

Information Paper for Consideration by HSSC11

Provision of product specification description to seek HSSC endorsement to continue the development

Submitted by:	Canada, SCUFN, UFNPT, IHO
Executive Summary:	Request of a product specification number for Undersea Feature Names.
Related Documents:	IHO Guideline Standard for Crating S-100 Product Specifications Part A and Part B, B-6, Report of SCUFN31
Related Projects:	GEBCO Technical Sub-Committee on Ocean Mapping (TSCOM) and Sub-Committee on Regional Undersea Mapping (SCRUM)

Introduction / Background

Through their Standing Committee on Undersea Feature Names (SCUFN), the General Bathymetric Chart of the Oceans (GEBCO) Guiding Committee gave three main objectives to the Undersea Feature Naming Project Team (UFNPT). The main objective concerning this proposal is to “Consider the development of an S-100 Product Specification for Undersea Feature Names and Register SCUFN terms in the IHO GI Registry”.

The purpose of this paper is to propose a new instance specification to HSSC, for their acceptance. The following ‘Analysis/Discussion’ section outlines the proposal by responding to the questions posed in the standardized proposal form.

Analysis/Discussion

1. Has the need for the product specification proposed been documented?
Yes, the GEBCO Guiding Committee has tasked the UFNPT with the development of an S-100 Product Specification for Undersea Feature Names and Register SCUFN terms in the IHO GI Registry
2. Has a compelling need been demonstrated?
Yes, the UFNPT conducted a test case extending the current Sea Area feature in S-101. The requirements of creating sub-types out of some of the 49 feature types (or generic terms) will create a very complex Sea Area feature. What is needed is an ISO 19135 compliant Instance Specification for the GEBCO database to be S-100 compatible (the Producer Codes register is an example of an instance register). Another one is required for named items.
3. Has the product specification considered being within the scope of HSSC?
The owner of the Instance Specification for Undersea Feature Names (UFN) would likely be GEBCO, through the Standing Committee on Undersea Feature Names (SCUFN). Although this information might not be essential to navigation safety (S-10X), and doesn’t set the limits of administrative zones (S-12X), it would fit into a new category (S-13X) that could be considered within the scope of HSSC.

4. Has the analysis of the product specification sufficiently addressed the cost to the IHO and possible legislative and administrative burdens?
Aligning the existing gazetteers to the new S-100 standard in development is inevitable. The costs of not doing so, would still need to be quantified.

5. Has the development duration considered?
The initial development is underway (see Annex 1) Additional improvements will be made as the definitions of the 40+ generic terms for undersea feature naming, and their potential sub-types, are identified. An estimate of the duration has not been calculated at this time.

Product Specification description		
Action	Description	Comments
Product Specification number	The intended number for this product specification	S-13X
Title	The title of the product specification	Undersea Feature Names
Abstract	A brief summary of the data product	Instance Specification for UFN Gazetteers
Purpose	Summary for the intention of how the product specification will be used	GEBCO and National Gazetteers are recognized as the authoritative source of UF descriptions and their names. As S-100 is further developed, the UFNs to be included in S-100 compatible products will be also be aligned to S-100
Specification Intention	The intended use of the specification— what the data does and the expected functionality of whatever uses it	Instance register of S-100 compliant UF
Product Specification Scope	The overall scope of the specification	GEBCO Gazetteer
Justification	The reason why this product specification should be developed	GEBCO Gazetteer is not S-100 compliant yet
Specification Interoperability	Any interoperability with other product specifications within the S-100 family	Pending the further development of the specification
S-98 Applicability	Applicable to S-98 (Yes or No)	pending
Cooperation with other HSSC WGs	Specify which WG will be involved to which extend	S-100 WG, to determine the future of Sea Area feature
Budget	Statement of budget need and the figure	Estimates pending
Schedule	Description of the intended time frame	Estimate pending

Conclusions

The UFNPT and SCUFN have a common understanding of the expectations and the deliverables.

