e-NAV12 Information paper

Agenda item 12.1

Task Number

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Developing a Product Specification for Marine Protected Areas

# Summary

This paper describes the experience of the IHO Standardization of Nautical Publications working group (SNPWG) with developing an S-100 conformant product specification for Marine Protected Areas (MPA). This was done by applying S-100 and the nautical publications (NPUBS) data model developed by SNPWG to creating a draft product specification [1] and examples of S-100 based datasets.

## Purpose of the document

This paper is intended as an experience report for information and use by e-NAV 13 WG6 (Data modelling WG) in its discussions.

## Related documents

The documents listed below were prepared by e-NAV working groups at other meetings or by other e-NAV participants/submitters:

1. e-NAV13/29: AtoN Information – Draft product specification.
2. e-NAV12/output/14: Introduction to preparing S-100 product specifications (Draft), 26 Sep. 2012.

# Background

The IHO Hydrographic Services and Standards Committee (HSSC) assigned SNPWG the task of developing a product specification and sample datasets for MPA information. SNPWG used the first version (1.0.0) of the S-100 standard [3] and the nautical publications information model developed by SNPWG to prepare a draft product specification and sample datasets, and used the work to evaluate the S-100 data model and explore the production issues involved in preparing S-100-based data products.

# Discussion

## Stages of work

The stages in the development of the MPA product specification were as follows.

1. Need identification: The need for an independent data product describing marine environmental protection information was identified by discussion in IHO HSSC and its working groups. The task of developing the specification was initially assigned to another working group and transferred to SNPWG after deciding that the product was more aligned with the domain of SNPWG.
2. Scope determination: SNPWG domain experts determined the scope of the product after examining various sources of information, including national legislation and regulations in Germany and the United State and existing online conservation databases such as the World Database on Protected Areas (WDPA). Through discussions and working on narrowing the scope, the decision was to model protected areas specifically.
3. Model development: Appropriate concepts were selected from the NPUBS online feature concept dictionary [2], extended if necessary, and an UML application schema modelling the MPA domain was developed.
   1. Concept selection and definition: The NPUBS feature concept dictionary and catalogue on the SNPWG Wiki already defined the necessary concepts. Concepts from the S-101 (ENC) model were used if available (e.g., “sea area” feature, “name” attribute).
   2. Attribute bindings: The suggested attribute bindings on the SNPWG Wiki were used mostly as-is, except that attributes not needed for MPA (e.g., CATSEA) were excluded. Additional attribute bindings were defined if needed for MPA modeling.
   3. Associations: Only necessary associations were included in the MPA model. Additional associations were added as needed (discovered during the testing phase).
   4. Geometry: Spatial objects for the MPA domain are limited to surfaces, lines, and points, which means that S-100 Level 3a was appropriate. There was a discussion of the need for primitives other than those defined in S-100 (specifically, centre-radius geometry, since some protected areas are legally defined in such terms) but as a workaround centre-radius geometry was modelled as polygons.
   5. Application schema: An application schema in UML was developed using the classes, attributes and associations identified as above.

Multiple iterations involving both domain and information modelling experts were needed for this stage. The concepts, enumerations, feature and information associations, and the application schema were further refined in the mapping, and testing stages.

1. Feature catalogue preparation: An XML version of a machine-readable feature catalogue was created by UKHO (using the beta TSMAD catalogue builder (still under development) and Enterprise Architect data file) and thence a printable (HTML) version of the feature catalogue was generated with XSL transforms.
2. Document compilation and editing: Preparation of the documents embodying of the product specification and data capture and encoding guide started after the application schema was reasonably mature. These documents were prepared based on Part 11 of S-100 and drew on common material from other, earlier, examples of product specifications.
3. Encoding development: The MPA product specification specifies use of GML as the principal encoding. The XML schemas for the GML encoding are documented separately.
4. Testing: The product specification was tested and refined by mapping and converting sample data.
   1. Mapping: Examples selected by SNPWG domain experts were mapped to the application schema’s and feature catalogue’s entity/attribute conceptual model by the domain experts. The process resulted in corrections and refinements of the modelling artefacts (application schema, feature concept dictionary, feature catalogue).
   2. Data conversion: The mapped data was converted from spreadsheets to the GML encoding format by the data conversion team and reviewed by the domain experts. Additional discrepancies in the model and application schema were discovered and corrected in this stage.
5. Framework verification: The work included evaluation of where S-100 met needs and where it did not. Change proposals to S-100 are being prepared, where needs were not met.

Figure 1 shows the workflow.

Determine Scope

Feature Catalogue

Prod Spec and DCEG

Encoding

Testing

Modelling

Identify Need

Application schema

Associations

Attribute bindings

Select concepts

Dataset conversion

Mapping

Sailing Directions, Radio Signals, CFR, SeeSchStrO

XML exchange set

publications, regulations, WDPA

Geometry

**SNPWG**

Refine?

Y

Exit

N

Figure 1. Workflow, MPA product specification development

## Notes

The SNPWG Wiki acted as a substitute for the IHO GI registers.

SNPWG developed examples of MPA symbolisation but this and a portrayal catalogue were not included in this version of the MPA product specification, because in S-100 edition 1.0.0 Part 9 (Portrayal) is currently just a placeholder.

The product delivery and metadata portions of the product specification, and their implementation in the sample datasets, are mostly derived from S-100 and were not customized for MPA. “Update” delivery and encoding were not defined.

Tools exist to generate XML schemas from UML models (exported from Enterprise Architect) but will need adaptation to generate S-100 constructs.

## Lessons learned

Iterative development is needed for the model and encoding – a model/test/refine cycle is appropriate for the application schema and encoding, with testing being done in the form of mapping sample data and conversion of the mapping to sample datasets. Further testing by use in sample applications is recommended, but has not yet been done for the MPA product specification.

# References

1. IHO Geospatial Standard for Marine Protected Areas. Draft 0.0.3. URL: <http://www.iho.int/mtg_docs/com_wg/SNPWG/SNPWG15/SNPWG15-6.5C_MPA-PS_GML-Nov2012.pdf>
2. SNPWG Feature Concept Dictionary development Wiki. URL: <http://www.fuerstenberg-dhg.de/mediawiki/index.php/SNPWG>
3. S-100 – Universal hydrographic data model, IHO Special Publication S-100, International Hydrographic Bureau, Monaco, ed. 1.0.0, January 2010.

# Action requested of the Committee

The Committee is requested to:

1 note this paper