

Paper for Consideration by NIPWG

[Discussion activities to harmonize MSI data models between KRISO, Jeppesen and DMA]

**Submitted by:** KRISO, Jeppesen with input from DMA  
**Executive Summary:** KRISO, Jeppesen and DMA agreed to cooperate on a harmonization of MSI data models and have been discussing how to harmonize the data models. This paper introduces the progress of discussion activities.  
**Related Documents:** S-53 Joint IMO/IHO/WMO Manual on Maritime Safety Information  
**Related Projects:** Korean e-Navigation R&D Project

Introduction / Background

KRISO and Jeppesen drafted the MSI data model and studied test case for the MSI Service of e-Navigation. Meanwhile, DMA developed the MSI-NM which is a website and editor that has been developed as part of the ACCSEAS WP6 MSI-NM (T&P) project. The three organizations discussed to hold a tele conference meeting for the harmonization of MSI data models during the 16<sup>th</sup> IALA e-Nav committee meeting. Since then, there were four times meetings so far. This paper would describe the progress of discussion activities on the harmonization of MSI data models and share the interim discussion results.

Analysis/Discussion

MSI Case study of KRISO and Jeppesen

KRISO and Jeppesen that have been involved in the development of S-100, agreed to cooperate on drafting MSI data model and test case study. The group drafted the KRISO-Jeppesen MSI data model based on the IHO S-53 Joint IMO/IHO/WMO Manual on Maritime Safety Information. Fig. 1 shows the MSI data model used in the test case study.

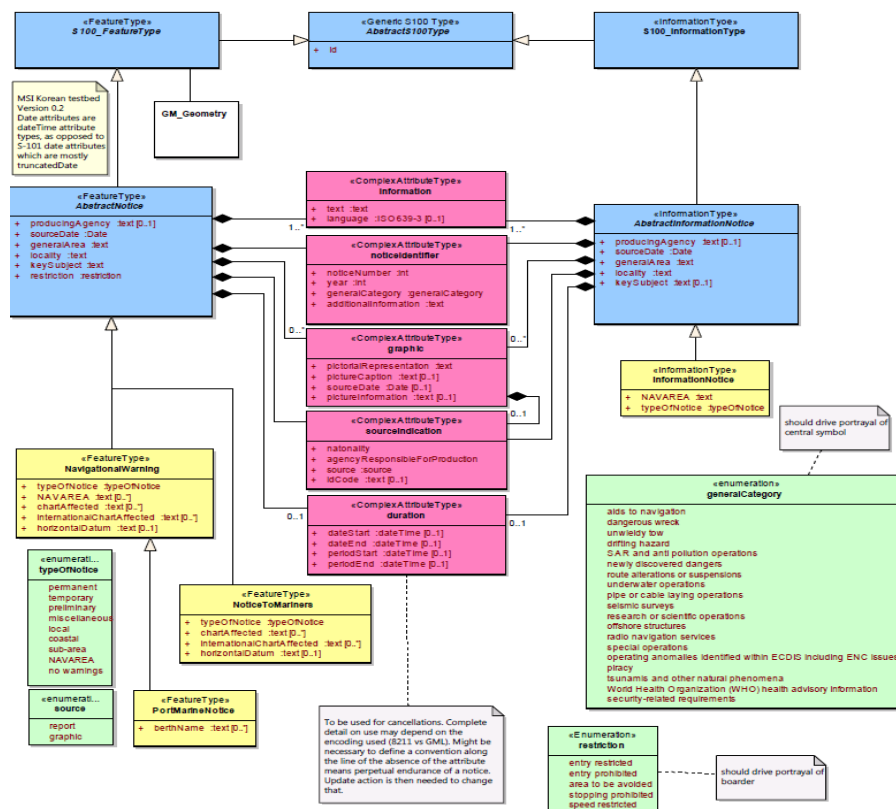


Fig. 1 KRISO-Jeppesen MSI data model

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

After drafting the MSI data model, the development activities were followed to implement the test case study.

- Definition of GML Schema according to the MSI data model
- Editing sample dataset using NAVTEX Messages from Korean Coast Guard
- Preparation of a simplified onshore module for MSI service
- Development of ENC based MSI shipboard system

The study and development results were used in the 2 times sea test which was implemented in the Korean e-Navigation testbed project. The major results from the sea tests were like below:

Num.	Title	Ship Route	Communication Network (Interface)	Major Results
1	1 <sup>st</sup> Sea Test	Busan -> Yeosu	3G network (Socket Connection)	<ul style="list-style-type: none"> <li>- Establishment of exchange method on MSI dataset.</li> <li>- Verification of exchanging S-100 MSI dataset</li> <li>- Challenge on communication network status in datasets exchange</li> </ul>
2	2 <sup>nd</sup> Sea Test	Mokpo -> Jeju	Satellite/Iridium (Socket Connection)	<ul style="list-style-type: none"> <li>- Change of communication network</li> <li>- Verification of exchanging S-100 MSI dataset</li> <li>- Operation of sea test according to the Route scenario</li> <li>- Survey of MSI service's usability for mariners</li> </ul>