Action Required of HSSC11

The HSSC11 is invited to consider this request, and take any other actions that HSSC would deem necessary to advance the development of the S-100 compliant specification for UFN.

IHO S-100 Product Specification Development Process And UFN Application Schema (draft)

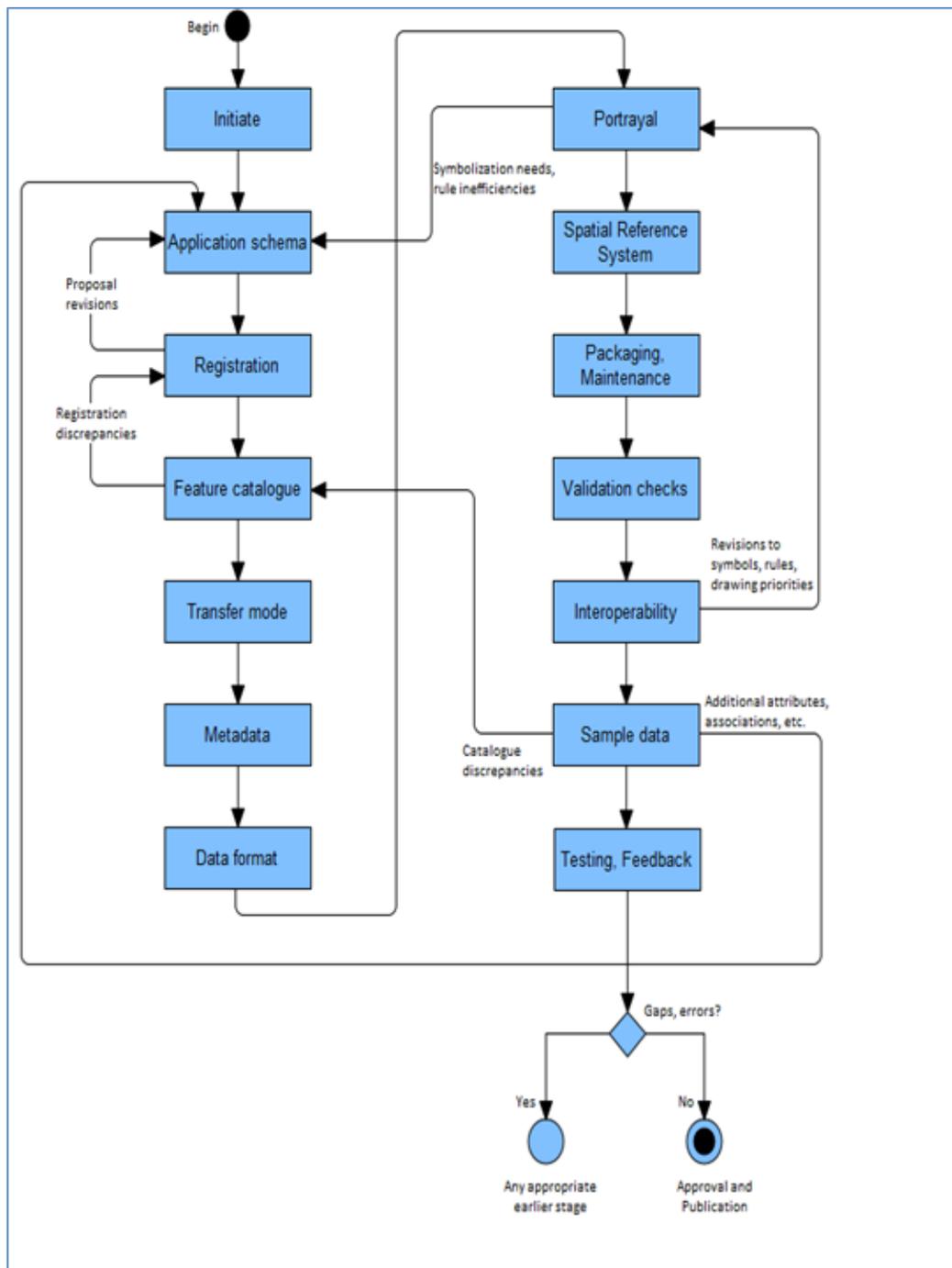
11 February 2019

1) IHO S-100 Product Specification Development Process

- S-100 extends the scope of the existing S-57 *Hydrographic Transfer Standard for Digital Hydrographic Data*. Unlike S-57, S-100 is inherently more flexible and makes provision for such things as the use of imagery and gridded data types, enhanced metadata and multiple encoding formats. It also provides a more flexible and dynamic maintenance regime via a dedicated on-line registry.
- S-100 provides the data framework for the development of the next generation of ENC products, as well as other related digital products required by the hydrographic, maritime and GIS communities.
