

S-100 – Part 4a

Metadata

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4a-1 Scope

The S-100 metadata profile described in parts 4A, 4B and 4C provides a specification for describing, validating and exchanging metadata about geographic datasets commonly produced by hydrographic organizations. Its purpose is the creation of metadata records that provide information about the identification, spatial and temporal extent, quality, application schema, spatial reference system, and distribution of digital geographic data. It is applicable to the cataloguing of datasets, clearinghouse activities, and the full description of geographic and non-geographic resources. Although it is primarily intended to describe digital geographic data, it may also be used to describe other resources such as charts, maps, images, textual documents and non-geographic resources. It makes provision for the description of; *attributes, attributeTypes, features, featureTypes, collectionHardware, collectionSession, datasets, dataset series, nonGeographicDatasets, propertyTypes, fieldSession, software* and *services*. It should be noted that this profile is not limited to the resources listed in the ISO 19115 code list *MD_ScopeCode<<Codelist>>* (ISO 19115 - B.5.25), and can be extended to include additional resources if required.

This profile is based on ISO 19115:2003 Metadata and 19115 Part 2 - Metadata for imagery and gridded data. It also takes account of ISO/TS 19139 Metadata – XML schema implementation.

ISO 19115 provides an abstract structure for describing digital geographic information by defining metadata elements and establishing a common set of metadata terminology, definitions, and extension procedures. ISO/TS 19139 provides an eXtensibleMarkup Language (XML) implementation of ISO 19115, and guidance for developing profiles and extensions. It should be noted that this profile is not limited to the resources listed in the ISO 19115 code list *MD_ScopeCode<<Codelist>>* (ISO 19115 - B.5.25), and can be extended to include additional resources if required.

This document is intended for developers and implementers of metadata applications, and provides a basic understanding of the principles and the overall requirements for standardisation of geographic information. It should be used in conjunction with the standards listed under clause 4a-3 – Normative references.

Further information concerning S-100 metadata implementation, encoding and quality principles are included in the following associated documents.

- 1) S-100 Part 4B – Metadata Extensions for Imagery and gridded data
- 2) S-100 Part 4C – Metadata Quality Principles
- 3) Appendix 4A–C - Metadata Implementation

4a-2 Conformance

4a-2.1 Conformance of this Profile with other Standards

In addition to the elements listed in ISO 19115:2005, this profile also adopts all associated 19115 obligations and conditions, with the exception of the *fileIdentifier* element which has been changed from optional to mandatory. This has been done to facilitate the implementation and management of metadata records by allowing instances of duplicate metadata records to be identified, and defining the relationship of a child metadata record with its parent metadata record. The specifics of any metadata hierarchy relationships will be detailed in the product specifications.

Taking into account the change identified above, and the requirements documented in ISO 19106:2004, this Profile meets the requirements of conformance class 11. The Profile is a

¹ Conformance class 1 as described at Section 2 *Conformance* and Appendix B.3 *Example of a profile with specialisations*(ISO 19106:2004).

subset² of ISO 19115:2005 and includes an extension in the context permitted by the base standard³.

This profile includes *parentIdentifier* as a core metadata element for geographic datasets. If a dataset metadata record has a parent metadata record, then this element becomes mandatory and therefore should be considered a 'core' element. Guidance on the XML implementation of this profile is included at Appendix 4A-C.

4a-3 Conformance to this Profile

Any metadata claiming conformance to this Profile shall:

- 1) have content according to the data dictionary definitions in Annex B of ISO 19115:2005, (including changes required by ISO 19115:2003/Cor.1:2006) with the exception of the metadata element *fileIdentifier* which has a mandatory obligation;
- 2) prove conformance by validating XML document instances against the S-100 Metadata Profile schemas which are available from the IHO website at Profiles based on this Profile

All product specific implementations of this profile shall provide an Extensible Stylesheet Language (XSL) transform file/resource that can translate the XML document instances into the S-100 Metadata Profile XML format. These resulting XML document instances shall be validated using the ISO/TS 19139:2007 XSDs.

4a-4 Normative References

The following referenced documents are required for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including amendments) applies.

4a-4.1 Profile definition

The following documents were the references used to define the S-100 Metadata Profile:

ISO 19115:2005, Geographic information – Metadata.

ISO 19115:2003/Cor.1:2006, Geographic information - Metadata - Technical Corrigendum 1

ISO 19115-2:2006 - Geographic information - Metadata - Part 2: Extensions for imagery and gridded data.

ISO 19119:2005 - Geographic information – Services.

ISO/TS 19139:2007, Geographic information - Metadata - XML schema implementation.

² A profile of a single base standard can include a subset, which is equivalent to the entire base standard. That is, a subset can equal the whole (19106:2005, p15).

³ This conforms to the rules included at Annex C.6 (ISO 19115:2005).

4a-5 Requirements

4a-5.1 Business purpose and Intended use

Metadata can satisfy a number of uses:

- 1) Data Discovery - summary descriptions of content and quality, contact details, off-line distribution and on-line references (URL) for on-line viewing.
- 2) Data use - more extensive information on data coverage, maintenance, content and details of data creation. It includes additional contact, distribution and quality details.
- 3) Data Fitness – additional detail about use, limitations, format, age, and extents. This level of metadata assists the user to determine the data’s suitability for use.
- 4) Data Sharing – further detail relating to data content, transfer formats, and spatial representation.
- 5) Data Management – the most detailed level of metadata, which includes information on the data quality regimes and data quality test results. This type of information is sometimes important when data is exchanged between organizations.

