSS001REWW geologic log available."/>
      <gsmpl: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"/>
      <gsmpl:groundWaterChemistry xlink:href="http://www.opengis.net/def/nil/OGC/0/unknown" xlink:title="unknown"/>
      <gsmpl:rockGeochemistry xlink:href="http://www.opengis.net/def/nil/OGC/0/unknown" xlink:title="unknown"/>
      <gsmpl:poreGasChemistry xlink:href="http://www.opengis.net/def/nil/OGC/0/inapplicable" xlink:title="inapplicable"/>
      <gsmpl:geoTechnicalInfo xlink:href="http://www.opengis.net/def/nil/OGC/0/unknown" xlink:title="unknown"/>
    </gsmpl:BoreholeView>
  </wfs:member>
</wfs:FeatureCollection>
```

Using the index as a quick look-up and shortcut to data flows



Using the index as a quick look-up and shortcut to data flows

```
<wfs:FeatureCollection numberMatched="unknown" numberReturned="1084"
http://localhost:8080/epos/schemas/gml/3.2.1/gml.xsd http://www.opengis.net/wfs/
https://forge.brgm.fr/svnrepository/epos/trunk/schemas/epos-lite.xsd">
```

```
- <wfs:member>
```

```
- <gsmlp:BoreholeView gml:id="ISPRA_rm_DBH_1">
```

```
  <gml:description>GELA</gml:description>
```

```
  - <gml:identifier codeSpace="http://www.ietf.org/rfc/rfc2616">
```

```
    http://sgi2.isprambiente.it/eposLite/BoreholeView/ISPRA_rm_DBH_1
```

```
  </gml:identifier>
```

```
  <gml:name>ACATE 1 DIR</gml:name>
```

```
  + <gsmlp:identifier></gsmlp:identifier>
```

```
  <osml:nurnose xlink:href="http://inspire.ec.europa.eu/codelist/BoreholePurne
```

Borehole

gsmlp:identifier-> (URI)

URI

Borehole

BoreholeIndex has unique direct access to feature information

Using the index as a quick look-up and shortcut to data flows

`<gsmlp:identifier>`

`http://sgi2.isprambiente.it/epos/Borehole/ISPRA_rm_DBH_1`

`</gsmlp:identifier>`

Borehole

BoreholeIndex has unique direct access to detail feature information

gsmlp:identifier-> (URI)

```
<wfs:FeatureCollection numberMatched="unknown" numberReturned="1084" timeStamp="2017-08-28T07:00:28.749Z" xsi:schemaLocation="http://www.opengis.net/gml/3.2
http://localhost:8080/epos/schemas/gml/3.2.1/gml.xsd http://www.opengis.net/wfs/2.0 http://localhost:8080/epos/schemas/wfs/2.0/wfs.xsd https://forge.brgm.fr/svnrepository/epos/trunk/schemas
https://forge.brgm.fr/svnrepository/epos/trunk/schemas/epos-lite.xsd">
```

```
- <wfs:member>
```

```
- <gsmlp:BoreholeView gml:id="ISPRA_rm_DBH_1">
```

```
  <gml:description>GELA</gml:description>
```

```
  + <gml:identifier codeSpace="http://www.ietf.org/rfc/rfc2616"></gml:identifier>
```

```
  <gml:name>ACATE 1 DIR</gml:name>
```

```
- <gsmlp:identifier>
```

```
  http://sgi2.isprambiente.it/epos/Borehole/ISPRA_rm_DBH_1
```

```
</gsmlp:identifier>
```

```
  <gsmlp:purpose xlink:href="http://inspire.ec.europa.eu/codelist/BoreholePurposeValue/hydrocarbonExploration" xlink:title="hydrocarbon exploration"/>
```

```
  <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>AGIP MINERARIA</gsmlp:operator>
```

```
  <gsmlp:driller>AGIP MINERARIA</gsmlp:driller>
```

```
  <gsmlp:startPoint xlink:href="http://resource.europe-geology.eu/vocabs/BoreholeStartPoint/seaFloor" xlink:title="seaFloor"/>
```

```
  <gsmlp:inclinationType xlink:href="http://resource.europe-geology.eu/vocabs/BoreholeInclinationType/vertical" xlink:title="Vertical"/>
```

```
  <gsmlp:boreholeMaterialCustodian>unknown</gsmlp:boreholeMaterialCustodian>
```

```
  <gsmlp:boreholeLength_m uom="http://qudt.org/vocab/unit/M">3388.0</gsmlp:boreholeLength_m>
```

```
  <gsmlp:elevation_m uom="http://qudt.org/vocab/unit/M">-3.0</gsmlp:elevation_m>
```

