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## Borehole update: simpleFeature exchange, conceptual UML model

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# Borehole update: simpleFeature exchange, conceptual UML model

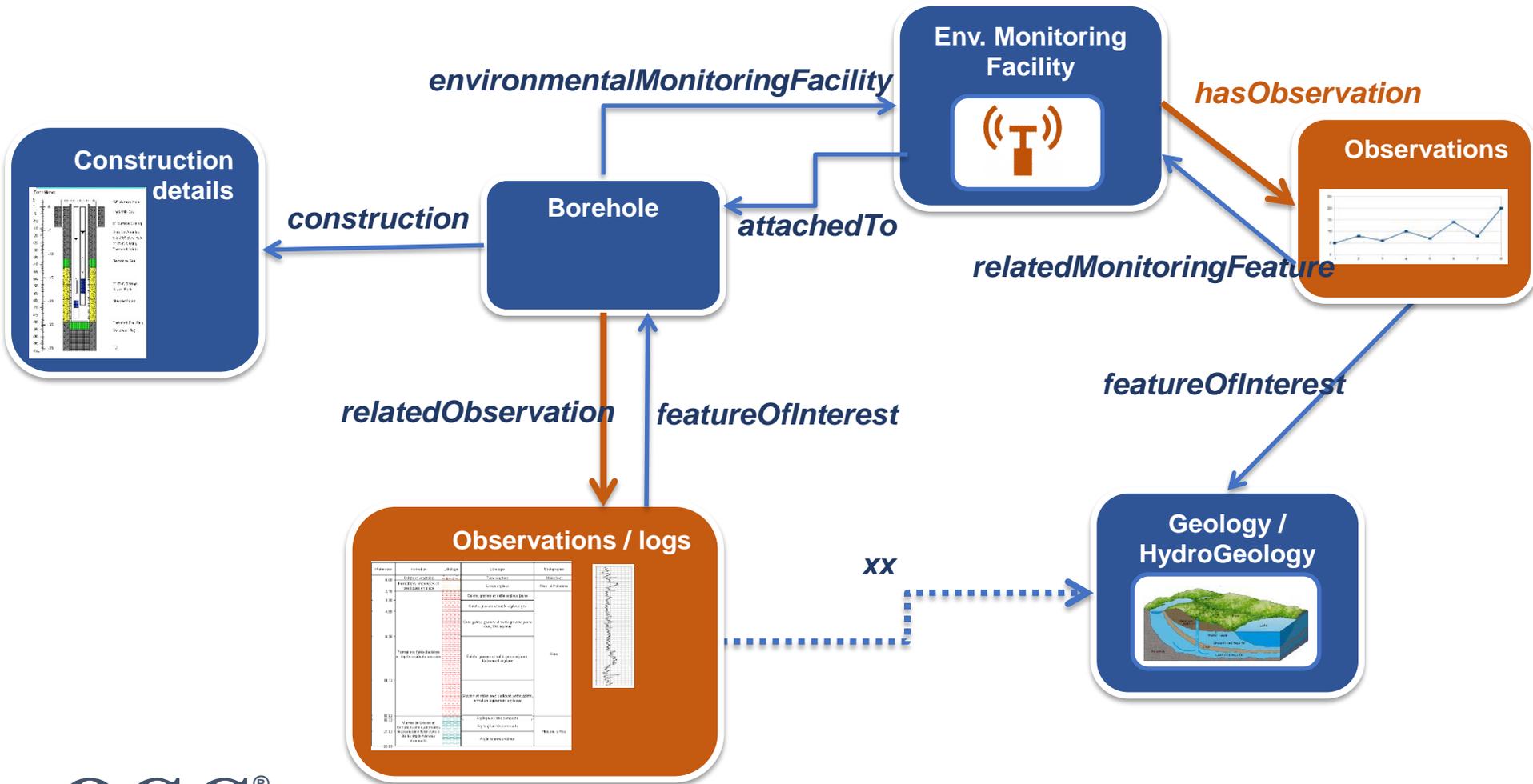
104th OGC Technical Committee – GeoScience DWG session