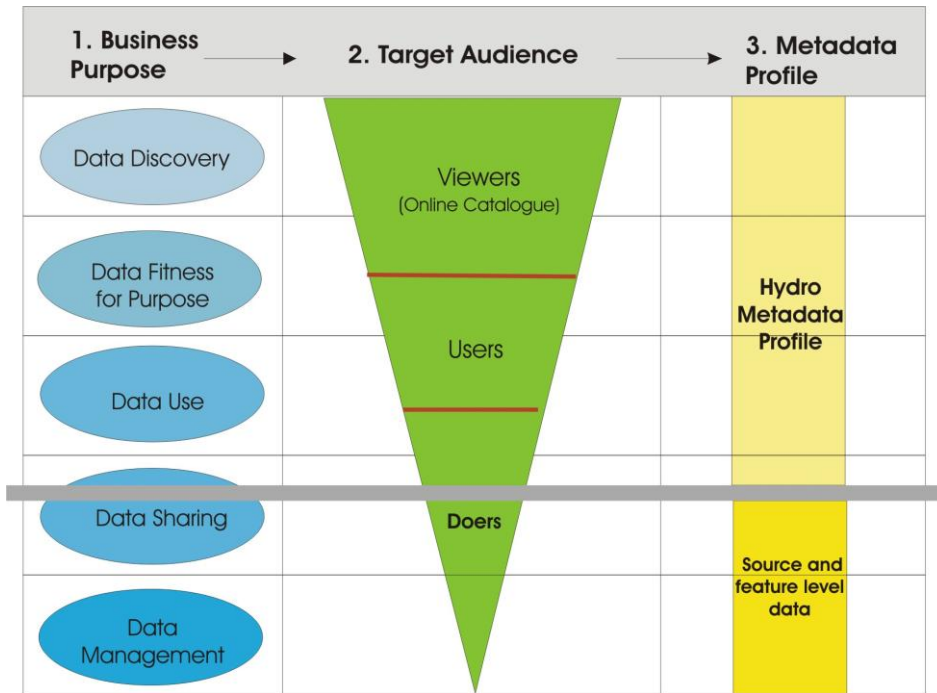


Figure 4a-1— Business Purpose

Figure 4a-1 above illustrates the relationship between the types of metadata required by different user communities, and the scope of this profile. Each S-100 based product specification will describe the source and feature-level metadata that will be required to support data use, data sharing, and data management. The more demanding requirements for comprehensive metadata (as illustrated by “Doers” in Figure 4a-1), require further attribution to allow source selection and feature analysis.

ISO 19115 does not provide all the metadata necessary to describe imagery. This has been included in part 2 to ISO 19115, which incorporates elements that are needed for the description of imagery and gridded data. ISO 19130 – “Sensor and data model for imagery and gridded data”, is an important standard associated with ISO 19115 Part 2, as it specifies the information required to support the geolocation of georeferenceable imagery, including a sensor description and associated physical information defined by a sensor model, fitting functions, and ground control points. It describes how the sensor measurements and the

geolocation information are logically associated. In particular, ISO 19130 describes the sensor and data model for hydrographic sonar requirements, and the associated metadata. This will be described in relevant product specifications.

An XML implementation of the ISO 19115 which describes how the abstract UML models in ISO 19115 and 19115 Part 2 are converted into XML is documented in ISO publication ISO/TS 19139.

Although this profile is largely based on the above mentioned standards, reference to additional standards will need to be made. (See sections 3 – “Normative References”).

This Profile defines:

- 1) mandatory and conditional metadata sections, metadata entities, and metadata elements
- 2) the minimum set of metadata elements for any resource in order to conform to this Profile
- 3) the core metadata for geographic datasets
- 4) optional metadata elements that allow for a more extensive standard description of resources
- 5) the option to extend the Profile to cater for specialised needs.

Implementation of the Profile is based on ISO/TS 19139:2007, and includes;

- 1) the use of the ISO/TS 19139:2007 XSDs,
- 2) XML documents containing dictionaries to implement the ISO 19115:2005 code lists (XML data dictionaries of the ISO 19115:2003 code lists in GML format),
- 3) XML data dictionaries of the S-100 Geographic Extent Names and Search Words.⁴

While the UML class *S100_Metadata* specialises the class *MD_Metadata*, the specialisation only involves restrictions of the parent class. Hence, for the purpose of XML implementation, the *MD_Metadata* element shall be used to support interoperability with other ISO 19100 standards for geographic information. This follows the recommendation in ISO/TS 19139:2007 Annex A.4.

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 code lists and enumerations⁵.

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.

4a-5.3 Obligations/conditions

Obligation descriptors have been included to provide an indication of whether a metadata entity or element must be documented or may be conditionally or unconditionally left to the

⁴ Reference to values documented in the S-100 Metadata encoding guide. They do not appear in the ISO 19115:2003 code lists.

⁵ Enumeration: a fixed list of valid identifiers of named literal values. Attributes of an enumerated type may only take values from this list (source: ISO 19136:__, *Geographic information — Geography Markup Language (GML)*)

discretion of the metadata encoder. This descriptor may have the following values: M (mandatory), C (conditional) or O (optional). The following definitions from section B.1.5 *Obligation/Condition* of ISO 19115:2005 are included below.

A **mandatory (M)** obligation means the metadata entity or metadata element shall be documented.

A **conditional (C)** obligation specifies an electronically manageable condition under which at least one metadata entity or a metadata element is mandatory. 'Conditional' is used for one of the three following possibilities:

- 1) Expressing a choice between two or more options. At least one option is mandatory and must be documented.
- 2) Documenting a metadata entity or a metadata element if another element has been documented.
- 3) Documenting a metadata element if a specific value for another metadata element has been documented.

If the answer to the condition is positive, then the metadata entity or the metadata element shall be mandatory.

