Paper for Consideration by S-101PT8

Proposal to Rebind Complex Attribute information to S-101 Geo Features

Submitted by:	S-101 DCEG Sub-Group; (ENCWG) S-57 to S-101 Conversion Sub-Group.
Executive Summary:	This paper recommends the rebinding of the **information** complex attribute and **pictorial representation** simple attribute to the S-101 Geographic feature types.
Related Documents:	S-57 to S-101 Conversion GitHub discussion: https://github.com/iho-ohi/S-57-to-S-101-conversion-sub-WG/issues/4; S-101 Annex A – *Data Classification and Encoding Guide*.
Related Projects:	S-101 development.

Introduction / Background

1. During the initial development of the S-101 Data Classification and Encoding Guide (DCEG), the decision was made to remove the binding of the textual and pictorial attributes (included respectively as sub-attributes of the complex attribute **information** and as the simple attribute **pictorial representation**) from individual feature types in S-101 and replace this with a requirement to associate an instance of the Information type **Nautical Information** to the relevant feature(s) if this information is required. Discussions that have taken place within the (ENCWG) S-57 to S-101 Conversion Sub-Group have questioned this decision.

2. This Paper proposes the rebinding of the complex attribute **information** to all S-101 Geographic feature types and the simple attribute **pictorial representation** to selected Geographic feature types for the next version of the S-101 DCEG and S-101 Feature Catalogue.

Discussion

3. In S-57 the attributes INFORM, NINFOM, TXTDSC, NTXTDS and PICREP were included in attribute binding to the individual object classes in the S-57 Object Catalogue and extended to the ENC Product Specification. In S-100 the concept of Information types has been introduced; and the S-101 DCEG Sub-Group, which was tasked with developing the first Edition of the S-101 DCEG, determined that this information, where required, must only be included using the information type **Nautical Information** associated to the individual Geographic (Geo) feature instances using the association **Additional Information**.

4. The principal reason for this decision was the observation for S-57 ENC data that in many cases, particularly for the attributes INFORM and NINFOM and text files referenced by the attributes TXTDSC and NTXTDS, this information is repeated for multiple object instances. Taking this into account it was considered that the most economical data modelling option was to utilise the capability to "share" a single Information type instance between multiple Geo feature instances.

5. For updates, this would then necessitate a change to the single Information type instance only, rather than having to apply the change individually for multiple Geo feature instances. Having agreed on this modelling, it was further agreed that these attributes should therefore not be included on the individual Geo feature types following the principle that the data model should not include multiple options/methods to encode the "same" information within the Product Specification.

6. The S-57 to S-101 Conversion Sub-Group is a Sub-Group under the ENCWG. Currently, the main activity of this Sub-Group is the development of a guidance document for ENC data producers to aid them in preparing their S-57 ENC dataset/database holdings for conversion to data capable of producing S-101 datasets, using bespoke S-57 to S-101 data conversion software tools.

7. During discussions, concern has been raised that, with the current S-101 DCEG/Feature Catalogue, for all instances of the population of the attributes INFORM, NINFOM, TXTDSC, NTXTDS or PICREP on any S-57 object instance, it will be required to create and associate an instance of the S-101 Information type **Nautical Information** in addition to creating the associated corresponding S-101 Geo feature instance. A discussion thread has been included as an issue on the dedicated S-57 to S-101 Conversion Sub-Group GitHub repository at https://github.com/iho-ohi/S-57-to-S-101-conversion-sub-WG/issues/4.

8. While the Sub-Group understands and supports the principle of the "populate once, use many" process that has been implemented by allowing the association of an Information type instance to multiple Geo feature type

instances, it questions the requirement for this process to be mandated when the relationship between a feature instance and the information currently contained in the text or pictorial attributes is "one to one", and thus does not require the "sharing" of an Information Type instance. In particular, concern has been raised where many short text strings have been populated in the S-57 attribute INFORM that are unique to a single encoded object instance, which in S-101 will require many "isolated" instances of **Nautical Information** to encode such information.

Conclusions

9. The Sub-Group's initial conclusion resulting from these discussions was that the requirement to encode an associated instance of **Nautical Information** in order to include additional textual or pictorial information unique to a single encoded feature instance adds an unnecessary level of complexity to the data model in S-101.

10. An additional conclusion is that the primary design principle of the **Nautical Information** information type is to share common information between multiple feature instances in a dataset. For data content where the relationship is predominantly one-to-one it is felt that the use case is different, and therefore use of a thematic attribute is more appropriate in data modelling terms. This should not be seen as different methods for encoding such information, rather it strengthens the case for **Nautical Information** to be used only where sharing of information between features is required.

11. Therefore the attributes necessary to encode this information should be re-introduced as allowable attributes for the Geo feature types themselves. Discussion on the notion that this proposal will introduce the ability to encode the same information in multiple ways concluded that this will not be the case if the guidance included in the S-101 DCEG specifies that the encoding of the information on the attributes for the feature itself should only be done where the information is unique to the feature; and where the information is shared for multiple features this should be done using an associated instance of **Nautical Information**.

12. To prevent inconsistent encoding, it is also suggested to create an S-101 validation check to verify that a **Nautical Information** instance is not associated to only one feature instance.

Recommendations

13. It is recommended that the S-101PT approve the binding of the complex attribute **information** and the simple attribute **pictorial representation** to the individual geo feature types based on the following criteria:

- For **information**, all features having the S-101 association **Additional Information** as an allowable association for the feature[1]; and
- For **pictorial representation**, all features having PICREP as an allowable attribute for the corresponding S-57 object class. For new features introduced in S-101, addition of **pictorial representation** should be determined based on the binding for similarly themed features in S-57.

14. Pending this approval, it is recommended that the following amendments are applied to the S-101 DCEG and Feature Catalogue:

14.1. Add the complex attribute **information** and simple attribute **pictorial representation** as allowable attributes for S-101 feature types based on the above criteria:

14.2. Amend the guidance throughout the S-101 DCEG (noting especially clauses 2.4.6 and 2.4.12) related to the encoding of **information** and **pictorial representation** to reflect this change, in particular specifying that information applicable to a single feature should be encoded on the features themselves and information applicable to multiple features should be encoded using an associated instance of **Nautical Information**.

Action Requested of the S-101PT

15. The S-101PT is invited to:

1) **Approve** the binding of the complex attribute **information** and the simple attribute **pictorial representation** to the individual geo feature classes as required (noting possible further discussion required in regard to the footnote below).
2) **Approve** the draft amendments to the S-101 DCEG applied in line with the recommendations above (draft redline changes included in the draft Edition 1.0.2 submitted to S-101PT8).

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[1] **NOTE:** In S-101 DCEG version 1.0.1 the **Additional Information** association is not an allowable association for any of the S-101 meta feature types, however the attributes INFORM, NINFOM, TXTDSC and NTXTDS are allowable attributes for all the meta object classes in S-57. The S-57 to S-101 Conversion Sub-Group has noted that these attributes have been utilised on the meta objects in some S-57 ENC portfolios. The S-101PT may wish to investigate the merit of allowing the additional binding of the **information** complex to the meta features in S-101 based on this observation.

3) Approve the creation of an S-101 validation check as described in clause 12 of this paper.