Creation and Evaluation of an INSPIRE HY Extension

– a Swedish case study

Helen Eriksson, Lantmäteriet, Sweden

Reasons for extending INSPIRE specifications

- A need to provide more detailed and specific information at a national level

- Provide up-to-date, authoritative, interoperable, cross-border geographic information with an European coverage (ELF/ELS)

- Reduce the number of datasets and services at the national level?
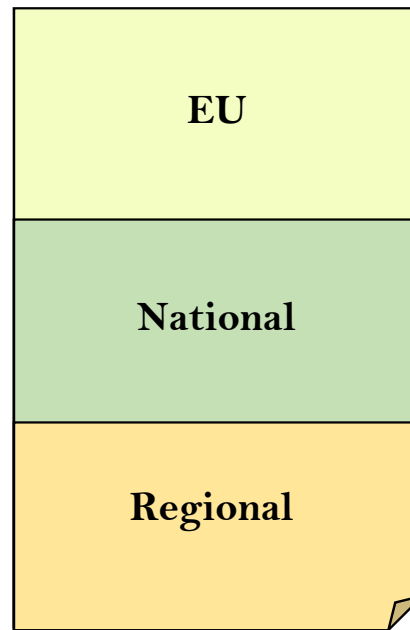
For 34 themes: 102 specifications and 136 network services