An **optional (O)** obligation means that the metadata entity or the metadata element may be documented or may not be documented. Optional metadata entities and optional metadata elements have been defined to provide a guide to those looking to fully document their data. (Use of this common set of defined elements will help promote interoperability among geographic data users and producers world-wide.) If an optional entity is not used, the elements contained within that entity (including mandatory elements) will also not be used. Optional entities may have mandatory elements; those elements only become mandatory if the optional entity is used.

4a-5.4 Minimum metadata requirements

The minimum requirements for recording metadata include a number of elements that must be completed in order to conform to this Profile. It should be noted that the obligation is not mandatory for all elements, however some conditional elements may become mandatory under certain conditions (e.g. *hierarchyLevel*).

Table 1 identifies the minimum set of metadata elements that should be completed for datasets and other resources. These elements also form part of the core metadata for geographic datasets listed in Table 2.

Table 4a-1 — Minimum metadata for geographic datasets and other resources

Name	Path	Datasets	Other resources
Metadata file identifier	MD_Metadata.fileIdentifier	M	M
Metadata language	MD_Metadata.language	C (documented if not defined by the encoding process)	C (same as for dataset)
Metadata character set	MD_Metadata.characterSet	C (documented if ISO 10646-1, is not used and not defined by the encoding process)	C (same as for dataset)
Metadata file parent identifier	MD_Metadata.parentIdentifier	C (documented if the hierarchy of a higher level exists)	C (same as for dataset)
Metadata hierarchy level	MD_Metadata.hierarchyLevel	O (assumed to be 'dataset' if MD_Metadata.hierarchyLevel is omitted)	M (documented if hierarchyLevel not = 'dataset')
Metadata hierarchy level name	MD_Metadata.hierarchyLevelName	O (assumed to be 'dataset' if MD_Metadata.hierarchyLevelName is omitted)	M (documented if hierarchyLevel not = 'dataset')
Metadata contact individual name	MD_Metadata.contact>CI_ResponsibleParty.individualName	C (documented if 'organisationName' and 'positionName' documented)	C (same as for dataset)
Metadata contact organisation	MD_Metadata.contact>CI_ResponsibleParty.organisationName	C (documented if 'individualName' and 'positionName' documented)	C (same as for dataset)

Name	Path	Datasets	Other resources
Metadata contact position	MD_Metadata.contact>CI_ResponsibleParty.positionName	C (documented 'individualName' if and not 'organisationName' documented)	C (same as for dataset)
Metadata contact role	MD_Metadata.contact>CI_ResponsibleParty.role>CI_RoleCode	M	M
Metadata date stamp	MD_Metadata.dateStamp	M	M
Resource title	MD_Metadata.identificationInfo>MD_DataIdentification.citation>CI_Citation.title	M	M (See note 2)
Resource reference date	MD_Metadata.identificationInfo>MD_DataIdentification.citation>CI_Citation.date>CI_Date.date	M	M (See note 2)
Resource reference date type	MD_Metadata.identificationInfo>MD_DataIdentification.citation>CI_Citation.date>CI_Date.dateType>CI_DateTypeCode	M	M (See note 2)
Abstract describing the resource	MD_Metadata.identificationInfo>MD_DataIdentification.abstract	M	M (See note 2)
Resource language	MD_Metadata.identificationInfo>MD_DataIdentification.language	M	C (only used if MD_DataIdentification has been used)
Resource character set	MD_Metadata.identificationInfo>MD_DataIdentification.characterSet	C (documented if ISO 10646-1 is not used)	C (documented if ISO 10646-1 is not used)
Topic category	MD_Metadata.identificationInfo>MD_DataIdentification.topicCategory	M	C (if hierarchyLevel = 'series' topicCategory is mandatory)

Name	Path	Datasets	Other resources
Geographic location of the resource (by description)	MD_Metadata.identificationInfo>MD_DataIdentification.extent>EX_Extent>EX_GeographicDescription.geographicIdentifier>MD_Identifier.code	C (See notes 3 and 4)	O (See note 4)
West longitude	MD_Metadata.identificationInfo>MD_DataIdentification.extent>EX_Extent>EX_GeographicBoundingBox.westBoundLongitude	C (See notes 3 and 4)	O (See note 4)
East longitude	MD_Metadata.identificationInfo>MD_DataIdentification.extent>EX_Extent>EX_GeographicBoundingBox.eastBoundLongitude	C (See notes 3 and 4)	O (See note 4)
South latitude	MD_Metadata.identificationInfo>MD_DataIdentification.extent>EX_Extent>EX_GeographicBoundingBox.southBoundLatitude	C (See notes 3 and 4)	O (See note 4)
North latitude	MD_Metadata.identificationInfo>MD_DataIdentification.extent>EX_Extent>EX_GeographicBoundingBox.northBoundLatitude	C (See notes 3 and 4)	O (See note 4)

NOTE1 ISO 10646-1 - Information technology — Universal Multiple-Octet Coded Character Set (UCS)

NOTE2 MD_ServiceIdentification may be used instead of MD_DataIdentification if hierarchyLevel = 'service'

NOTE3 For a geographic dataset, include metadata for the geographic bounding box (West longitude, East longitude, South latitude and North latitude) or the geographic description identifier (The use of geographic bounding box is recommended - see Section 6.5.3).

NOTE4 If any one of west longitude, east longitude, south latitude or north latitude exists, then the remaining three must also be completed

4a-5.5 Core metadata for geographic datasets

Although ISO 19115:2005 defines an extensive set of metadata elements, only a subset of these are used. It is essential however that a minimum number of metadata elements be maintained for a dataset (as listed in Table 1). When describing geographic datasets however, it is recommended that additional metadata elements (in addition to the minimum requirements for geographic datasets) be used. This set of metadata, which includes the minimum set of metadata and some additional optional elements, is referred to as **core metadata**. Table 4a-2 lists the core metadata required to describe a *dataset*, typically for catalogue purposes. This list contains metadata answering the following questions:

- 1) 'Does a dataset on a specific topic exist ("what")?'
- 2) 'For a specific place ("where")?'
- 3) 'For a specific date or period ("when")?'
- 4) 'A point of contact to learn more about or order the dataset ("who")?'

