Paper for Consideration by S-100WG/S-101PT

S-101 Support file management

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Executive Summary:	Proposed updated support file management description in S-101. The updated description is located both in the Product Specification main document and in the Data Classification and Encoding Guide.
Related Documents:	S-101 Draft Product Specification 20170705, S-101 Draft Annex A Data Classification and Encoding Guide (DCEG)
Related Projects:	

Introduction / Background

This paper is made according to action from TSMAD29 reference 10.3B:
Prepare a proposal on support file management for the DCEG – and comment out the existing section on support file management in S-101.

Support files carry additional feature information. When encoding the information type **Nautical Information,** its complex attribute **Information** with sub attribute **File Reference** and its attribute **Pictorial Representation** references the support files. The association **Additional Information** (Role Type Association) is used to create an association between the feature(s) and the information type.

To implement functionality for support files to be replaced or/and deleted, appropriate mechanisms need to be implemented in end user systems. To do so, metadata registrations defining version control is necessary. A support file is therefore defined as either new, replacement or deletion. This is registered in the support file metadata attribute S101_SupportFilePurpose.

Rules to prevent unwanted use of support files should be established. This paper will therefore suggest an upgraded version of S-101 Product Specification section 11.4.2 Support file management. In addition, further explanatory support file management description will be suggested for the DCEG.

The formats TXT, HTM, XML and TIF (Metadata S-101_SupportFormat: ASCII, HTML, XML, TIFF) are currently supported. With the release of S-100 edition 3.0.0 PDF was added as a valid support file format.
The inclusion of PDF will be discussed, and metadata corrections proposed accordingly. Changes related to PDF inclusion in the Product Specification 11.2 and 11.4 will also be proposed.

Analysis/Discussion

Support file format PDF
PDF was added as a possible support file format in S-100 3.0.0. S-101 DCEG 2.4.12.2 already has this option described: "…Picture files that form part of the ENC can be in Tagged Image File (TIF) format 6.0 or in PDF format".
This option must also be reflected in the S-101 Product Specification 11.2, 11.4 and in the metadata.

Support file format XML
Although currently included as an option, due to the nature of XML files it should be considered whether additional guidance needs to be included in the DCEG covering specific use cases for XML files. It may be appropriate to retain XML as an allowable format but simply add guidance that it is not used in this version of S-101.

Multiple use
One support file can be associated by multiple features in a dataset. E.g. two Caution Areas.

One support file can be associated by features in more than one datasets. E.g. a surface feature with coverage in two neighbouring datasets.
One support file can be associated by multiple features in several datasets. E.g. several surface features available in neighbouring datasets like a range of Caution Areas.

Due to multiple use it is important, when a support file is no longer being referenced by a feature, that the end user system check whether it is being referenced by other features. If it is not, the file can be removed from the system. If it is, the file must not be removed before instructions have been given for the other features to not reference this support file any more.

Also, due to multiple use, a set of rules must be established to portray the limitations necessary for support file management to be effective and functional.

Support file authentication.
The information support files are carrying is not deemed to be significant for encryption in S-101. As for S-57, the data files are carriers of the important information that needs encryption protection. However, a digital signature mechanism embedded in the discovery metadata that validates a support files origin is supported.

Support file location.
Support files should be in a separate folder within the exchange set, ref Figure 21 – S-101 Exchange Set.

Metadata removal
In the Product Specification 12.1.3 S101_SupportFileDiscoveryMetadata, the last sentence in the editionNumber Remarks column must be deleted. Use of update and reissue is not an option for support files.

Limitation rules
Based on the above discussion the Product Specification should inherit the following rules for limitation of support file use:
-Only one version, the latest edition, can be active
-Updated files must be issued as replacements
-Reuse regulation is necessary
-Multiple usage regulations are necessary
-Storage must be in separate folder(s)
-Reissue and Update references must be removed from support file metadata

In the following proposals (a-g) updated text amendments and strikethroughs are marked with red colour.

a) Product Specification 11.2 change proposal

Reference to simple attributes Textual Description changed to:
Support files are supplementary information which are linked to the features by the complex attribute ***information*** and its sub attribute ***file reference***, and by the simple attribute ***pictorial representation.***

b) Product Specification 11.4 change proposal

Add PDF to the third sentence:
Picture files transmitted must be in TIFF 6.0 Specification (TIFF) or PDF format.