Extending INSPIRE specifications

Application schema
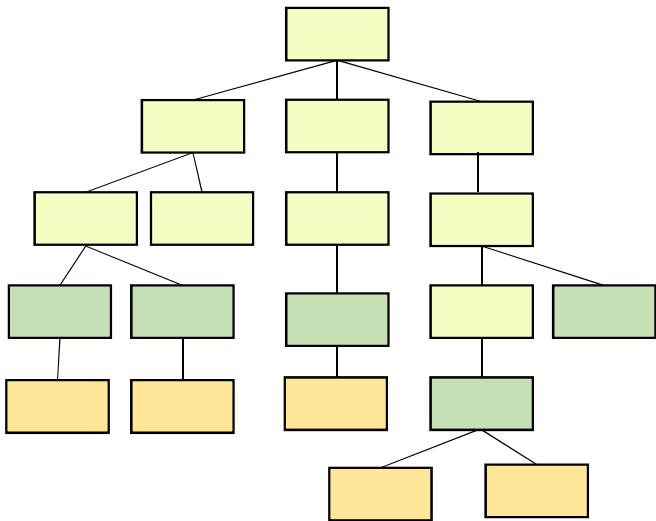
Data specification

Network Services

EU

National

Regional

Download

View
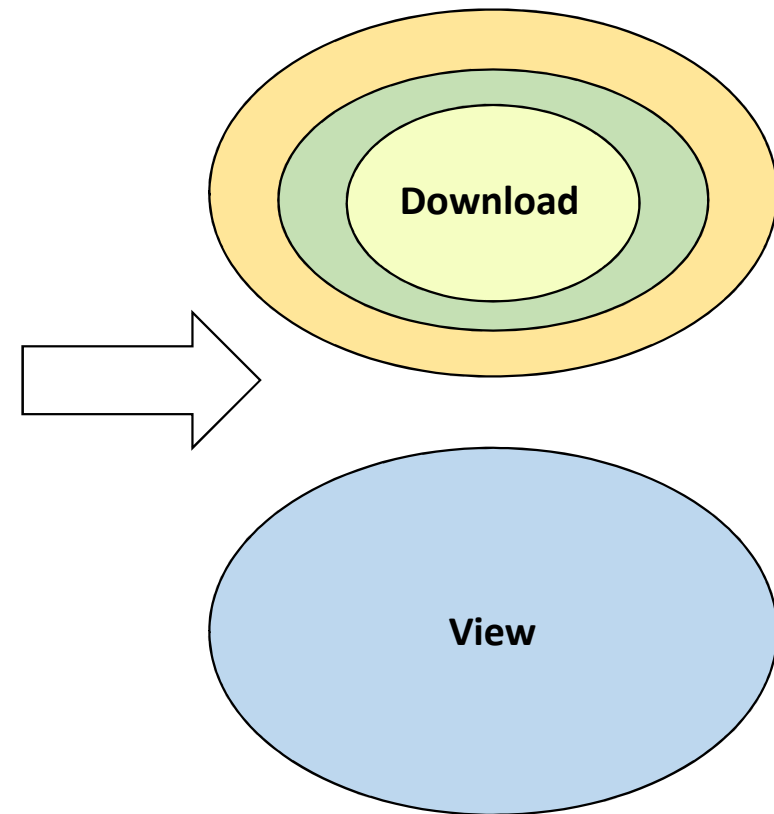
Example from my research

Test:
- Extend the INSPIRE HY data specification with all information from the Swedish Water System Standard (SWSS)

Purpose:
- Evaluate if complex INSPIRE extensions with many new classes, attributes and relations between feature types can be created
- Create a dataset that includes both European and national information
- Evaluate the consequences of INSPIRE extensions, both from a user and a data provider perspective

Method

- Compare – what is included in SWSS but not in INSPIRE HY?

    (44 object types with attributes and relations)
- Create a new application schema in EA and import the application schema from INSPIRE HY
- Add the object types, attributes, relations, data types and code lists from the SWSS
- Transform the UML application schema to an XSD Schema using ShapeChange
- Map data to the XSD Schema and transform it to GML files using Humboldt Hale
- Validate the GML files
- Test the usability of the GML file

Application Schema example
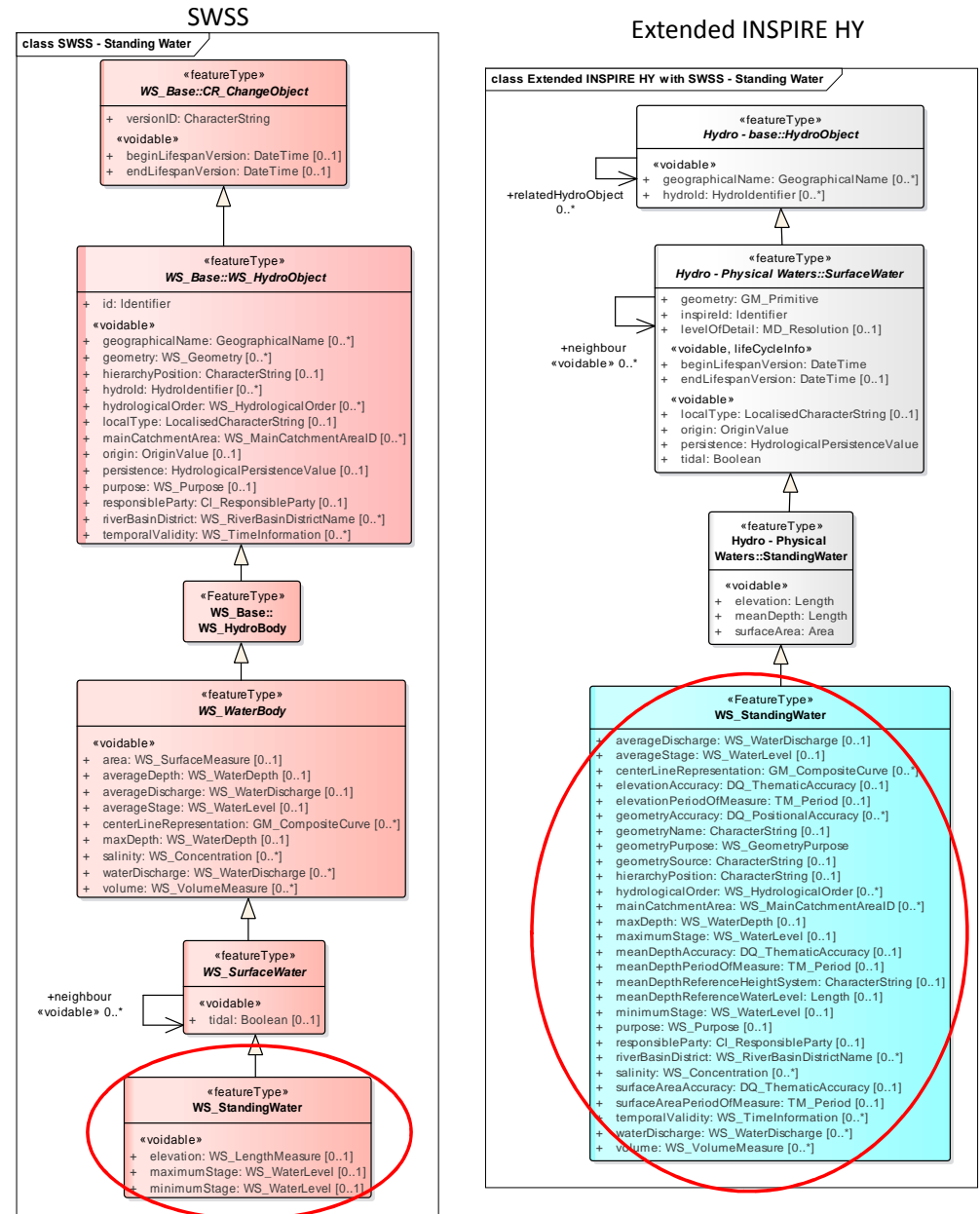
Extension of water bodies:
- INSPIRE HY, light grey
- SWSS, light blue

