National Oceanic and Atmospheric Administration
U.S. Department of Commerce

S-100 Edition 5.0.0
Significant revisions to Edition 4.0.0

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Remote VTC

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Overview

- This presentation describes the revisions in S-100 Edition 5.0.0.
  - The focus of this presentation is the revisions relevant to TWCWG product specifications (S-104 and S-111).
  - *This presentation describes the HSSC 14 draft, and further revisions are possible before Edition 5.0.0 is published.*
- S-100 5.0.0 has been submitted to HSSC for consideration at HSSC 14 (May 16-19, 2022).
  - Publication of Edition 5 will be proposed for Fall 2022
  - Publication will be subject to HSSC approval and subsequent Member State vote.
- S-98 (Interoperability) will also need to be considered, but for Readiness Level 3 (S-1xx Ed. 2.x+).

HDF5 dataset format

- New data coding format DCF 8 (“Stationwise fixed stations”) – as approved at S-100 WG5 (April 2020).
  - Arrays of data points at successive times – separate array for each station.
- Embedded metadata
  - New and revised metadata attributes for describing the CRS (S-100 WG5).
  - Attributes specifying the location of the data point within grid cells as one of the four corners or center, or in terms of an offset vector (only for gridded coverages).
  - Attribute specifying chunk sizes removed (S-100 WG6).

External metadata - 1

- New Part 17 for exchange set structure and metadata
- Metadata describing the temporal extent of a dataset
  - Intended for time series datasets.
  - Times of first and last records (counting all the features in the dataset).
- Metadata describing maintenance frequency
  - Allow specifying either the interval between successive releases, or the date & time the successor is due
- New attributes for “DatasetID” (MRN) and “ReferenceID” (MRN of predecessor)
  - The rules for MRN structure have been discussed but not finished.
- New “navigation purpose” attribute. Mandatory if data is intended for navigation. Three allowed values:
  - Port: For port and near shore purposes
  - Transit: For coast and planning purposes
  - Overview: For ocean crossing and planning purposes
- New attribute notForNavigation (true/false) to indicate if a dataset is not intended for navigation

External metadata - 2

- New optional attribute approximate grid resolution (in each axis).
- Metadata attributes for CRS and datum have been removed from external metadata.
  - CRS and datum are supposed to be specified internally in dataset files, and applications are supposed to obtain them from the datasets.
  - The list of vertical datums is retained, and includes all the Edition 4 datums plus *BSCD2000*, *IGLD2020*, *seaFloor*, *seaSurface*, and *hydrographicZero*.
- Digital signatures for datasets are now mandatory
  - The readiness level matrix (S-97) requires them in Readiness Level 3 (eds. >2.0.0), and the supporting infrastructure for digital signatures is not yet ready.
- Provisions for multilingual metadata
- Files with metadata in ISO 19115-1 format can optionally be included in the exchange set.
- Miscellaneous changes to various metadata classes and attributes.

