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# PRIMAR papers S-100WG8

**Svein S. Skjaeveland**

Operated by the Norwegian Mapping Authority, Hydrographic Service

**FREEDOM TO CHOOSE**

- **S100WG8-24\_4.9:** Catalogue and Dataset versioning
- **S100WG8-26\_4.10:** Metadata extensions clarifications in S-100 Part 4 and part 17
- **S100WG8-27\_4.11:** Namechange to S100\_DatasetDiscoveryMetadata attribute notForNavigation
- **S100WG8-36\_4.12:** Support files concept and clarification
- **S100WG8-25\_6.11:** PRIMAR viewpoint on Catalogue Distribution

# S100WG8-24: Catalogue and Dataset versioning



- A mechanism for linking a dataset to a version of a catalogue (Portrayal Catalogue, Feature Catalogue) is currently missing in S-100.
- Challenge: A Product Specifications FC/PC may change numbering independently of the main Product Specification number.

# S100WG8-24: Catalogue and Dataset versioning

## S-101PT11 2023 11.1 EN S-100 Versioning Discussion V1:

**IHO PROPOSED TABLE**

Ref	Type of change	Example	DPS	DCEG	FC	PC	Validation
1	Major change includes an S-100 version change	New concept in S-100 used by S-101	X.0.0	X.0.0	X.0.0	X.0.0	X.0.0
2	New content no portrayal impact	Attribute value added <sup>1</sup>	X.X.X	X.X.X	X.X.X	X.X.X	Possibly If yes: X.X.X
3	New content with portrayal impact	New attribute value and corresponding symbol	X.X.X	X.X.X	X.X.X	X.X.X	Possibly. If yes: X.X.X
4	Symbol change only data not affected	New symbol for existing content	X.X.X	X.X.X	X.X.X	X.X.X	X.X.X
5	Validation change only	Additional check non critical	X.X.X	X.X.X	X.X.X	X.X.X	X.X.X
6	Encoding change	Change of guidance to cover new real world concept consistently	X.X.X	X.X.X	X.X.X	X.X.X	Possibly. If yes: X.X.X
7	Feature catalogue correction, no content or portrayal impact	Add listed value to FC that is described in the DCEG but missing from FC.	X.X.X	X.X.X	X.X.X	X.X.X	X.X.X
8	Portrayal catalogue correction, no content or FC impact	Correct portrayal catalogue rule	X.X.X	X.X.X	X.X.X	X.X.X	X.X.X

- A. (Ref 2) New content no portrayal impact – changes to FC versioning
- B. (Ref 3) New content with portrayal impact - changes to FC and PC versioning
- C. (Ref 4) Symbol change only data not affected - changes to PC versioning
- D. (Ref 7) Feature catalogue correction, no content or portrayal impact - changes to FC versioning
- E. (Ref 8) Portrayal catalogue correction, no content or FC impact - changes to PC versioning

# S100WG8-24: Catalogue and Dataset versioning



- Linking a dataset to a version of a catalogue is needed for the use of a dataset in the end user system.
- If a dataset is encoded in accordance with an updated version of a catalogue, and the end user system uses an older version of a catalogue, there is a possibility that encoded information could be unavailable/not displayed or erroneously/wrongly displayed for the end user.

## Action required:

- Note the paper and discuss the issues presented.
- Consider approving the accompanying change proposal to S-100.

# S100WG8-24: Catalogue and Dataset versioning

- S-100 Part 17 DatasetDiscoveryMetadata – attribute productSpecification (Type: S100\_ProductSpecification):

S100\_ProductSpecification

Role Name	Name	Description	Mult	Type	Remarks
Class	S100_ProductSpecification	The Product Specification contains the information needed to build the specified product	-	-	-
Attribute	name	The name of the Product Specification used to create the datasets	0..1	CharacterString	The name in the GI Registry should be used for this field. For example, "Electronic Navigational Chart"
Attribute	version	The version number of the Product Specification	0..1	CharacterString	TR 2/2007 specifies versioning of Product Specifications.
Attribute	date	The version date of the Product Specification	0..1	Date	
Attribute	<a href="#">featureCatalogueVersion</a>	<a href="#">The version number of the Feature Catalogue</a>	<a href="#">1</a>	<a href="#">CharacterString</a>	<a href="#">The version number of the Feature Catalogue to be used with this dataset.</a>
Attribute	<a href="#">portrayalCatalogueVersion</a>	<a href="#">The version number of the Portrayal Catalogue</a>	<a href="#">1</a>	<a href="#">CharacterString</a>	<a href="#">The version number of the Portrayal Catalogue to be used with this dataset.</a>
Attribute	productIdentifier	Machine readable unique identifier of a product type	1	CharacterString (Restricted to Product ID values from the IHO Product Specification Register, in the IHO Geospatial Information Registry)	For example, "S-101"
Attribute	number	The number used to lookup the product in the Product Specification Register of the IHO GI registry	1	Integer	For IHO Product Specifications these should be taken from the IHO Product Specification Register in the IHO Geospatial Information (GI) Registry
Attribute	complianceCategory	The level of compliance of the Product Specification to S-100	0..1	S100_ComplianceCategory	See Part 4a, clause 4a-5.5