```
  <gsmlp:elevation_srs>http://www.opengis.net/def/crs/EPSG/0/4326</gsmlp:elevation_srs>
```

```
  <gsmlp:positionalAccuracy>unknown</gsmlp:positionalAccuracy>
```

```
  + <gsmlp:source></gsmlp:source>
```

```
  <gsmlp:metadata_uri>http://sgi.isprambiente.it/geoportal</gsmlp:metadata_uri>
```

```
  + <gsmlp:genericSymbolizer></gsmlp:genericSymbolizer>
```

```
  + <gsmlp:shape></gsmlp:shape>
```

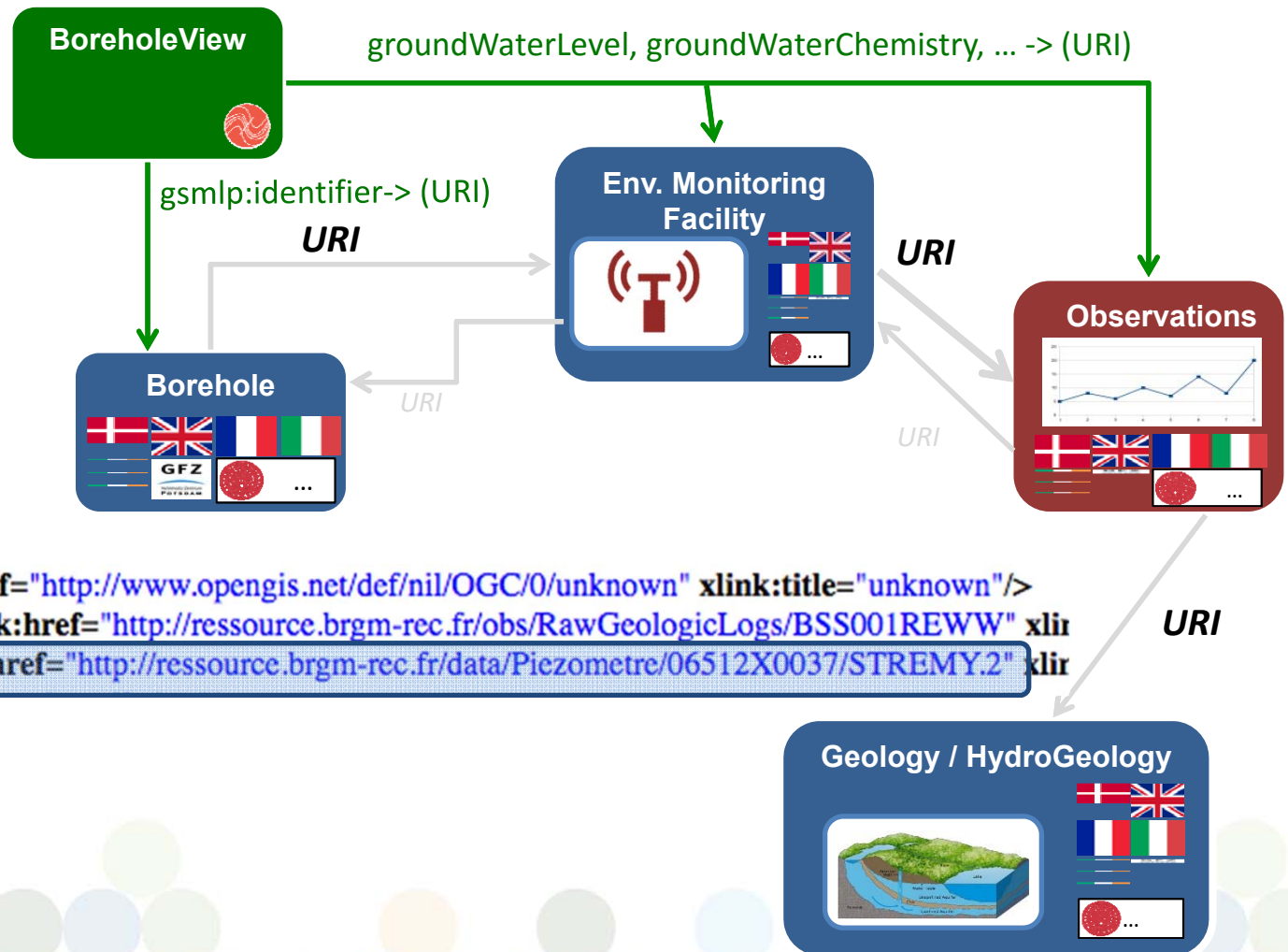
```
  <gsmlp:cored>false</gsmlp:cored>
```

```
  <gsmlp:accessToPhysicalDrillCore>false</gsmlp:accessToPhysicalDrillCore>
```

