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 till S-100 testbed project of the IHO is completed

- Contact person(s): Yong Baek, ybaek@korea.kr (Project Manager)

- Testbed website: N/A

- Organization(s) involved : KHOA (Korea Hydrographic and Oceanographic Agency)

- Funding program and budget: KHOA

- Last Edited/Updated: 23 March 2018

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. Through the development of Phase 3 (Simple Viewer), Phase 1, a catalogue produced through S-100 infrastructure, and Phase 2 including simple production tool, S-101 converted, S-100 simple overlay can be validated. Phase 4 and Phase 5 can be validated through the development of 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 S-100 Registry, FCB and PCB and validation of S-100 TDS production/validation/packaging tools. Since data formats such as 8211, GML, BAG and HDF-5 are used 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, Ver. 3.0

- 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

5. Testbed Results

5.1 Processing various data formats of S-100

S-100 product specifications developed according to S-100 framework include data not only in vector but also grid formats so the function to process them needs to be developed. Therefore, we developed encoding processing function to support various formats of S-100.

- 8211 (vector): S-101 ENC

- GML (vector): S-122 MPA, S-124 NW, S-412 Weather

- BAG (grid): S-102 Bathy

- HDF-5 (grid): S-104 Water level, S-111 Surface current

Meanwhile in order to load and present S-100 data on screen, it needs to be processed according to the portrayal processing procedure defined in S-100 Chapter 9. Figure 1 shows the procedure for processing according to various formats of S-100 and portrayal methods. The KHOA S-100 Testbed project has led to the development of data processing and screen presentation methods according to S-100 portrayal methods.
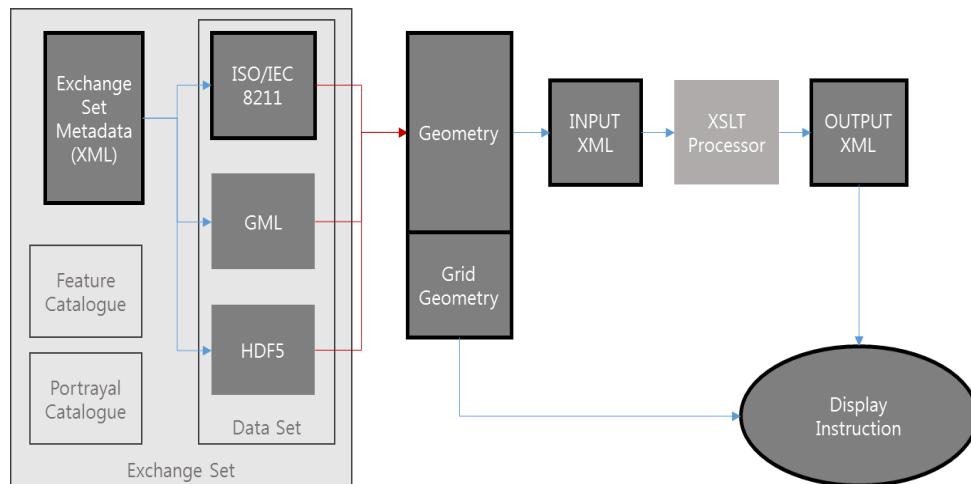

Fig. 1 Processing various data formats according to the S-100 portrayal process

5.1 Development of S-100 Exchange set processing function

S-100 data is packaged and distributed in exchange set. S-100 Viewer does not approach individual data set straight away but identifies data included in packages through S-100 exchange set catalogue first, then convert and process internal data.

Folder composition of S-100 exchange set and Exchange Catalogue are written according to S-100 meta data model. As for S-100 exchange set, Feature/Portrayal Catalogue for the corresponding data set can be sent.