Add PDF to table 3 – Support file extensions.

c) Product Specification 11.4.1 change proposal

Adding pdf as support file format (third bullet point):

- . EEE – support file extension. (TXT, HTM, XML, TIF or PDF)

d) Product Specification 11.4.2 amended text proposal

When a support file is created, or a subsequent version is issued it must carry its own issue date and be supported with a digital signature which authenticates it against the producer's public key included in the exchange set metadata.

The type of support file is indicated in the "purpose" field of the discovery metadata. Three types: new, replacement and deletion are defined. Support files carrying the "deletion" flag must be removed from the system. When a feature pointing to a text, picture or application file is deleted or updated so that it no longer references the file, the system software must check to see whether any other feature referenced the same file, before that file is deleted.

Each support file must be included only once in the exchange set.

Support files ~~should~~ must be stored in a separate folder within the exchange set, ref Figure 21 – S-101 Exchange Set.

Reuse of a support file name after a deletion period is possible only if the support files edition number is higher than previous edition was before deletion.

Only the latest edition of a support file can be used. As soon as a new edition is created and installed, the older version is retired and can no longer be used by any feature.

If a support file is associated with multiple features in one or several datasets, a new edition of the file will immediately be used by all associated features.

If a new edition of a support file contains changes not applicable to all previous associated features, a completely new file must be created instead. This is to maintain the support file information in the associated features not effected by the last changes. The associations to the old file must then be removed and new ones created for the new support file. Features where changes were not applicable will continue to use the old support file.

e) Product Specification 12.1.3 change proposal

In editionNumber row, remove last sentence:
When a dataset is initially created, the edition number 1 is assigned to it. The edition number is increased by 1 at each new edition. ~~Edition number remains the same for Update and re-issue.~~

f) Product Specification 12.1.3.1 change proposal

Add PDF to the list of S101_SupportFormat.

g) DCEG change proposal

DCEG describes the use of support files in section 2.4.12 and sub sections 2.4.12.1 and 12.4.12.2. Section 2.4.12 is currently lacking description. The following proposed solution draws some information from the sub sections to avoid duplication. In the sub sections this information is proposed deleted.
Missing references are included.
References to the information *class* Nautical Information is replaced with references to the information *type* Nautical Information, in accordance with DCEG 2.3 and 24.4.

2.4.12 Attributes referencing external files

The information type **Nautical Information** (see clause 24.4) is used to encode external file references. The complex attribute **information** and its sub-attribute **File reference** references textual support files. The simple attribute p**ictorial representation** references picture files. The association **Additional Information** (see clause 25.1) is used to create an association between the feature(s) and information type.

The attributes **information** and p**ictorial representation** are considered portrayal feature attributes, meaning that under given circumstances the "information" symbol (magenta I) will be portrayed in ECDIS

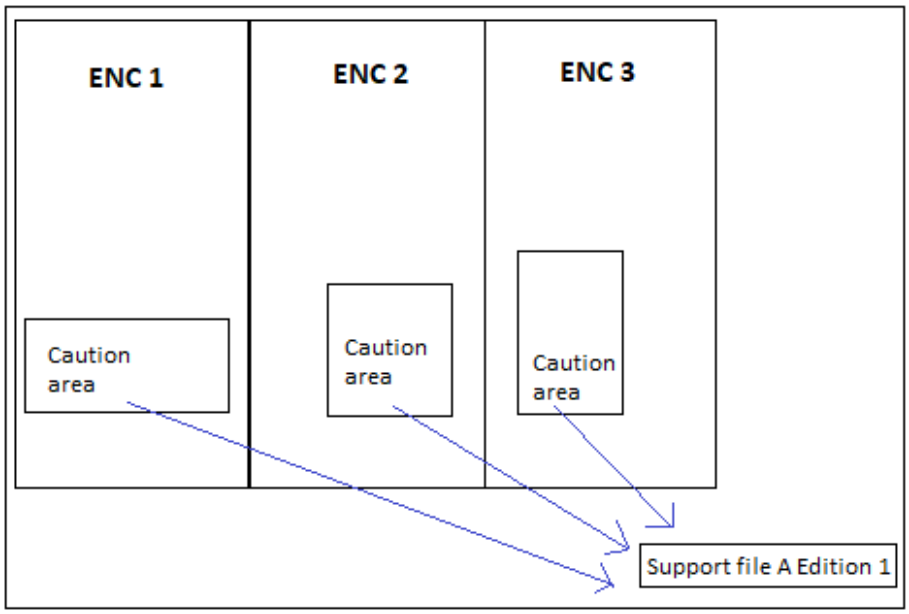
when one or both of these attributes are populated. Due to risk of ECDIS screen clutter, producers should carefully consider the use of these attributes.