By using the core metadata described below, interoperability will be enhanced, and potential users should be able to understand without ambiguity the characteristics of geographic datasets or resources.

Table 4a-2 — Core metadata for geographic datasets

Name	Path	Obligation
Metadata file identifier	MD_Metadata.fileIdentifier	M _a
Metadata language	MD_Metadata.language	C _b
Metadata character set	MD_Metadata.characterSet	C _c
Metadata file parent identifier	MD_Metadata.parentIdentifier	C _d
Metadata point of contact	MD_Metadata.contact>CI_ResponsibleParty	M
Metadata date stamp	MD_Metadata.dateStamp	M
Metadata standard name	MD_Metadata.metadataStandardName	O
Metadata standard version	MD_Metadata.metadataStandardVersion	O
Dataset title	MD_Metadata.identificationInfo>MD_DataIdentification.citation>CI_Citation.title	M
Dataset reference date	MD_Metadata.identificationInfo>MD_DataIdentification.citation>CI_Citation.date	M
Abstract describing the data	MD_Metadata.identificationInfo>MD_DataIdentification.abstract	M
Dataset responsible party	MD_Metadata.identificationInfo>MD_DataIdentification.pointOfContact>CI_ResponsibleParty	O
Spatial representation type	MD_Metadata.identificationInfo>MD_DataIdentification.spatialRepresentationType	O
Spatial resolution of the dataset	MD_Metadata.identificationInfo>MD_DataIdentification.spatialResolution>MD_Resolution.distance or MD_Resolution.equivalentScale	O _e
Dataset language	MD_Metadata.identificationInfo>MD_DataIdentification.language	M

Name	Path	Obligation
Dataset character set	MD_Metadata.identificationInfo>MD_DataIdentification.characterSet	C f
Dataset topic category	MD_Metadata.identificationInfo>MD_DataIdentification.topicCategory	M
Geographic location of the dataset (by four coordinates or by description)	MD_Metadata.identificationInfo>MD_DataIdentification.extent>EX_Extent>EX_GeographicBoundingBox or EX_GeographicDescription	C g, h
Temporal extent information for the dataset	MD_Metadata.identificationInfo>MD_DataIdentification.extent>EX_Extent.temporalElement	O
Vertical extent information for the dataset	MD_Metadata.identificationInfo>MD_DataIdentification.extent>EX_Extent.verticalElement>EX_VerticalExtent	O
Lineage	MD_Metadata.dataQualityInfo>DQ_DataQuality.lineage>LI_Lineage	O
Reference system	MD_Metadata.referenceSystemInfo>MD_ReferenceSystem.referenceSystemIdentifier>RS_Identifier	O
Distribution Format	MD_Metadata.distributionInfo>MD_Distribution>MD_Format	O
On-line resource	MD_Metadata.distributionInfo>MD_Distribution>MD_DigitalTransferOption.onLine>CI_OnlineResource	O

- a) the Profile imposes a mandatory obligation on the metadata element *fileIdentifier*
- b) language: documented if not defined by the encoding process
- c) characterSet: documented if ISO 10646-1, is not used and not defined by the encoding process
- d) documented if a higher level of hierarchy level exists (e.g. if the geographic 'dataset' is part of a 'series')
- e) distance is preferred over *equivalentScale* because the scale will change when presented at different sizes on a screen
- f) characterSet: documented if ISO 10646-1 is not used
- g) include either the geographic bounding box (*extents*) or the geographic description (It is recommended that geographic bounding box should be used - see Section 6.5.3)
- h) if any one of west longitude, east longitude, south latitude or north latitude exists, then the remaining three must also be completed

Source: Adapted from Table 3 - *Core metadata for geographic datasets* (ISO 19115:2005).

4a-5.6 Variations and preferences

4a-5.6.1 Metadata element *fileIdentifier*

The obligation for the metadata element *fileIdentifier* is 'optional' in ISO 19115:2005, however this profile applies a more stringent obligation and defines an extension to make the obligation **'mandatory'**. Each product specification will provide rules for creating file identifiers.

For example, this could support linkage between parent and child metadata records. The content of the child's *parentIdentifier* element is the same as the content of the parent's *fileIdentifier* element, thus supporting the hierarchical relationship between metadata records.

4a-5.6.2 Metadata element *parentIdentifier*

The metadata element *parentIdentifier* (conditional obligation) is included as a core metadata element for describing geographic datasets in the profile. Under certain conditions this metadata element is mandatory. For instance, in some cases dataset metadata may be part of a dataset series. In these circumstances *parentIdentifier* shall be populated.

The concept of metadata hierarchies allows a dataset to be described in more than one metadata record. A dataset may be part of a collection, and in this instance, the dataset may be described in two metadata records: as a dataset in its own right and as part of a collection. The dataset may also be more discrete. For example, a chart may be described individually and as part of a collection or (chart series). An organization may choose to produce a metadata record for each chart and a metadata record for the collection (chart series). Further information on metadata hierarchies and their implementation is available in Annex H and Annex I of ISO 19115.

4a-5.6.3 Geographic extent of the dataset

The ISO 19115:2005 condition for spatial extent determines that if the *hierarchyLevel* is 'dataset' then either the *geographic bounding box* or the *geographic description* is mandatory. To make spatial searches more effective, it is recommended that the extent be described as a geographic bounding box in preference to a geographic description. Completing only the geographic description code may not satisfy the needs of spatial searches as an extent could be ambiguous (e.g. 'France' could mean the mainland only or it may include all external territories). However, in other circumstances, the geographic descriptions are clearly defined, and can present a more efficient means of description. Therefore, product specifications shall specify how geographic extent of a dataset is described.

