Paper for Consideration by TSMAD

S-101 Exchange Set Discussion

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| *Submitted by:* | S-101 Work Item Leader |
| *Executive Summary:* | This paper is to discuss and resolve the content for S-101 product specification concerning exchange sets |
| *Related Documents:* | Exchange Set Questions for Discussion |
| *Related Projects:* | S-101 |

## Introduction / Background

In August, the S-101 Work Item Leader sent to TSMAD members a discussion paper related to S-101 and Exchange Sets. However, the responses to the questions were mixed and on serval of them there was no indication of consensus. Therefore, these issues need to be discussed at the full TSMAD meeting for further clarification and adjudication.

The Exchange set Text is in Annex A for reference.

## Analysis/Discussion

Question 1: It was mentioned at the last TSMAD meeting that the exchange set should include the S-101 Feature Catalogue and Portrayal Catalogue. Are we in agreement that it should?
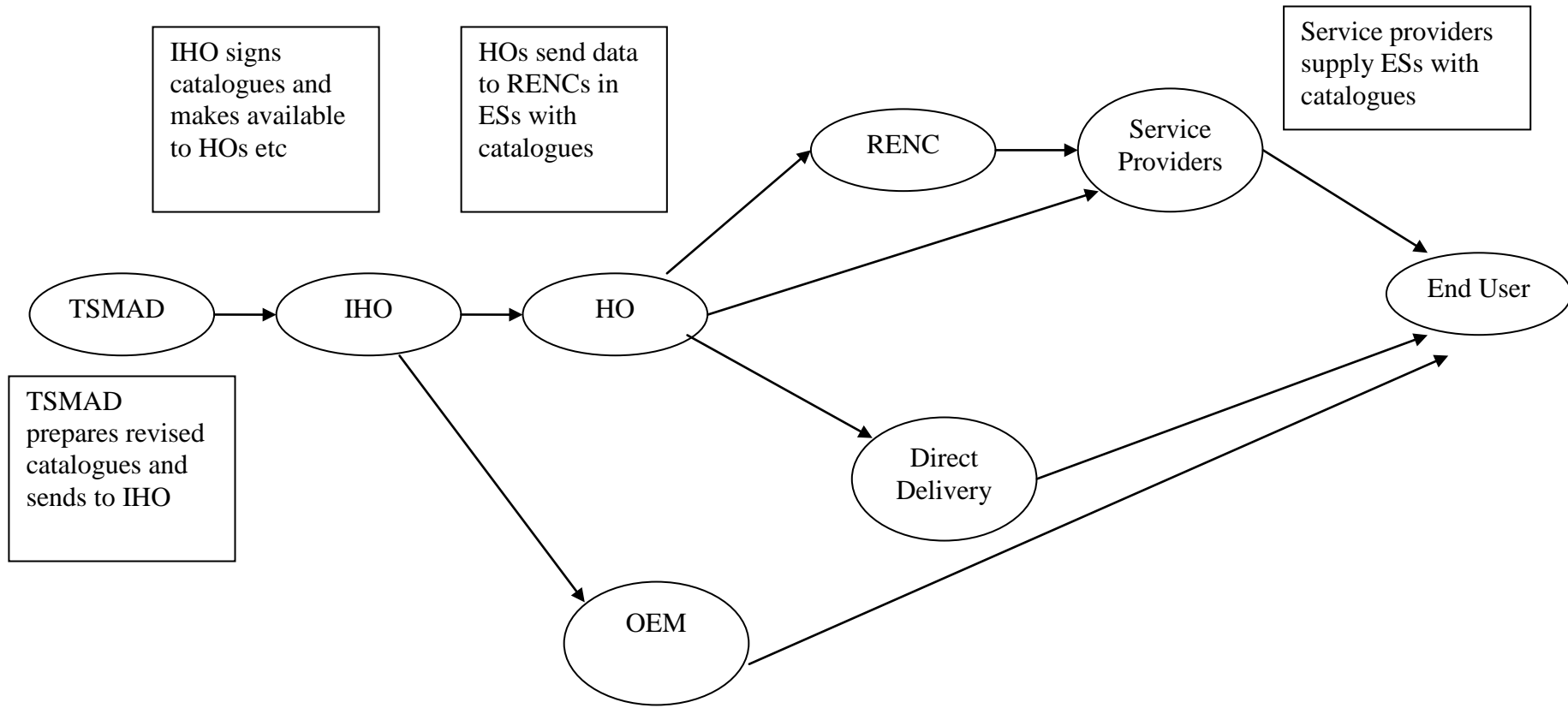
Clarifying this further, the catalogues will be delivered as part of an exchange set, the actual question is should they accompany the data?
In answering this question it has to be remembered that the primary goal which must be achieved is to guarantee that every system on every vessel receives new versions of feature and catalogue files when published.