- S-100 consists of 13 elements that are required for standard producers to construct the hydrographic field product specification.
- Each standard element is composed of items to be included in the product specification, electronic format, quality of the data, symbol representation method on the map and the metadata used on services.
- The guideline consists of two main parts.
- Part A provides an in-depth description of the various components of an S-100-based product specification.

ication, and Part B describes the typical steps and activities involved in creating an S-100 based product specification (Doc. S-100WG3-5.3.1, 5.3.2).

(https://www.iho.int/mtg_docs/com_wg/S-100WG/S-100WG3/S-100WG3_Docs.htm.)

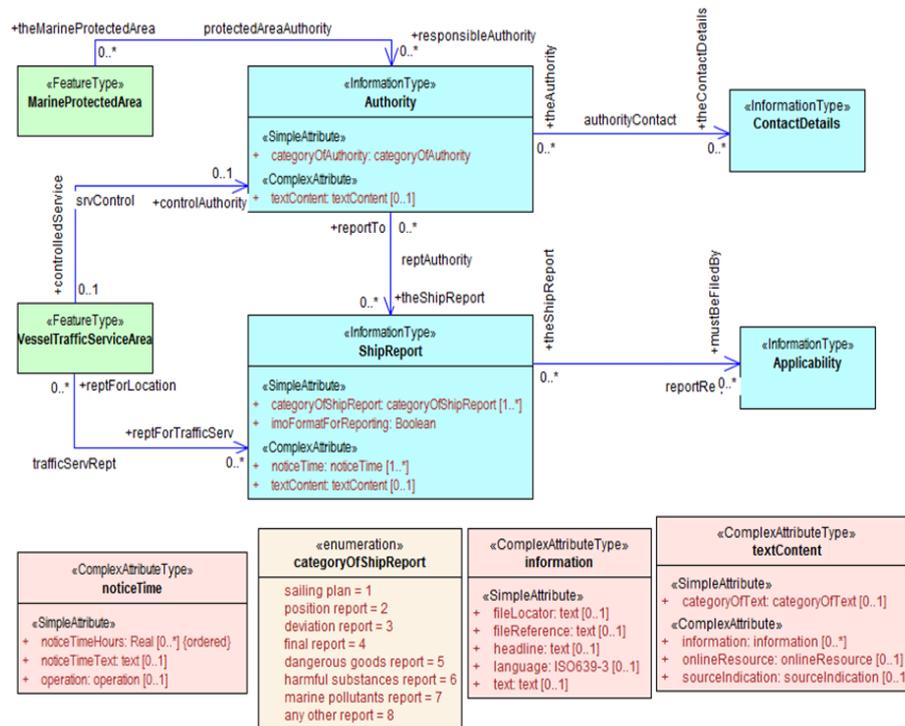


○ Initiation

- First, we need to identify a need for data products to develop the product specification, and we need to make sure that existing product specification can be extended.
- If you want to develop a new product specification, it is necessary to define the product requirements, scope, and constraints.