4a-5.6.4 Data and Date Time information

Dates for both the metadata and the actual data must be provided. In MD_Metadata, there is a date stamp for the metadata. In the citation, provided as part of MD_Identifier, there is a production, publication, or revision date for the dataset. These dates are not necessarily the same. In some cases, one set of metadata may be provided for multiple sets of data, which may have been produced, published or revised at different times. The need for an associated date of origin is not restricted to digital or geographic data. Users who derive results from reprocessed data need to know the version of the data they are using.

This profile constrains the choices available in ISO 19115, which references ISO 19103 and ISO 8601. These classes are documented in full in ISO/TS 19103. Both Date and DateTime, shall follow the basic format for complete specification, as per ISO 8601.

- 1) **Date:** the date format shall be year, month and day and will be encoded as a character string (i.e. CCYYMMDD).
- 2) **DateTime:** shall be a combination of a **date** and a **time** (given by hour, minute and second), with a time zone i.e. CCYYMMDDTHHMMSS±hhmm (or 'Z' for UTC). Note that +0100 implies one hour ahead of UTC, such as might occur in Geneva.
- 3) Where any part of the date is not known then lower precision dates or dateTimes need to be stored as per ISO 8601, e.g. if a date was known to be sometime in 1990 but the exact month and day are not known then the date would be given as 1990.

4a-5.6.5 Metadata extension information

The *S100_Metadata* class specialises the *MD_Metadata* class, restricting the obligation of *fileIdentifier* from optional to mandatory. Tables 4a-3 and 4a-4 provide relevant information about the extension for *S100_Metadata*. A modified UML diagram is provided at Appendix A, the modified values for the data dictionary are provided at Appendix B (Table B-1 - *Modifications to data dictionary ISO 19115:2005*).

Table 4a-3 — Metadata extension for *S100_Metadata*

MD_MetadataExtensionInformation		
MD_MetadataElementInformation		
name	S100_Metadata	
shortName	S100Meta	
definition	S-100 Metadata Profile of MD_Metadata	
obligation	Mandatory	
condition		
dataType	specifiedClass	
maximumOccurrence	1	
domainValue		
parentEntity	MD_Metadata	
rule	New class	
Rationale	Extension of MD_Metadata to include change of obligation to <i>fileIdentifier</i>	
Source	organisationName	International Hydrographic Organization
	role	owner

Table 4a-4— Metadata extension for *S100_Metadata*

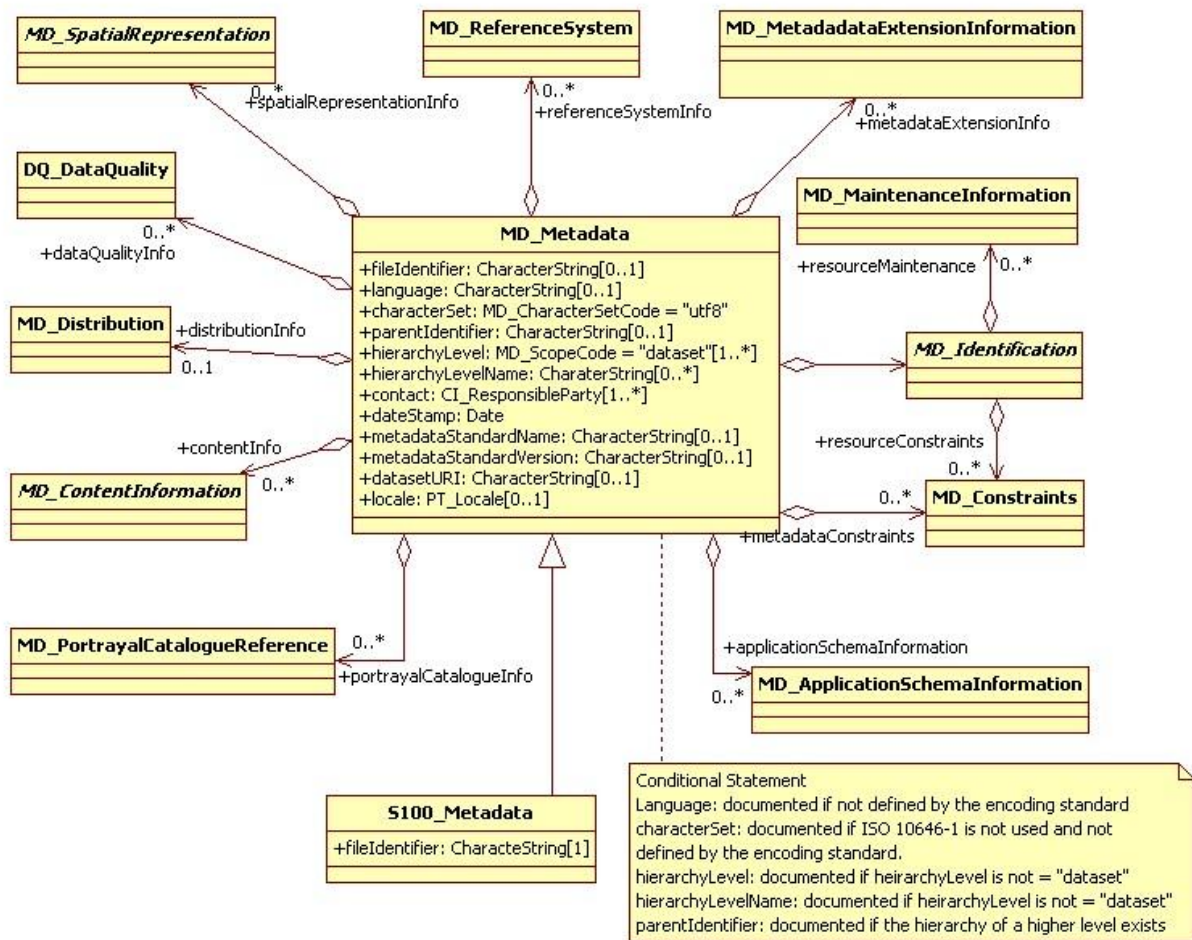
MD_MetadataExtensionInformation		
MD_MetadataElementInformation		
name	fileIdentifier	
shortName	mdFileId	
definition	ISO 19115:2005 element (2)	
obligation	mandatory	
condition		
dataType	characterString	
maximumOccurrence	1	
domainValue	free text	
parentEntity	S100_Metadata	
rule	Change obligation to mandatory	
Rationale	To ensure a file identifier is always entered	
Source	organisationName	International Hydrographic Organization
	role	owner