The responses to this question were mixed. The majority of responses agreed that the Feature and Portrayal Catalogues should accompany the data in an exchange set, while others felt that the catalogues should only come from a single source – such as the IHO.
In reality there doesn't necessarily have to be one method of distributing the exchange set whether it contains data or not although most vessels using ECDIS must receive data at some point.

Whichever solution is defined, this is an element of the distribution chain. All new versions would be initially distributed by the IHO announced by a C.L. addressed to all stakeholders. The following graphic shows the possible feature and portrayal catalogue distribution chain.

IHO signs catalogues and makes available to HOs etc

HOs send data to RENCs in ESs with catalogues

Service providers supply ESs with catalogues

TSMAD prepares revised catalogues and sends to IHO

TSMAD → IHO → HO → RENC → Service Providers → End User

HO → Direct Delivery → End User

IHO → OEM → End User

Question 2:  If there is agreement that the exchange set also contain the catalogues, how do we tell the system to use which version, if a newer version is released to replace the old one?  I assume that this becomes a business rule.

The first part of this question is probably best treated in a similar way to the ENC data itself. There is a mechanism using meta data to inform the system of the latest version of the data in the exchange set, whether this is a ENC or a catalogue, both are data.

The second part of the question needs further thought although it really deals with how we accommodate backward compatibility. What has to be addressed is what changes to the feature catalogue could invalidate older data or cause an issue with the portrayal rules.

As an example, if a change consisted of promoting a 'category of' enumeration (eg. foul ground) to a full feature this could be handled by having both versions in the catalogue and similarly two entries in the look up table, both pointing to the same symbol. This would be transparent to the encoder.

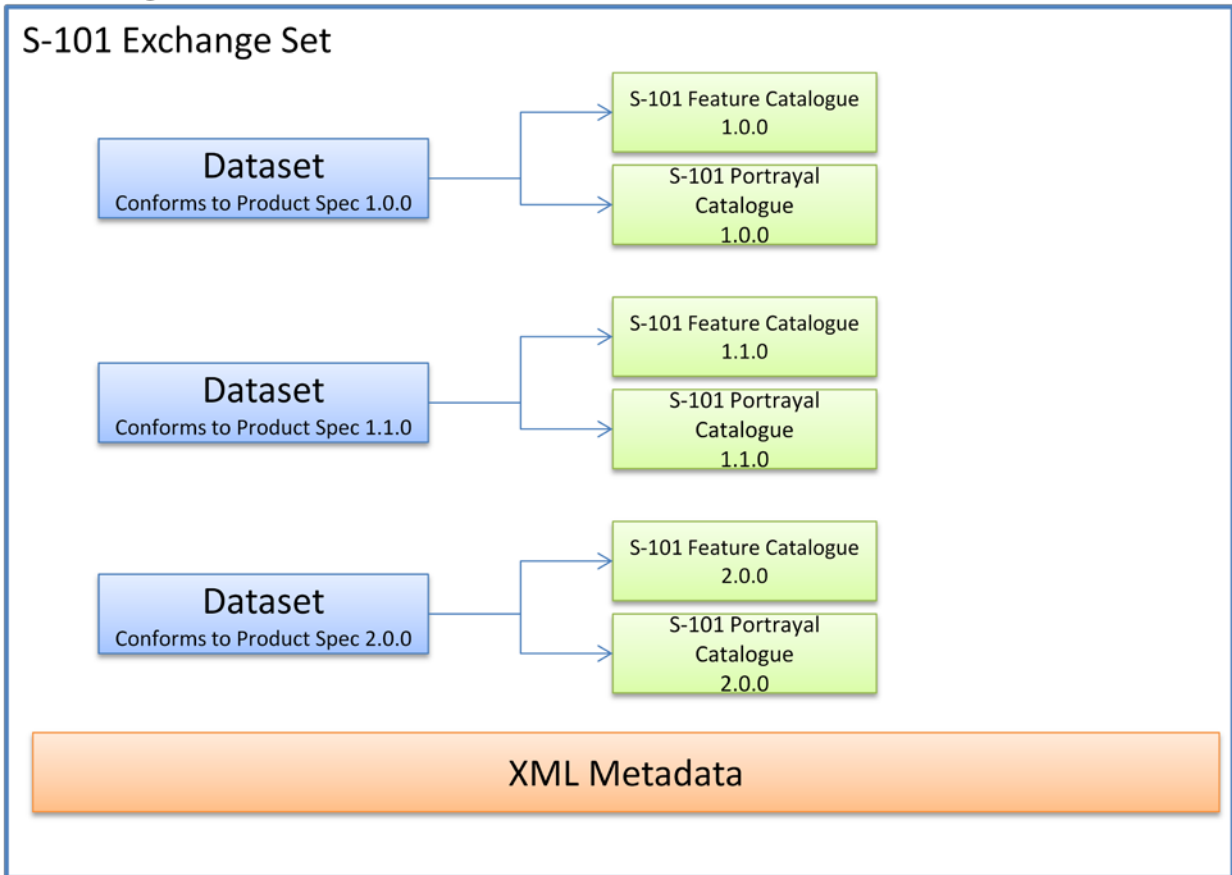Is this more effective than more than one version of the feature catalogue at any one time?