Southampton, United Kingdom

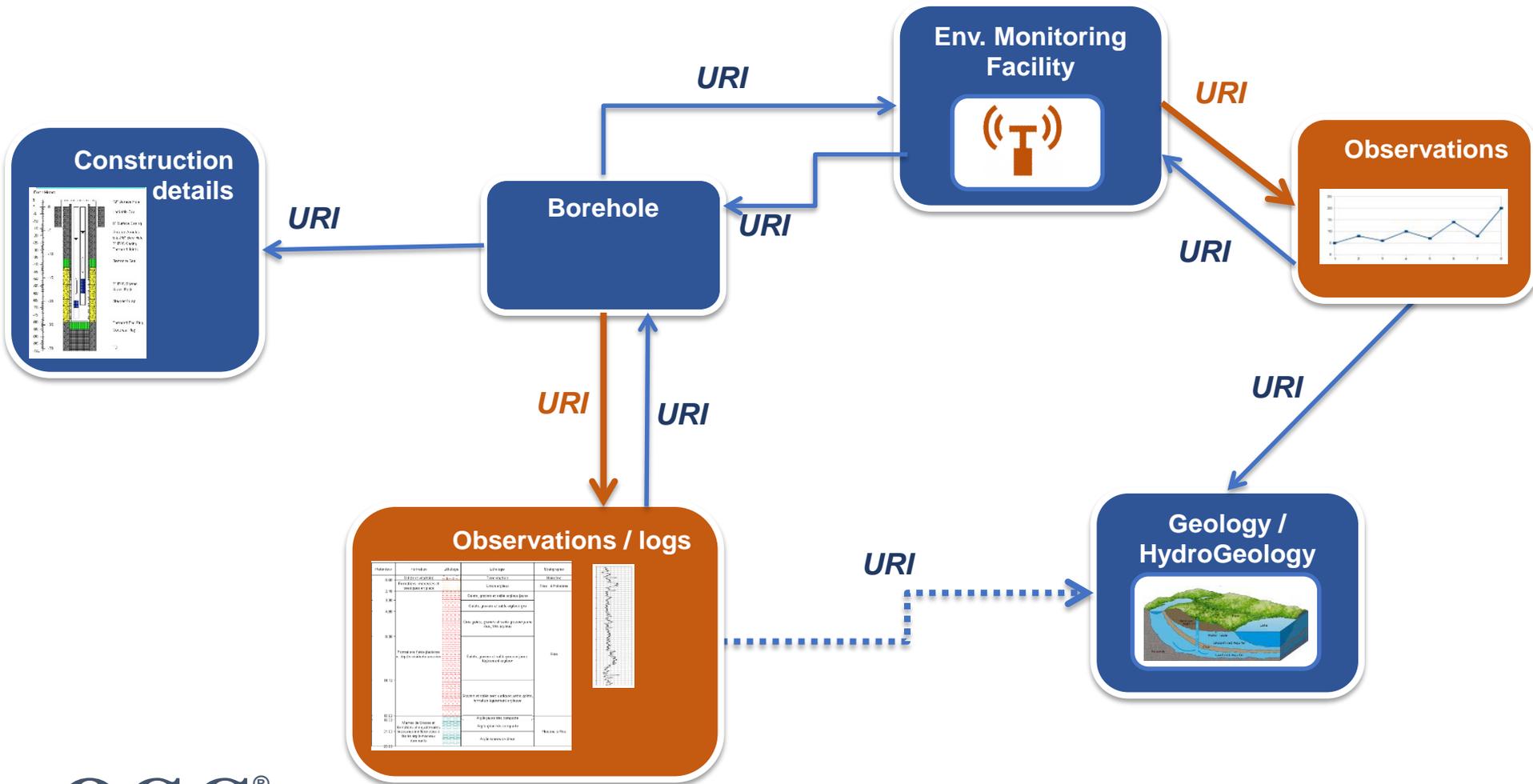
Sylvain Grellet - BRGM

GeoSciML DWG - 12 September 2017

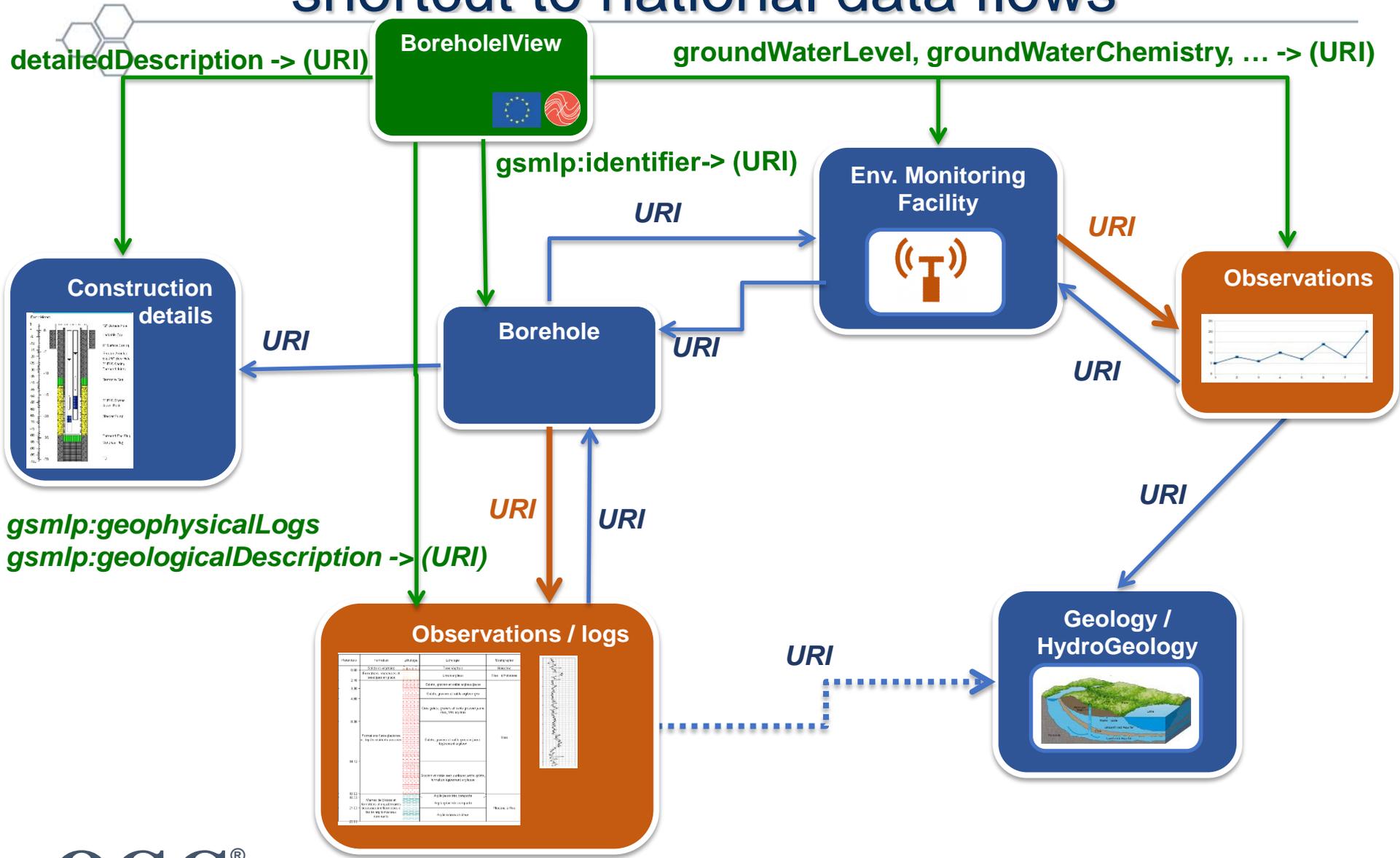
# Borehole in EPOS – Model View



# Borehole in EPOS – Resource View



# Using BoreholeView as an EU Index and shortcut to national data flows





- 
- EPOS Borehole View
  - EPOS Borehole conceptual model

# EPOS BoreholeView

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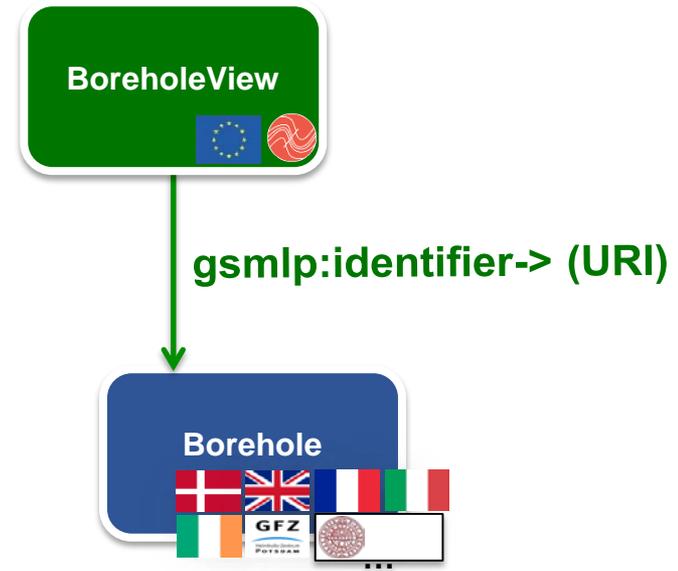
- GeoSciML BoreholeView with Stronger typing (ex : `gml:ReferenceType` for vocabularies,...)
