

**Geoscience for our changing Earth** 

# Notes for: Experiences with implementing interoperable WFS 2.0 services

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## Open source software issues

- Open source (and commercial) software often does not implement the 'optional' parts of the old OGC standards e.g. WMS 1.3 – however many of these optional items are mandatory for a serious SDI such as INSPIRE – we helped solve this for MapServer and Geoserver (but Snowflake will not do it at the moment) but the issue continues – WCS 2.0 for INSPIRE needs the same
- newer OGC/ISO standards such as WFS 2.0 are defined as module by module support but nobody declaring this modular support yet – late arriving WFS 2.0 CITE testing facilities?



#### Complexity of querying

Hierarchical dictionaries:

If we want to bring back all units of "Upper Jurassic" age then we also want to retrieve "Kimmeridgian", "Oxfordian" and "Tithonian" age units as the latter time periods belong within the Upper Jurassic period. In FES we have to make the client know about the dictionary hierarchy and explicitly list all the sub-classes of a dictionary term we are querying. In the past we have used a custom user-defined function (available in an old version of Deegree) to allow the client just to specify one dictionary term and the server to work out what the sub-terms are. However, not much software allows defining custom functions like this.

<fes:Filter>

<fes:Or>

<fes:PropertyIsEqualTo>

<fes:ValueReference>gsml:specification/gsmlgu:GeologicUnit/gsml:relatedFeature/gsmlga:GeologicHistory/gsml:relatedFeature/gsmlga:GeologicEvent/gsmlga:OderN amedAge/@xlink:href</fes:ValueReference>

<fes:Literal>http://resource.geosciml.org/classifier/ics/ischart/UpperJurassic</fes:Literal>

</fes:PropertyIsEqualTo>

<fes:PropertyIsEqualTo>

<fes:ValueReference>gsml:specification/gsmlgu:GeologicUnit/gsml:relatedFeature/gsmlga:GeologicHistory/gsml:relatedFeature/gsmlga:GeologicEvent/gsmlga:OderN amedAge/@xlink:href</fes:ValueReference>

<fes:Literal>http://resource.geosciml.org/classifier/ics/ischart/Kimmeridgian</fes:Literal>

</fes:PropertyIsEqualTo>

<fes:PropertyIsEqualTo>

<fes:ValueReference>gsml:specification/gsmlgu:GeologicUnit/gsml:relatedFeature/gsmlga:GeologicHistory/gsml:relatedFeature/gsmlga:GeologicEvent/gsmlga:OderN

amedAge/@xlink:href</fes:ValueReference>

<fes:Literal>http://resource.geosciml.org/classifier/ics/ischart/Oxfordian</fes:Literal>

</fes:PropertyIsEqualTo>

<fes:PropertyIsEqualTo>

<fes:ValueReference>gsml:specification/gsmlgu:GeologicUnit/gsml:relatedFeature/gsmlga:GeologicHistory/gsml:relatedFeature/gsmlga:GeologicEvent/gsmlga:olderN amedAge/@xlink:href</fes:ValueReference>

<fes:Literal>http://resource.geosciml.org/classifier/ics/ischart/Tithonian</fes:Literal>

</fes:PropertyIsEqualTo>

</fes:Or>

</fes:Filter>



### Complexity of querying

1). Numerical ranges:

Originally had a range for the proportion of a geological unit of a certain composition <swe:value>50.0 95.0</swe:value>

However, we can't use FES to check [the standard cannot achieve this]. E.g. When the lower bound is greater than 50% so had to change Schema to have separate lower and upper range values

<gsmlu:lowerValue>50.0</gsmlu:lowerValue> <gsmlu:upperValue>95.0</gsmlu:upperValue>

2). Queries with several conditional parts:

A query like "Find me units which are dominantly chalk (say over 50%)" requires us to query the value of a property in one part of the XML tree dependent on another. *In this case this is just expressible within the limits of FES* but not well supported by (even commercial) WFS software.

<fes:Filter> <fes:PropertyIsGreaterThanOrEqualTo> <fes:ValueReference>

gsml:specification/gsmlgu:GeologicUnit/gsmlgu:composition/gsmlgu:CompositionPart[gsmlgu:material/gsmlem:RockMaterial/gsmlem:lith ology/@xlink:href

= 'http://resource.geosciml.org/classifier/cgi/lithology/chalk']/gsmlgu:proportion/gsmlu:GSML\_QuantityRange/gsmlu:lowerValue </fes:ValueReference>

</fes:ValueReference> <fes:Literal>10.0</fes:Literal> </fes:PropertyIsGreaterThanOrEqualTo> </fes:Filter>

# Complexity of the results

- We don't have generic clients that can process complex (=information rich) features and allow the user to query them.
- An example: we now (having evolved with OGC and INSPIRE to move from URNs to URIs and be 'w3c standard') use Linked Data URIs in xlink:href attributes of properties with categorical values with SKOS/RDF at the end of the URIs. However, we don't currently have any software that can process these and present something usable for a user to understand the term definitions and formulate queries.