○ Application Schema

- The application schema as defined in S-100 is usually synonymous with “domain model” as the latter term is used in information modelling. It is a specification of the classes, attributes, and relationships relevant to the data product.
- When designing the application schema for a product specification, first determine whether the data product is coverage or vector data, and identify the concepts in the application domain.
- The application domain is a field that is appropriate for a given data product in a variety of fields. After the application domain is identified, search for existing concepts (classes, attributes, and relationships) in the registry which can be re-used.
- If re-use is not possible, the feature type, information type, and attribute and relationship to be included in the data product should be defined through sufficient discussion with stakeholder groups.
- S-100 refers to the ISO 19100 series for converting real-world information into a geographical data model and uses the conceptual diagram language UML (Unified Modelling Language).



○ Registration

- The IHO is operating the IHO GI Registry that can store various registries of related hydrographic information such as feature data dictionary, data type, and metadata.
- S-100 is managed by registering items such as feature type and information type included in the designed data model into the S-100 GI registry.
- It is recommended that at least one member of the project team or working group be a submitting organization.
- If existing classes and attributes need to be modified, submitting organizations propose changes and additions to the contents of Registers. If you register new classes and attributes, use the IHO Registry interface to add new classes and attributes should be proposed.
- Procedures for registration are explained in S-99.

○ Feature Catalogue

- The feature catalogue should be documented by a text-based documentation of their contents, which organize features and attributes that conceptually classify real-world feature.
- The creation of feature catalogue is done by domain experts in the field in which the product specification is to be developed.
- The domain experts can create feature catalogues based on the feature catalogue data model and the feature catalogue XML schema of S-100.

○ Transfer Mode

- Determine whether data products are to be delivered as data files contained in transfer (exchange) sets by web services (and if so, identify or outline a service protocol) or e-mail and determine whether data is to be delivered in real or near real-time.
- Identify constraints and requirements arising from delivery mechanisms and communication constraints such as message size, bandwidth limitations, availability of communications to customers, licensing and payments, encryption, etc.

○ Metadata

- When producing and supplying S-100, you need to configure the exchange set of the folder structure and create XML formatted metadata describing each file (such as GML, XML, catalog, additional image) constituting the exchange set.
- The minimum metadata requirements are set forth in Part 4 of S-100 (Appendix 4a-D for vector data, Parts 4b/8 for coverage data).
- Product specification developers should consider whether the metadata elements listed in S-100 are relevant to the data product and which of them are appropriate for its allowed packaging and delivery methods.

- If additional metadata elements are needed they should be documented in the product specification Metadata section and extensions to the standard metadata schemas developed using the standard ISO extension mechanism.
- IHO metadata XML schemas for exchange catalogues and discovery metadata have been developed and are available at the IHO software distribution site (<https://github.com/IHO-S100WG>).

○ Data Format

- The encoding format should be defined for product delivery and provision and should be selected based on the type of product and other requirements, including production and processing.
- The characteristics of the three standard data formats included in S-100 Edition 3.0.0 are summarized below for convenience.
- GML format will require definition of XSD files encapsulating the S-100 application schema as XSD files conforming to the GML specification (ISO 19136 and S-100 Part 10b).

	ISO 8211	GML	HDF5
Type of product to which suited	Nautical charts and feature-heavy vector data	Nautical publications and information-heavy vector data; discrete weather information; small datasets such as marine safety information; data delivered via messages and web services	Coverage-based data

Generic data format	Yes	Yes	Yes
Data production complexity	Requires custom tools	Can be produced with a range of tools from text editors to custom apps and database SQL queries	Custom apps that use off-the-shelf libraries
Processing complexity	High	Low	High
Supporting off-the-shelf software	Not much	Off-the-shelf viewers and server software; can be viewed with ordinary text editors	Off-the-shelf viewer
Data volumes	High	Low	High
Type of data	Vector	Vector; coverage schemas are defined in the GML specification but not used in S-100	Gridded
Supporting artifacts needed in product specifications	Feature catalogue	XML schemas for data validation; datasets can be processed by apps without XML schemas; self-documented format (tags indicate objects and attributes); Feature catalogue optional	Embedded object and attribute tags; feature catalogue optional

○ Portrayal

- Determining rules for creating a display from symbols and data products to be used for rendering for features generated through the data model, and creating a description catalogue.
- It should be defined for pictorial representations of symbols and colors, including recommendations and specifications for the use of symbols.

