

KHOA S-100 Testbed Project

1. General Information

- ✓ Name of testbed: KHOA S-100 Testbed Project
- ✓ Location of testbed: Busan, ROK
- ✓ Time and duration of testbed: Ongoing
- ✓ Contact person(s): BAEK Yong, ybaek@korea.kr (Project Manager)
- ✓ Testbed website: None
- ✓ Organization(s) involved : KHOA (Korea Hydrographic and Oceanographic Agency)
- ✓ Funding program and budget: KHOA
- ✓ Last Edited/Updated: January 30, 2019

2. Executive summary

This project aims to develop Phase 3 (Simple Viewer) and Phase 6 (shore-based ECDIS) of S-100 test framework to support the S-100 Testbed project of the IHO. While developing Phase 3 (Simple Viewer), it has been tested to produce proper catalogues using S-100 infrastructure as Phase 1 and validated S-100 simple overlay products on top of S-101 ENC's converted by the IHO converter as Phase 2. Phase 4 and Phase 5 would be validated through the Phase 6 (shore based ECDIS).

3. Testbed Information

3.1 The type of user group(s) involved in the test

S-100 WG and TSM members, S-100 infrastructure developers and S-100 Product Specification developers are involved.

3.2 Details of the S-100 testbed solutions

S-100 testbed allows testing of S-100 infrastructure including the GI Registry, FCB, PCB and validation of S-100 TDS production/validation/packaging tools. Since data formats such as 8211, GML, BAG and HDF-5 are included in S-100, S-100 TDS using these formats can be tested.

4. Testbed Methodology

4.1 Methodology used for data collection

Data applied to KHOA S-100 Testbed requires catalogue data and TDS according to the type of next-generation hydrographic information and it was prepared with the following methods:

Data applied to KHOA S-100 Testbed

- Feature Catalogue: Produced Test Feature Catalogue using KHOA FCB

- Portrayal Catalogue: Produced Test Portrayal Catalogue using KHOA PCB
- TDS in 8211: Produced using NOAA/Esri Converter or CARIS Composer
- TDS in GML: Produced using our own editor and converter
- TDS in BAG: Produced using our own converter which uses open source
- TDS in HDF-5: Produced using our own converter which uses open source

4.2 Summary information on testbed respondents / participants

None.

4.3 Procedure used in the testbed

4.3.1 Technical solutions used

The following solutions were applied to develop S-100 Viewer and shore-based ECDIS for the KHOA S-100 Testbed project.

- S-100 Portrayal process: Portrayal rule was applied and screen was presented (XSLT application method) about S-10X TDS according to S-100 Chapter 9.
- S-10X TDS: Processing various data formats including 8211, GML, BAG and HDF-5
- S-100 Exchange Catalogue: Loading and processing data according to information included in exchange set catalogue
- S-100 Interoperability: Organizing screen presentation methods among S-100 product specifications from portrayal perspective
- Plug & Play Concept: Changes to data model of S-100 Product Specifications are applied to Feature/Portrayal Catalogue. Data processing and screen presentation are applied according to Catalogues information.

4.3.2 Standards

- S-100 Universal Hydrographic Data Model Ed. 3.0.0
- S-101 ENC Electronic Navigational Chart (ENC)
- S-102 Bathymetric Surface
- S-104 Water Level Information for Surface Navigation
- S-111 Surface Currents
- S-122 Marine Protected Areas
- S-124 Navigational Warnings
- S-412 Weather Overlay
- S-100 Interoperability Design Specification

5. Testbed Results

5.1 Creation of S-100 test datasets (Phase 2, Phase 4)

KHOA created the S-100 test datasets to secure the production capability of S-100 data and prepare the TDS for S-100 test bed. The S-100 test datasets created in 2018 were as follows:

- S-101 ENC: Update of 10 cells created in 2016 (for Gunsan) and 15 cells created in 2017 (for Busan), new creation of 23 cells for Gwangyang and 2 cells for Gunsan in 2018. S-101 Converter, CARIS S-57 Composer and KHOA Simple editor were used to create S-101 ENC.