Would there need to be an expiry date on the older entry for the enumeration or, given the relatively small rate of change experienced in the last 15 years, is the overhead a problem? This would certainly accommodate backward compatibility.

The type of change which could cause a serious issue is if an attribute changes type for whatever reason e.g. integer to floating point or even character string. However this would probably be a rare or may never happen ever event.  Again is it conceivable for the catalogues to cater for both versions?

Multiple versions of catalogues in ECDIS would require OEM input. It would probably involve a mechanism to link versions of data sets and catalogues during the SENC conversion process.

As a result, there are four different scenarios that are up for discussion, in order to seek the best way forward.

## Scenario 1 – All valid Feature and Portrayal Catalogues are part of Exchange Set

**S-101 Exchange Set**

| Dataset | | S-101 Feature Catalogue 1.0.0 |
|---|---|---|
| Conforms to Product Spec 1.0.0 | → | S-101 Portrayal Catalogue 1.0.0 |

| Dataset | | S-101 Feature Catalogue 1.1.0 |
|---|---|---|
| Conforms to Product Spec 1.1.0 | → | S-101 Portrayal Catalogue 1.1.0 |

| Dataset | | S-101 Feature Catalogue 2.0.0 |
|---|---|---|
| Conforms to Product Spec 2.0.0 | → | S-101 Portrayal Catalogue 2.0.0 |

**XML Metadata**

| Pros | Cons |
|---|---|
| Ensure that the end user and ECDIS will have all the valid catalogues that are needed to read and portray the data | More Files to manage |
| | Exchange set could get large and hinder Satellite Internet delivery |
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| | |

Scenario 2: Only the latest approved catalogue is part of the exchange set
The ECDIS keeps a library of all old valid catalogues.