Appendix 4A-A (normative)

A.1 Metadata Entity Set Information

The structure of metadata included in the S-100 Metadata Profile is defined with reference to UML diagrams that identify metadata packages and classes included at Annex A of ISO 19115:2005 (and further modified by Technical Corrigendum 1 ISO 19115:2003/Cor.1:2006). [It should be noted that in ISO 19115:2003/Cor.1:2006, there is a discrepancy between the use of “locale” in the UML diagram (Figure A.1) and element 11.2 “locate” in Table B.2.1. The word “locale” in MD_Metadata shown in Figure 4a-2 below is the correct reference].

The new class *S100_Metadata* shows the relationship to *MD_Metadata* and its related metadata classes. For the purpose of this Profile *Metadata entity set information* replaces the equivalent diagram Figure A.1 in ISO 19115:2005.



Source: Adapted from ISO 19115:2005 and ISO 19115:2003/Cor.1:2006

Figure 4a-2 — Metadata entity set information

Appendix 4A-B (normative)

B.1 Data Dictionary

The data dictionary in Annex B of ISO 19115:2005 (and further modified by ISO 19115:2003/Cor.1:2006) describes the characteristics of the metadata identified in the UML package diagrams included at Annex A of 19115.

Modifications to the data dictionary, required to recognise the extension to the metadata element *fileIdentifier* that was introduced in this Profile, are included at Table B.1. The information contained in the table replaces, or is in addition to, that provided at B.2.1, Annex B, ISO 19115:2005 and ISO 19115:2003/Cor.1:2006.

Table B-1 — Modifications to the data dictionary ISO 19115:2005

	Name / Role name	Short Name	Definition	Ob	Max Occ	Data type	Comment
1	MD_Metad a	Metadata	root entity which defines metadata about a resource or resources	M	1	Class	See B.2.1, Annex B, ISO 19115:2005
1. 1	S100_Metad ata	S100Meta	root entity which defines metadata about a resource or resources	M	1	Class	Specialises <i>MD_Metad ata</i> class
2	fileIdentifier	mdFileID	unique identifier for this metadata file	M	1	Character String	Free text (changed obligation from optional to mandatory)

Ob = Obligation / Condition **Max Occ**= Maximum occurrence

Appendix 4A-C (normative)

C-1 Metadata Implementation

C-1.1 Background

ISO 19115:2005 defines the content of a set of metadata elements, their definitions, data types and inherent dependencies. The logical model of the metadata specifies the content and not the form of implementation or the form of presentation. A primary goal in the management of metadata for resources is the ability to access the metadata and the related resource it describes. This requires software implementations using common encoding methods to achieve operational use of the metadata.

It is necessary to implement the Profile in order to prove compliance. ISO/TS 19139:2007 is an XML schema implementation of ISO 19115:2003 and can be used to prove partial compliance to ISO 19115:2003 and the S-100 metadata profile. ISO/TS 19139:2007 does not fully implement ISO 19115:2003. The XML documents provided by IHO allow full implementation of ISO 19115:2005. IHO has also developed XML documents to allow for the implementation of the S-100 Metadata Profile. The ISO/TS 19139:2007 XSDs have been used for this implementation. IHO has developed additional Schematron rules to enforce the additional restriction for the fileIdentifier element. Proof of compliance to this profile be via validation of the XML document instances against the ISO/TS 19139:2007 XML Schema Definition (XSDs) and the S-100 Schematron Metadata Rules.

While the S100 Metadata class specializes the MD Metadata class, the specialization only involves restricting fileIdentifier from optional to mandatory. Therefore the MD Metadata root element must be used instead of the S100 Metadata for XML instances of S-100 metadata in order to ensure interoperability with ISO standards and software tool.

The XML documents consist of:

- 1) ISO/TS 19139:2007 XSDs,
- 2) GML / XML document instances for each of the S-100 Geographic Extent Name category lists and the S-100 Search words so they can be registered according to the ISO 19135:2006 standard and be referenced from XML metadata document instances.

Proof of compliance to the S-100 Metadata Profile will be via validation of the XML document instances against the ISO/TS 19139:2007 XML Schema Definition (XSDs).

Granularity of geographic data supported: The notion of cataloguing a set of related documents together in a discoverable series is common practice for map catalogues. With digital spatial data, the definition of what constitutes a dataset is more problematic and reflects the institutional and software environments of the originating organisation. Common metadata can be derived for a series of related geographic datasets, and such metadata is generally relevant or can be inherited by each of the dataset instances. Software to support this inheritance of metadata for geographic data within a cataloguing system can simplify data entry, update and reporting.