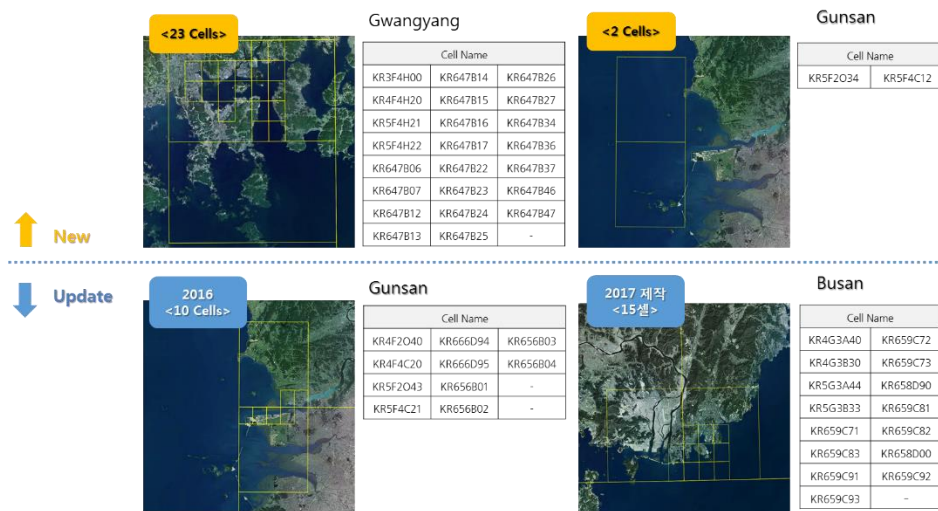


Fig. 1 Update and new creation of S-101 ENC

- S-122 MPA, S-123 RS, S-127 MTM: NPUB TDS was created based on the S-12X product specifications of NIPWG. The coverage covered all areas of ROK. XML editor such as Oxygen XML Editor and XML Spy were used to create the TDS. Also, customized product method of CARIS S-57 Composer was used. When the team used the S-57 Composer, the structure of GML dataset was different compared to the example provided by NIPWG. Manual modifications were required to change the dataset structure according to the NPUB examples.

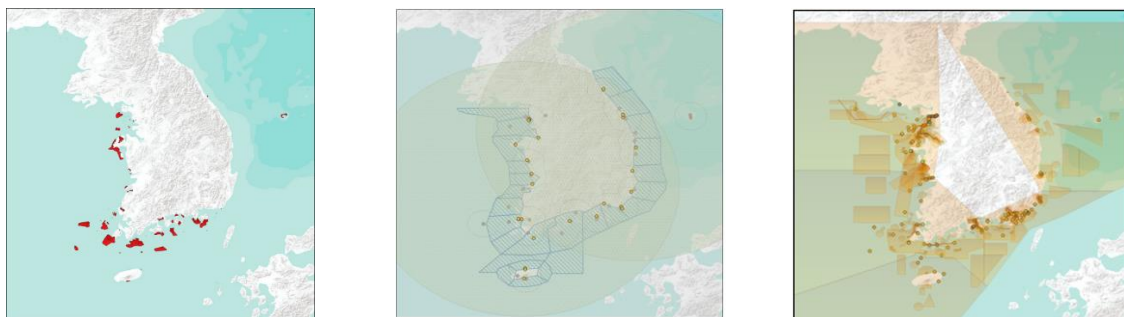


Fig. 2 NPUB TDS Creation of S-122 MPA, S-123 RS, S-127 MTM

5.2 Update of S-100 Simple Viewer

KHOA focused on testing NPUB test datasets and applying Lua portrayal process in the S-100 Simple Viewer. The NPUB portrayal catalogues for S-122, S-123 and S-127 were drafted for testing purpose. Fig. 3 shows one of NPUB TDS which is displayed in the S-100 Viewer. The testing result of NPUB TDS was reported to the NIPWG6 held in Rostock, Germany in 2019. (Reference [NIPWG6-34.1](#))