S-101 Feature and Portrayal Catalogues are the latest versions
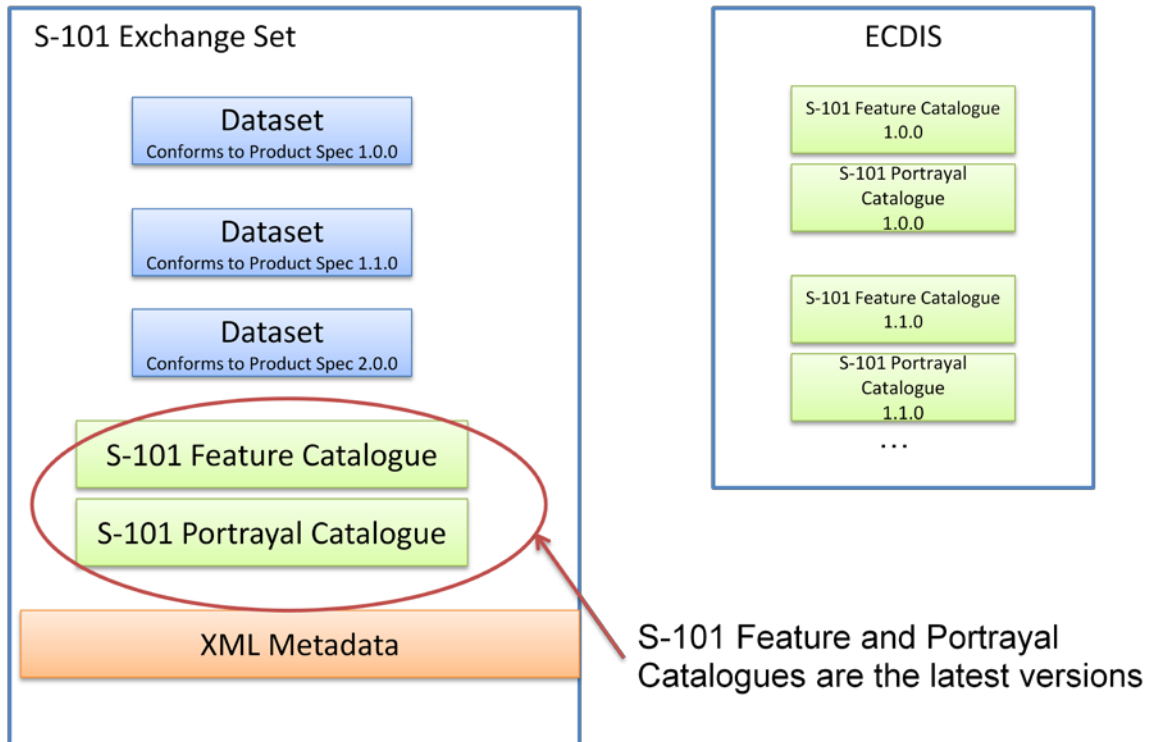
| Pros | Cons |
|---|---|
| Less overhead in catalogue distribution | Need to ensure that the ECDIS has a library of all past catalogues |
| Reduce the size of the exchange set | |
| Ensure that the end user will have the latest version of the catalogue that is needed for the data – without having to wait for a software upgrade | |
| ECDIS still has all the catalogues needed for the different datasets | |

**Scenario 3:** This S-101 Feature and Portrayal Catalogue is a cumulative version, Therefore it includes all the changes made in prior versions



S-101 Feature and Portrayal Cumulative Versions
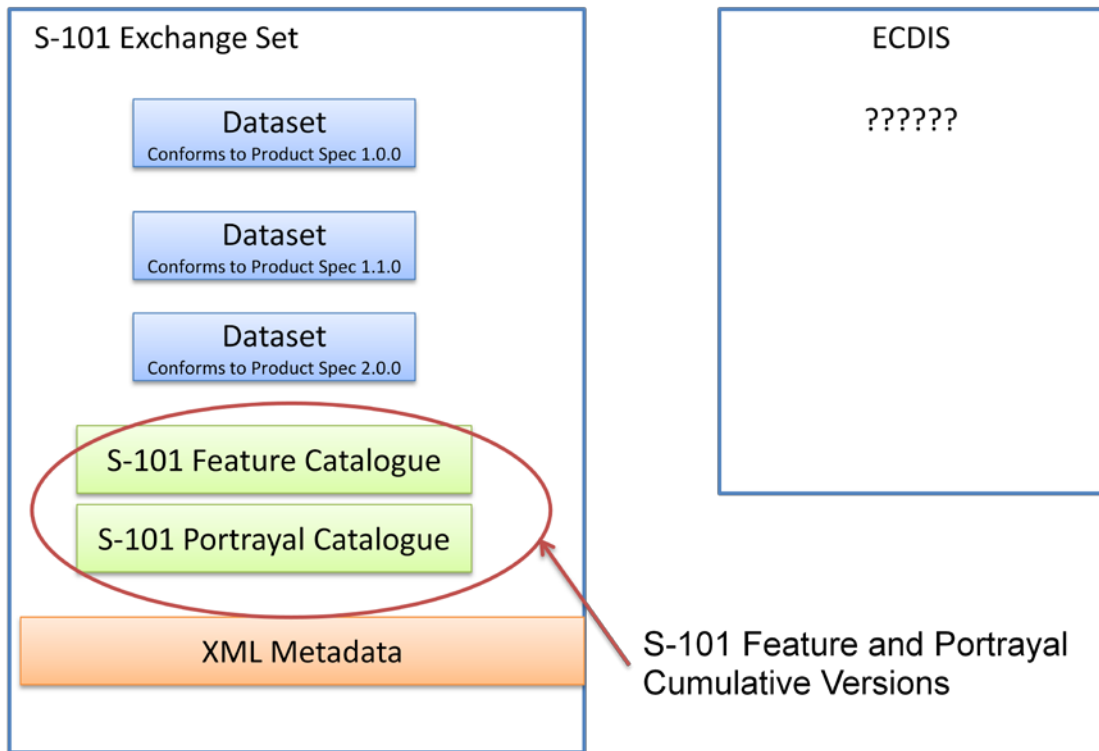
| Pros | Cons |
|---|---|
| Less overhead in catalogue distribution | Need to ensure that the ECDIS knows that it is an additive catalogue and if the metadata in the dataset states that it was created with an earlier catalogue version then the latest version is still valid for that dataset |
| | Could end up with a similar issue as the S-57 STED |
| | Could not change a value from and integer to a character string without messing things up |
| | |

