Paper for Consideration by NIPWG

IHO / IALA S-100 / S-200 workshop related to ongoing NIPWG actions

Submitted by:	Vice Chair
Executive Summary:	Status update of discussion and workshop related to ongoing action items
Related Documents:	HSSC actions 13/40 and 13/41
Related Projects:	All S-100 related work, especially S-125, S-124, S-101, S-98 and S-201

Introduction / Background

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) and the International Hydrographic Organization (IHO) in association with the Norwegian Coastal Administration (NCA) are hosting a joint workshop on S-100/200 development and portrayal in Ålesund, Norway, from 05 to 09 September 2022.

IALA works with IHO S-100 compliant product specifications within the IALA S-200 domain. IALA product specifications cover fields within the IALA remit, including Aids to Navigation (AtoN), Vessel Traffic Services (VTS), positioning systems and communication systems.

The objective of the workshop is to:
- Harmonize and open feedback channels between IHO and IALA regarding Product Specification requirements and development processes.
- Share visions of the use of S-100 based Product Specifications of IHO and IALA among stakeholders.
- Identify possible updates and recommend amendment to existing documents.
- Provide clarity regarding development of S-100

Additionally to providing a forum for general learning and discussion, also specific group sessions for particular topics are planned. The groups and topics are as follows;

- WG 1 Initializing and productizing of S-100 series data
- WG 2 S-201,124 and 125 development
- WG 3 S-98 interoperability and Marine AtoN portrayal

HSSC 13 tasked NIPWG to provide papers describing the envisioned interoperability of S-125, S-201 and S-124, including a related discussion on scale dependency. Additionally, HSSC tasked NIPWG and S100WG to provide a paper describing the full picture of S-100 in relation to internal and external stakeholders and especially IMO.

NIPWG work generally relates closely to the topics of this workshop, and particularly the ongoing NIPWG actions related to HSSC 13 / 40 and 13 / 41.

HSSC 13/40
After having considered an IALA outline paper describing how S201, S-124, S-125 may work together, HSSC tasked NIPWG to provide a paper discussing SD/SI data handling aspects.

HSSC 13/41
HSSC welcomed the offer by NIPWG to develop an outline paper, in liaison with S-100WG, describing the whole S100 picture in close cooperation with stakeholders, inside and outside the IHO community and with IMO in particular.

Related NIPWG actions (VTC 04/21) #01 and #04 were initially planned for presentation at HSSC 14 (05/2022), but are still in progress due to dependencies on the discussions with multiple involved parties. Additionally a related action (VTC 02/22) #02 states that "The actual intent for S-125 needs to be specifically highlighted and presented to HSSC as part of outstanding HSSC actions placed on NIPWG".

Analysis/Discussion (before the Workshop)

Extracts of past and current discussions are presented here as background information. Conclusions and possible Recommendations will be updated based on the outcome of the IALA-IHO workshop 5-9.9.2022

S-125

S-125 is a product specification owned by NIPWG, but has a close relation to S-201. As S-125 initially was given a low priority within IHO, IALA ARM volunteered to develop this PS in cooperation with NIPWG.

IALA ARM13 informed IHO of an initiative to extend the scope of the work on S-125 and S-201 product specifications to include specifications of E-navigation Technical Services. In short, one or more E-Navigation Technical Service implements a Maritime Service (MS). The technical service is a description of how the data provider and consumer interact in order to transfer datasets. The actual data transferred would be the S-125 and S-201 datasets. IALA guideline G1128 describes the requirements of E-Navigation Technical Services. Unless IHO raises concerns with this approach, IALA indent to develop two separate services. One service is for provision of AtoN- information to main stakeholders, and the second for data provision to end users.

IALA ARM14 meeting documents include a draft S-125 Service Specification document. Based on draft documents and presentations at ARM 15 and NIPWG VTC 03/22, the vision of S-125 is to produce a data model for a marine navigational service that can be used as a Nautical Publication Information Overlay (NPIO) within an Electronic Chart Display and Information Systems (ECDIS). S-125 datasets would be the digital equivalent of an extended list of lights. S-125 would additionally include all unlighted AtoNs, as well as status information like temporary changes, proposed changes, advance notice of changes and discrepancies.