#### ACCSEAS MSI-NM (T&P) Project of DMA

As part of the ACCSEAS WP6 MSI-NM (T&P) project, a combined model for MSI and NM T&P was devised and a web application was developed in order to effectively test the combined model, the portrayal and promulgation of the messages. The MSI-NM System include features such as:

- An editor for MSI and NM T&P messages.
- Multi-language message support and features such as rich-text descriptions, attachments, etc.
- Management of message life cycles and base data such as categories, areas, charts, etc.
- Promulgation via web services, mailing lists, Maritime Cloud Messaging Service (MMS), NAVTEX, Twitter, etc. Web interface and API's for searching and filtering MSI-NM T&P messages.
- Map-based portrayal of MSI-NM T&P messages.
- A navigational display test application, the e-Navigation Prototype Display (EPD), was updated to integrate with the MSI-NM System

Fig. 2 depicts the main MSI-NM UML model, which represents a generalization of the IHO-IMO-WMO S-53 MSI standard and the IHO S-4 NM standard, and is used throughout the MSI-NM system for exporting and importing data. The model is not an S-100 model, but the stated aim has been that the MSI-NM model should be compatible with a future S-124 NW product specification, in the sense that it should be possible to devise a transformation from the MSI-NM model classes to the corresponding S-124 features and model.

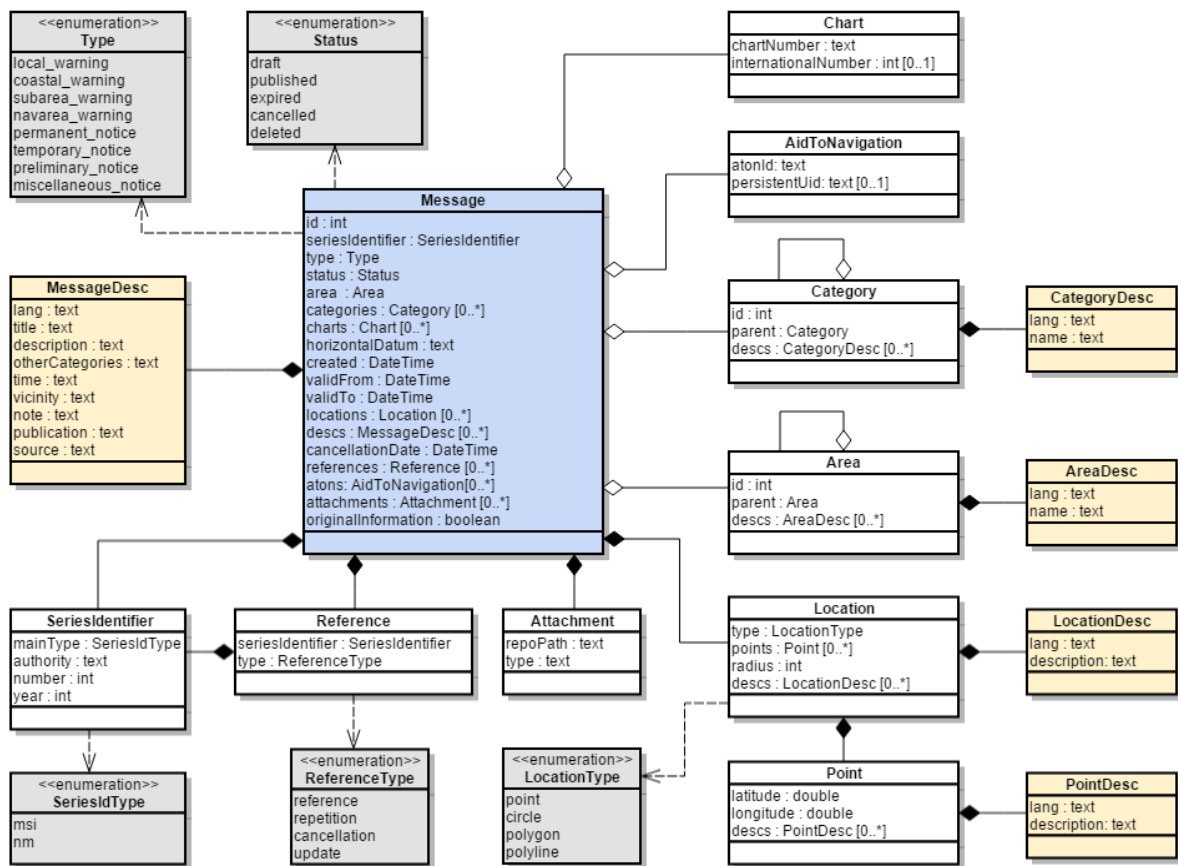


Fig. 2 MSI-NM data model of DMA

### Progress of discussion activities on harmonization of MSI data models

It has been assumed that there are two kinds of MSI data models, which is KRISO-Jeppesen MSI data model and ACCSEA MSI-NM data model. The three organization have been holding a tele conference meeting to discuss the harmonization of MSI data models. The history of discussion is like below:

- (1) 1<sup>st</sup> tele conference meeting (29<sup>th</sup> April, 2015)
  - Sharing the status and relevant data on MSI data models
  - Decision to establish the Dropbox to share relevant data
- (2) 2<sup>nd</sup> tele conference meeting (8<sup>th</sup> May, 2015)
  - Before the 2<sup>nd</sup> meeting, DMA provided a document including comments on KRISO-Jeppesen MSI data model, Jeppesen and KRISO replied on the comments
  - The group discussed the comments during the meeting
  - Jeppesen amended the KRISO-Jeppesen MSI data model according the discussion results
- (3) 3<sup>rd</sup> tele conference meeting (21<sup>st</sup> May, 2015)
  - DMA provided comments again on the amended MSI data model
  - The group resumed a discussion on the comments during the meeting
  - Jeppesen amended the KRISO-Jeppesen MSI data model again
- (4) 4<sup>th</sup> tele conference meeting (5<sup>th</sup> June, 2015)
  - The group discussed on the amended MSI model
  - The data model requirements from the S-124 CG were reviewed during the meeting
  - After the meeting, Jeppesen updated the data model to be harmonized with S-101 and NPubs data models, and amended the UML diagram to make the model easier to read

### The interim discussion results on the harmonization of MSI data models

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While The KRISO-Jeppesen model target ship system using ENC and is based on the IHO S-100 registry, the MSI-NM model of ACCSEAS is more general and the main purpose is to define a format that is usable for all sorts of clients, ranging from ECDIS to websites, apps, Twitter, and so forth. The group had a consensus although there are many similarities and few differences between two MSI data models, it's required to be harmonized to provide a harmonized data models to S-124 CG as an input. Since the harmonized MSI data model is needed to follow the CSL (Conceptual Schema Language) Rule and how to make application schema using GFM (General Feature Model) of S-100, the group carried the discussion in a way to review and update the KRISO-Jeppesen MSI data model iteratively. Major discussion results were like below:

- The "generalCategory" and "additionalInformation" fields of the "noticeIdentifier" class were moved up to the Abstract classes such as "AbstractNotice" and "AbstractInformationNotice"
- The "noticeIdentifier" complex attribute was redefined to indicate a format: "Type-Authority-Number-Year"
- Information type References was added including three attributes: referencetype (enumeration), noticeIdentifier (complex), sourceIndication (complex) and has been associated with both AbstractNotice and AbstractInformationNotice.
- The model then allow for hard reference through the inherited referencing ability from AbstractS100Type, and soft reference through either noticeReference or sourceIndication.
- The new information type can then be used to cancel one or more existing notices, update one or more existing notices, repeat one or more existing notices, or be used to reference relevant information for a new notice.
- The "sourceIndication" complex attribute was clarified clearly and has been removed from AbstractNotice and AbstractInformationNotice, but retained for the complex attribute graphic.
- The "NAVAREA" attribute of NavigationWarning class was renamed to "navigationalArea"
- It was agreed that the "NavigationalWarning" + "NoticeToMariner" sub-types were to remain and the "typeOfNotice" enumerations was to be split into two enumerations: "typeOfNotice" and "typeOfNoticeToMariners"
- The "affectedChart" complex attribute was added including the existing simple attributes: chartAffected and internationalChartAffected
- The "generalCategory" enumeration is difficult to enumerate all relevant categories across MSI and NM and from nation to nation. It will be rationalized and merged.
- The "restriction" attribute was considered to use it similarly to S-52 and will drive portrayal of boarder
- Regarding the status flag such as enumeration of "draft", "published", "expired", "cancelled" and "deleted", it was agreed that Cancellation/revision could be done by issuing a message with the same number and appropriate end date-time info and Notice history if needed could be supposed to be maintained on the system.
- The "originalInformation" attribute was included to indicate a flag for NMs based on original information in the "NoticeToMariners" feature type
- The "horizontalDatum" attribute was moved up to the Abstract class
- The "listOfLightNumber" attribute was added newly in the AbstractNotice class
- The "duration" complex attribute was extended to the "periodicDateRange" and "fixedDateRange" class