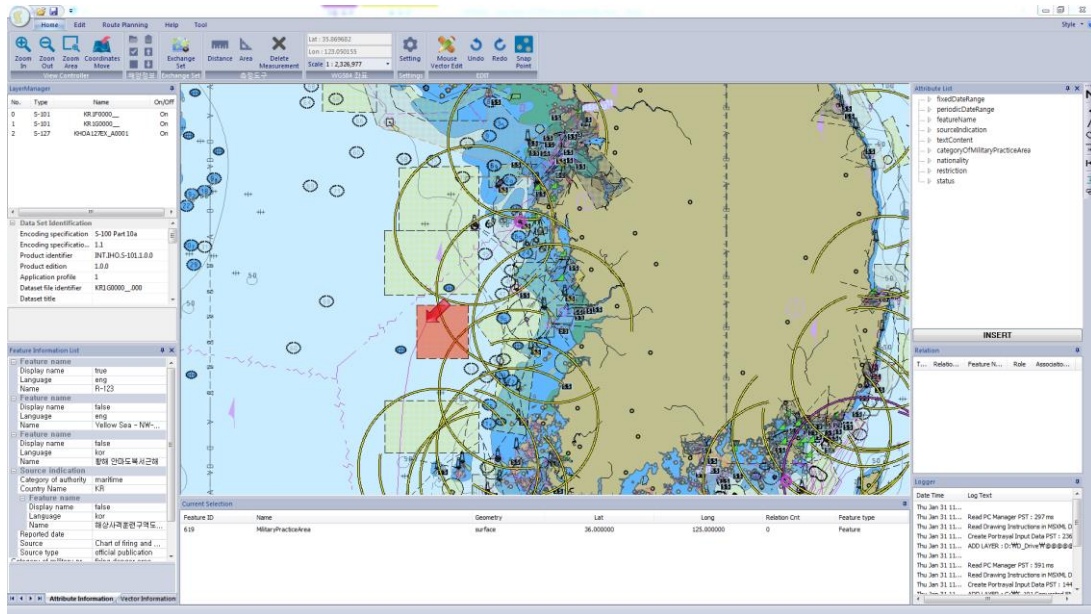


Fig. 3 NPUB TDS Test in the S-100 Simple Viewer

As the rule processing method of S-101 portrayal catalogue was changed from XSLT to Lua, KHOA started a study to apply Lua process to the S-100 Simple Viewer. Part 9a Portrayal (Lua) and Part 13 Scripting included in the S-100 Ed. 4.0.0 were reviewed and Host Functions for implementing Lua Portrayal process have been developed. KHOA is assuming that the process of developing the host function was up to 30% at the time of writing this document.

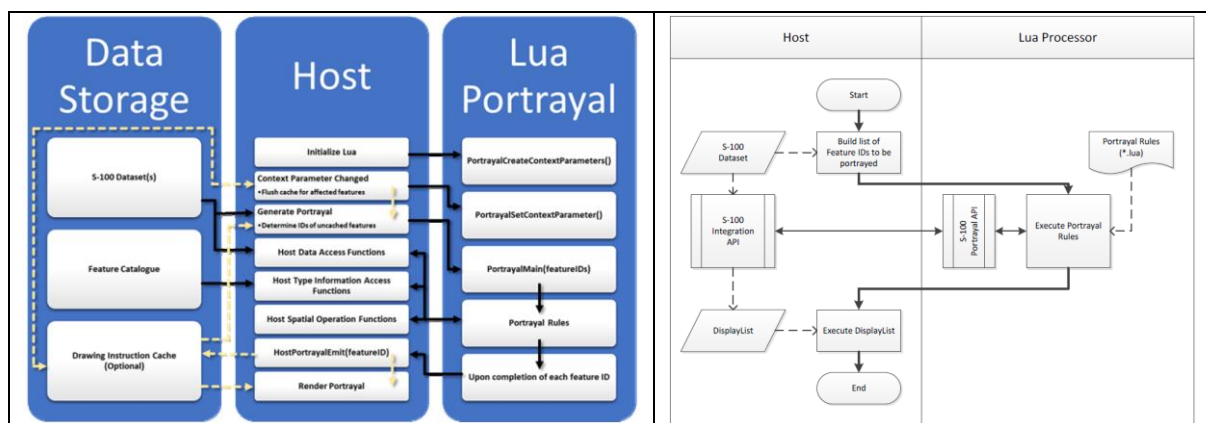


Fig. 4 Lua Portrayal Process

KHOA will present some of the development results, implication and proposal on the Lua Portrayal process during the S-100WG4 meeting.

