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Paper for consideration by DQWG

Update on Data Quality Elements in Nautical Publications

21 June 2013

Submitted by:	SNPWG
Executive Summary:	This paper contains a snapshot of the data quality model for nautical publications information as of June 2013.
Related Documents:	S-101 Appendix A (Draft), Feb. 2013.
Related Projects:	S-101

1 Introduction / Background

The Data Quality Working Group proposed a model of data quality for S-101 to TSMAD 23 which was adapted by TSMAD. Further adaptations were discussed in SNPWG in connection with the SNPWG work on marine protected area information and datasets. This document provides an update to DQWG on the current data quality model for publications information, as of March 2013.

2 References

ISO 19115: Geographic Information – Metadata (2003). Updated by Corrigendum 1 (2006).

ISO/DIS 19157: Geographic Information – Data quality. Draft standard (July 2011).

TSMAD23-4.5.13: S-101 Data Quality. See also TSMAD23-4.5.13A and TSMAD23-4.5.13B.

TSMAD26-DCEG: Electronic Navigational Chart Product Specification: Appendix A – Data Classification and Encoding Guide. TSMAD Review 1, Draft, February 2013. URLs: http://www.iho.int/mtg_docs/com_wg/TSMAD/TSMAD26/DCEG/DCEG1%20S101_Data_ClassificationAndEncodingGuide_Working_SubWG.pdf and http://www.iho.int/mtg_docs/com_wg/TSMAD/TSMAD26/DCEG/DCEG3%20S101_DataClassificationAnd%20EncodingGuide_TSMAD_Review_1.doc.

3 Discussion

The UML model of data quality types in the marine protected areas (MPA) model and subsequently updated by SNPWG is shown in Figure 1. Elements from the “S101” and “Spatial” namespaces are taken from S-101/S-57 and the generic S-100 geometry model and the relationships between them are defined in the DQWG/TSMAD data quality model (a snapshot from late 2012). Elements from the “NP” namespace are part of the nautical publications information model. The data quality model specializes class **QualityOfNonbathymetricData** from the DQWG/TSMAD model with a new class **QualityOfNPInformation**. The class **QualityOfBathymetricData** is not used.

Comparing **QualityofNPInformation** to the draft[1] standard ISO/DIS 19157, it functions as a *partial* implementation of class **DQ_DataQuality** (ISO 19157 C.2.1.1). It implements the element **scope** (data type **DQ_Scope**) in that table by binding **hierarchyLevel** and **scopeDescription** attributes to **QualityOfNPInformation** (equivalents of **level** and **level description** respectively in ISO 19157 C.2.1.6). The binding to the **extent** in **DQ_Scope** is implemented by an (inherited) association to **GM_Surface**. It

[1] The draft available is nearly 2 years old (July 2011). It is unknown whether there have been subsequent revisions. The ISO web site indicates that the current status of ISO 19157 is “approved for registration as a FDIS” as of 2013-04.15. ISO 19157 will revise the relevant standards ISO 19113:2002, ISO 19114:2006 and ISO/TS 19138:2006 so concepts, definitions, etc., depending on those standards might change.

does not include the **report** and **standaloneQualityReport** roles defined in ISO 19157 (C.2.1.1), they are not currently part of the DQWG/TSMAD quality model (being replaced by the various uncertainty attributes and the common attributes **information** and **textualDescription**?). **QualityOfNPInformation** also binds information that indicates reliability by providing source information in the complex attribute **sourceIndication**.

Details for the new or adapted elements are in Annex A.

4 Recommendations

A common framework for scoping quality information is likely to be useful for multiple S-100 product specifications. DQWG is invited to develop such a framework taking into account ISO 19157 when that standard becomes available, and the scope description and hierarchy components of the model described in this document.

5 Conclusion

This paper is a snapshot of the model of data quality information for nautical publications information as of June 2013. The underlying ISO standards are being revised and while the impending new ISO standard appears to be quite mature, there may be updates to the definitions, concepts, and models in subsequent versions and before a final international standard is released. SNPWG may also update this model as datasets are developed for more kinds of nautical publications information.