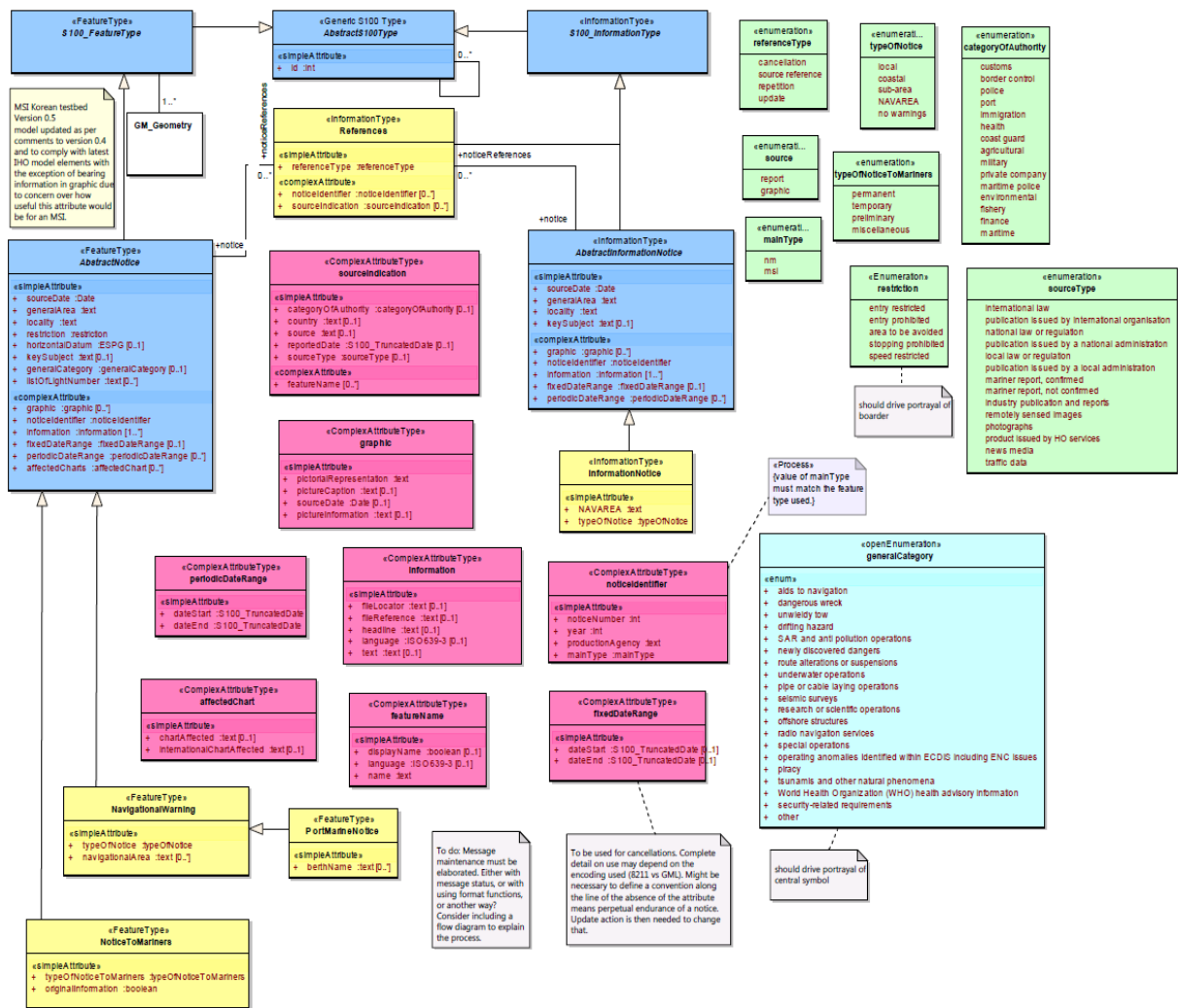


Fig. 3 Interim discussion results for the harmonization on MSI data model

DMA documented the procedures currently used at their organization to consider a promulgation of NW's and Jeppesen prepared a document to consider ENC way of promulgation of MSI information. KRISO surveyed examples of Navigation warning and Notice to Mariners service. Meanwhile, DMA has extended their MSI-NM editor with the option to export S-124 compliant GML and the format of the GML is based on the KRISO-Jeppesen sample GML datasets, updated to better match the latest UML model. Jeppesen reviewed the sample datasets and provided comments. The discussion group will continue their discussion to harmonize the data model and provide a harmonized MSI data model to S-124 CG soon.

### Action Required of NIPWG

The NIPWG is invited to:

- note the progress reported in this paper.
- provide recommendations that may be helpful to harmonize the MSI data models.