

# Summary of Responses to the S-102 Impact Study

IHO S-100WG Letter 4/2021

Compilation by IHO Secretariat

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# Outline

- Survey on the S-102 Impact Study was conducted through IHO S-100WG Letter 4/2021
- The period is from 5<sup>th</sup> December 2021 to 8<sup>th</sup> January 2022.
- 15 responses

## (Member State)

- ✓ China (MSA)
- ✓ Denmark
- ✓ Finland
- ✓ France
- ✓ Germany
- ✓ Netherlands
- ✓ Norway
- ✓ Portugal
- ✓ Sweden
- ✓ UK
- ✓ US (NOAA)

## (Developer/Manufacturer)

- ✓ Esri

## (RENC)

- ✓ IC-ENC
- ✓ PRIMAR

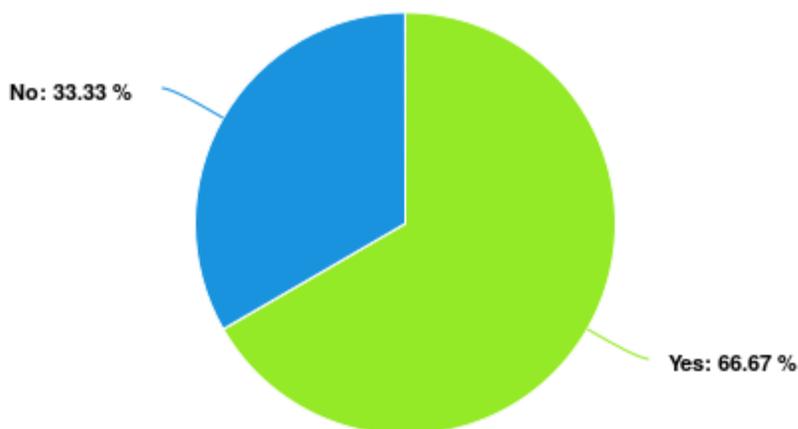
## (Other)

- ✓ University of New Hampshire



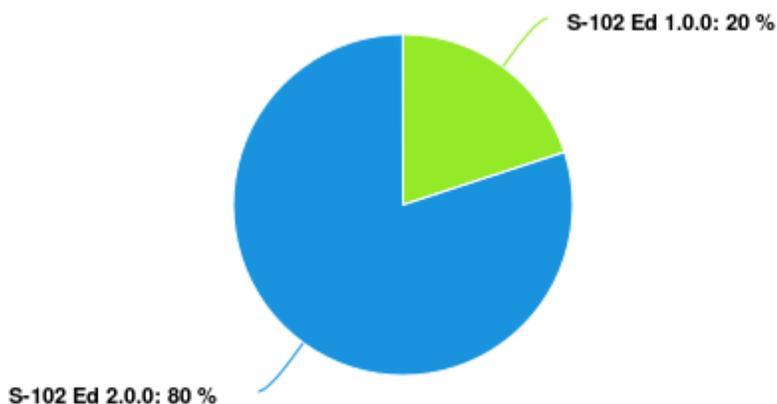
1. Have you implemented S-102 Ed 1.0.0 or Ed 2.0.0?

15/15 responses



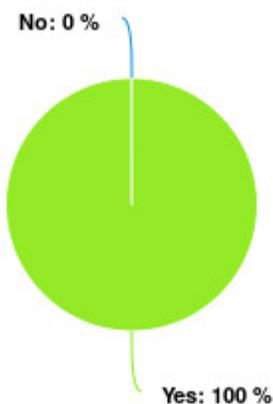
2. If 'yes' to (1), which version of S-102 have you implemented?

10/10 "yes" responses



3. If 'yes' to (1), would you implement an upgrade to S-102 Ed 2.1.0?

10/10 "yes" responses



4. If 'no' to (3), please explain your concerns.

0/5 "no" responses



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(cont.)

5. If 'yes' to (1), what difficulties have you encountered in the implementation of S-102?

Comments

**China**

- Data partition.
- Data integration from different sources.

