Paper for Consideration by TSMAD and DIPWG

Management of Feature and Portrayal Catalogues in S-101

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Executive Summary:	This paper outlines the options available for the management of S-101 Feature and Portrayal Catalogues in the S-100 ECDIS with the associated Product Specification version control. The options are to be discussed by TSMAD and DIPWG to ensure the best solution for implementation in S-101.
Related Documents:	S-101 (Implementation Guidance), S-100, TSMAD26/DIPWG5 10.5A, Resolution 2/2007
Related Projects:	S-101, S-100

Introduction / Background

One of the objectives of S-100 is to enable manageable flexibility that can accommodate change. The intention is that product specifications will be allowed to evolve through extension without the need to publish new versions of existing product specifications.

The S-101 ENC Product Specification is designed to be flexible with the introduction of machine readable Feature and Portrayal Catalogues that will allow for managed change and will enable the introduction of new navigationally significant features and their portrayal using a "just in time" methodology.

The S-101 Feature Catalogue describes the feature types, information types, attributes, attribute values, associations and roles which may be used in an ENC.

The S-101 Portrayal Catalogue contains the symbology and portrayal rules which determine the display of features contained within the S-101 ENC dataset from the Feature Catalogue.

The S-101 Feature and Portrayal Catalogues can be included in the exchange set as optional elements to deliver the latest version to the end user, using the S-101 exchange set mechanism for datasets.

Each version of the S-101 Feature and Portrayal Catalogues is tied to a version of the Product Specification. Changes to the Product Specification may result in changes to the Feature Catalogue and/or the Portrayal Catalogue and also the ENC.

The maintenance procedures for S-100 contain Clarifications, Corrections and Extensions, whereas the version control for the S-101 Product Specification is based on M-3 Resolution 2/2007, encompassing Clarifications, Revisions (including urgent revisions, for serious implications to safety of navigation) and New Editions.

The associated version control numbering to identify changes (*n*) to the S-101 Product Specification should be as follows:

New Editions denoted as ***n***.0.0, Revisions denoted as n.***n***.0, Clarifications denoted as n.n.***n***

The version control numbering for the S-101 Feature and Portrayal Catalogues, and the S-101 ENC datasets are not affected by Clarifications to the S-101 Product Specification, and will therefore follow the format: n.n.

Not all changes to the S-101 Product Specification, such as the introduction of new object classes, will affect all ENC datasets initially; consequently ENC datasets and the S-101 Feature and Portrayal Catalogues may be tied to different versions of the Product Specification. However, once all previous Product Specifications have been withdrawn, all ENC datasets not tied to the latest version of the Product Specification will need to be updated to ensure loading on the S-100 ECDIS. Until such time that all previous versions of the Product Specification are withdrawn the S-100 ECDIS will need to manage different versions of ENC dataset, tied to different versions of the Product Specification, using different versions of the Feature and Portrayal Catalogues. Hence S-101 must provide some implementation guidance on the management of multiple versions in the S-100 ECDIS.

The table below shows the associated version control numbering for the S-101 Product Specification:

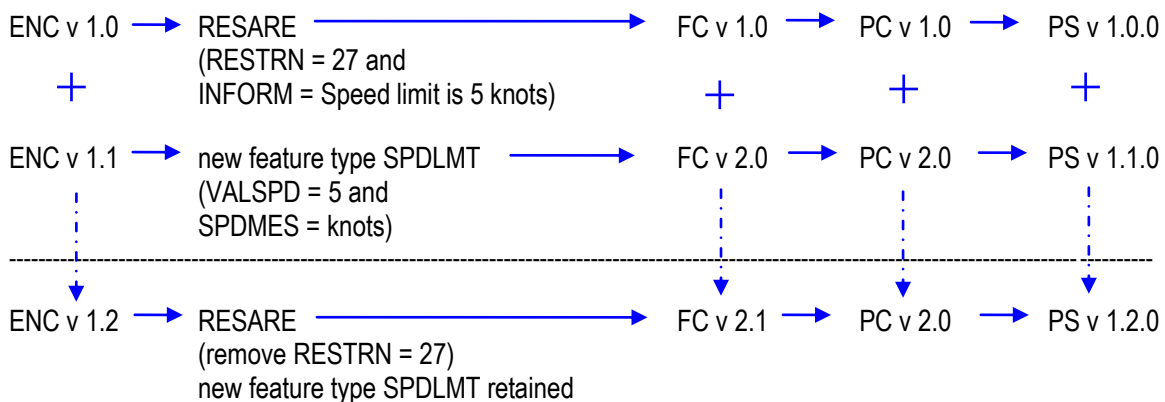| PS	Change	FC	PC	OEM action	ENC dataset version
1.0.0	Initial draft	1.0	1.0	Y	1.0
1.0.1	Clarification - remove spelling error	1.0	1.0	N	1.0
1.1.0	Revision - new feature (new FC/PC)	2.0	2.0	Y	1.0 1.1
1.2.0	Revision - new enumerates (new FC only)	3.0	2.0	Y	1.2
2.0.0	New Edition - significant change	4.0	3.0	Y	2.0

