

Paper for Consideration by S-101PT

Use and Modelling of the UpdateInformation Feature

Submitted by:	IHO Secretariat
Executive Summary:	Changes in modelling and guidance are proposed for the UpdateInformation meta feature in accordance with discussions at S-101PT10 and Action S-101PT10-21; and further discussion at S-101 DCEG Sub-Group 4 meeting (September 2023).
Related Documents:	S-101PT10-07.10_Use_of_Update_Information; S-101PT Action S-101PT10-21; S-101 DCEG; S-98. S-101 DCEG Sub-Group 4 meeting Notes
Related Projects:	S-101; S-100 ECDIS performance

Introduction / Background

- Discussions at S-101PT10 (June 2023) in relation to Paper S-101PT10-07.10 – *Use of the UpdateInformation Feature*, resulted in the decision that further work was required in the modelling and encoding guidance for the S-101 meta feature UpdateInformation. The resultant changes, intended for inclusion in S-101 Edition 1.2.0, are summarised below, with draft redline changes to S-101 Annex A – *Data Classification and Encoding Guide*, included in the accompanying Annex to this Paper.
- It must be noted that this proposal is not intended to replace the actual update mechanism in the ECDIS as currently described in S-101 and S-98. It is intended only to enhance the highlight capability of ENC Updates on Mariner selection.

Analysis/Discussion

- Discussions on Paper S-101PT10-07.10 - *Use of the UpdateInformation Feature*, resulted in the following decision and action:

Decision: S-101PT agreed that further work was required for the modelling and implementation of the UpdateInformation feature, based on the recommendations in Paper S-101PT10-07.10.

Action S-101PT10-21: IHO Sec to develop a proposal for the modelling and implementation of the UpdateInformation feature, based on the recommendations in Paper S-101PT10-07.10, for consideration of the DCEG Sub-Group.

- The rationale put forward to inform changes to the modelling of the UpdateInformation meta feature was that, rather than the feature being intended as an optional feature to provide Data Producers with the ability to provide the Mariner with additional information related to an updated feature, the UpdateInformation feature could be utilised in S-100 ECDIS to replace the binary differencing methodology used in S-57/S-52 ECDIS to highlight ENC Updates on request by the Mariner. The method of binary differencing provides no capability for the Data Producer to cartographically impact the way the Update highlight functionality is performed by the ECDIS; and no ability to provide any further information that may be considered relevant for the Updated feature(s). This has long been a source of frustration for both Data Producers and Mariners, particularly in regard to portrayal.
- Changes to the modelling of the UpdateInformation meta feature as included in the Annex are summarised as follows:
 - The former complex attribute updateDescription has been removed. Revised guidance has been included to optionally provide any additional information relevant to the Update using the complex attribute information.

- The complex attribute fixedDateRange has been added. This attribute is intended to be populated only if the feature being updated has fixedDataRange populated; and if populated must have identical values to the feature being updated.
- A new attribute updateNumber has been added to aid in the portrayal of the UpdateInformation features when the Mariner chooses to view update highlights based on dataset load. The requirement for this attribute will need to be determined through testing.
- A new enumerate type attribute updateType has been added (as per recommendation in Paper S-101PT10-07.10) to identify the update instruction (insert, delete, modify, move). In regard to implementation, this attribute is intended to impact on ECDIS portrayal only, as described in S-52 Presentation Library Edition 4.0(.2), Part I for current S-57/S-52 ECDIS performance – see Figure 1 below (taken from Paper S-101PT10-07.10).

10.7.2 Identifying Automatic Chart Corrections On Mariners Demand

The ECDIS manufacturer must provide a means of identifying chart corrections to the SENC on demand by the Mariner.

Note: Manufactures may choose to implement a filtering mechanism to emphasise only the significant change to the Mariner.

On mariners demand automatic chart corrections of ENC information must be highlighted as follows:

10.7.2.1 Added Feature

When the ENC ISO 8211 record update instruction (RUIN) is set to 1 = Insert:

Point object: Superimpose SY(CHRVID01).
 Line object: Overwrite with line LC(CHRVID02).
 Area object: Overwrite area boundary with line LC(CHRVID02) and superimpose SY(CHRVID01) on any centred symbol.