6 Actions Requested

DQWG is invited to:

- develop a common model or framework for scoping quality information
- note this paper

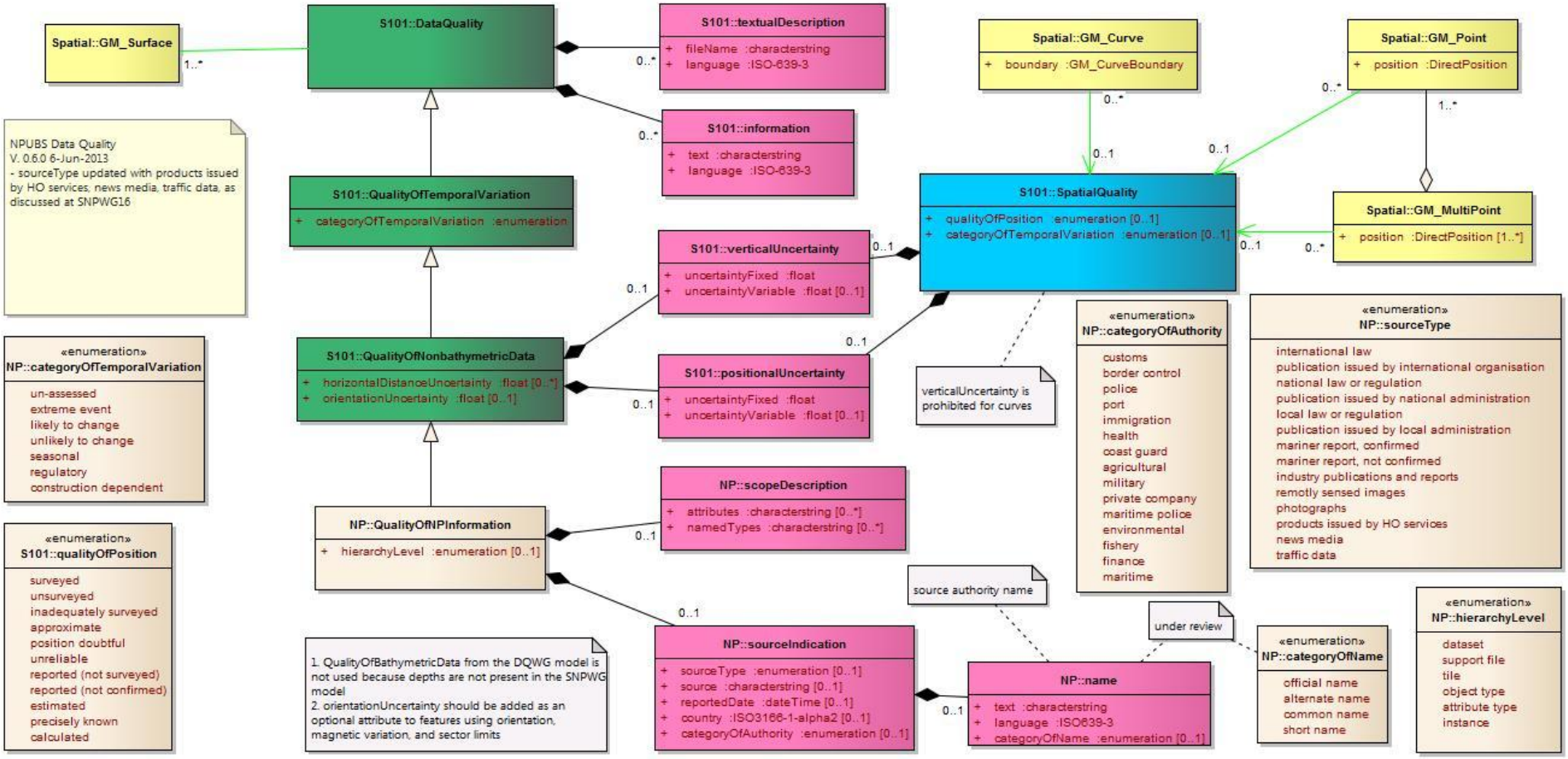

Figure 1. Data quality model for nautical publications information

Annex A. Publications quality model documentation

Inherited attributes are in *italics*. Inherited attributes which are not expected to be used are in ~~*strikethrough*~~ font. Attributes bound in the NP data quality model are in plain font. Highlights show where a change or extension was made. “Clause X.X” is a placeholder for the ultimate numbering in the relevant data quality document or DCEG