These attributes must not be used when it is possible to encode the information by means of any other attribute.

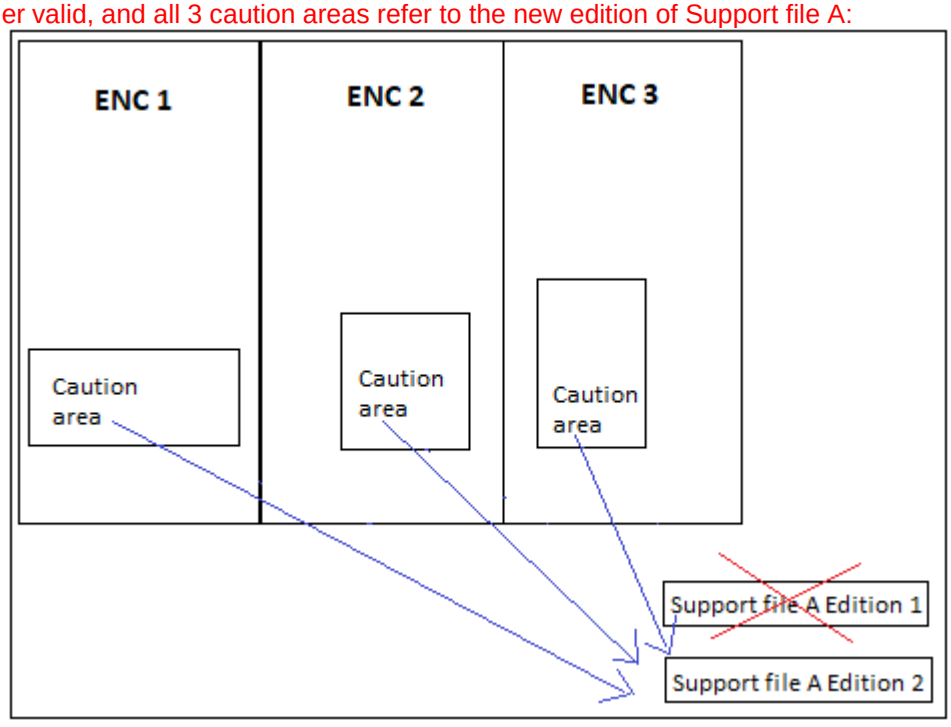
Clause 11.2 of the S-101 Product Specification main document specifies the content of an exchange set and the inclusion of support files. Clause 11.4 of the Product Specification main document outlines specific rules and limitations for support file management.

The following scenario demonstrates the rules related to versioning and issuing of new external files:

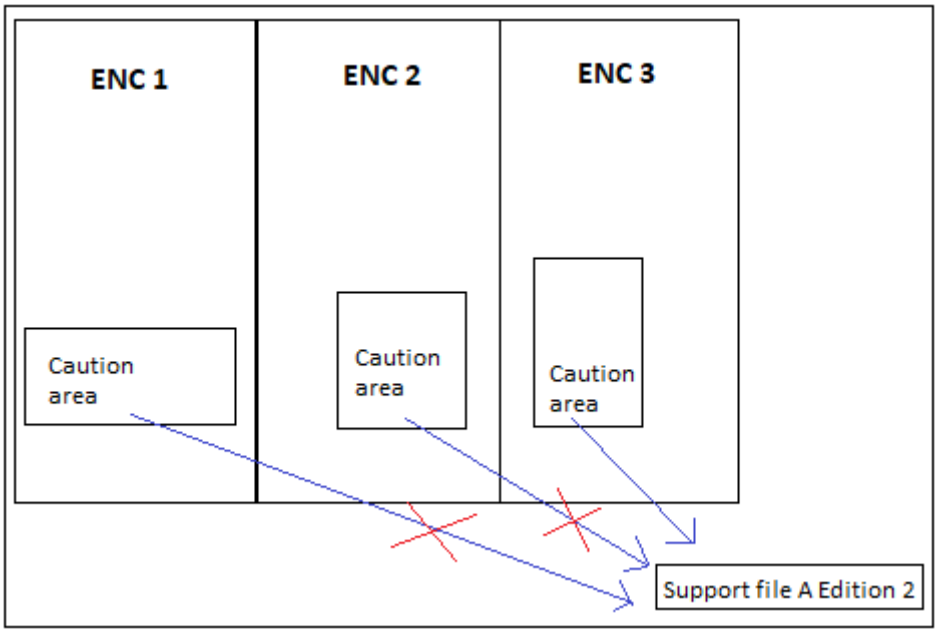
Three Caution areas are encoded within three different ENCs. All of them references the same support file A:



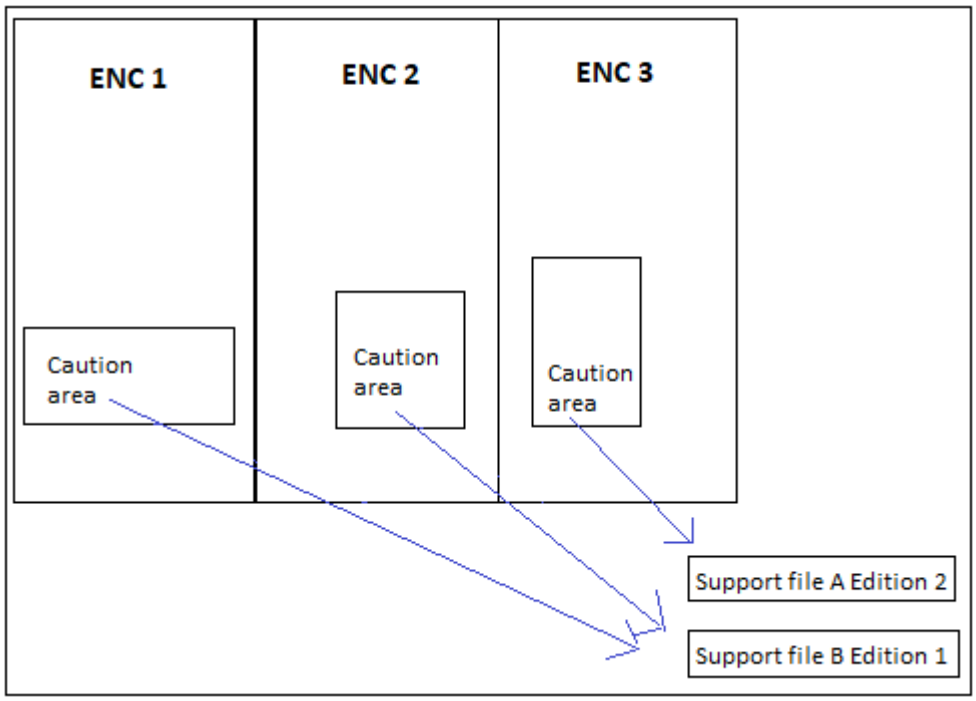
Changes occur making it necessary to issue a new edition of Support file A. Edition 1 is no longer valid, and all 3 caution areas refer to the new edition of Support file A:



Changes occur that are only applicable to the Caution areas in ENC 1 and ENC 2. Consequently, these ENCs can no longer refer to support file A Edition 2:



A new support file B must be created for ENC 1 and ENC 2 to use as reference:



2.4.12.1 Reference to textual files

~~The information class **Nautical Information**, complex attribute **information** must not be used when it is possible to encode the information by means of any other attribute. Under certain ECDIS display settings the "information" symbol will display when this attribute is populated. Therefore producers should carefully consider use of this attribute as the symbol may contribute significantly to ECDIS screen clutter.~~

The files referenced by **information** sub-attribute **file reference** must be.TXT, .HTM or .XML files, and may contain formatted text. These files should generally be used for longer texts (for example

longer chart notes, tables or paragraphs from nautical publications), but should not be used to replicate large blocks of text (for example entire chapters of Sailing Directions) that can be found in other Nautical Publications, which may not be suitable for viewing in ECDIS. It is up to the Producing Authority to determine the most suitable means of encoding a particular piece of text. Files must only use UTF-8 character encoding.