The three options available for the management of S-101 Feature and Portrayal Catalogues in the S-100 ECDIS outlined in this paper are to be discussed by TSMAD and DIPWG to agree the overarching principles to be used by software manufacturers and ECDIS manufacturers.

Analysis/Discussion

The three options below demonstrate the version management for the S-101 ENC dataset (ENC), the S-101 Feature Catalogue (FC), the S-101 Portrayal Catalogue (PC) and the S-101 ENC Product Specification (PS), from the existing capture of a known speed limit, through to the implementation of a new speed limit feature type, SPDLMT, improving upon the existing encoding of the INFORM attribute, and the eventual removal of the enumerate RESTRN = 27 from RESARE.

Option 1 - Multiple catalogues

The capture of a speed limit where the speed limit is known:

ENC v 1.0 → RESARE → FC v 1.0 → PC v 1.0 → PS v 1.0.0
(RESTRN = 27 and
+   INFORM = Speed limit is 5 knots)   +   +   +

ENC v 1.1 → new feature type SPDLMT → FC v 2.0 → PC v 2.0 → PS v 1.1.0
(VALSPD = 5 and
SPDMES = knots)

ENC v 1.2 → RESARE → FC v 2.1 → PC v 2.0 → PS v 1.2.0
(remove RESTRN = 27)
new feature type SPDLMT retained
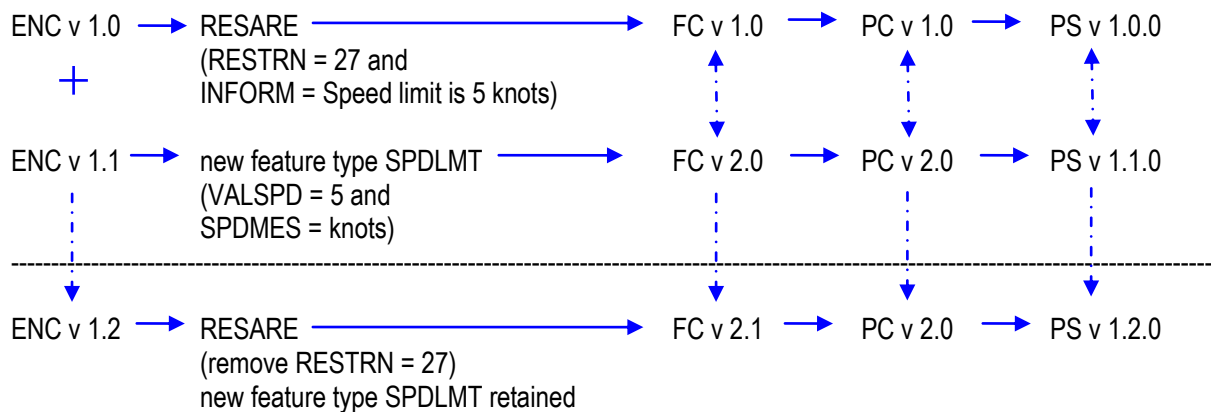
In summary:

ENC v 1.0 is encoded using the existing RESARE object with RESTRN = 27 (speed restricted) and INFORM = Speed limit is 5 knots. As this creates no changes to the versions, all original version numbers are retained.

ENC v 1.1 is encoded using the new feature type SPDLMT with VALSPD = 5 and SPDMES = knots. The addition of a new feature type creates revisions for the ENC and the PS and new editions for the FC and PC.