**France**

- The S-102 allows grids in any projection. If the view is not in the projection of the data, there is an obligation to go back to the grid and then reproject.
- Part 9. 2 on shading: the specification does not impose any obligation on the choice of the algorithm to produce shading. HillShade? Anything else?
- The S102 is a product specification for Navigation. It is not yet clear how the product can be used in navigation. A discrepancy between S101 and S102 can appear. The remark is perhaps more relevant to the S-98. Note that the specification should be at least clarified on this point to refer to S-98.
- S102 PS offers uncertainty on every point. There is no metadata on the surveys that were used to generate the grid, not in hdf5 or catalog. xml. At least the date of the survey. And the specification document does not provide any information on how to use uncertainty, even in display.
- At present, no test dataset is supplied with its catalog. xml. The information of optimal, minimum and maximum display scale is taken from the table of specification document 11. 2. 2. 1. Not sure if this is the right way to get it. Possibly adding this scale information to the hdf5 would be beneficial.
- There is no chapter in the spec S102 document equivalent to Chapter 4. 7. 1 Dataset Loading algorithm in the S101 spec. The issue of product selection may appear when an area is covered by S102 from different offices.

**Germany**

- Ed 2.0.0 not finalized yet; missing metadata attributes for surveys; uncertainty=information of the production process, but not appropriate for the mariner

**Norway**

- at this point we have only produced testdata.

**Sweden**

- No major difficulties I foreseen with the actual product specification. Some challenges are related to our production process.

**UK**

- To clarify - implemented means we have produced trial data sets which endeavour to comply with the current S-102 standard.
- Difficulties encountered - reliant on software suppliers to update their software and tooling to get these datasets produced effectively.
- Source data held or supplied is not always of a resolution necessary to create suitable enhanced bathymetric data products for use in navigation.

**US**

- Product Spec may be overly complex to accommodate unneeded flexibility. PS is vague when it comes to important definitions. There is a lack of concrete examples and templates that uses most/all of the available data structures, which leaves things to interpretation. Diagrams/UML are not consistent throughout the document and appendices. Could use more specific references back to S-100 which would increase the ease of use/implementation. It's not necessarily clear when S-102 reduces the flexibility/or supersedes S-100 (when is S-102 more restrictive?).
- Did not have access to all the ISO documents that S-100 references (they are not all publicly available).
- The names of some of the data labels are duplicative (i.e. bathymetry).



(cont.)

5. If 'yes' to (1), what difficulties have you encountered in the implementation of S-102?

Comments (cont.)

**Esri**

- Our difficulties in implementing various updates to S-102 come from a software vendor perspective. More rapid prototyping and data sharing could resolve inconsistencies and help solidify the specification.

**IC-ENC**

- For IC-ENC, as a RENC, the broad scope of the S-102 Product Specification has created additional work to filter out the non-navigational purpose content; this has been achieved by producing an IC-ENC S-102 Product Profile for the navigational purpose only, specifying the information required to develop an IC-ENC S-102 service, e.g., size of S-102 datasets at 10MB not 256MB, not using tracking lists, etc. It seems appropriate given the introductory paragraph to have the S-102 Product Specification split into two distinct profiles (ISO 19106:2006 Geographic Information - Profiles), for navigational and non-navigational purposes, rather than two separate Product Specifications. Other difficulties include the lack of test datasets and Validation Checks/Tools. IC-ENC has produced S-102 Registration Checks for the initial validation process in the IC-ENC trial S-102 service. IC-ENC has also produced S-102 test datasets with errors, used for the implementation of the S-102 Registration Checks.
- IC-ENC already processes S-57 HD ENCs, as part of the IC-ENC S-57 ENC service.

**PRIMAR**

- We have implemented support for version 1 and 2, and are working on our 2.1 implementation. Our challenges have already, or are in the process of being reported to the PT.
- Annex of validation checks would help to improve our implementation of automated S-102 validation.



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6. If 'no' to (1), would you implement any high-density bathymetric products (e.g., HD ENC for S-101)? Or have you already implemented any such high-density bathymetric products?