- Adding extra attributes (esp. to support reference to the complex flows)
- Ex [instance](#)

# EPOS BoreholeView

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

# EPOS BoreholeView – use

```
- <wfs:FeatureCollection numberMatched="unknown" numberReturned="1" timeStamp="2017-09-05T07:42:27.003Z" xsi:schemaLocation="http://www.opengis.net/http://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>
- <gsmlp:BoreholeView gml:id="BSS001REWW">
  <gml:description>Borehole description</gml:description>
- <gml:identifier codeSpace="http://www.ietf.org/rfc/rfc2616">
  http://ressource.brgm-rec.fr/data/BoreholeView/BSS001REWW
  </gml:identifier>
  <gml:name>Forage BSS001REWW</gml:name>
- <gsmlp:identifier>
  http://ressource.brgm-rec.fr/data/Borehole/BSS001REWW
  </gsmlp:identifier>
```



*gml:identifier SHALL contain a unique identifier for this BoreholeView representation*

*gsmlp:identifier SHOULD resolve to an internationally agreed complexFeature representation of a Borehole (e.g : Inspire Geology, GeoSciML,...)*



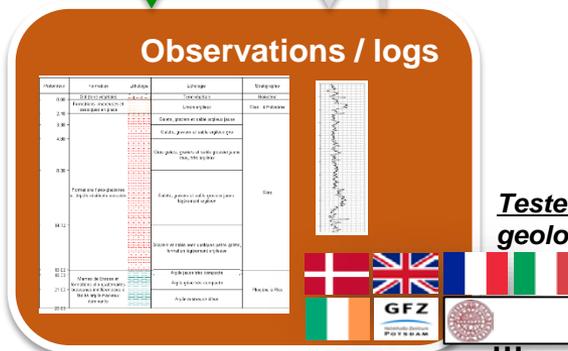
# EPOS BoreholeView – use



*gsmpl:geologicalDescription*  
-> (URI)