Nautical Publication Information Overlay (NPIO)

Several S-100 PS state the aim to produce data products to be used as Nautical Publication Information Overlay (NPIO). Similarly to Marine Information Overlays (MIO) these are supposedly used to supplement the minimum information required by ECDIS. MIO:s are usually only displayed on top of the ENC without any interaction, similar to current Radar and AIS overlays. Contrary to MIO, some of the PS described as NPIO are also described to include interoperability functionality above a simple overlay.

Since MIOs are optional, non-mandatory information that supplement the minimum chart- and navigation-related information required for safety-of- navigation, portrayal has been left to the discretion of OEMs and/or ECDIS users, with a recommendation to use colours and symbology contained in corresponding printed publications. If an NPIO would contain interoperability at even a low level, the demands might be different.

S-124

At NIPWG5, the status report of S-125 considered connections between S-125, S-101 and S-201. Since then, also a connection to S-124 has been identified. The commonality here seem to be the AtoN discrepancies. Depending on the area, authority and situation, AtoN- discrepancies might or may not be indicated both in an up-to-date S-125 dataset and broadcasted as S-124 navigational warnings. This might cause a situation where data describing the same discrepancy is present in both S-124 and S-125. Additionally, the actual AtoN related to the discrepancy is also displayed in the S-101. Due to different update-intervals of products, indication of current status might not be updated in all products. Traditionally, navigational warnings are issued immediately and withdrawn only after it is assumed that the same information has reached most vessels as Notices to Mariners (6 weeks from publication).

Interoperability within S-100

In S-100 5.0.0 interoperability documentation is divided into an abstract specification (new S-100 Part 16) and implementation specification (revised S-98). This documentation recognizes that data products are likely to contain features, which may have some common elements or be different expressions of similar underlying concepts. Part 16 defines a framework for specifying machine-readable rules governing the interaction of data products in an S-100 compatible system. This framework is used to establish system specific rules, which are contained in an interoperability catalogue. The catalog describes how groups of products are to be used and displayed simultaneously.

Scale dependent and Scale independent data (SD /SI)

The discussion known as Scale dependent / Scale independent (SD / SI) was first documented in a paper at TSMAD20 in year 2010. The idea back then was that a part of the data in ENC would be transferred into a cell that is independent of scale, and the data in this cell would be visible across several or all scale bands. This data

would consequently have been removed from the other scale dependent cells. The topic was investigated, analyzed and discussed until TSMAD25, where the meeting agreed that the SD/SI concept should not be implemented in parallel with S-101. Development was agreed to be temporarily retired until a better understanding of impact was gained.

During the SD/SI discussion, a list of objects suitable for transfer into the SI- cell was created. These objects were mainly objects with point- geometries such as aids to navigation. Also, some objects with simple line and area geometries were included, but it was concluded, at that time, that geometry simplifying should not be a part of ECDIS functionality. The SD/SI discussion has seemingly been re-initiated with the discussion of interoperability possibilities within S-100.

S-125 is a Scale independent dataset, consisting mainly of point geometries. Today S-100 also could support the association of multiple spatial attributes to a single feature instance. It would then be possible, within one dataset, to have a single instance of a feature that has more than one geometry. Each of these geometries could have different display scales. This would provide an alternative approach to SD / SI datasets. If interoperability between S-125 an S-101 is to be developed, it might be worthwhile to consider, whether the original concept of first placing the corresponding AtoN- data into a separate scale independent cell in S-101 would be feasible.

S-101
Even though S-100, S-98 and ECDIS interoperability concepts have evolved since 2010, there are additional aspects discussed in regards to S-101 (ENC). Different opinions exist, as to what degree current regulations restrict features in S-57 / S-101 ENC from being enhanced, updated, replaced or altered by data in other S-100 based product specifications.

Conclusions (of the Workshop 5-9.9.2022)
The Workshop included presentations and discussions covering a broad range of S-100 related topics.

WG 1
WG 1 discussed S-100 generally, and found a need for marketing and creation of S-100 marketing material. This material should be available for different aspects of S-100 and in different levels, to be used for different audiences. It was found that documents as S-97 should be updated and expanded to cover additional topics related to e-Navigation, and IALA could benefit from creating a roadmap for S-100.