5/5 "no" responses



### Comments

#### **Finland**

- High density bathymetry is in the process of being added onto standard S-57 ENCs in main fairways. The same will be available on S-101 ENCs as well. This is done regardless of future S-102 implementation for now.

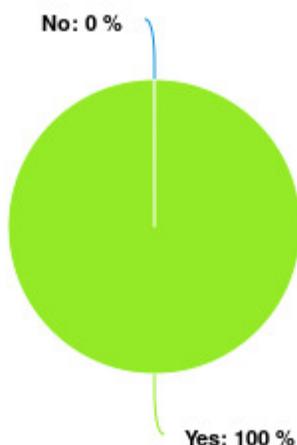
#### **University of New Hampshire**

- I'm working on developing an automated model for the compilation of ENCs directly from database, and I'm planning to use the new S-102 bathymetric product within the model.

(cont.)

7. Would you approve of an upgrade to S-102 Ed 2.1.0?

14/15 responses



Comments

**France**

- PS for the context of navigation is not completely achieved : portrayal catalogue, data tests and validation checks are not yet developed, they are essential for the use of S-102 products in S-100 ECDIS.

**Norway**

- Our end users are expecting S-102 ed 2.1.0.

**Sweden**

- Sweden thinks it is important that the Data exchange specification is taken care of after an operational version of the Navigational specification is finalized.

**UK**

- Pending review of 2.1.0 comments from spring 2021

**Esri**

- We have implemented support for 1.0. We are in development to support v 2.1. We support high-density ENC and bENCs. We support HD ENCs as defined in S-65. We support high-density contours for ENCs and bathymetric ENCs for both S-57 and S-101.

**IC-ENC**

- IC-ENC reviewed the redline version of S-102 Ed 2.1.0, and provided comments in May 2021, approval is subject to further review as exact scope and content not known. As noted previously, IC-ENC supports a single Product Specification for S-102, which contains a profile for navigational purposes and a profile for non-navigational purposes, thereby, avoiding the additional maintenance and effort required of two separate Product Specifications.

**PRIMAR**

- We do see high potential in using S-102 for non-navigation purposes, and would prefer this being an option also in the future. Use cases for planning and conducting challenging marine operations, port excavation building projects etc are available at the following locations:
- <https://s-100.no/operational-tests-2/>
- <https://s102.no/operational-tests-results/>



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(cont.)

8. For which use cases and which user groups have you implemented (or would you implement) S-102 Ed 1.0.0 or Ed 2.0.0?

Comments

**China**

- I have implemented S-102 Ed 1.0.0 for Department internal users and specific 3D GIS users.
- It is hoped that the secondary S-100 based product specification to support data exchange or non-navigation will be developed soon.

**Denmark**

- Currently have not decided on our specific use cases but will likely prioritise pilotage use.

**Finland**

- The future S-102s are planned primarily for navigation - for mariners and pilots.

**France**

- For testing purposes until S-102 will be operationally approved.

**Germany**

- at first for pilots and Vessel Traffic Service Center

**Netherlands**

- Areas with a critical UKC.

**Norway**

- Harbour, anchorage, more

**Portugal**

- we haven't implemented yet

**Sweden**

- Mainly for navigational purposes within test-bed projects. There are a clear demand from Swedish pilots for this product.

**UK**

- Created trial data sets for Ed 1.0.0 and Ed 2.0.0 which have been primarily focused on supporting user groups closely related to navigation such as OEMs, simulation, pilots and data suppliers

**US**

- Navigation.

**Esri**

- We recognize that the present survey is intended for (prospective) users of S-102 products. Nevertheless, as software engineers, we are interested in taking part in the discussion of S-102 development and evolution. We are eager to see and assimilate the results of this survey so that our development efforts can target the needs of the mariners and maritime industries who will use S-102 data.

**IC-ENC**

- Ed 2.0.0 - IC-ENC is currently developing a trial S-102 service for ECDIS navigation, also S-102 test datasets will be made available under the new IC-ENC Product Development and Testing Licence, to support all forms of innovation / testing / development and trials in the future.