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## S100WG8-26: Metadata extensions clarifications in S-100 Part 4 and part 17

- Inconsistency related to Product Specifications metadata profile have been discovered between S-100 Part 4a and S-100 part 17.
- Part 4a allows to extend the metadata profile even though it now is common acceptance for not extending the S-100 Part 17 Exchange Catalogue profile on a Product Specification level.
- S-100 Part 4a-5.2:

### **4a-5.2 Metadata for describing geographic data and other resources**

The Profile identifies the metadata required to describe digital geographic data and resources, and is applicable to independent datasets, dataset aggregations, geographic features, feature classes and attributes. Metadata is documented via the creation of XML document instances, which are validated against the S-100 Metadata Profile XSDs, and relevant codelists and enumerations<sup>5</sup>.

~~If a Product Specification extends the metadata of this profile, the rules in Appendix 4a-E must be followed, and the Product Specification must provide a metadata Schema to validate metadata against.~~

Metadata records must contain a minimum set of core elements (see Section 4a-5.3 which are necessary for conformance with this Profile. A number of additional elements required for discovery purposes have also been identified and are described in the Appendix 4a-C.

Quality information is important for assessing whether datasets or resources are fit for use, and quality metadata have therefore been documented in Part 4c.

# S100WG8-26: Metadata extensions clarifications in S-100 Part 4 and part 17

## ➤ S-100 Part 4a, Appendix 4a-D:

### Rules for creating an extension

- 1) Extended metadata elements shall not be used to change the name, definition or data type of an existing element.
- 2) Extended metadata may be defined as classes and may include extended and existing metadata elements as components.
- 3) An extension is permitted to impose more stringent obligations on existing metadata elements than the standard requires. (Metadata elements that are optional in the standard may be mandatory in an extension.)
- 4) An extension is permitted to contain metadata elements with domains that are more restrictive than the standard. (Metadata elements whose domains have free text in the standard may have a closed list of appropriate values in the profile.)
- 5) An extension is permitted to restrict the use of domain values allowed by the standard. (If the standard contains five values in the domain of an existing metadata element, the extension may specify that its domain consists of three domain values. The extension shall require that the user select a value from the three domain values.)
- 6) An extension is permitted to expand the number of values in codelists or enumerated lists. Extending codelists or enumerated lists are discouraged, even in profiles. When they must be extended care should be taken to minimize the number of additional entries. Also, the extended codelist or enumerated list should be published or otherwise made available.
- 7) An extension shall not permit anything not allowed by S-100.
- 8) References to files shall be of type URI following the formatting.

**Note:** These extension rules do not apply to the Exchange Catalogue profile as described in S-100 part 17, as part 17 can only be restricted at product specification level.





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## S100WG8-26: Metadata extensions clarifications in S-100 Part 4 and part 17

### ➤ S-100 Part 17-4.5:

#### 17-4.5 Elements of the Exchange Set Catalogue

The tables in this section provide a detailed textual description of the encoding of the S-100 Exchange Set Catalogue. The design follows a number of key design principles that have been consistently applied throughout the development process.

One of these principles drives the choice of multiplicity value assignments. At the S-100 framework level, the majority of S-100 Exchange Set Catalogue elements are intended to be optional and therefore have their lower multiplicity bound set to 0. Only those elements that are considered absolutely necessary across all S-100 data products have their lower multiplicity bound set to 1, effectively making them mandatory for all data products. Overall, the resulting multiplicity values at the S-100 Framework level are considered to be a starting point for S-100 Product Specification developers and can be overridden at the individual data product level if necessary.

Another principle was to retain some of the existing element names for historical reasons. For example, the naming of the NotForNavigation element could be improved, but this element was retained from previous versions for backwards compatibility reasons. Similarly, the terms file and resource are used interchangeably in the model and for historical reasons.