We developed the following functions and procedure for the project:

- Process S-100 Exchange Catalogue files and load several data sets included in package

at once

- Identify Feature and Portrayal Catalogue included in exchange set before processing data set and process it using the Catalogues

It seems plug & play function can be featured and validated in the future using processing function of the S-100 Exchange Catalogue. Figure 2 shows the result of processing S-100 exchange set and its presentation on screen.
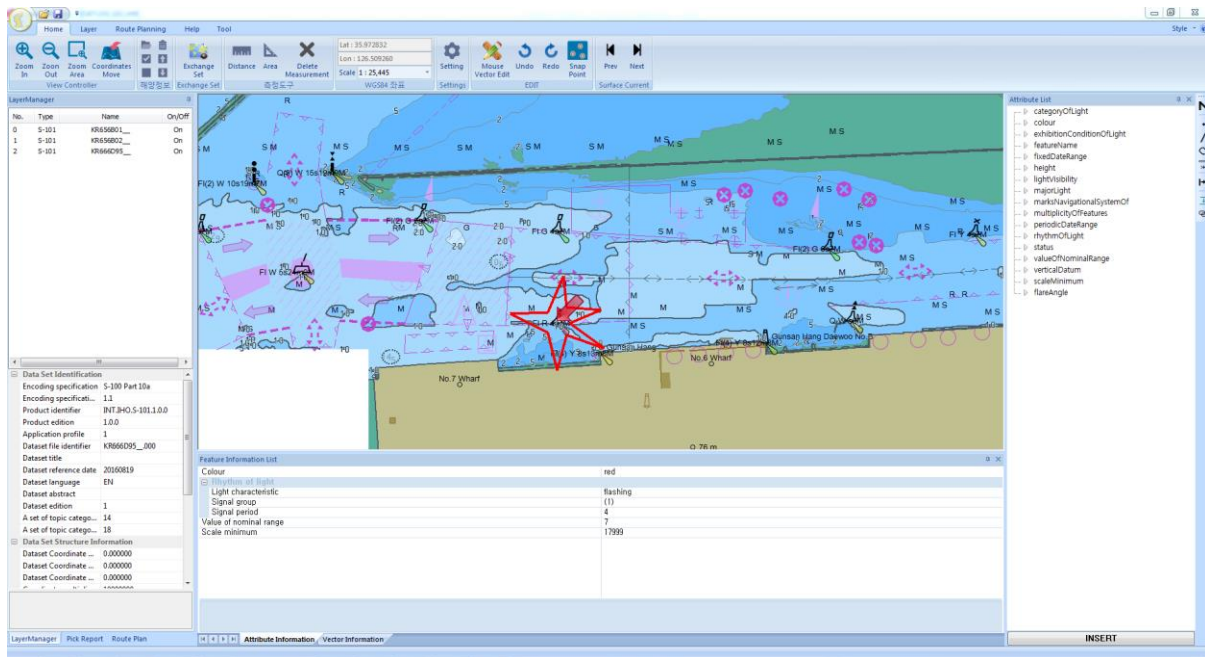