Exchange set structure

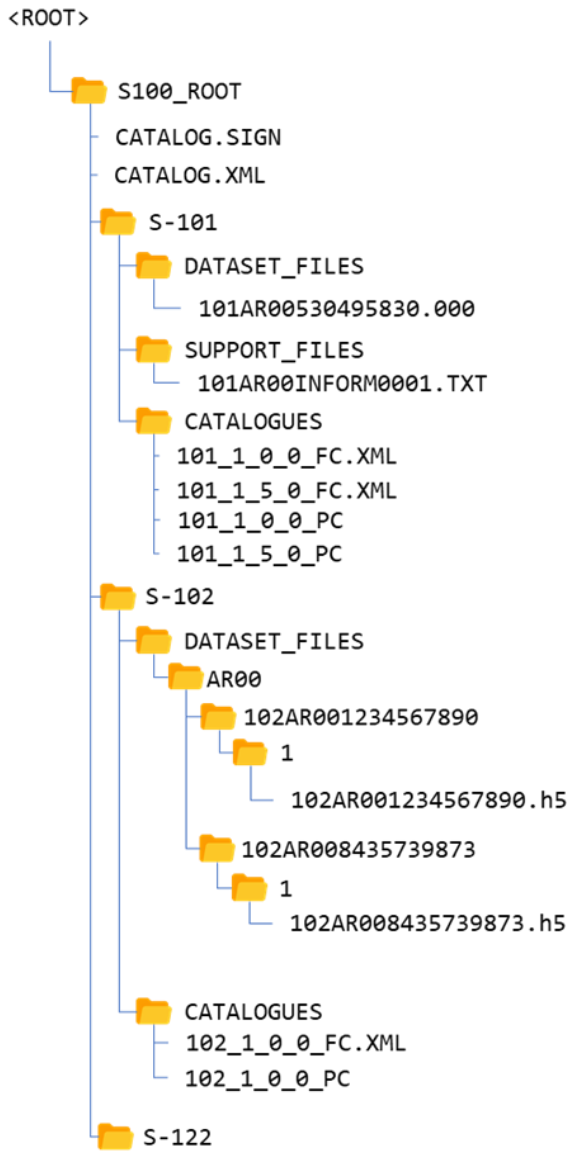


Figure 17-3 – An S-100 Exchange Set folder structure

- Requirements:
  - base folder name S100_ROOT;
  - a subfolder for each data product;
  - specific names for the exchange catalogue and signature files
  - DATASET_FILES and SUPPORT_FILES folders
- Allows some latitude.
  - For example, datasets do not have to be placed directly in DATASET_FILES
  - Compare S-101 and S-102 in the figure
  - Product specifications can further constrain the structure.
- Dataset name structure (from S-97 Part A):
  - XXXYYYYØØØØØØØØØ.[EXT]
- The S-104 exchange set structure was taken from an early version.
- New rules for support files

Other relevant S-100 revisions - 1

- Minor changes to the feature catalogue model (add product ID to header).
- Portrayal (S-100 Parts 9 and 9a)
  - Adds support for discrete coverages – Portrayal Catalogues can now specify where symbols can be placed in relation to data points in coverage data.
  - Support for “data box” presentations described in S-104 1.0.0 still unclear.
- New Part 16 describing interoperability.
- New Part 18 describing a model for “language packs” which are intended to allow provision of translations of XML files in an S-100 data product (specifically, Feature Catalogues).
- Changes to the IHO Geospatial Information Registry model (Parts 2, 2a, 2b).
- Updates to data encryption and permits (Part 15).
  - The related infrastructure and implementation unclear at this time, but this is required only in Readiness Level 3 (editions > 2.0).

Other S-100 revisions - 2

- New DCF 9 (“Feature oriented regular grid”) approved at S-100 WG6 (January 2022). Designed for S-102 bathymetric data.
  - Regular grid with an additional 1-D array of data records which are referenced from each grid point.
  - Intended for associating survey information metadata to individual cells in the grid.
- Several changes in S-100 relating to vector data
  - Support for alerts and indications
  - Additional minor changes to the feature catalogue model for representing feature and information associations
- Online data exchange (Part 14) received only editorial revisions and is still quite abstract.