10.7.2.2 Deleted Feature

When the ENC ISO 8211 record update instruction (RUIN) is set to 2 = Delete :

Point object: Superimpose SY(CHRVDEL1).
 Line object: Overwrite with line LC(CHRVDEL2) (do not remove the original line).
 Area object: Overwrite area boundary with line LC(CHRVDEL2) and superimpose SY(CHRVDEL1) on any centred symbol.

10.7.2.3 Moved Feature

As for deleted feature, followed by added feature.

10.7.2.4 Modified Feature

When the ENC ISO 8211 record update instruction (RUIN) is set to 3 = Modify:

Point: Superimpose SY(CHRVID01) and SY(CHRVDEL1).
 Line: Overwrite with LC(CHRVID02) and LC(CHRVDEL2).
 Area: Overwrite the boundary with LC(CHRVID02) and LC(CHRVDEL2) and also superimpose SY(CHRVID01) and SY(CHRVDEL1) on any centred symbol.

Figure 1

6. In regard to the association of UpdateInformation to the impacted feature using the association UpdatedInformation, technical advice is sought from implementers as to how this would work for deletions (that is, where the feature instance in the System Database is deleted when the Update is applied). The assumption is that the association would not be required for deletions as the impacted feature is deleted from the System Database; and the UpdateInformation and its geometry would subsequently exist independently in the System Database.
7. For Data Producers, it is hoped that ENC production software will be able to largely automate the creation of UpdateInformation features and related UpdatedInformation associations as data changes are applied in the source database or ENC dataset. For example:
 - The requirement to “auto-create” UpdateInformation features may be initiated by a simple global “create UpdateInformation” selection pop-up at the beginning of each editing session; or a selection pop-up as a change is made after the initial commit of a feature to the source database/product dataset. Such functionality may also be used to identify the value to be populated for the mandatory attribute updateNumber.
 - The geometry of the UpdateInformation will be the same geometry as for the updated/deleted feature. If proof of concept is achieved through implementation and testing and it is agreed that this revised modelling is to be included in the Operational Edition (2.0.0) of S-101, then consideration should be given to enhancing the encoding guidance to allow, for example, the encoding of a single UpdateInformation of type surface to cover an area of change.
 - For a “moved” feature two UpdateInformation features will be created – one for the deletion of the existing feature and one for the insertion of the feature at the relocated position, in accordance with S-52 Presentation Library Edition 4.0(.2), Part I, clause 10.7.2.3 for moved feature operation.
 - The population of the attributes fixedDateRange (however see Paragraph 9 below) and scaleMinimum can be auto-populated in the UpdateInformation from the feature being updated, if these attributes are populated for the feature. The mandatory attribute updateType can be auto-populated based on the action being performed by the compiler.

The optional attributes source and information are considered to be enhancements in S-101 to provide additional information about the update. It is expected that, as long as the above steps are performed, the performance in the ECDIS will be at least the equivalent of the performance for S-57/S-52 ECDIS, therefore the manual population of these attributes will be at the discretion of the Producing Authority.

8. Some advantages of this approach are considered to be:
 - The management of the ability to highlight ENC Updates on request by the Mariner is done at the dataset (encoding) and Feature/Portrayal Catalogue level, and there is no requirement for a mechanism to be implemented by the OEMs.
 - Update highlighting will only be done for the features being updated/deleted from a navigational perspective. For example, incidental geometry changes to associated geometry, such as insertion of a new connected note for a new line/boundary, will not highlight all the associated features that have not substantively changed as a result of the update. This will, as a result, be much more informative for the Mariner.
 - Enhanced ability for Data Producers to tailor the provision of this information. Data Producers may choose not to include an associated instance of UpdateInformation for a change that is inconsequential/minor and does not impact on the safety of navigation. Data Producers may also choose to provide additional information through population of the source and information attributes. In addition, provision of UpdateInformation does not need to be restricted to Update (ER) datasets – important new/changed information contained in New Edition (EN) datasets may also be identified using this mechanism.
9. Technical discussion will need to take place regarding (and possibly not restricted to) the following:
 - The capability for this methodology for highlighting updated information to be implemented along with the existing S-52 methodology during the Dual-Fuel transition period. It is assumed that the existing process will need to be retained in S-100 ECDIS in order to correctly highlight S-57 ENC Updates in dual-fuel mode.

