

## Paper for consideration by NIPWG

## Context Features for Nautical Information

<b>Submitted by:</b>	Jeppesen/BSH
<b>Executive Summary:</b>	Describes the criteria for selecting context feature for Nautical Information data products.
<b>Related Documents:</b>	(1) SNPWG letter 03/2013 (Annex 3); (2) SNPWG letter 01/2015; (3) Draft S-122 DCEG [SNPWG Wiki].
<b>Related Projects:</b>	(1) S-122 and other NIPWG product specifications

## 1 Introduction/Background

Since even S-100 Edition 2.0.0 does not provide appropriate techniques for the integration or interoperability of datasets of different kinds (i.e., different product specifications), the SNPWG discussed which context features would be needed to provide a geo-referential charted background to the MPA Product Specification. A set of context features would also be needed if the MPA products would be provided as stand-alone products and probably, on devices other than ECDIS. The discussion was expanded from context features for S-122 to context features for all NPUBS product specifications.

SNPWG Letter 03/2013 (Annex 3) listed a set of candidate context features for the MPA (S-122) product specification. An updated set was later posted on the SNPWG Wiki and members requested to review it in SNPWG letter 01/2015. Responses to this letter focused on the avoidance of the duplication of features in different themes and of the addition of missing features. This paper attempts to address concerns raised in the responses. It also provides, in the form of an accompanying matrix, selection criteria for context features and further details which are difficult to express graphically in the diagrams on the SNPWG/NIPWG Wiki.

## 2 Analysis/Discussion

In the following discussion, the “core” feature types are those defined in the application schema for the overlay version of the product, i.e. the set of feature types directly relevant for the data product. E.g., for S-122 (MPA) the “core” features are Marine Protected Area, Traffic Control Area, and Restricted Area.

### 2.1 Context Themes

The basic question is exactly what “context” is needed for a data product. Answers allow us to define useful “context themes”. The S-101 grouping of features may be a starting point, but need not be definitive for NPUBS. The criteria identified for “context” themes include:

- Provide a portrayal context for data (e.g., support correct portrayal – e.g., if portrayal rules depend use features not in the “core set”).
- Provide physical, topographic, operational, thematic, legal, or administrative context for “core” information.

The table that follows lists the themes identified to date. The themes are loosely based on the divisions in the S-101 DCEG. Themes may not be relevant to all data products, except skin of the earth and possibly additional topography.

Theme	Description
Skin of the earth	Geographic features that create a complete non-overlapping coverage of the area of data coverage of an ENC dataset [S-101 DCEG, adapted]. As context features, they provide topographic context and distinguish land/sea areas.
Additional Topography	Physical features that add relevant topographic detail or provide visual context to core features, or can be used to situate yourself. E.g., Land Area features (points) which are not skin of the earth features; Coastline features (demarcate the land/sea border).

	S-101 requires that the limits of a Land Area of type surface must share the geometry of certain physical features (5.4.1, S-101 DCEG).
Landmarks	Prominent features useful for position-fixing or location awareness, either of the vessel or other features.
Offshore installations	Structures or equipment, either permanent or semi-permanent. May be used for navigational marks or for situating vessels or other features. Generally intended for production or extraction of a material, natural resource, product, or electrical power. Some installations such as moorings, or NCCBs (navigational, communication and control buoys) may have a navigation purpose.
Administrative and Legal	Administrative and legal context, e.g., indicating which coastal State exercises overall control over the geographic location of a core feature.
Bathymetry	Bathymetric context in or around core features.
Environmental features	Additional thematic context, e.g., research areas or animal sanctuary. May be used for features that are not part of the dataset but indirectly related to features in it.
Marks	Physical and operational context for core features. E.g., if the boundaries of protected areas are sometimes marked, it is useful for mariners to know what marks are used and where they are located
Operational	Any information that is relevant to the operation or passage of craft, but is not described by a core feature. E.g., camping sites, landing/launching places for boats; restricted areas which are restricted for reasons not relevant to the core set.