URI

URI



**Tested Implementation**  
*geologicalDescription (log) provided using GWML2:GW\_GeologyLogCoverage*

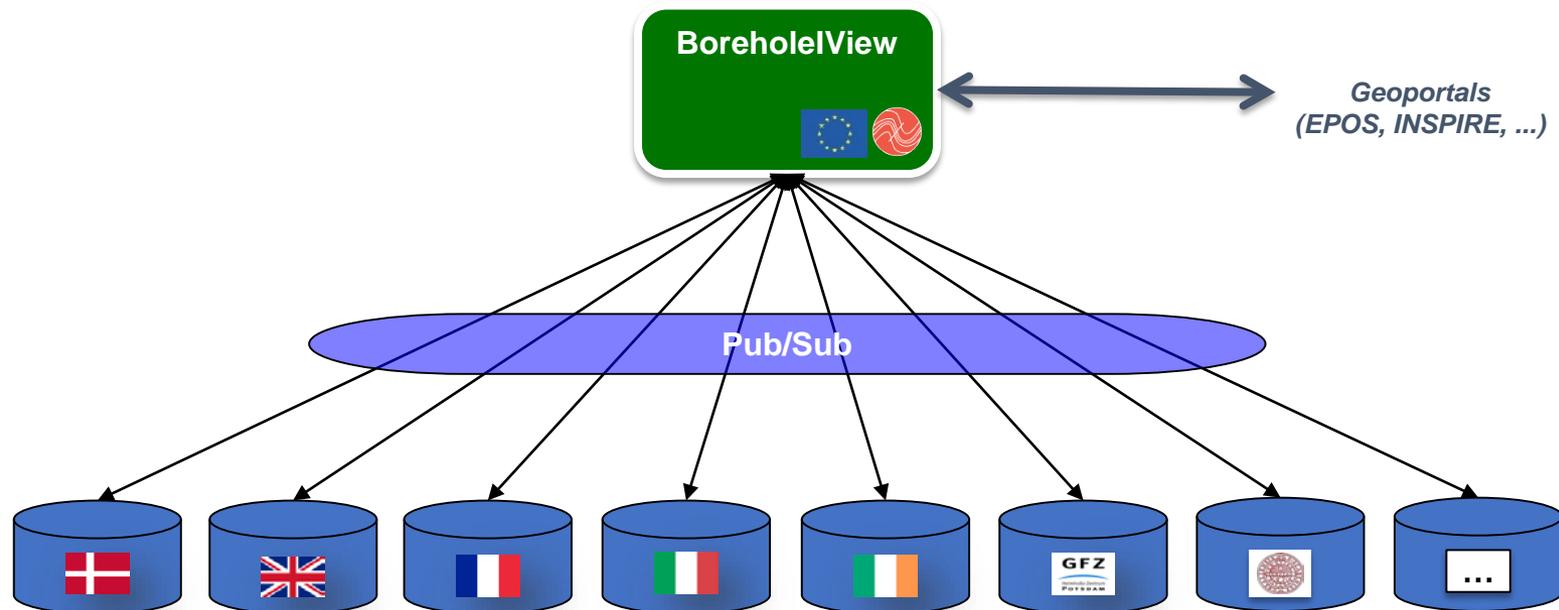
```
<gsmpl:geophysicalLogs xlink:href="http://www.opengis.net/def/nil/OGC/0/unknown" xlink:title="unknown"/>
<gsmpl:geologicalDescription xlink:href="http://ressource.brgm-rec.fr/obs/RawGeologicLogs/BSS001REWW" xli:
<gsmpl:groundWaterLevel xlink:href="http://ressource.brgm-rec.fr/data/Piezometre/06512X003//STREMY.2" xli:
```



# EPOS BoreholeView – feeding the index



- Each institution maintains its Borehole BoreholeView (SF-0) service and underlying complexFeature flows
- Only SF-0 flows are harvested at EU level
- The index is up-to-date thanks to a pub/sub approach



# EPOS BoreholeView – Conclusions

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- Exposing summary Information (SF-0) 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
  - SF-0 just here to support discovery

# EPOS BoreholeView – Conclusions

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- ***Data provider***

- So far: BRGM, GEUS, ISPRA, UU-SE
- Coming: BGS, GSI, GFZ, CGS, GeoZS
- 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
- ⇒ Where is the reference ontology we could point to