○ Spatial Reference System

- This part defines the conceptual schema for the description of spatial referencing by coordinates. It describes the minimum data required to define a one, two and three dimensional spatial coordinate reference.
- All the elements necessary to fully define spatial referencing by means of coordinate systems and datums are contained in this section.
- It also describes the information required to change coordinates from one coordinate reference system to another and all the elements necessary to describe the parameters and methods of coordinate operations. Coordinate operations include projections and datum transformations.

○ Packaging / Maintenance

- This part defines the content and structure of delivery packages, updating of data, and any auxiliary content delivered either with or as an adjunct to data.
- The exchange set structure shall use the structural diagrams of the S-100 or define the limits of the allowed components or extend the individual components and, if there is an internal structure of the exchange set, it should include the specifications for the required layout and naming conventions.

○ Validation Checks

- At least two types of validation checks are needed:
- First step is dataset validation checks for individual datasets. These checks operate on individual objects in datasets and on individual datasets as a whole. They should check the integrity of individual objects in the dataset (spatial, feature, and information types), associations between objects in the dataset, any embedded metadata or header information in the dataset, and support files referenced in the dataset.
- Second step is package validation checks for verifying the structure and content of packages (e.g. exchange sets) and accompanying metadata.
- Given that some features, information types, and application schema constructs are used in multiple products, there will be validation checks in common with existing product specifications and any such related product specifications should be consulted for validation checks

○ Interoperability

- Jointly with the IHO Interoperability Catalogue maintenance team, determine if any product groups in interoperability catalogues are supplemented or enhanced by the data product.
- Determine whether and how the IHO interoperability catalogue will be affected by the new product, including updates to display priorities, interleaving, predefined combinations, and other interoperability rules and operations.