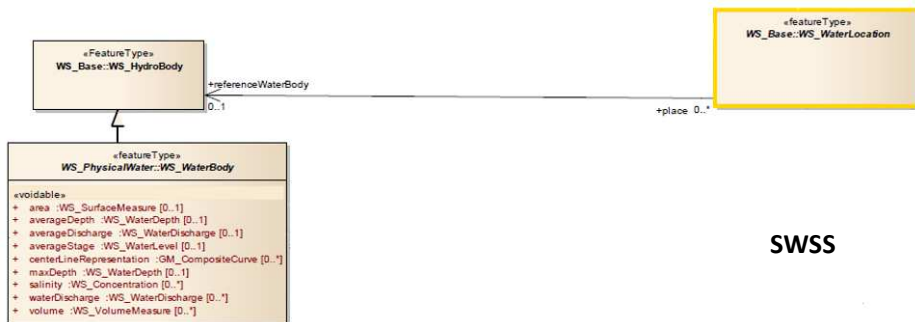SWSS contains both more object types and attributes
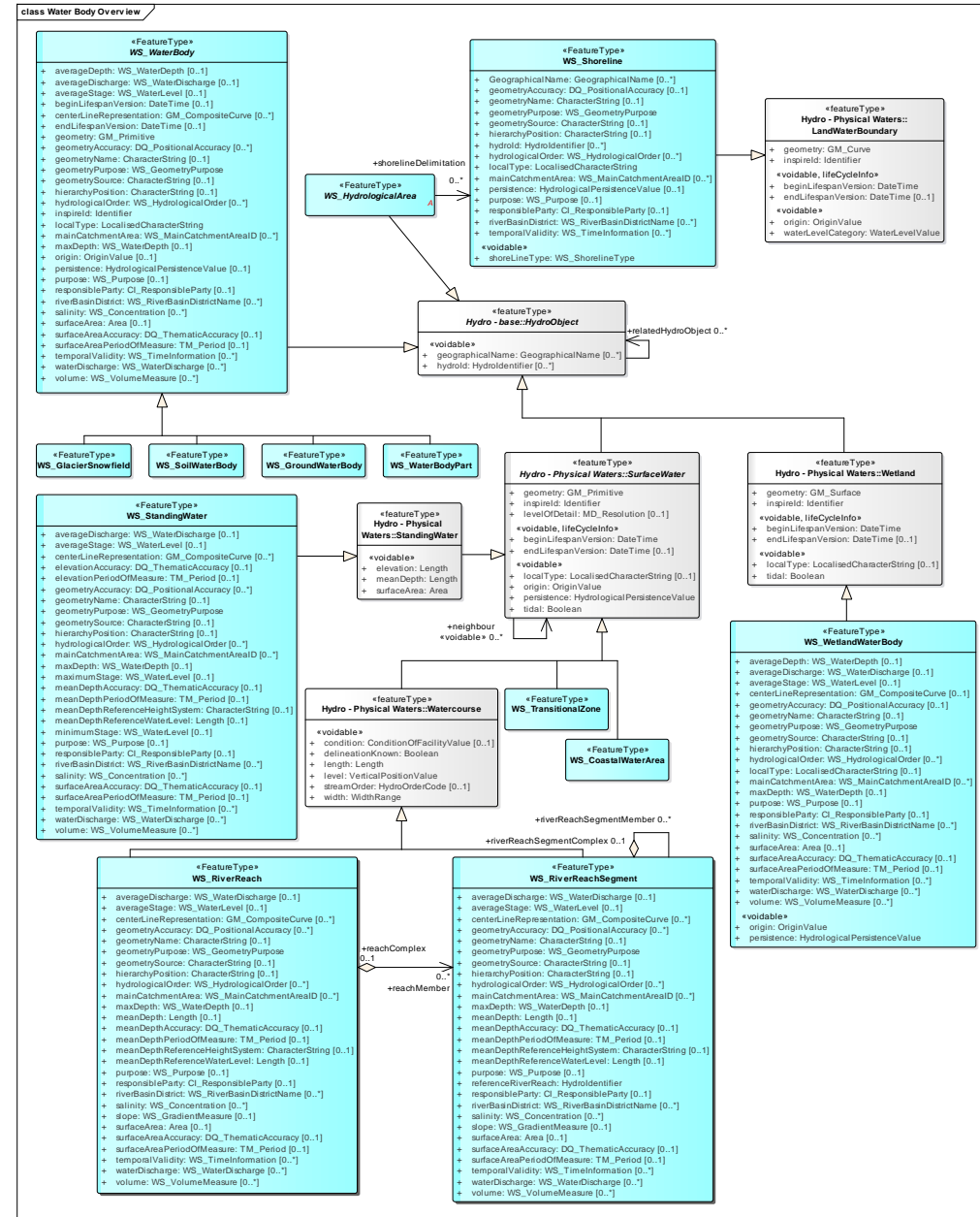
SWSS vs. extended INSPIRE HY in UML