- The logic and capability for the population of the complex attribute fixedDateRange. For example, a feature to be deleted by Update through population of the sub-attribute dateEnd would require the corresponding UpdateInformation to have this date populated in dateStart, so that the highlight feature is display when the related feature is effectively removed. This may be technically complicated and may benefit from additional attribution?
- The logic for the inclusion of the updateNumber attribute.
- New portrayal for the attribute updateType proposed value 4 (move).
- Any additional attribution required for the UpdateInformation feature; and the required encoding guidance that will be required to support such changes to the data model.
- Portrayal implications.
- The capability for this change to be implemented in data production software (both database and dataset oriented systems) so as to optimise an automated process (paragraph 7).
- Impacts on end-user systems (ECDIS).

Conclusions and recommendations

10. The proposed amendments to the modelling and associated encoding guidance for the S-101 UpdateInformation meta feature is intended to replace the existing S-57/S-52 functionality; and to provide an enhanced end-user experience with minimal additional resource implication on the Data Producer.

11. It is recommended that S-101PT:

- Approve the revised modelling and associated encoding guidance for the UpdateInformation meta feature and discuss any improvements that may be made in the model or associated guidance;
- Approve the replacement of the existing S57/S-52 binary differencing method for the highlighting of S-101 ENC Updates at mariner request with highlighting using the UpdateInformation meta feature, taking into account the discussion items raised in paragraphs 4-8.
- Discuss the technical aspects of this implementation as listed in paragraph 9.
- Agree for the approved changes to the UpdateInformation meta feature to be included in S-101 Edition 1.2.0 for implementation and testing purposes, in particular the testing of the methodology in the dual-fuel environment, with the intention to incorporate changes resulting from feedback on this modelling and associated ENC Update highlight methodology in the operational S-101 Edition 2.0.0.

Justification and Impacts

12. Inclusion of the functionality for the highlight of ENC Updates on mariner selection using the UpdateInformation meta feature at the dataset level with no requirement for implementation at the end-user system level will improve the capability for Data Producers to provide more meaningful information for such highlighting.

13. This proposal will need to be carefully discussed in regard to its impact on all aspects of ENC production and ECDIS implementation.

Action Required of S-101PT

14. The S-101PT is invited to:

- **Discuss** this proposal.
- **Approve** the recommendations included in paragraph 11.
- **Initiate** any further action as required.

ANNEX: S-101 DCEG Draft Redline Changes.

DCEG Draft Redline Changes

3.11 Update information

IHO Definition: **UPDATE INFORMATION.** The Update Information metadata feature is used to represent a change to the information shown.

S-101 Metadata Feature: Update Information**Primitives: Point, Curve, Surface***Real World**Paper Chart Symbol**ECDIS Symbol*

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
update description			C	1,*
—language		ISO 639-2/T	(S) TE	0,1
—text			(S) TE	1,1
fixed date range		See clause 2.4.8	C	0,1 †
date end	(DATEND)		(S) TD	0,1
date start	(DATSTA)		(S) TD	0,1
update number			IN	1,1
update type		1 : insert 2 : delete 3 : modify 4 : move	EN	1,1
scale minimum	(SCAMIN)	See clause 2.5.9	IN	0,1 †
source			TE	0,1
information		See clause 2.4.6	C	0,*
file locator			(S) TE	0,1
file reference	(TXTDSC) (NXTDSC)		(S) TE	0,1 †
headline			(S) TE	0,1
language		ISO 639-2/T	(S) TE	0,1
text	(INFORM) (NINFOM)		(S) TE	0,1 †

† For each instance of **fixed date range**, at least one of the sub-attributes **date end** or **date start** must be populated.

fixed date range and/or **scale minimum** are mandatory if **fixed date range** and/or **scale minimum** are populated for the associated Geo feature, and must be identical to the values populated for the associated Geo feature.