- EPOS Borehole View
- EPOS Borehole conceptual model

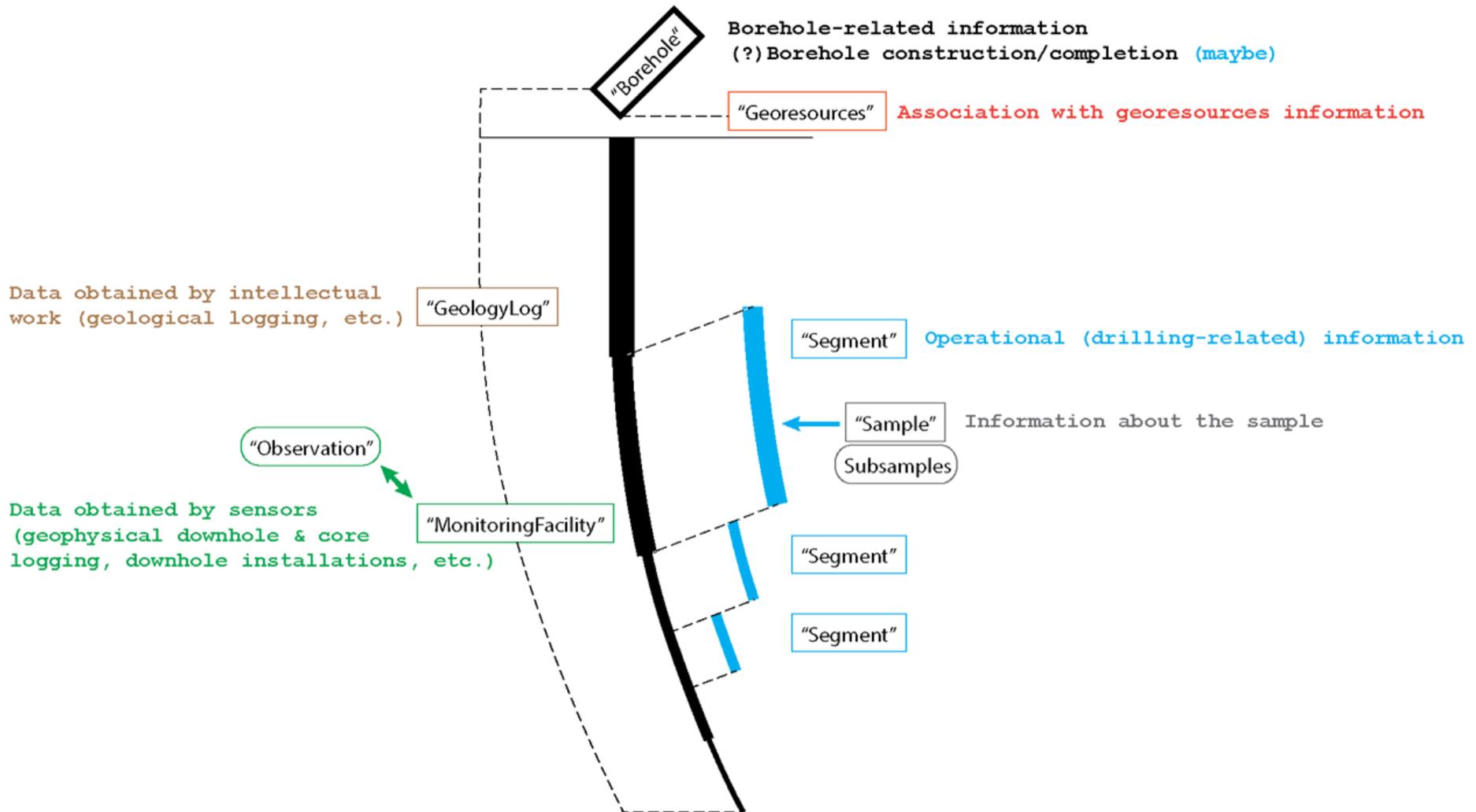
# EPOS Borehole conceptual model

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- To define what should be retrieved from national complexFeature flows
  - ⇒ agree on the semantic
- Bridging the gap between standards
  - ⇒ Map to pre-existing standards (GeoSciML 4.1, GWML2, BoreholeML, INSPIRE:GE)