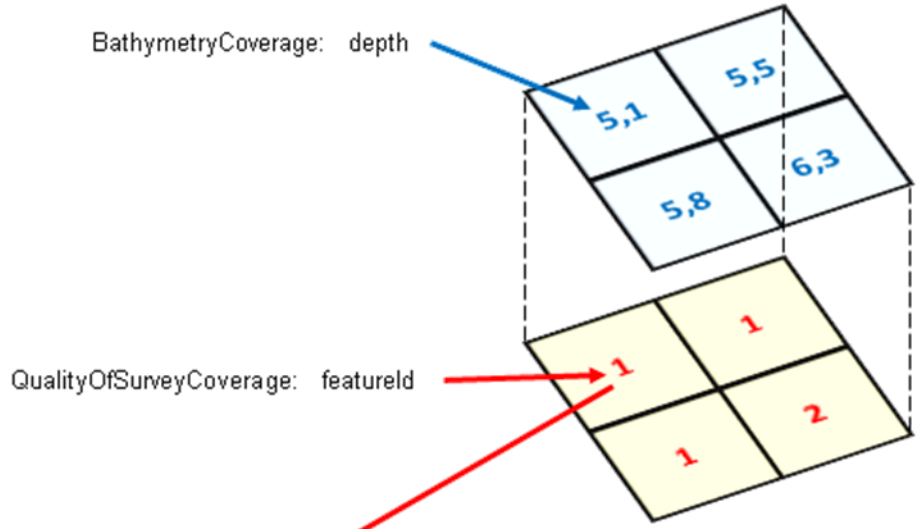
Other matters

- A draft of S-98 Edition 1.0 has also been submitted to HSSC14.
  - S-98 Main + Parts A/B/C/D describe “Interoperability” of different S-100 data products on ECDIS – meaning integrating or replacing data in S-101 ENCs with other S-100 products.
    - Parts A/B/C/D describe successively greater integration. Only Parts A & B are to be implemented initially.
  - S-98 Annex C is the S-100 successor to S-52
    - Annex C contains common rules for displaying S-101 and other products, including both vector and coverage products, on ECDIS (e.g., graphical indexes).
    - Annex C also contains some specific rules for coverage datasets on ECDIS.
    - Annex C also describes water level adjustment of S-101 ENC depth information using bathymetry (S-102) and water level information (S-104). This elaborates on one of the use cases described in S-104 Annex G.
- Common validation checks for all S-100 products
  - Under development by a sub-group – currently a distant “work in progress”.
- A register for units of measure is also a work in progress.

Conclusion – Alignment with 5.0.0

- The HDF5 format encoding for data has been extended in 5.0.0, but the existing 4.0.0 constructs for coding data have changed little in descriptive attributes and not at all where structure is concerned.
- S-100 5.0.0 changes in metadata are significant.
  - Both internal and external metadata have been significantly revised in S-100 5.0.0. S-104 1.0.0 internal metadata is almost identical to S-100 5.0.0.
- S-97 Part C mandates a data quality section with specific content.
- Validation checks and exchange catalogs are needed for Readiness Level 2 (Ed. = 2.0).
- Portrayal catalogs - S-111 has a PC (in XSLT), S-104 PC has not been developed.
- Several other revisions in various places throughout both product specifications.
  - Exchange set structure; specific dataset file naming conventions; update UML diagrams for S-111; outlines for production and delivery processes?
- Encryption and digital signatures may need to be postponed until the necessary infrastructure and processes are defined.
- Sample datasets and test datasets from different producers?
- Discussion of postponed items (cf. S-104 presentation).
- Recommendation: Align the next drafts with S-100 5.0.0, but not necessarily as S-111 Edition 2.0 (which would have to qualify as Readiness Level 2).

DCF 9 (Feature oriented regular grid)



Feature Attributes

id	surveyAuthority	surveyDateRange.dateStart	techniqueOfVerticalMeasurement	…
1	BSH	20210216	2:foundByMultiBeam	
2	WSA HH	20180723	1:foundByEchoSounder	
…				

Readiness Levels

S-100 Readiness Levels, for reference if needed

Required Product Specification component	Level 1 v1.0.0	Level 2 v1-2.0.0	Level 3 >v2.0.0	Level 4 >v2.0.0	Level 5 >v2.0.0
Main Document (Defines the relevant parts of S-100 that are required for the Product Specification)	X	X	X	X	X
A Default Encoding	X	X	X	X	X
S-100 Compliant Feature Catalogue	X (draft)	X (updated)	X (final, from IHO GI Registry)	X	X
Data Classification and Encoding Guide	X (draft)	X	X (final)	X	X
S-100 Compliant Portrayal Catalogue NOTE: Not every Specification will need a Portrayal Catalogue – this should be determined as part of the development process and stakeholder feedback.		X	X	X	X
Data Quality Checks		X	X	X	X
Test Data Sets		X	X	X	X
Data Validation (and test datasets)		*X*	*X*	*X*	*X*
Exchange Catalogue		X	X	X	X
Encryption / Digital Signatures			X	X	X
Interoperability			x* (draft)	X* (tested)	X*
Alerts and Indications				X*	X*
Operational data					X

(X* = ECDIS only)