For each instance of **information**, at least one of the sub-attributes **file reference** or **text** must be populated.

INT 1 Reference:

3.11.1 Update information

~~If it is required to encode information about changes made to ENC data it must be done using **Update Information**. This feature must be encoded to cover the extent of changed data incorporated in the System~~

~~Database via ENC Updates (ER Application Profile), and may also be used to indicate changes introduced in ENC New Editions. It carries information about the changes.~~ The meta feature **Update Information** is used by the ECDIS to provide, on request, a visual indication to the Mariner of information that has changed in the System Database when an ENC Update is applied. Therefore, an associated instance of **Update Information** corresponding to each feature instance included in an ENC Update dataset (ER Application Profile) is mandatory for all changes that impact on navigation*. **Update Information** ~~may~~ must be associated with features that have changed using the association **Updated Information** (see clause 25.19).

* Data producers may consider the non-inclusion of an instance of **Update Information** for minor changes to a feature that have no impact on navigation, such as correction of spelling/syntax errors in text strings or associated text files. For further guidance see Section 31.

Remarks:

- The mandatory attribute **update number** must be used to indicate the Update number of the Update dataset that the changed information is included in, as indicated in the file extension of the Update dataset.
- The mandatory attribute **update type** must be used to indicate the type of update applicable to the feature (insertion, deletion, modification, move).
- The ~~mandatory~~ complex attribute **update description information** (see clause 2.4.6) ~~must~~ may be used to provide a brief textual description of the changes to the ~~dataset~~ associated feature as included in the Update. ~~If a more detailed description of the Update is required, this should be encoded using the complex attribute information (see clause 2.4.6).~~
- Where the changed information is related to an information type, the **Update Information** should be associated with the features to which the information type is associated.
- The attribute **source** may be used to indicate the related paper chart Notice to Mariner's number.
- At each New Edition of an ENC cell, **Update Information** features which are no longer relevant must be deleted; and for the next Update to an ENC cell **Update Information** features included in the previous Update dataset should be considered for deletion. Where a new Update impacts a feature that has previously been updated, any existing instance of **Update Information** associated to the feature must be deleted as part of the new Update; this ~~may~~ must be done by deleting the existing **Update Information** from the dataset, ~~or by removing the impacted feature(s) from the association Updated Information if there are features included in the association that are not impacted by the new Update.~~
- The creation of **Update Information** meta feature instances and the corresponding **Updated Information** association instances may be substantively automated in ENC production systems and associated databases, with automated population of the mandatory attributes **update number** and **update type** based on the change made to the data; and the complex attribute **fixed date range** and attribute **scale minimum** based on the attribution of the associated geo feature. Any additional information populated for **Update Information** is at the discretion of the Data Producer.
- ~~Where information has been deleted from an ENC the Update Information feature should cover the extent of the deleted information.~~

Distinction: Information Area; Caution Area.

Feature/Feature associations: **Updated Information**

28.X update number

IHO Definition: **UPDATE NUMBER.** The number corresponding to the extension part of the file name for an Update dataset.

Attribute Type: Integer

Indication: For an Update file, corresponds to the EEE of an ENC dataset file name 101CCCC00000000000.EEE.

Format: xxx

Minimum value: 0

Example: 1 for Update number 1

Remarks:

- Leading zeros must not be encoded.

28.Y update type

IHO Definition: **UPDATE TYPE.** An action performed when the contents of a dataset are changed.

Attribute Type: Enumeration

1) **insert**

IHO Definition: To put or introduce into the body of something. (Merriam-Webster Dictionary).

2) **delete**

IHO Definition: To eliminate especially by cutting out or erasing. (Adapted from Merriam-Webster Dictionary).

3) **modify**

IHO Definition: To make basic or fundamental changes to the characteristics of something, often to give a new orientation to or to serve a new end. (Merriam-Webster Dictionary).

4) **move**

IHO Definition: To change the place or position of something. (Adapted from Merriam-Webster Dictionary).

Remarks:

- No remarks.