WG 3
WG 3 discussed S-98 and interoperability on a general level. Discussion around portrayal and the need for integration of MSI- information on ECDIS (navtex etc.). Conflicting and diverting views and visions of interoperability among the workgroups was found, and a need to clarify. It is anticipated that use of the S-100 ECDIS will need an IP- based connection, as VDES etc. will not provide the needed bandwidth for future needs. IHO- members should participate in ARM in order to progress cooperation. A new workshop was proposed.

WG 2
The rest of this paper is based on discussion notes and the initial report of the WG2. WG2 considered the following topics;
- The continued development of S-201,124 and 125
- The data flow between the S-201,124 and 125 product specifications
- Interoperability of S-201, 124 and 125 with S-101

The work was initiated with introductions of S-201, S-125 and S-124. Some discussions not relayed here, included common questions regarding the Product specifications. The most discussed concept was use of S-125 in relation to S-101. S-124 was not discussed that much.

The continued development of S-201,S-124 and S-125

S-201 is intended for transfer of data between offices. S-201 is not intended for navigation systems like ECDIS. It is supposed that S-201 can include additional technical and administrative information not relevant for navigation. Current edition is 1.0.0. A revised package of S-201 will be reviewed by ARM 16 in October 2022, updated to 5.0.0 with improvements to the FC and XSD. The final version 1.1.0 is supposed to be available within 2022.

The concept of updating by always replacing a dataset by a full updated set raised some questions. Although S-201 is not meant for end-users, some internal use-cases within the offices were identified, that might need transmission of delta-change sets or partial datasets. It was discussed, that intermediate and internal services might provide similar functionality and filtered datasets, although the identification of data on the PS- level does not include functionality for identification of delta-changes to existing data.

S-125 is intended for use by end-users. The version 1.0.0 of S-125 will follow the same timetable as S-201 version 1.1.0. The identified use-cases (aton streaming service, source for a list of atons/lights and ECDIS display) were discussed.

During the discussions it was concluded, that the main added value of S-125 consist of the AtoN status information that is not available in ENC. It was also concluded that current updating routine of ENC is very different among producers, and S-125 could provide more timely access to data. The general recommendation by IHO S-4, that producers should reflect temporary changes published as Notices to Mariners also in ENC was noted.

Data flow between the S-201, S-124 and S-125

As each country has a different organization for managing maritime data, it was agreed to indicate a task responsible for each maritime data instead of indicating a specific organization on the data flow. The WG outlined a proposed data flow and agreed it should be refined further through cooperation between IHO and IALA. The responsibility for each task should be decided on a regional/national level. The dataflow is described in the figure below.
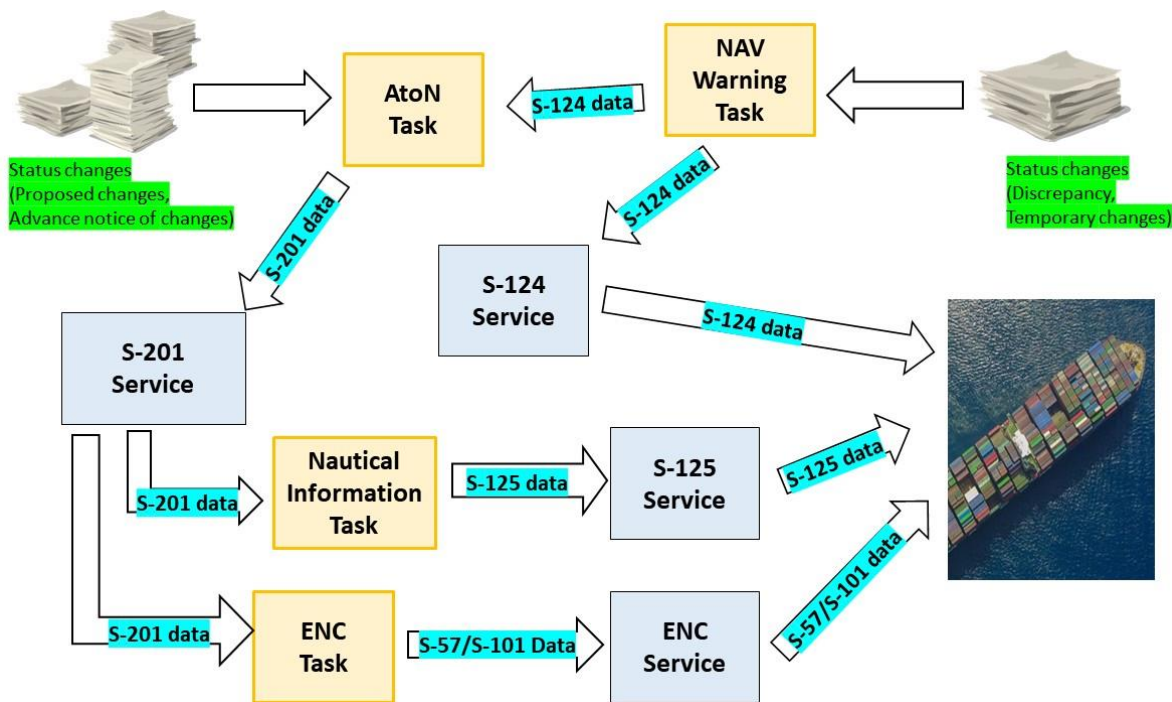
Interoperability of S-201, 124 and 125 with S-101