A.1. Quality of Nautical Publications Information

QualityOfNPInformation is derived from **QualityofNonbathymetricData**, which is defined in the S-101 DCEG [TSMAD26-DCEG]. QualityofNPInformation adds the scoping attributes **hierarchyLevel** and **scopeDescription**, and binds the quality indicator **sourceIndication**. The last is expected to be useful to indicate reliability to mariners.

IHO Definition: **QUALITY OF NAUTICAL PUBLICATIONS INFORMATION**. An area in which there is a uniform estimate of the overall accuracy of the specified kinds of nautical publications information.				
S-101 Geo Feature: Quality of nautical publications information (M_QNPI (?))				
Primitives: Surface				
Real World	*Paper Chart Symbol*	*ECDIS Symbol*		
Attribute	**S-57 Acronym**	**Allowable Encoding Value**	**Type**	**Multiplicity**
Category of temporal variation (Note: The S-101 DCEG has only items 1-4 and names item 2 as “event”).		1 : unassessed 2 : extreme event 3 : likely to change 4 : unlikely to change 5 : seasonal 6 : regulatory 7 : construction dependent	*EN*	*1,1*
Horizontal distance uncertainty	*(HORACC)*		*RE*	*0,1*
Orientation uncertainty			*RE*	*0,1*
Positional uncertainty	*(POSACC)*		*RE*	*0,1*
~~*Survey date range*~~			~~*C*~~	~~*0,1*~~
~~*Date end*~~	~~*(SUREND)*~~	~~*ISO 8601:1988*~~	~~*(S) DA*~~	~~*0,1*~~
~~*Date start*~~	~~*(SURSTA)*~~	~~*ISO 8601:1988*~~	~~*(S) DA*~~	~~*0,1*~~
Vertical uncertainty	*(VERACC)*		*(S) RE*	*0,1*
Information			*C*	*0,**
Language		*ISO 639-3*	*(S) TE*	*0,1*
Text	*(INFORM)*		*(S) TE*	*1,1*
~~*Scale minimum*~~	~~*(SCAMIN)*~~	~~*See clause X.X*~~	~~*IN*~~	~~*0,1*~~
Textual description			*C*	*0,**
File reference	*(TXTDSC)*		*(S) TE*	*1,1*
Language		*ISO 639-3*	*(S) TE*	*0,1*
Hierarchy level		1 : dataset 2 : support file 3 : tile 4 : object type 5 : attribute type 6 : instance	EN	0,1

Scope description			C	0,1
Attributes			TE	0,*
Named types			TE	0,*
Source indication			C	0,1
Source type		1 : international law 2 : publication issued by international organisation 3 : national law or regulation 4 : publication issued by a national administration 5 : local law or regulation 6 : publication issued by a local administration 7 : mariner report, confirmed 8 : mariner report, not confirmed 9 : industry publications and reports 10 : remotely sensed images 11 : photographs 12 : products issued by HO services 13 : news media 14 : traffic data	EN	0,1
Source			TE	0,1
Reported date		ISO 8601:1988	DT	0,1
Country		ISO 3166-alpha2	TE	0,1
Name(?)		(under review)	C	0,1
Category of authority		(see below)	EN	0,1

INT 1 Reference:

A.1.1. Encoding instructions and constraints - TBD

Distinction: Quality of Non-bathymetric Data, Quality of Bathymetric Data.

A.2. Category of Authority

This enumeration was defined for other nautical publications modeling purposes and is included as-is in the data quality model.

Category of authority: IHO Definition: The type of authority (tentative definition)

1) **Customs**

   IHO Definition: The agency or establishment for collecting duties, tolls. (Merriam-Websters online Dictionary 23rd February 2006, amended)

2) **Border control**

   IHO Definition: the administration to prevent or detect and prosecute violations of rules and regulations at international boundaries (adapted from Merriam-Websters online Dictionary 23rd February 2006)

3) **Police**

IHO Definition: the department of government, or civil force, charged with maintaining public order (Adapted from OED).