# EPOS Borehole conceptual model

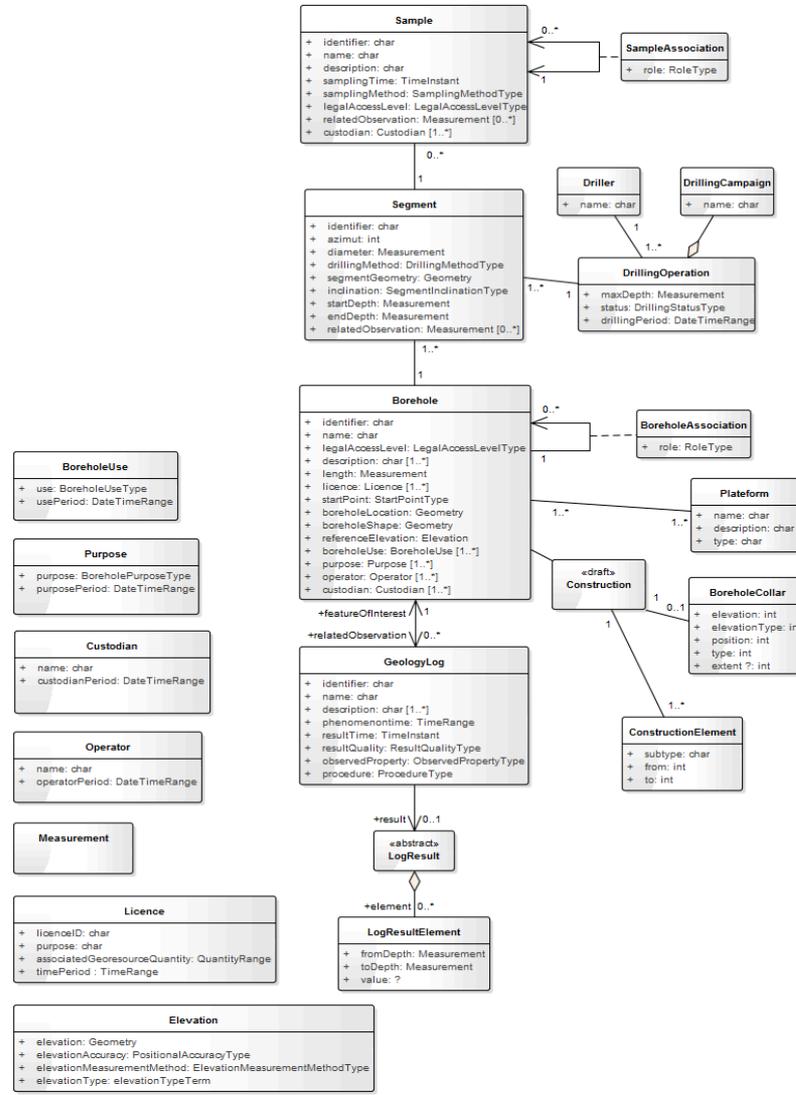


# EPOS Borehole conceptual model

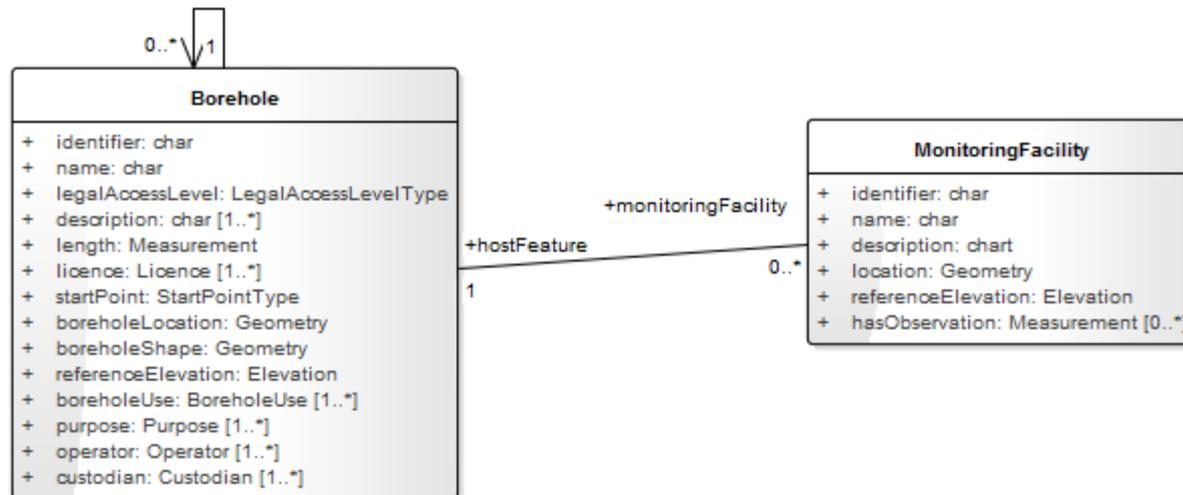


## UML\_Conceptual

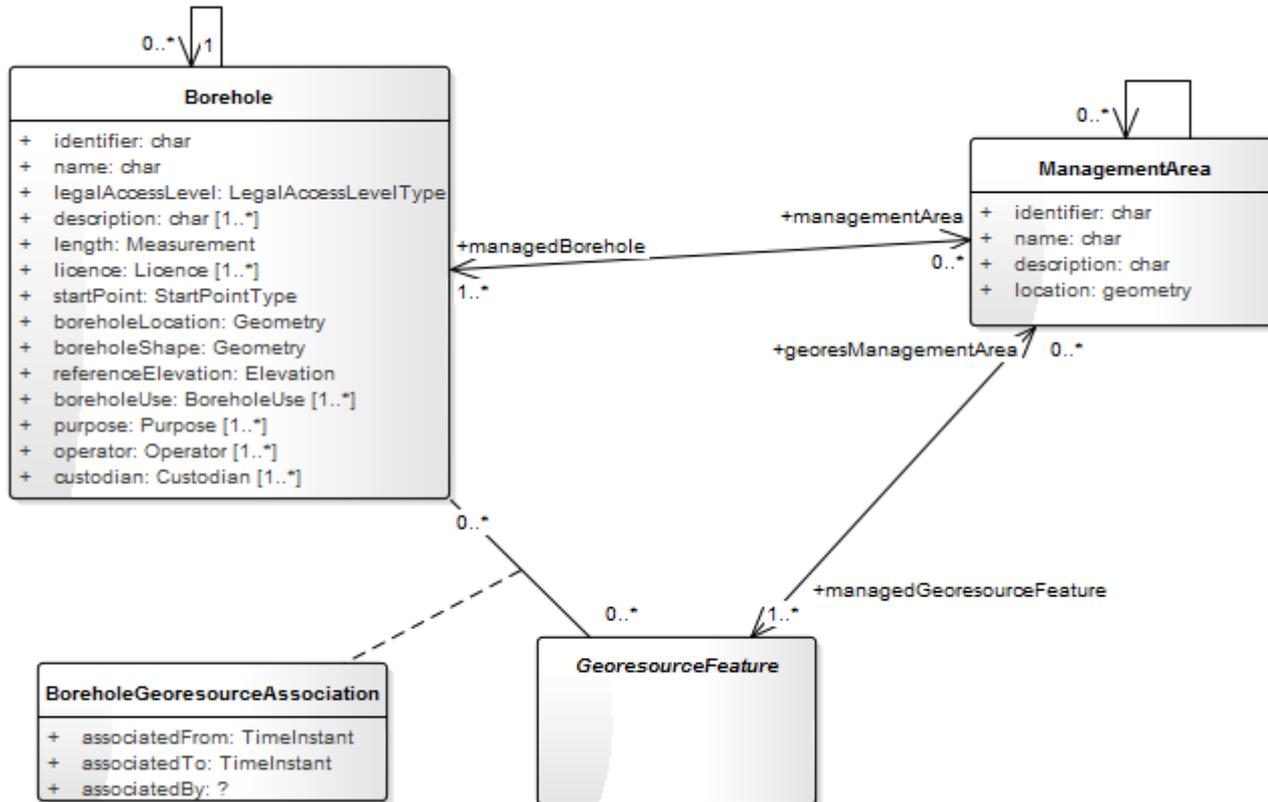
- UML\_Conceptual
  - Borehole\_UML
  - CodeLists
  - ManagementArea-GeoresourceFeature
  - MonitoringFacility / Observation
  - Borehole
  - BoreholeAssociation
  - BoreholeCollar
  - BoreholeGeoresourceAssociation
  - BoreholeUse
  - <draft> Construction
  - ConstructionElement
  - Custodian
  - Driller
  - DrillingCampaign
  - DrillingOperation
  - Elevation
  - GeologyLog
  - GeoresourceFeature
  - Measurement
  - Licence
  - <abstracts> LogResult
  - LogResultElement
  - ManagementArea
  - MonitoringFacility
  - Operator
  - OutOfBandResult
  - Platform
  - Purpose
  - Sample
  - SampleAssociation
  - Segment
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  - <CodeLists> BoreholeUseType
  - <CodeLists> DrillingStatusType
  - <CodeLists> DrillingMethodsType
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  - <CodeLists> ObservedPropertyType
  - <CodeLists> ProcedureType
  - <CodeLists> ResultQualityType
  - <CodeLists> RoleType
  - <CodeLists> SamplingMethodType
  - <CodeLists> SegmentInclinationType



# EPOS Borehole conceptual model



# EPOS Borehole conceptual model



# EPOS Borehole conceptual model – next steps

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- Finish first version of conceptual UML model
  - 90% done. Only GWML2 mapping missing
  - Share it with OGC SWGs (GeoSciML, GWML) for feedback
- Decide on logical model for implementation, then services and code lists
- Logical models
  - Within OGC : GeoSciML4.1 / GWML2 overlap on this.
  - Maybe some clarification is needed
- Implement

# Thanks