5.3 Development of TDS Management System (Phase 5)

There are 10 types of S-100 test data planned by KHOA including S-101 ENC and S-124 Navigational Warning and the test data can be extended depending on the IHO's development of Product Specifications. The TDS Management System was developed to manage the test datasets and create an exchange set. Fig. 5 shows the relationship between the TDS Management system and S-100 test system. The TDS management system manages S-100 data and metadata and transfers the TDS to the S-100 test system after packaging according to the S-100 Exchange set model.



Fig. 5 S-100 TDS Management System

5.4 S-100 Test System (shore-based ECDIS) (Phase 6)

KHOA has developed the S-100 test system (shore-based ECDIS) in 2017, which consists of chart display window and additional information display window. The system was developed combining S-100 simple viewer and ECDIS SW in cooperation with KHOA research team and ECDIS OEM.

In the 2018 research, the ECDIS SW in the S-100 test system was changed as the latest version and the UKC part in the additional information window was improved to support 2.5D chart.

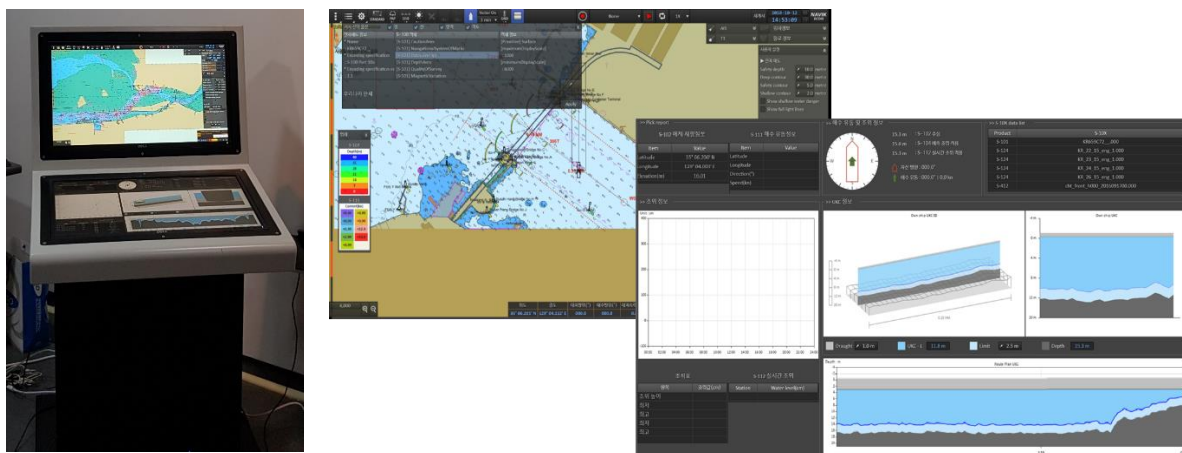


Fig. 6 S-100 Test System developed by KHOA

6. Conclusions and Recommendations

6.1 Conclusions

KHOA has conducted S-100 test bed project to support the S-100 and infrastructure of the IHO. The project focused on the development of S-100(Phase 3) Viewer and shore-based ECDIS (Phase 6) according to the S-100 Test Framework.

In the reporting period, KHOA tested the NPUB test datasets and tried to apply the Lua portrayal process in the S-100 simple viewer. The TDS Management system was developed to manage S-100 data and package S-100 exchange set. The ECDIS SW in the S-100 test system was changed as the latest version and the UKC function was improved to support the 2.5D chart.

7. Publications

N/A

8. Reference Material

S-100 Ed. 3.0.0

S-101 ENC Product Specification, FC/PC, TDS

S-102 Bathy surface Product Specification

S-104 Water level of surface navigation Product Specification

S-111 Surface current Product Specification, TDS

S-122 MPA Product Specification, FC/PC, TDS

S-123 MRS Product Specification, FC/PC, TDS

S-124 NW Application Schema, GML Schema, TDS

S-412 Weather overlay Application schema, DCEG, TDS

S-100 Interoperability Design Specification