Certain subsets of S-101 features have been omitted since they are either not expected to be useful as context, or expected to be core features in NPUBS or other datasets:

- Cultural features – Building (single) and built up areas will be considered for Additional Topography, other features are not anticipated to be useful for context.
- Port facilities – probable core features in the planned Harbour Infrastructure product specification.
- Tides and currents – probable core features in S-111 and other product specifications related to tides and currents.
- Tracks and routes – most or all will be core features in S-127
- Radio services – most or all will be core features in S-124.
- Services – pilotage, VTS, harbour facilities, signal, warning, and coast guard stations –probable core features in Navigational Services, Harbour Infrastructure, and other planned product specifications.

## 2.2 Feature selection

Once a theme has been identified, the question is how features from the ENC can be filtered. Examples of the filtering criteria in the current matrix are:

- Spatial relevance – e.g., overlap and proximity to “core” feature types.
- Thematic relevance – e.g., only the navigation aids (if any) demarcating a “core feature”. This may involve filtering based on attribute value, e.g., for S-122, **Vegetation** with *CATVEG* = 7 (mangroves) or 21 (mangrove tree).
- Coverage – e.g., skin of the earth features to differentiate land and sea.

In general it may be necessary to add associated or aggregated features needed for correct portrayal; or coincidental features, if used for the same reason.

Filter criteria must obviously be documented in the product specification (DCEG or a “context scope” in the main part of the product specification).

Feature types may be present in different themes for the following reasons:

- Different primitives or attribute values: E.g., S-101 defines only LandArea with surface geometry as being skin of the earth, so LandArea with point primitives may appear in other themes.
- Associations: S-101 uses IslandGroup for naming island groups, though IslandGroup is not intrinsically skin of the earth it may appear with LandAreas which are skin of the earth features.

- “General-purpose” features: Restricted Area, for example, may be relevant to multiple themes or be restricted for different reasons. S-101 also defines the feature Sea Area/Named Water Area to encode name and type of part of the sea or navigable waters.

## 2.3 Spatial primitives

The boundaries of polygons are often designed by a human based on cartographic considerations rather than distinct physical identity, e.g., the boundaries of Depth Area polygons are often at depth contours made by a cartographer. Nautical publications data is expected to be scale-independent. Datasets should therefore use features at the best scale and with minimal cartographic alteration.

## 2.4 Attributes and associations

The thematic attributes bound to a context feature need not be all the attributes of the feature as defined in S-101. Only necessary attributes, e.g., those attributes which drive the portrayal of those context features should be mandatory. On the other hand, efficiency needs to be considered.

Question: Are there criteria for “necessity” other than portrayal?

## 2.5 Documenting context features

The most efficient method for documenting context features remains to be determined. Possibilities:

- In each product specification, define a “context scope” and define an application schema & feature catalogue for the context features.
- Define a standard set of context features, sub-divided in to themes and let each product specification include the themes needed for that product specification. Appropriate exclusions and additions will be allowed – if the standard set is properly defined there should not be too many of these in any single product specification.

## 2.6 Context feature sets for individual product specifications

The accompanying matrix lists feature types and selection criteria for some NIPWG product specifications.

## 3 Recommendations

NPUBS product specifications should be written to allow for context features where appropriate. The working group should address whether a standard set of context themes can be defined to cover most or all NPUBS product specifications.

## 4 Justification and Impacts

Justification: Context is needed for NPUBS data products which may be used as standalone datasets.

Impacts: A limit amount of additional work for NIPWG product specifications development will be needed, mainly in application schemas, portrayal catalogues, and compilation of exchange sets. The preparation of standalone datasets will involve more effort than overlay datasets to add the context features, including extraction from S-57 or S-101 data or feature databases and additional processing to prepare suitable geometry.

## 5 Additional References

[HSSC6] List of S-100 based product specifications of which the development is under the NIPWG responsibility according to 6th HSSC Meeting, November 2014.

S-122 Marine Protected Area

S-123 Radio Services

S-125 Navigational Services

S-126 Physical Environment

S-127 Traffic Management

## **6 Actions Requested**

The NIPWG is invited to:

- review and comment on the accompanying matrix of NIPWG1 product specifications, context features and selection criteria;
- review and comment on the provisional set of context themes listed in this paper.