Fig. 2 Result of processing S-100 exchange set

5.2 Test application of S-100 Interoperability Catalogue

On this project we developed the function to process S-100 Interoperability Catalogue and present portrayal for each product specification on S-100 Viewer in order to validate the concept of S-100 Interoperability design specification.
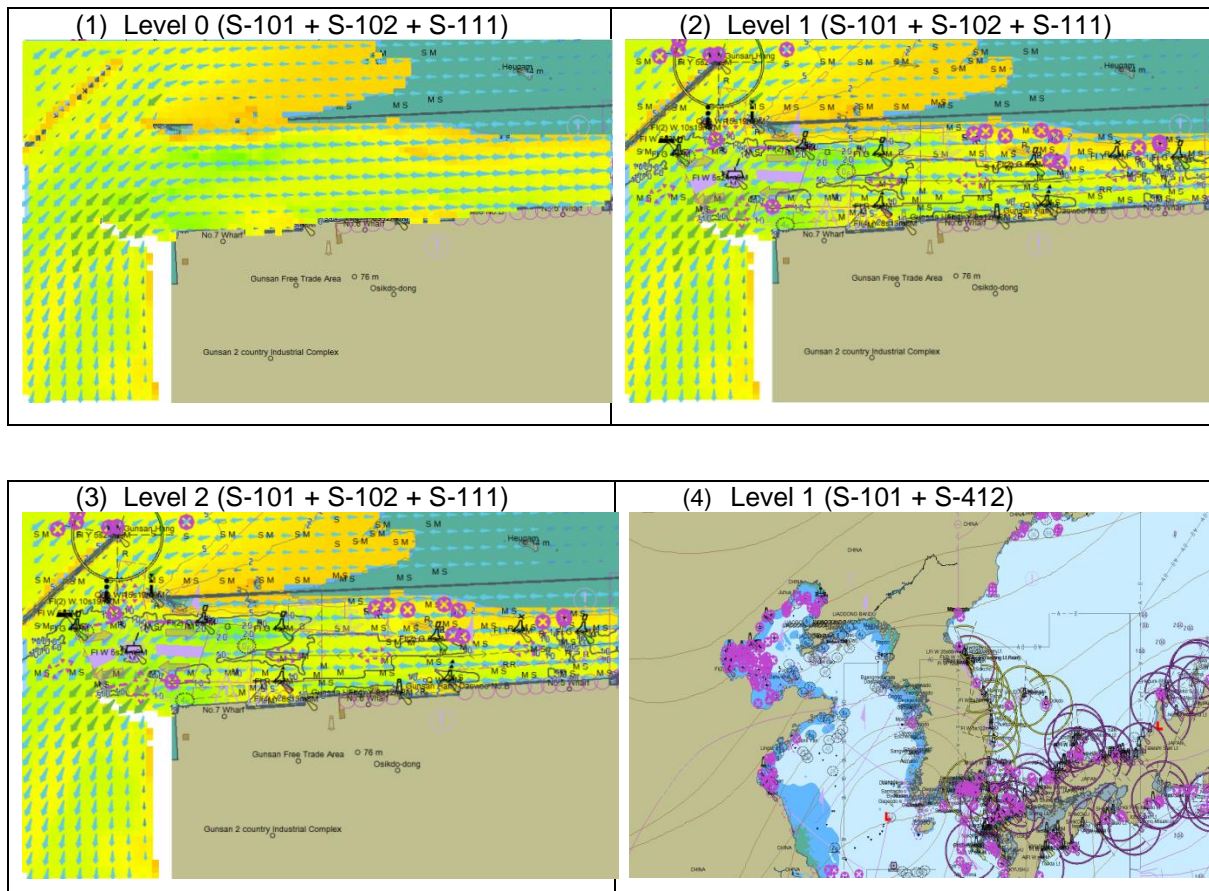
Scenario

Validating the concept of the IS required methods to develop the IC first. To enable that, KHOA therefore developed a prototype IC builder and its principle is as below.

- To provide S-101 ENC on top of several S-nxx additional information, the tool identifies features to be applied to the IC level 1 or 2 according to the IS – for example, whether a PS needs to be added on a specific layer among S-101 data or what S-101 feature should be replaced – and creates a scenario what feature will be presented in what cases, how and where.

Testing Results

The S-100 IS Workshop discussed the application scenario of the IC and drafted the S-100 ECDIS IC accordingly. With the IC, the workshop was able to come up with the following outcome using the KHOA S-100 Viewer. The images below are the outcome of applying the IC on S-101 ENC, S-102 Bathymetric

Surface and S-111 Surface Currents with Levels 0, 1 and 2.

(1) Level 0 (S-101 + S-102 + S-111)

(2) Level 1 (S-101 + S-102 + S-111)

(3) Level 2 (S-101 + S-102 + S-111)

(4) Level 1 (S-101 + S-412)

6. Conclusions and Recommendations

6.1 Conclusions

KHOA has been carrying out the S-100 Testbed project to support the development of S-100 and its infrastructure of the IHO. The project aims to develop Phase 3 S-100 Viewer and Phase 6 shore based ECDIS.

After the S-100WG2 in Genoa we applied functions to process various S-100 data sets, S-100 exchange set and apply Interoperability Catalogue. As for Interoperability, we applied prototypes of Levels 1 and 2 and plan to proceed with more development according to the outcome of discussion.

6.2 Recommendations

The following has been identified while applying S-100 exchange set and is therefore recommended to be discussed at the S-100WG:

- Define the structure of folders in S-100 exchange set

- Develop an item to distinguish between Feature Catalogue and Portrayal Catalogue in S-100_CatalogueMetadata of S-100 Exchange Catalogue

- S-100 Viewer allows processing of Feature Catalogue and Portrayal Catalogue for various product specifications. Identification numbers need to be assigned to distinguish Catalogues per product specification.

7. Publications

N/A

8. Reference Material

S-100 Edition Ver. 3.0

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