A third principle is that the S-100 Exchange Catalogue profile cannot be extended at the product specification level. This principle exists for implementers of the S-100 Exchange Catalogue profile not needing to consider product specific extensions.

- A third principle is that the S-100 Exchange Catalogue profile cannot be extended at the product specification level. This principle exists for implementers of the S-100 Exchange Catalogue profile not to consider product specific extensions.

### Action required:

- Note the paper and discuss the issues presented.
- Consider approving the accompanying change proposal to S-100.



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## S100WG8-27: Namechange to S100\_DatasetDiscoveryMetadata attribute notForNavigation

- TSM9 advised to propose this change proposal for acceptance into the S-100 6.0.0 version.
- The reason for naming the attribute notForNavigation instead of forNavigation is unclear - and the denial that lies within the name reverses what seems to be the logical approach when clarifying if a product is for navigation or not.
- It could be argued that the name notForNavigation = true (not for navigation) becomes an unnecessary double denial.
- To approach the most logical way of encoding whether a product is for navigation or not, it is proposed to change the name, description and remarks of the attribute notForNavigation (if there is no intent behind using denial in attribute name) accordingly:

Attribute	<del>not</del> ForNavigation	Indicates <b>if</b> the dataset is <del>not</del> intended to be used for navigation	1	Boolean	<i>True</i> indicates the dataset is <del>not</del> intended to be used for navigation <i>False</i> indicates the dataset is <del>not</del> intended to be used for navigation
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## S100WG8-27: Namechange to S100\_DatasetDiscoveryMetadata attribute notForNavigation

- This change should also trigger the removal of the strikethrough sentence in the figure below:

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Another principle was to retain some of the existing element names for historical reasons. ~~For example, the naming of the NotForNavigation element could be improved, but this element was retained from previous versions for backwards compatibility reasons.~~ Similarly, the terms file and resource are used interchangeably in the model and for historical reasons.

Action required:

- Approve change proposal for S-100 6.0.0.

## S100WG8-36: Support files concept and clarification

- Support File types miss one additional concept clearly described in S-100 to be available for use in the product specifications (like S-101).
- There are currently two ways (concepts) an external resource is related to a dataset:
- Concept 1: *External resources defined in supportFileDiscoveryMetadata not being referenced in the dataset attribution (like for example Feature Catalogues, Portrayal Catalogues and Language packs), but instead those resources pointing to the datasets using them through the S100\_SupportFileDiscoveryMetadata attribute supportedResource.*
- Concept 2: *Datasets hold a reference to the external resource of the type supportFile as an attribute value (E.g., TXT, TIFF files as we know from S-57).*

## S100WG8-36: Support files concept and clarification

- Concept 2: *Datasets hold a reference to the external resource of the type supportFile as an attribute value (E.g., TXT, TIFF files as we know from S-57).*
- **This support file (concept 2) is actually an integral part of an ENC product - an extension of an attribute. It is being used if there is not enough space to add the information in the dedicated attribute field, or it could be a picture which cannot be added directly into the ENC's 8211 encoding.**
- We believe S-100 is not describing concept 2 properly.
- There is a need for distinguishing support files defined as concept 1 from concept 2, to enable a proper application, discoverability, distribution and use in the S-101 Product Specification.

## S100WG8-36: Support files concept and clarification

In the current situation, some challenges are identified:

- Currently it is not accessible information in the dataset discovery metadata which support files a dataset is referencing through attribution reference. This creates challenges in distribution services and end user systems to discover/understand if a product (e.g., ENC) is complete.
- Removal of support files from a dataset requires an update to the supportFileDiscoveryMetadata attribute supportedResource. The identifier of the dataset in supportedResource must be removed for the end user system to understand that this support file is no longer used by this dataset.
- ENCs are distributed as encrypted files, which cannot be accessed for data discoverability reasons. This means information must be accessible in the dataset discovery metadata (in CATALOG.XML). As discussed above, concept 2 type support files can be considered as an integral part of an ENC product, and as such information about a concept 2 type support file should be available in **S100\_DatasetDiscoveryMetadata**.