**PRIMAR**

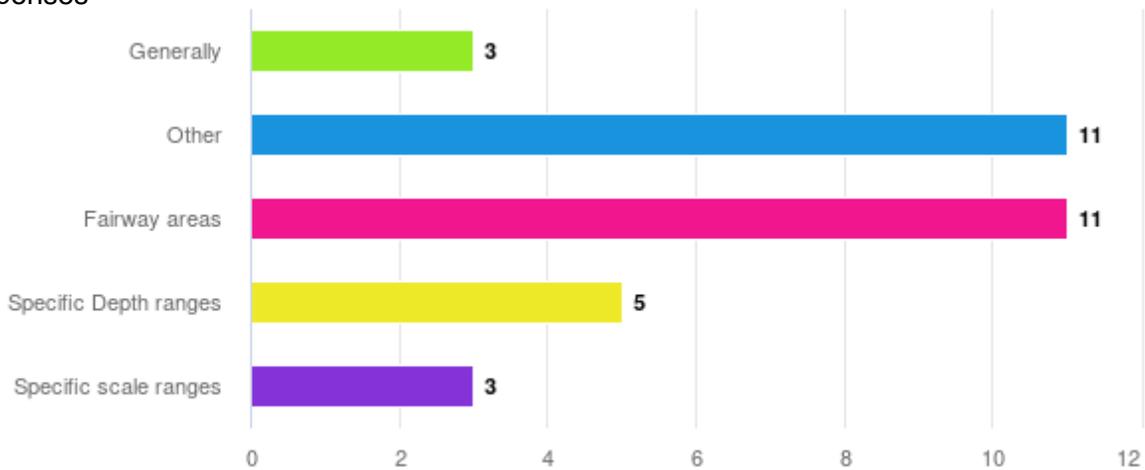
- Ports
- Pilots
- VTS operators
- Shipping companies
- oil and gas companies
- Coastal planning management
- Pilot operations in narrow areas, anchoring areas etc. Port and port planning purposes

**University of New Hampshire**

- I'm working on the generalization of smaller scale ENC's from the highest level of detail, so will implement it for the all scale bands (when the time comes)

9. For which sea areas is the use of S-102 planned or useful?

15/15 responses



“Other” includes:

- We are still developing our implementation plan for S-102 but fairways will likely be priority.
- Harbours and approaches to harbours.
- Harbours
- Our initial focus will be in locations where an enhanced bathymetric view would add most value to mariner such as ports and approaches.
- Wherever we have bathymetry. All US waters.
- As a RENC, this is a decision to be made by the data producers, however, generally it is expected to be for larger scale coverage, in shoaler waters, covering critical areas from high resolution surveys.
- Anchorage areas, ports, challenging fairways, narrow straits
- It will be very useful in navigational channels and confined areas (as a start)
- Shallow waters

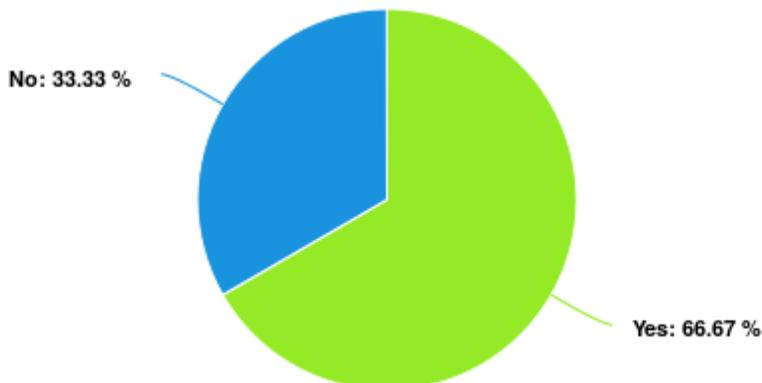


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10. Do you use a regular tiling scheme to define boundaries of any product within the navigation scope?