There is a potential hierarchy of reusable metadata that can be employed in implementing a metadata collection. By creating several levels of abstraction, a linked hierarchy can assist in filtering or targeting user queries to the requested level of detail. The hierarchy should not necessarily be interpreted to require multiple copies of metadata being managed online. Conversely, the definition of general metadata can be supplemented by spatially specific metadata that, when queried, either inherits or overrides the general case.

Through the use of pointers this method can reduce the redundancy of metadata managed at a site and provide for different views of the holdings by users. These 'pointers' are implemented in the XSDs by XLink attributes.

Dependencies between metadata document elements and elements in other metadata documents may exist, allowing inheritance of metadata between hierarchy levels. Dependencies between metadata document elements and resources from standard registers may exist, allowing re-use of

standard resources without copying the content. For either purpose the dependency may be made explicit through use of the XLink attributes which are available on most property elements in the XML representation. XLink:href is used to point to the re-used resource. XLink:arcrole is used to indicate the kind of re-use. XLink:role is used to indicate the nature of the reused resource.

Appendix 4A-D (normative)

D-1 Discovery Metadata for Information Exchange Catalogues

D-1.1 Introduction

For information exchange, there are several categories of metadata required: metadata about the overall exchange catalogue, metadata about each of the datasets contained in the catalogue, and metadata about the support files that make up the package.

D-1.2 Overview

Figures 4a-D1 to 4a-D3 outline the overall concept of an S-100 exchange set for the interchange of geospatial data and its relevant metadata. Figure 4a-D1 depicts the realization of the ISO 19139 classes which form the foundation of the exchange set. The overall structure of S-100 Exchanges Sets is modelled in Figure 4a-D2. More detailed information about the various classes is shown in Figure 4a-D3 and a textual description in the tables at clause 3.

The discovery metadata classes have numerous attributes which enable important information about the datasets and accompanying support files to be examined without the need to process the data, e.g. decrypt, decompress, load etc. Other catalogues can be included in the exchange set in support of the datasets such as feature, portrayal, coordinate reference systems, code lists etc. The attribute “purpose” of the support file metadata provides a mechanism to update support files more easily.

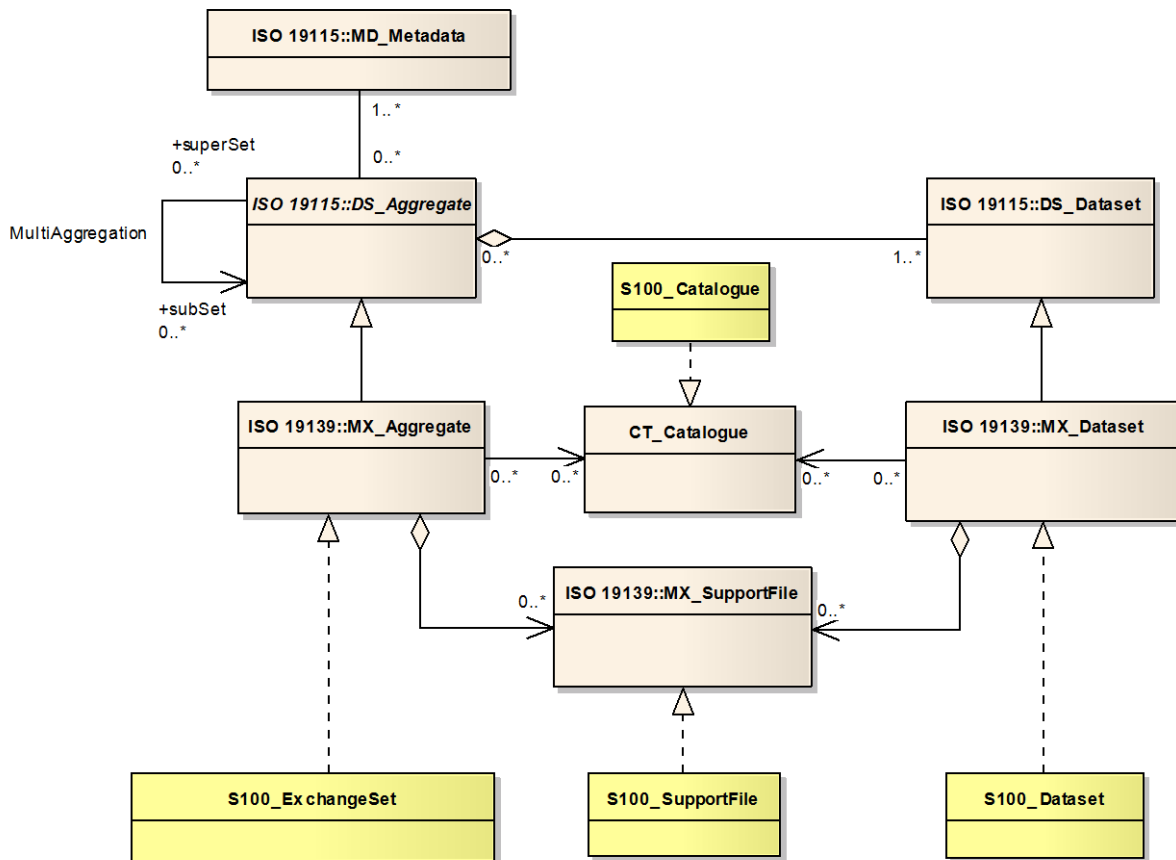


Figure 4a-D1 Realization of the Exchange Set Classes

The S100 Exchange set is a container that combines all the elements needed for the exchange of S100 data. The exchange set may include S100 datasets, S100 files, S100 feature catalogue and S100 portrayal catalogues as shown in figure 4a-D2 below.