Comparison between the structure of a lake (WS_StandingWater) object in SWSS and the extended INSPIRE HY
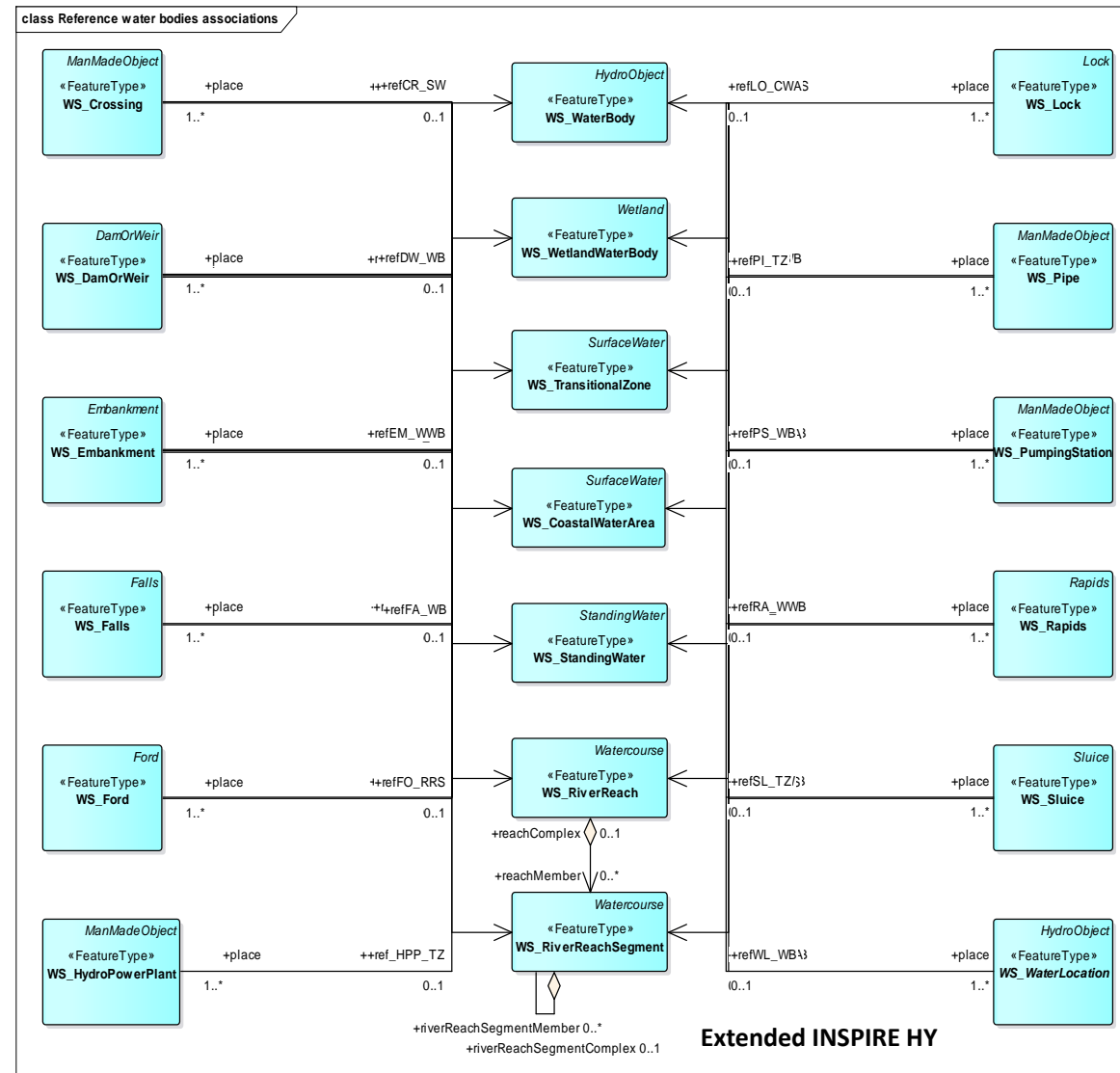
In SWSS the relations are between objects high up in the hierarchical structure (WS_HydroBody and WS_WaterLocation):