## Scenario 4: No catalogues are distributed via exchange set
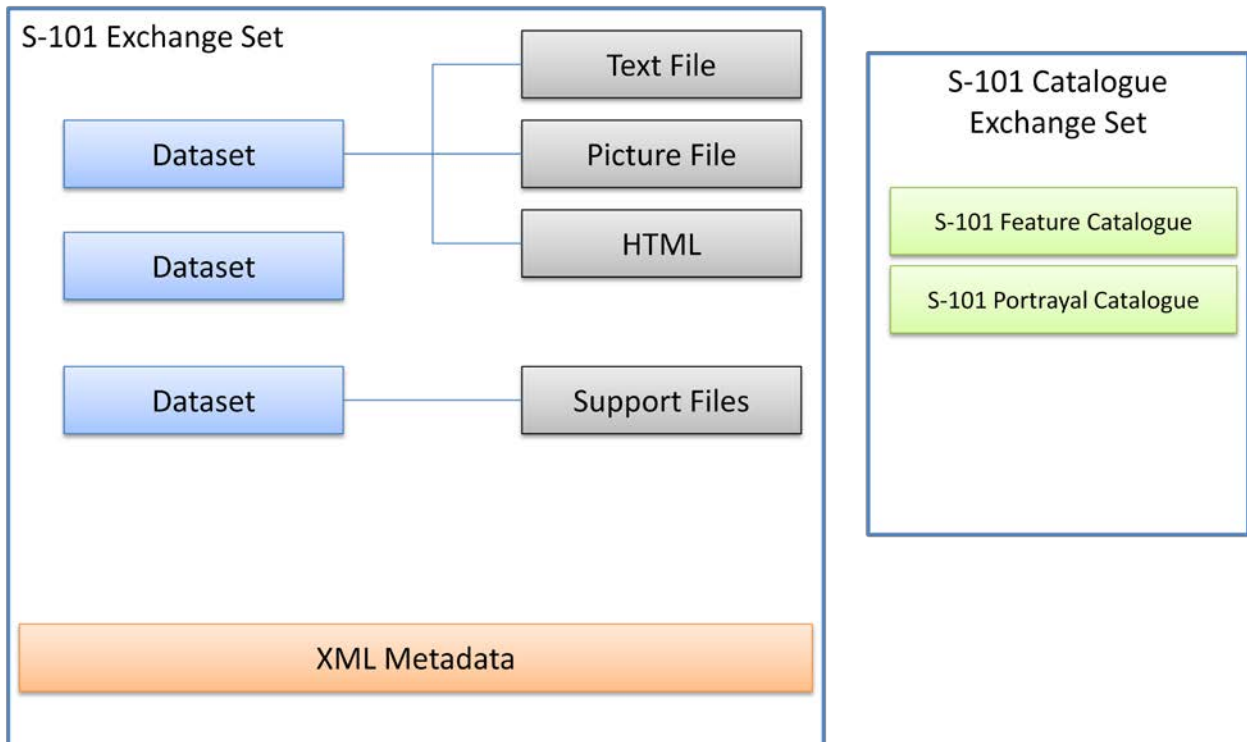


| Pros | Cons |
|---|---|
| Less Overhead | Can't ensure that the ECDIS has the latest version |
|  |  |
|  |  |
|  |  |

In working through each of these scenarios TSMAD should be able to develop a consensus position to bring to the OEMs.