```
  <gsmlp:boreholeUse xlink:href="http://inspire.ec.europa.eu/codelist/BoreholePurposeValue/hydrocarbonExploration" xlink:title="hydrocarbon exploration"/>
```

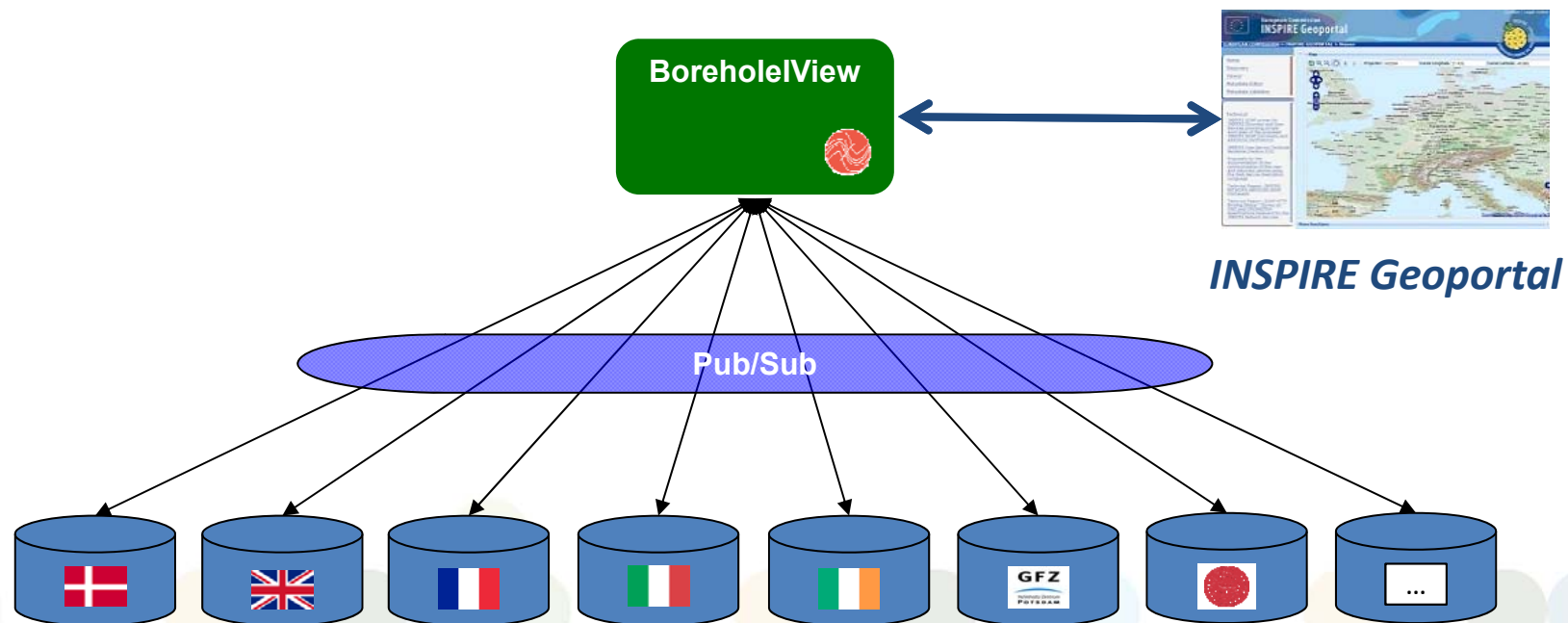
```
  <gsmlp:detailedDescription xlink:href="http://www.opengis.net/def/nil/OGC/0/template" xlink:title="template"/>
```

Using the index as a quick look-up and shortcut to data flows



How do we feed the index ?

- Each institution maintains its Borehole summary info service
- Only those summary info are harvested at EU level
- The index is up-to-date thanks to a pub/sub approach



Conclusions

- Exposing summary Information (simpleFeature) is easier/faster than complex Feature
 - Allows to add more data providers
- Harvesting simpleFeature is more reasonable than complex Feature
 - WFS on complexFeature is not meant/suited to synchronize millions of instances !
 - Harvesting a 'Borehole vCard' just for discovery makes more sense
- The Borehole index in turns points to National data flows
 - With respect to INSPIRE semantics
 - Just here to support discovery

Perspectives

- ***Data provider***
 - Add more EU geological surveys and research partners
- ***IT***
 - EU Borehole Index entries now around 3 Million (this will grow)
⇒ Need for faster WFS : Studying connexion of GeoServer app-schema with Sol'R index
- ***Having the index indexed by search engines***
 - ⇒ Exposing its content in (Geo)JSON-LD

Thank you