12/15 responses



Comments

**China**

- But we use tiling scheme in non-navigational 2D or 3D GIS systems

**Denmark**

- We are considering gridding for S-101 to align products

**Finland**

- For S-57/S-101 ENC's an irregular tiling scheme is used instead of a regular one.
- The first S-102 products will be 'standalone' products of specific fairways i.e. having boundaries based on the data and the area of interest. In the future, if the coverage of our S-102 products expands significantly, the question of using a tiling scheme (and what kind of tiling) is to be discussed.

**Germany**

- creation of a seamless DTM and using tiling schema as cookie cutter

**Sweden**

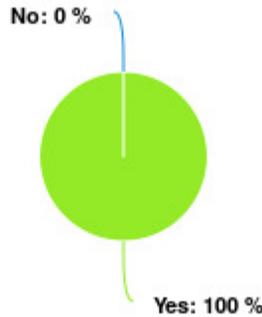
- Yes. In the sense of using a regular grid to base our product extents on and not in the sense of chunking down our 10MB cells to more manageable parts.

**PRIMAR**

- HO is producer of products and decides on any tiling scheme

11. Does your workflow (or notional workflow) require the capability to map multiple surveys and associated metadata to one product file? (e.g., multiple vessels from different times in one geographical area)

13/15 responses



Comments

**China**

- The case often occurs.

**Germany**

- seamless DTM requires unambiguous metadata of each survey within a product file

**US**

- This is why providing metadata/attributes about source information is important to us, so we can automate cartography and still communicate to the mariner crucial source information.

**Esri**

- Our software supports the compilation of multiple surveys into a single geodatabase and the ability to view and query those datasets synchronously. We support aggregation of datasets and their export as a single product file.

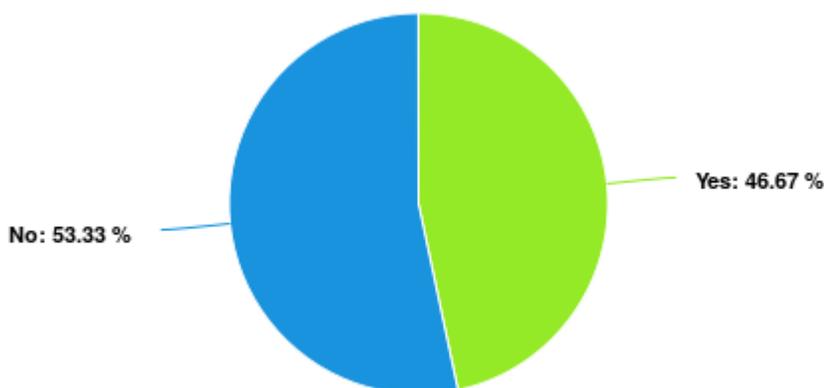


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12. In your opinion, is additional information required within the navigation scope?

15/15 responses



13. If 'yes' to (12), which would they be?

Comments

**Germany**

- date of survey, survey method, surveyor - and other metadata for a harmonized, combined usage of S-101 and S-102

**Sweden**

- Yes, we support the addition of the discrete coverage functionality. We see that there could be some information that could be useful to add for example Survey date and Interpolation flags.

**UK**

- More work needs to be done on representation on quality see comments supplied on this subject (particularly on uncertainty) in the draft of the S102 2.1.0 in May 2021.

**US**

- S-101 Quality of Bathymetric Data extended to include flags indicating source information that is either estimated or measured. Source information (data originator, survey name/ID, data license). For feature size detected, we recommend two values (a constant value and a variable value based on depth).

**IC-ENC**

- Updating to include cancellation mechanism, etc., for S-102 datasets and the catalogue file corrected to CATALOG.XML, along with alignment to S-100 Edition 5.0.0 once this is published later in 2022.

**University of New Hampshire**

- My understanding is that the bathymetric surface can be used alone or as a layer in an ENC, which includes information about depths, uncertainty and capable of tracking the golden soundings detected by the Hydrographer for safety of navigation. These information are safe enough for the scope of navigation.