SWSS

In the extended INSPIRE HY the relations are between objects at a lower level
(84 relations instead of 1):

Extended INSPIRE HY

Evaluating the extended INSPIRE HY GML files

The evaluation consists of three parts:

- *Quantitative evaluation* – comparison of size, structure etc. of the GML files

- *User-centric usability study* – test case

- *Data provider-centric study* – interviews

Data from *Höje* river catchment area in the southern part of Sweden is used in the evaluation

Quantitative evaluation

- Comparison of file size and no. of attributes for WS_StandingWater

Data Specifications for Standing Water	File size in kB	No. of attributes with values	No. of empty attributes with void reason	Max no. of hierarchical levels for an attribute
INSPIRE HY	1137	20	5	9 (geometry)
SWSS	1166	23	3	11 (geometry)
Extended INSPIRE HY	1599	27	5	8 (levelOfDetail)

- The average file size for **INSPIRE HY** is **60%** of the extended INSPIRE HY and contains **52%** of the attributes

- The average file size for **SWSS** is **85%** of the extended INSPIRE HY and contains **88%** of the attributes

SWSS vs. extended INSPIRE HY in GML

Comparison between the structure of a lake (WS_StandingWater) object in SWSS and the extended INSPIRE HY

SWSS

Extended INSPIRE HY

Data provider centric usability study

Interviews with personnel from the IT and marketing departments at Lantmäteriet:

- How will the transformation and delivery of data be affected if the current download services for INSPIRE HY and the SWSS is replaced with one download service for the extended INSPIRE HY?

