# Use Case:

Publish ontologies to describe spatial data products and the relationships between them.

## Pre-Conditions

A domain model (e.g. HY\_Features) formally defined in UML as an Application Schema using the ISO 19109 General Feature Model and ISO 19100 series defined data types.

Tooling to map an UML Application schema to an OWL class model.

Another UML model or OWL ontology describing the structure of a specific hydrological implementation.

A mapping between elements in these models.

## Post-Conditions

An OWL ontology defining terms used in the target Application Schema.

An OWL ontology defining terms used in one or more related Application Schema.

An OWL ontology defining relationships between elements in the related schema and the target schema.

These ontologies deployed and accessible by dereferencing the URI terms they define.

Convenience APIs to access simplified views of feature types, and mappings between feature types.

## Description

Integrating or interpreting spatial data requires knowledge of data structure (class and attributes), relationships between features, and specialised spatial data types.

UML models (Application Schemas defined using ISO19100 standards) exist for many data products, and can be used to define implementation schemas such as GML encodings for use in Web Service interfaces. Such models may be encoded as OWL class models (given assumptions and the scope of property names), however it is unclear whether a full description of the ISO19100 series base models provides utility at run time. Regardless of UML or OWL expression, a significant challenge exists for a user in that the class inheritance path must be fully traversed to identify inherited properties and constraints.

It is therefore proposed that publishing such as model using OWL be based on:

1. Publishing a minimal OWL class model, using OWL and RDFS native data types where applicable, without dependencies on ISO19100 semantics.
2. Publishing an extended ontology binding this model to relative ISO19100 ontologies
3. Publishing a simplified (e.g. SKOS) ontology that includes explicit properties for all properties inherited from the OWL model
4. Linking ontology terms to alternative expressions, such as HTML documentation, GML schemas, UML artefacts
5. Making these alternative views available by dereferencing the URI terms in the ontology as Linked Data

Having stable, dereferencable identifiers for elements of these ontologies then provides for the key functionality required to discover and use existing web services – the ability to map terminology in use in different systems, implemented in existing platforms such as OGC web services, files and geodatabases, to common concepts.

In particular, heterogeneous data structures relating to similar concepts are common, and often necessary to express different aspects of complex phenomena using simple meta-models – for example the use of watershed geometries to describe hydrological catchments expresses different information than a graph of how these are related topologically.

In order to express how such data sets relate to each other, it is desired to publish a common ontology (as an OWL class model) of feature types and relationships, and a related ontology describing how elements of an alternative data structure relates to this model. Different communities of practice may elect to use different target common ontologies.

(This corresponds to the requirements to publish HY\_Features Part 3 – OWL encoding, and to provide testable transformations for mapping existing data products to the HY\_Features model.)

## Additional Requirements

It is implicit in this Use Case that separate artefacts and governance arrangements are required for each Application Schema, and also for each set of mappings, as such mappings must be able to be described by a third party at any stage.