Until ENC v 1.2 is implemented superseding all previous versions, multiple FC and PC will be required in the ECDIS in order to load ENC versions 1.0 and 1.1. The PS v 1.2.0 will no longer contain the enumerate RESTRN = 27, so in ENC v 1.2 only the new feature type SPDLMT will be encoded for speed limits, therefore the FC will have a revision for the removed enumerate however the PC version will not change as the symbology will not be affected.

Option 2 – Cumulative catalogues

The capture of a speed limit where the speed limit is known:

ENC v 1.0 → RESARE ─────────────→ FC v 1.0 → PC v 1.0 → PS v 1.0.0
+ (RESTRN = 27 and
    INFORM = Speed limit is 5 knots)

ENC v 1.1 → new feature type SPDLMT ─────→ FC v 2.0 → PC v 2.0 → PS v 1.1.0
    (VALSPD = 5 and
    SPDMES = knots)

ENC v 1.2 → RESARE ─────────────→ FC v 2.1 → PC v 2.0 → PS v 1.2.0
    (remove RESTRN = 27)
    new feature type SPDLMT retained

In summary:

As above, ENC v 1.0 is encoded using the existing RESARE object with RESTRN = 27 (speed restricted) and INFORM = Speed limit is 5 knots. As this creates no changes to the versions, all original version numbers are retained.
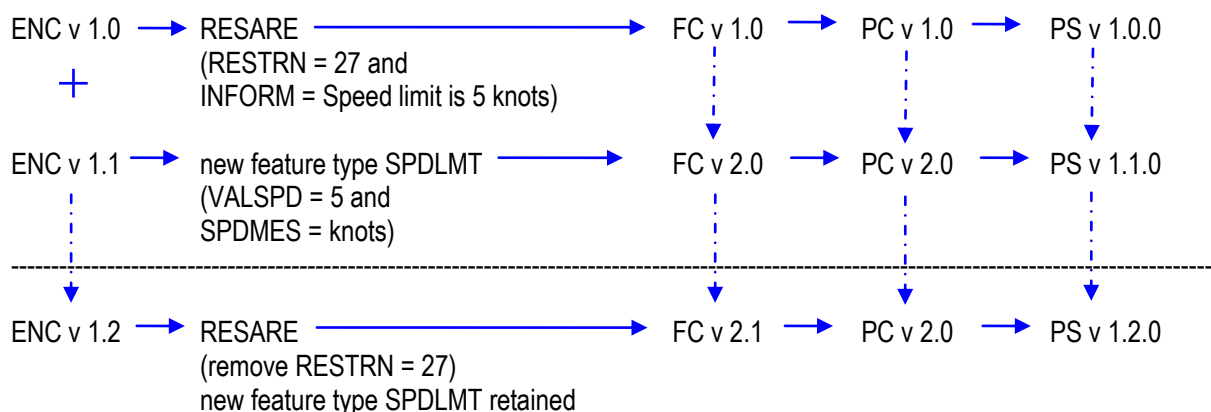
ENC v 1.1 is encoded using the new feature type SPDLMT with VALSPD = 5 and SPDMES = knots. The addition of a new feature type creates revisions for the ENC and the PS and new editions for the FC and PC. As v 2.0 of the FC and PC will contain mapping to v 1.0 of the catalogues for backward compatibility, only the latest version of the FC and PC is required, however all previous versions mapped to the current version will still need to be held in the ECDIS.

Until ENC v 1.2 is implemented superseding all previous versions, the latest version of the FC and PC and all previous versions mapped for backward compatibility will be required in the ECDIS in order to load ENC versions 1.0 and 1.1. As above, the PS v 1.2.0 will no longer contain the enumerate RESTRN = 27, so in ENC v 1.2 only the new feature type SPDLMT will be encoded for speed limits, therefore the FC will have a revision for the removed enumerate however the PC version will not change as the symbology will not be affected.

For this option the ECDIS only has to manage the latest version of FC and PC that are compatible with different datasets that are compliant to different versions of the product specification. However the ECDIS also needs to hold numerous FC and PC related to the different versions of the PS, in order to load and display previous ENC versions. A maximum number of versions for the cumulative method would need to be agreed by TSMAD.