4) **Port**

IHO Definition: person or corporation, owners of, or entrusted with or invested with the power of managing a port. May be called a Harbour Board, Port Trust, Port Commission, Harbour Commission, Marine Department (NP 100 8th Edition 14 Oct 2004).

5) **Immigration**

IHO Definition: the authority controlling people entering a country.

6) **Health**

IHO Definition: the authority with responsibility for checking the validity of the health declaration of a vessel and for declaring free pratique.

7) **Coast guard**

IHO Definition: the organisation keeping watch on shipping and coastal waters according to governmental law; normally the authority with responsibility for search and rescue.

8) **Agricultural**

IHO Definition: the authority with responsibility for preventing infection of the agriculture of a country and for the protection of the agricultural interests of a country.

9) **Military**

IHO Definition: a military authority which provides control of access to or approval for transit through designated areas or airspace.

10) **Private company**

IHO Definition: a private or publicly owned company or commercial enterprise which exercises control of facilities, for example a calibration area.

11) **Maritime police**

IHO Definition: a governmental or military force with jurisdiction in territorial waters. Examples could include Gendarmerie Maritime, Carabinierie, and Guardia Civil.

12) **Environmental**

IHO Definition: an authority with responsibility for the protection of the environment.

13) **Fishery**

IHO Definition: an authority with responsibility for the control of fisheries.

14) **Finance**

IHO Definition: an authority with responsibility for the control and movement of money.

15) **Maritime**

IHO Definition: a national or regional authority charged with administration of maritime affairs.

Remarks:
- No remarks.

A.3. Category of temporal variation

The list of allowed values extends the corresponding list in the S-101 model.

Category of temporal variation: *IHO Definition: An assessment of the likelihood of change within an*

area since last survey.

1) ***Unassessed***

   IHO Definition: Temporal variation not assessed or cannot be determined.

2) **Extreme *event***

   IHO Definition: No new hydrographic survey conducted after an event (e.g. hurricane, earthquake, volcanic eruption, landslide, etc), which is considered likely to have changed the seafloor significantly.

3) ***Likely to change***

   IHO Definition: Continuous or frequent change (e.g. river siltation, sand waves, seasonal storms, ice bergs, etc).

4) ***Unlikely to change***

   IHO Definition: Significant change to the seafloor is not expected.

5) **Seasonal**

   IHO Definition: Varies with the season.

6) **Regulatory**

   IHO Definition: May be changed by local or other regulation.

7) **Construction-dependent**

   IHO Definition: Changes likely due to anticipated or in-progress construction.

Remarks:
- *No remarks.*

A.4. Attributes

ISO 19115 defines **MD_ScopeDescription>attributes** (B.2.5.2, see also ISO 19115 Corr. 1). A non-null value for this attribute allows different data quality information to be scoped by attributes.

Attributes: IHO Definition: The concept identifier for an attribute of a feature or information type. (tentative definition)

Indication: The string encodes the camel case code for a thematic attribute bound to a feature or information type. The camel case code is given in the feature catalogue.

Examples: **verticalClearance**, **availableBerthingLength**

Remarks:
- No remarks.

A.5. Hierarchy level

Attribute “hierarchy level” is an adaptation of the code list MD_ScopeCode (§B.5.25) in ISO 19115:2003. See also Figure 4 in the draft ISO 19157. The allowed values **object type**, **attribute type**, and **instance** are adaptations of **feature type**, **attribute type**, and **feature** from ISO 19115, made so as to include feature types and information types. The adaptations were made because S-100 distinguishes features from information types and conform nomenclature to the (proposed for edition 2.0.0) feature catalogue model in S-100.

Hierarchy level: IHO Definition: The hierarchical level of information to which the owning object applies. (tentative definition)

1) **Dataset**

IHO Definition: Information applies to the data set. (ISO 19115:2003).

2) **Support file**

IHO Definition: Information applies to support files.

3) **Tile**

IHO Definition: Information applies to a tile, a spatial subset of geographic data. (ISO 19115:2003).