After conclusion, that the main added value of S-125 consist of the AtoN status information, interoperability was discussed, mainly between S-101 and S-125. The suggested method of suppressing existing AtoN data in the ENC by interoperability functionality was questioned by the group. The use of S-125 data merely as an overlay was considered a big enough first step to implement instead of data suppression (replacement). As an option for suppression of data, portrayal of only the status data, and not replacing nor duplicating actual existing AtoN symbology was generally accepted. It was noted, that the actual dataset could still contain a full set of AtoN data, although only status would need to be portrayed on ECDIS. The status indicator symbol would merely be flagging and not obscuring the ENC symbol. Interoperability could be enhanced at a later stage, but this was not further discussed.

Note: FOR REASONS OF ECONOMY, DELEGATES ARE KINDLY REQUESTED TO BRING THEIR OWN COPIES OF THE DOCUMENTS TO THE MEETING

Coordination of data content in S-124 and S-125 should be coordinated on a regional level, in order to minimize data duplication. It was generally agreed that the S-125 dataset should be updated at a frequency necessary to support navigational safety. Actual frequency necessary might differ regionally.

WG2 noted that S-125 data has benefits like AtoN status and frequent updates than S-101 ENC, but more work is required to determine what is the additional AtoN information that S-125 offers that would be beneficial to the mariner when compared to the AtoN information available in S-101.

S-124 was discussed on a general level only. In the case where an S-124 NW and S-125 AtoN status information is available for the same feature, there was an agreement that the information in the S-124 NW should have priority. In the discussion regarding interoperability between S-125 and S-101, it was concluded that only the S-125 status change symbology and pick reports need to be included by overlay/interleaving.

Executive Summary of the IALA/IHO workshop WG2 report

As there are differences in the frequency of when the S-101 data can be issued, which is to the best of the ability of the provider, the S-125 dataset should be updated at a frequency necessary to support navigational safety

The joint IHO/IALA development of S-125 should continue and the dataset should include, at a minimum, the same AtoN data contained in the S-101 Product Specification.

Tasks and services for S-201, S-125, S-124 and S-101 were identified and the data flow between each task was finalized.

Content in S-124 and S-125 should be coordinated on a regional level, in order to minimize data duplication.

In the case where an S-124 NW and an S-125 AtoN Information overlap for the same aid, there was agreement that the S-124 NW should take priority over the S-125 AtoN Information.

In the discussion regarding interoperability between S-125 and S-101, it was concluded that only the S-125 status change symbology and pick reports need to be included by overlay/interleaving.

Cooperation between the two international organizations is important to proceed with marine digitization, and in order to inform the shipping domain of the cooperation efforts between the two bodies, it is recommended that the relevant working group and task group prepare presentations and demonstrations of S-201/S-125/S-124 data service.

Recommendations
S-125 is a Product specification owned by IHO and NIPWG. NIPWG should follow the progress of development and vision for intended use and either agree with the current direction, or provide feedback to IALA ARM 16.

Action Required of NIPWG
The NIPWG is invited to:
a.   Take note of this paper and outcome of the workshop
b.   Discuss the further progress of related action items
c.   Discuss the impact on NIPWG S-100 related work
d.   Provide an input-paper for IALA ARM 16 if deemed necessary