Option 3 – Latest version catalogues

The capture of a speed limit where the speed limit is known:

ENC v 1.0 → RESARE ─────────────→ FC v 1.0 → PC v 1.0 → PS v 1.0.0
+ (RESTRN = 27 and
    INFORM = Speed limit is 5 knots)

ENC v 1.1 → new feature type SPDLMT ─────→ FC v 2.0 → PC v 2.0 → PS v 1.1.0
    (VALSPD = 5 and
    SPDMES = knots)

ENC v 1.2 → RESARE ─────────────→ FC v 2.1 → PC v 2.0 → PS v 1.2.0
    (remove RESTRN = 27)
    new feature type SPDLMT retained

In summary:

As above, ENC v 1.0 is encoded using the existing RESARE object with RESTRN = 27 (speed restricted) and INFORM = Speed limit is 5 knots. As this creates no changes to the versions, all original version numbers are retained.

ENC v 1.1 is encoded using the new feature type SPDLMT with VALSPD = 5 and SPDMES = knots. The addition of a new feature type creates revisions for the ENC and the PS and new editions for the FC and PC. As v 2.0 of the FC and PC will contain v 1.0 of the FC and PC only the latest version of the FC and PC is required.

After an agreed time ENC v 1.2 will be implemented to ensure consistent encoding. As above, the PS v 1.2.0 will no longer contain the enumerate RESTRN = 27, so in ENC v 1.2 only the new feature type SPDLMT will be encoded for speed limits, therefore the FC will have a revision for the removed enumerate however the PC version will not change as the symbology will not be affected.

For this option the ECDIS only has to manage a single FC and PC that are compatible with different datasets that are compliant to different versions of the product specification.

Conclusions

Options 1 and 2: the S-100 ECDIS must be able to carry multiple versions of the Feature and Portrayal Catalogues in order to load and display all valid versions of ENC datasets, which will require harmonization.

Option 3: the S-100 ECDIS only has to manage a single FC and PC that are compatible with different datasets that are compliant to different versions of the product specification.

A maximum number of versions would need to be agreed by TSMAD.

There needs to be a mandated timeframe in which a producer updates, as not all changes may affect all users, i.e. archipelagic sea lanes are not required for all nations waters.

A mechanism to add and/or delete Catalogues is required, which will need to be discussed with the software manufacturers and ECDIS manufacturers.

Assurance that all valid versions of ENC datasets will load and display on the S-100 ECDIS and any withdrawn versions do not load, is required thus ensuring integrity of the system for the mariner.

Recommendations

Early circulation of this paper is recommended for consideration, as a decision is required in April 2014.

It is recommended that TSMAD and DIPWG consider and discuss the three options above to ensure agreement on the best solution for implementation in S-101. A small sub working group will be required to produce the implementation guidance in the S-101 Product Specification. In addition, test cases will need to be created for the agreed option to be used in the test bed.

To address the potential issue of valid ENC datasets not loading on the S-100 ECDIS and withdrawn versions erroneously loading, it is recommended that a new field in the metadata is created which identifies allowable multiple versions to be loaded with the same edition number, i.e. with the implementation of the new feature type SPDLMT in PS v 1.1.0/ENC v 1.1 "multiple versions available" would be flagged in the ENC v 1.1 datasets, to ensure that the ECDIS loads all ENC datasets with edition number 1, in this case ENC v 1.0 and v 1.1 datasets. On implementation of PS v 1.2.0/ENC v 1.2 "superseding" would be flagged in the ENC v 1.2 datasets, to ensure that the ECDIS only loaded ENC v 1.2 datasets and all previous datasets still loaded would no longer be displayed.

The terminology used for the maintenance of S-101 is to be discussed by TSMAD and DIPWG to ensure agreement for Revisions and New Editions or Corrections and Extensions.

Action Required of TSMAD and DIPWG

The TSMAD and DIPWG are invited to:

a.   discuss the proposed options for the management of FC and PC in S-101.
b.   agree the option to be used for the management of the FC and PC in S-101.
c.   discuss the proposed new field in the metadata for ECDIS loading
d.   discuss the terminology for the maintenance of S-101
e.   agree the terminology for the maintenance of S-101