# S100WG8-36: Support files concept and clarification

Proposed solutions:

1. Concept 2 supportfiles should be discoverable in the dataset discovery metadata. We suggest to extend the S100\_DatasetDiscoveryMetadata with an attribute providing this information:

Role Name	Name	Description	Mult	Type	Remarks
Attribute	dataReplacement	Datasetname	0..*	CharacterString	A dataset may be replaced by 1 or more datasets See Note
Attribute	navigationPurpose	Classification of intended navigation purpose (for Catalogue indexing purposes)	0..3	S100_NavigationPurpose	If Product Specification is intended for creation of navigational products this attribute should be mandatory
Attribute	extensionFileReference	Reference to external resources (support files defined as extensionFile) being integral part of the dataset.	0..*	URI	See Part 1, clause 1-4.6 See Note
Role	resourceMaintenance	Information about the frequency of resource updates, and the scope of those updates	0..1	MD_MaintenanceInformation	S-100 restricts the multiplicity to 0..1 and adds specific restrictions on the ISO 19115 structure and content. See clause MD_MaintenanceInformation later in this Part Format: PnYnMnDTnHnMnS (XML built-in type for ISO 8601 duration). See clause 17-4.9

NOTE: replacedData and dataReplacement: The intended use of the attributes replacedData and dataReplacement could be, for example, to provide a mechanism for service providers to build automation when providing replacement data sets to customers within existing subscription periods.

S100\_NavigationPurpose

NOTE: extensionFileReference: The attribute extensionFileReference is mandatory if external resources defined as extensionFile exist in the dataset.

# S100WG8-36: Support files concept and clarification

Proposed solutions:

- We suggest extending the S100\_SupportFileDiscoveryMetadata attribute resourcePurpose - Type S100\_ResourcePurpose with the new value extensionFile, and add an explanatory note:

S100_ResourcePurpose				
Item	Name	Description	Code	Remarks
Enumeration	S100_ResourcePurpose	Defines the purpose of the supporting resource	-	-
Value	supportFile	A support file	1	For external resources not being referenced as an attribute in datasets.
Value	ISOMetadata	Dataset metadata in ISO format	2	
Value	languagePack	A Language pack	3	
Value	GMLSchema	GML Application Schema	4	
Value	extensionFile	Integral part of dataset	5	For external resources being referenced as an attribute in datasets. See Note
Value	other	A type of resource not otherwise described	100	

**NOTE:** For external resources being referenced as an attribute in datasets, the extensionFile value should be chosen.



# S100WG8-36: Support files concept and clarification

Proposed solutions:

- 3. All files covered by the S100\_SupportFileDiscoveryMetadata encoding should encode the attribute resourcePurpose. Then an end user system would always know the purpose of a supporting resource, and act correctly accordingly. Therefore, the attribute resourcePurpose (Type: S100\_ResourcePurpose) must be made mandatory:

Role Name	Name	Description	Mult	Type	Remarks
Class	S100_SupportFileDiscoveryMetadata	Metadata about the individual support files in the Exchange Catalogue	-	-	-
Attribute	fileName	Name of the support file	1	URI	See Part 1, clause 1-4.6
Attribute	revisionStatus	The purpose for which the support file has been issued	1	S100_SupportFileRevisionStatus	For <a href="#">example</a> new, replacement, etc.
Attribute	editionNumber	The Edition number of the support file	1	Integer	When a data set 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 a re-issue
Attribute	issueDate	Date on which the data was made available by the Data Producer	0..1	Date	
Attribute	supportFileSpecification	The specification used to create this file	0..1	S100_SupportFileSpecification	
Attribute	dataType	The format of the support file	1	S100_SupportFileFormat	
Attribute	otherDataTypeDescription	Support file format other than those listed	0..1	CharacterString	
Attribute	comment	Optional comment	0..1	CharacterString	
Attribute	compressionFlag	Indicates if the resource is compressed	1	Boolean	True indicates a compressed resource False indicates an uncompressed resource
Attribute	digitalSignatureReference	Specifies the algorithm used to compute digitalSignatureValue	1	S100_SE_DigitalSignatureReference (see Part 15)	
Attribute	digitalSignatureValue	Value derived from the digital signature	1..*	S100_SE_DigitalSignature (see Part 15)	The value resulting from application of digitalSignatureReference implemented as the digital signature format specified in Part 15
Attribute	defaultLocale	Default language and character set used in the support file	0..1	PT Locale	In absence of defaultLocale the language is English in UTF-8 A support file is expected to use only one as locale. Additional support files can be created for other locales
Attribute	supportedResource	Identifier of the resource supported by this support file	0..*	CharacterString	Conventions for identifiers are detailed in S-100 Part 15. S-100 allows file URI, digital signature or cryptographic hash checksums to be used
Attribute	resourcePurpose	The purpose of the supporting resource	0..1	S100_ResourcePurpose	Identifies how the supporting resource is used

↑  
Change multiplicity:  
From 0 to 1

# S100WG8-36: Support files concept and clarification

Proposed solutions:

4. It is suggested to provide explanatory text in S-100 Part 17-4.3. This to emphasize the two different concepts of external resources of type support files, and clarify that concept 2 type support files are considered as integral parts of a dataset.