4) **Object type**

IHO Definition: Information applies to all instances of specified feature or information types. (Adapted from ISO 19115:2003.)

5) **Attribute type**

IHO Definition: Information applies to the specified characteristic of feature or information types. (Adapted from ISO 19115:2003.)

6) **Instance**

IHO Definition: Information applies to a feature or information type instance. (Adapted from ISO 19115:2003.)

Remarks:

- The owning object is the instance of a feature or information type to which this attribute is bound.
- In case of overlapping owners with conflicting information, the information in the owner with the most specific hierarchy level prevails. The order of levels from general to specific is: (1) exchange set (2) dataset (3) support file (4) tile (5) class type (6) attribute type (7) instance.

A.6. Named types

ISO 19115 defines **MD_ScopeDescription>features** (B.2.5.2, see also ISO 19115 Corr. 1). The name was changed to include both feature and information types in S-100, which distinguishes between the two. A non-null value for this attribute allows different data quality information to be scoped by feature or information type.

Attributes: IHO Definition: The concept identifier for a feature or information type. (tentative definition)

Indication: The string encodes the camel case code for a feature or information type. The camel case code is given in the feature catalogue.

Examples: **UnderkeelAllowanceArea, WaterwayArea, Regulations**

Remarks:

- No remarks.

A.7. Reported date

(See reported date in the S-101 DCEG.)

A.8. Scope description

Attribute **scopeDescription** is a complex attribute which adapts **MD_ScopeDescription** in ISO 19115 (B.2.5.2). It includes only the attribute and feature types from that table. Instances from that table are not needed, being replaced by association of quality information metadata to the specific data object or quality attributes bound to the instance; “dataset” can be taken as implied in the absence of any other scoping, and “other” is a catchall, instead additional specific scopes should be defined if needed.

Scope description: IHO Definition:

Indication: The complex attribute describes the scope of the object to which it is bound.

Sub-attributes: **Attributes** see clause X.X

Named types see clause X.X

Remarks:
- No remarks.

A.9. Source indication

Source indication: IHO Definition: A source for the data encoded in a data object or dataset.

Indication: The complex attribute describes the source of data in the object to which it is bound.

Sub-attributes: **Source type** see clause X.X

Source see clause X.X

Reported date see clause X.X

Country see clause X.X

Name see clause X.X

Category of authority see clause X.X

Remarks:
- No remarks.

A.10. Source

Update reference: IHO Definition: A firsthand document or primary reference work.

Indication: Name of document or reference work String of characters.

Format: c...

Example:

US Coast Pilot Vol. 7

Remarks:
- No remarks

A.11. Source type

Source type: IHO Definition: The type of source. (tentative definition)

1) **International law**

   IHO Definition: Treaty, convention, or international agreement; or European Union law.

2) **Publication issued by an international organisation**

   IHO Definition: Publication including graphics and charts issued by an international organisation.

3) **National law or regulation**

   IHO Definition: Legislative or administrative law or regulation passed by a national government or

national regulatory agency or authority.

4) **Publication issued by a national administration**

IHO Definition: Publication including graphics and charts issued by a national administration.

5) **Local law or regulation**

IHO Definition: Legislative and administrative law or regulation passed by a national sub-division, for example a state, province, or local government or sub-national regulatory agency or authority.

6) **Publication issued by a local administration**

IHO Definition: Publication including graphics and charts issued by a local administration, such as local government or port authority.

7) **Mariner report, confirmed**

IHO Definition: Reported by mariner(s) and confirmed by another source.

8) **Mariner report, not confirmed**

IHO Definition: Reported by mariner(s) but not confirmed.

9) **Industry publications**

IHO Definition: Shipping and other industry publication including graphics and charts and web sites.

10) **Remotely sensed images**

IHO Definition: Information obtained from remote sensing devices.

11) **Photographs**

IHO Definition: Information obtained from photographs.

12) **Products issued by HO services**

IHO Definition: Information supplied by a hydrographic office.

13) **News media**

IHO Definition: Information derived from general news media other than shipping industry publications.

14) **Traffic data**

IHO Definition: Traffic density information derived from traffic monitoring services.

Remarks:
- No remarks.