Due to the nature of XML files specific guidance is provided within the DCEG in cases where they are to be used.

The exchange language for textual information should be English. The sub-attribute **language** must be populated with an appropriate value to indicate the language used. Languages other than English may be used as a supplementary option. Generally this means, when a national language is used in the textual attributes, the English translation must also exist.

Remark

- ~~Clause X.X of the S-101 ENC Product Specification main document specifies the content of an ENC exchange set, including the option to include textual files.~~
- ~~In some cases, for external files referenced by the attribute **information** with sub-attribute **language** populated as a language other than English, encoders have created text files using local character encoding that may not be interpreted correctly by an ECDIS and therefore not readable by the user.~~ Encoders must encode national text files (files referenced by the sub-attribute **file reference**) using UTF-8 character encoding. This means that the encoding of the characters in text files must match the encoding of other textual national attributes (that is, **feature name**, **information** (**text**) with value other than English populated for sub-attribute **language**) within the dataset.

2.4.12.2 Reference to pictorial files

~~If it is required to indicate a drawing or a photograph, the information class **Nautical Information** (see clause X.X), attribute **pictorial representation** must be used to indicate the file name (without the path) of the external graphical file. The **Nautical Information** is associated to the relevant feature using the association **additional information** (see clause X.X).~~ The files referenced by attribute **Pictorial representation** must be .TIF or .PDF files. ~~Picture files that form part of the ENC can be in Tagged Image File (TIF) format 6.0 or in PDF format.~~

~~Consideration should be given to the addition of the "information" symbol in some ECDIS display settings where **pictorial representation** is populated, which may contribute to ECDIS screen clutter.~~ The attribute **pictorial representation** should ~~therefore~~ only be populated where the information is considered important in terms of safety of navigation and protection of the marine environment.

Encoders should also consider, when including a reference to an external graphics file, whether the file is appropriate in terms of:

Size of the file: Graphics files should be kept to a minimum file size, and should be considered in relation to the maximum allowable size of an ENC dataset (10Mb). Therefore, for example, a graphic file of 100Mb should be considered to be inappropriate. Using the following values as a guideline for TIF files will ensure acceptable size files:

Recommended Resolution:	96 DPI
Minimum Size x,y:	200,200 pixels
Maximum Size x,y:	800,800 pixels
Bit Depth:	8 Bit Indexed Colour
Compression:	LZW
Format:	Tiff 6.0

- Content of the graphic: The information contained in the graphic should supplement, in terms of navigational relevance, the encoding of the associated feature. For example, an image of a standard IALA special purpose buoy that duplicates the attribution of the associated **Buoy Special Purpose/General** provides no relevant supplementary information to the mariner (and may be considered to be double encoding), and therefore should not be included.

- Aspect: Graphics should provide perspective relevant to the view of the mariner. For example, an image of the top of a bridge derived from a photograph taken from the top of a bridge tower or nearby building does not provide the mariner with any information relevant to their location, and should not be included. However, an image derived from a photograph taken from a vessel approaching the bridge may be considered relevant.
- Suitability for display in ECDIS: Graphics should be such that all the information in the graphic is legible in the ECDIS display. For example, text included in diagrams or tables must be large enough so as to be legible when the file is opened in the ECDIS display. Images included in a graphical file should also be appropriately scaled such that they comfortably fit in the picture display window on the ECDIS (that is, do not only take up a very small area of the window; or are so large that the image needs to be panned to see the entire image). Consideration must also be given to variation in ships' bridge lighting conditions. It is recommended that, where possible, associated files are tested by opening the file in an ECDIS prior to publication of the ENC.

Conclusions

Several topics related to S-101 Support File Management have been discussed. Some of them are already part of the draft Product Specification, the others are proposed above. The main issue is to establish a solid framework and highlight the limitations necessary to establish a successful support file management operation.

Action Required of S-100WG/S-101PT

The group is invited to review and discuss the proposed amendments.