○ Sample Data

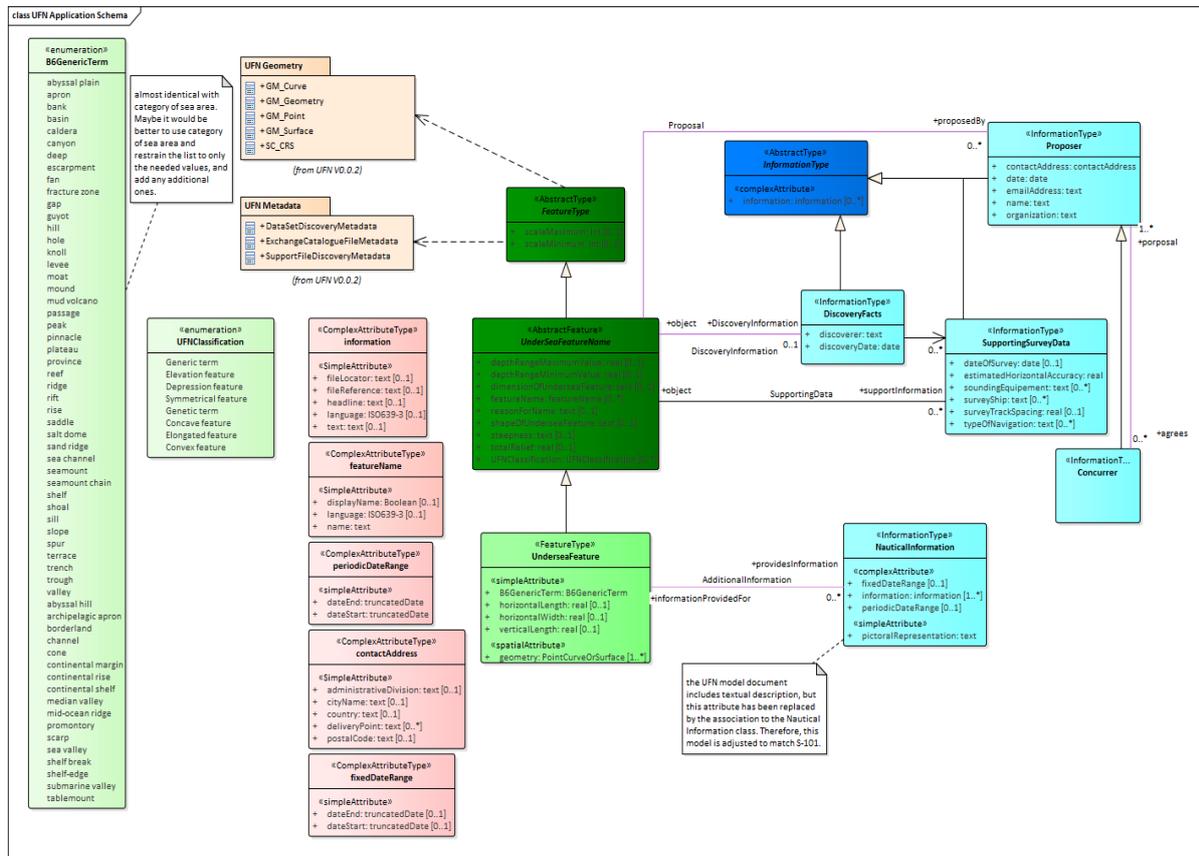
- Prepare sample data conforming to the data format and feature catalogue for testbeds and create enough sample data to verify the key characteristics of the data product.

○ Testing / Feedback

- Carry out tests of data production and use of sample data in selected applications to validate the correctness, completeness, consistency, and utility of the product specification, including related artifacts such as the feature catalogue and XML schemas.
 - The development of data product specifications will undergo repeated refinement according to user feedback and test results, and development will be completed by passing the final test.
- S-100 development process described above can be summarized as follows.
- Firstly, to develop S-100 product specification, user requirements are determined for the scope and user survey is conducted.
 - User requirements survey helps identify which parts of S-100 are used and required for product requirements.
 - When user requirements and scope have been established, the data model (Application Schema) will be designed through sufficient discussion with stakeholder groups.
 - Standardization items such as feature type and information type included in the designed data model are inputted into the S-100 GI registry to produce the feature catalogue and the portrayal catalogue.
 - When the results of the data model design are agreed between the stakeholder groups, we will start to create the product specification document and the object input document.
 - At the same time, create a test dataset for the product specification to apply the test dataset and feature / portrayal catalogue to the S-100 software, and finally review the development results.
 - The development of data product specifications will undergo repeated refinement according to user feedback and test results, and development will be completed by passing the final test.

2) UFN Application Schema (draft)

○ The following is a designed undersea feature name data model draft.



- Based on the new data model proposed by the UFN project team, KHOA designed the data model to store B-8 and B-6 information by defining the morphological characteristics of the undersea feature as the primary classification criteria.
- Data model defines UnderseaFeature class for undersea feature name management information, SupportingSurveyData and DiscoveryFact class which can store numerical and exploration information of undersea feature, and set the relationship.
- UnderseaFeature class inherits the abstract classes called UnderseaFeatureName and FeatureType. This class inherits all attributes and relationships from its super class, and can store attribute information to describe the height, size, and topological features of the undersea feature.
- B6GenericTerm refers to the list of B-6 terminology. UFNClassification consists of attributes for classifying subdivision undersea features such as generic name, genetic name, elevation term

ain, depression terrain, concave and convex terrain.

- Both attribute types are defined as codelist types so that they can be added in the future.
- Finally, Proposer and Concurrer classes are defined to store proposer and concurrer information.