Question 3: In the last line of Paragraph 5 it states: "A complete encoding suitable for commercial distribution will be published in IHO XX-YY." I'm assuming it means S-63. Is this a valid statement? Does this belong in S-101 at all?

The respondents were all that this either did not belong in this section or that it should be re-worded to take into account SENC distribution. The UK has proposed the following wording:

ENCs may be distributed commercially: the IHO S-63 standard and approved mechanisms such as SENC distribution support this.

The TSMAD work item's leader is to delete this line from the exchange set clause and move it to the Introduction of the Data Product Delivery clause.

Question 4: Paragraph 6: Suggest removing this entire paragraph and replace with a single line that Data conforming to S-101 shall be transformed, but not changed. The CRC is handled in Data Integrity and is part of the metadata. Do we concur with this suggestion?

There was general support for condensed verbiage in this paragraph. In addition, it was pointed out that data is translated and not transformed. Therefore the proposed new wording is – Data conforming to S-101 shall be translated and not changed.

Question 5:  Are we still keeping the README.TXT file?

It was indicated that much of the data that is in the README is found either via the metadata or a link to the HO's webpage that is in the metadata.  In addition, the respondents found that there was no need for the README file.

## Conclusions
As a result of the questionnaire sent to TSMAD members, it is apparent that there needs to be more discussion regarding the inclusion of Feature and Portrayal Catalogues within the exchange set, while the other questions had straightforward answers that can be included in the S-101 document.

## Recommendations
It is recommended that TSMAD work through the various exchange set scenarios outlined in this document to determine the best way forward for Feature and Portrayal catalogue distribution.

## Action Required of TSMAD
The TSMAD is invited to:

      a.     discuss the scenarios outlined in this paper

      b.     progress a solution for catalogue distribution.

ANNEX A:

## Exchange Set
S-101 datasets will be grouped into exchange sets. Each exchange set will consist of one or more ENC datasets with an associated XML metadata file and a single Exchange Catalogue XML file containing metadata. It may also include one or more support files, each of which will also be accompanied by an XML metadata file.

**Units of Delivery:**                               Exchange Set
**Transfer Size:**                          Unlimited
**Medium Name:**                               Digital data delivery
**Other Delivery Information:**

Each exchange set has a single exchange catalogue which contains the discovery meta data for each data set and references to any support files.
Support files are supplementary information are linked to by the following fields within the cells.
- TXTDSC
- NTXTDS
- PICREP

An exchange set is encapsulated into a form suitable for transmission either on hard or soft media by a mapping called an encoding. An encoding translates each of the elements of the exchange set into a logical form suitable for writing to media and for transmission online. An encoding may also define other elements in addition to the exchange set contents (i.e media identification, data extents etc…) and also may define commercial constructs such as encryption and compression methods.

This product specification defines a single encoding for ENC exchange sets which is described in Annex A. This encoding provides a hard-media / file based encoding for an exchange set with no encrypted or compressed contents and an additional file based cyclic redundancy check. It is not intended that this encoding is used for commercial distribution of ENC data as it contains no copy protection mechanisms or data authentication means. A complete encoding suitable for commercial distribution will be published in IHO XX-YY.

With all encodings it is paramount that data is only transformed and not changed. The acid test for an encodings consistency is the ability to extract individual feature information and recalculation of the features CRC value as defined in this standard. If an encoding can replicate the features CRC for arbitrary ENC data then the data has only been transformed (i.e reformatted) and not changed.

The S-101 Product Specification defines an encoding which can be used as a default for transmission of data between parties.
The encoding encapsulates exchange set elements as follows:
- ENC datasets – ISO 8211 encoding of features/attributes and their associated geometry and metadata. Defined further in Annex A

- Exchange Catalogue – the XML encoded representation of exchange set catalogue features [discovery metadata]. Includes an additional file level CRC check per dataset.

- Useful information about the ENC dataset. This is contained within a README.TXT file.

- Supplementary files – These are contained within the exchange set as files and the map from the name included within the cell and the physical location on the media is defined within the Exchange Catalogue.