- What are the economic consequences of providing the hydrographic data from one instead of two download services?

Hydrographic data delivery at Lantmäteriet

Extracted catchment area

Topologic database

HY

ESRI geodatabase

HY

- Dissolve lakes
- Create logic and geometric networks
- Quality controls

Updated catchment area

Delivery database

DI Hydro DB tables

DI Hydro INSPIRE View

- Change attribute names
- Adapt the temporal information
- Quality controls

FME

FME

FME

INSPIRE HY GML file

Extended INSPIRE HY GML file

GML file

Atom feed

Atom feed

Atom feed

Results – technical point of view
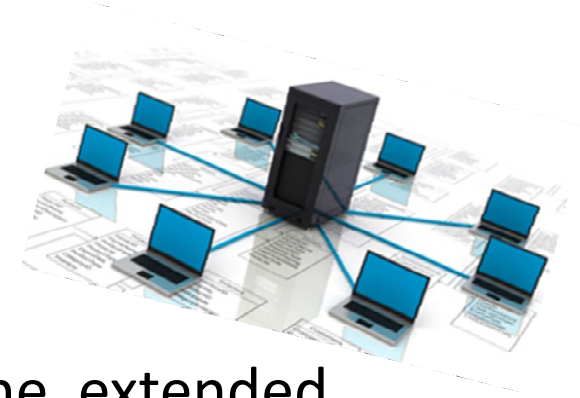
To be able to transform and deliver data according to the extended INSPIRE HY:

- New FME scripts to transform the data to GML must be developed together with a new atom feed description

- Advantage to have one instead of two services from a maintenance perspective

- Updates only twice a year, not much difference in workload between one and two services

Results – marketing point of view

- The cost to develop services is approximately 23.000 EUR for a download and 7700 EUR for a view service

- The yearly maintenance cost is approximately 2050 EUR for download (atom feed) and view services

- From a maintenance perspective there will be less products and product documentation to maintain

- From a marketing perspective it can be better to have different services (than one combined) if the user group is diverse

User-centric usability study – description

Sustainable Flood management and Social networks

- Sub-project: to study social network patterns within and between the municipalities along a river that can be flooded

- Purpose: Which social networks will be used in different flood scenarios
  - The outcomes will facilitate strategies for flood management both within and between municipalities

- My purpose: To get the usability of the extended INSPIRE HY dataset evaluated

User-centric usability study – data

Test area:

- Catchment area of Höje river in southern Sweden

Data:

- Topographical data (from SMHI, Lantmäteriet and the extended INSPIRE HY)
- Soil data
- Land use data
- Demographic data
- Data of flood sensitive infrastructure

User-centric usability study – method

- Topographical data – flow pattern of contributing areas to river discharge and for the modelling of areas prone to fluvial and pluvial flooding

- Soil data – modelling of infiltration

- Land use data – friction of overland flow, regulating the river discharge

- Demographic data – mapping the risks to human health and private property

- Data of flood sensitive infrastructure – analysed with the flood modelling and linked with the owner or responsible agent for the governing organisation

➔Generate results of which social networks that will have to indulge in different flood scenarios.

User-centric usability study – result

- The test case is ongoing
- No results so far…

Conclusions

- It is possible to create complex INSPIRE extensions
- The created UML models are not optimal and can be complicated to maintain
- The structure of the created GML files are similar to the original GML files
- The file sizes of the created GML files are larger, but also includes more attributes than the original GML files

Conclusions, cont.

- It is relatively simple to replace an INSPIRE and a national download service with one extended INSPIRE download service

- There will be one download service less (per theme) to develop and maintain. Difficult to know how much that will be saved.

- From a marketing perspective – better to have several services if the user group is diverse

- From a user perspective???

➔ Always consider to use extended INSPIRE specifications if it is possible

Thank you for your attention!

Questions?