## 17-4.3 Storage and Management of External Resources

S-100 datasets may refer to a number of externally referenced, supporting resources for content. This content may be textual or graphical and encoded in any of a number of formats (defined by the S100\_SupportFileFormat enumeration in the Exchange Catalogue Schema). Datasets hold a reference to the external resource as an attribute value. This value may be updated as any other attribute and updates the reference to the external resource. External resources can support either datasets or Catalogues or can be standalone entities in the Exchange Set

There are several different types of external resources (defined by the S100\_SupportFileDiscoveryMetadata Type: S100\_ResourcePurpose in the Exchange Catalogue Schema). One of the types defined are support files. There is an important distinction between support files being referenced as an attribute in datasets, and support files not being referenced in dataset attributes.

Support files being referenced as an attribute in datasets should be considered as integral parts of a dataset. They are considered to be extension files of the dataset and should be discoverable from the S100\_DatasetDiscoveryMetadata. Support files not referenced in dataset attribution are entities outside the dataset itself, and their relationship to a dataset is defined in the S100\_SupportFileDiscoveryMetadata. They are not considered extension files of a dataset, rather supplementary files for usage together with the dataset.

The encoding of an extension file reference in S100\_DatasetDiscoveryMetadata makes this distinction available for an end user system in data ingestion operations.

The S-100 Exchange Catalogue provides:

1. A normative definition of the location of each supporting resource. Where these are physical files this

## S100WG8-36: Support files concept and clarification

Proposed solutions:

5. As a consequence of the proposed changes, a review of S-100 support file/external resources descriptions in S-100 part 17 should eventually be undertaken.

Action required:

- Note the paper and discuss the issues presented.
- Consider approving the accompanying change proposal to S-100.

## S100WG8-25: PRIMAR viewpoint on Catalogue Distribution

- Currently PRIMAR is not facilitating the distribution of catalogues in our S-100 Service.
- Catalogues could contain machine readable code that could potentially harm the end user system. For liability reasons we are sceptical to include such products in our service.
- We have in principle no information about the end-user system except manufacturer and hardware ID; e.g. if it is a type approved ECDIS or ECS system, if it is a navigation system or a land-based installation, which software version/type of functionality is supported by end-user system.
- The nature of catalogue versioning and a multiplicity of catalogues being valid at the same time causes added complexity that makes us hesitant to incorporate catalogue distribution as part of our service



## S100WG8-25: PRIMAR viewpoint on Catalogue Distribution

- In a catalogue distribution service, it should only be necessary to provide catalogues when needed (always adding catalogues to data delivery packages is not a good idea due to data transfer size).
- Building support for a catalogue service where catalogues are only issued to end users when needed is potentially challenging, especially considering the complexity issues mentioned above.

## S100WG8-25: PRIMAR viewpoint on Catalogue Distribution

- As the catalogues are developed and issued by the IHO as part of their respective product specifications, they are currently available for anyone to download from the IHO Registry.
- It is a requirement in an S-100 ECDIS that all files entering the system must be digitally signed.
- Obtaining the catalogues from IHO for direct usage in the end user system would require that IHO in their position as S-100 standards custodian and Scheme Administrator will have functionality to:
  - Digitally sign the PC/FC/IC catalogues using S-100e5 part 15.
  - Package the catalogues in exchange sets according to the Part 17 CatalogueDiscoveryMetadata class.

## S100WG8-25: PRIMAR viewpoint on Catalogue Distribution

### Conclusions:

- PRIMAR is hesitant to include the distribution of catalogues (FC/PC/IC) in their service.
- Catalogues containing machine readable code could potentially harm the end user system.
- OEMs should probably be invited to test new/new versions of catalogues before being officially released.
- Catalogue versioning and a multiplicity of catalogues being valid at the same time gives added complexity to catalogue distribution.
- IHO must have functionality to digitally sign and package PC/FC/IC catalogues for their catalogue provision service – such functionality is being provided by PRIMAR.



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**Thank you for your attention**

**Questions?**

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