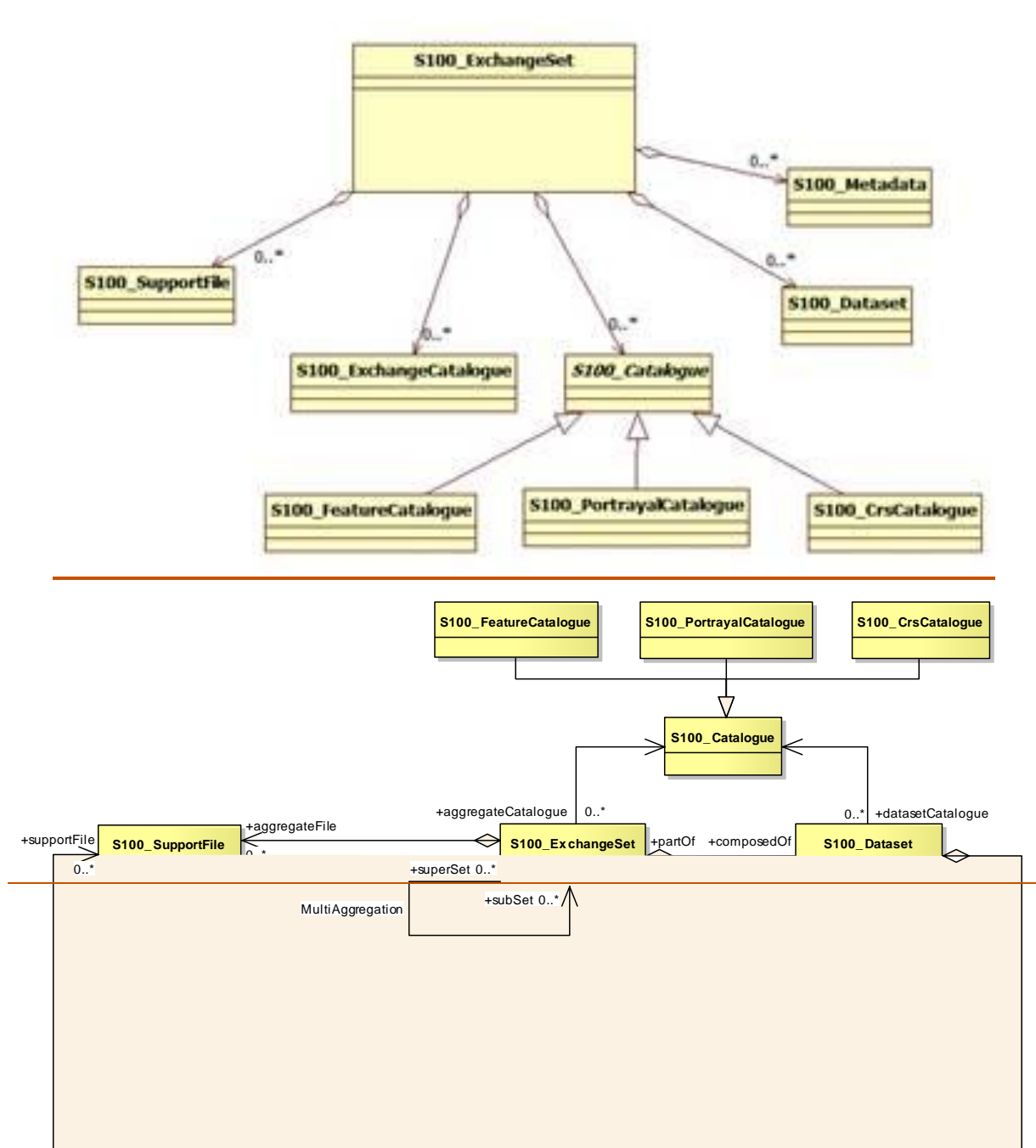


Figure 4a-D2 - S100 Exchange Set

The S100_ExchangeCatalogue is an XML instance, which provides the information needed to exploit all the components of an exchange set. It consists of sections for the catalogues and datasets with subsections for support file metadata and a reference to classic ISO 19115 dataset metadata.

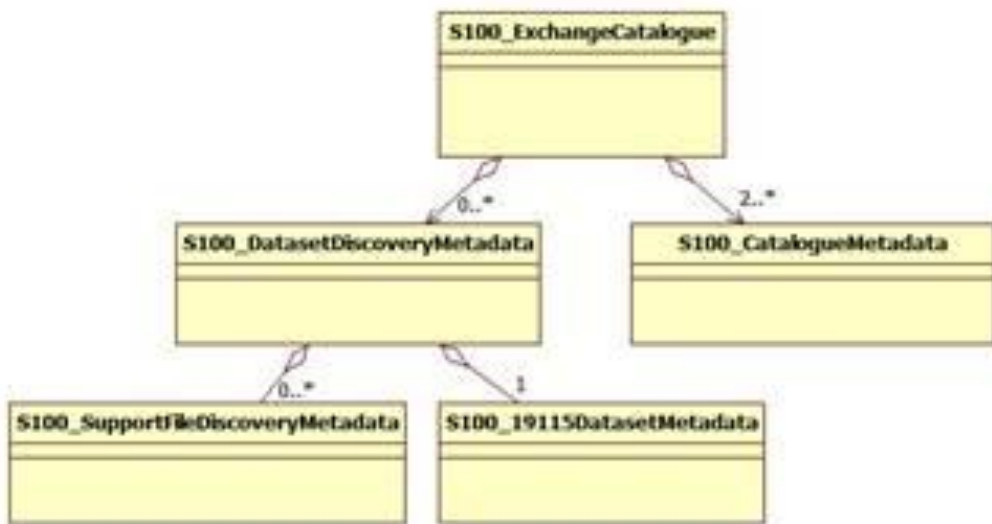


Figure 4a-D3 - S100 ExchangeSetCatalogue

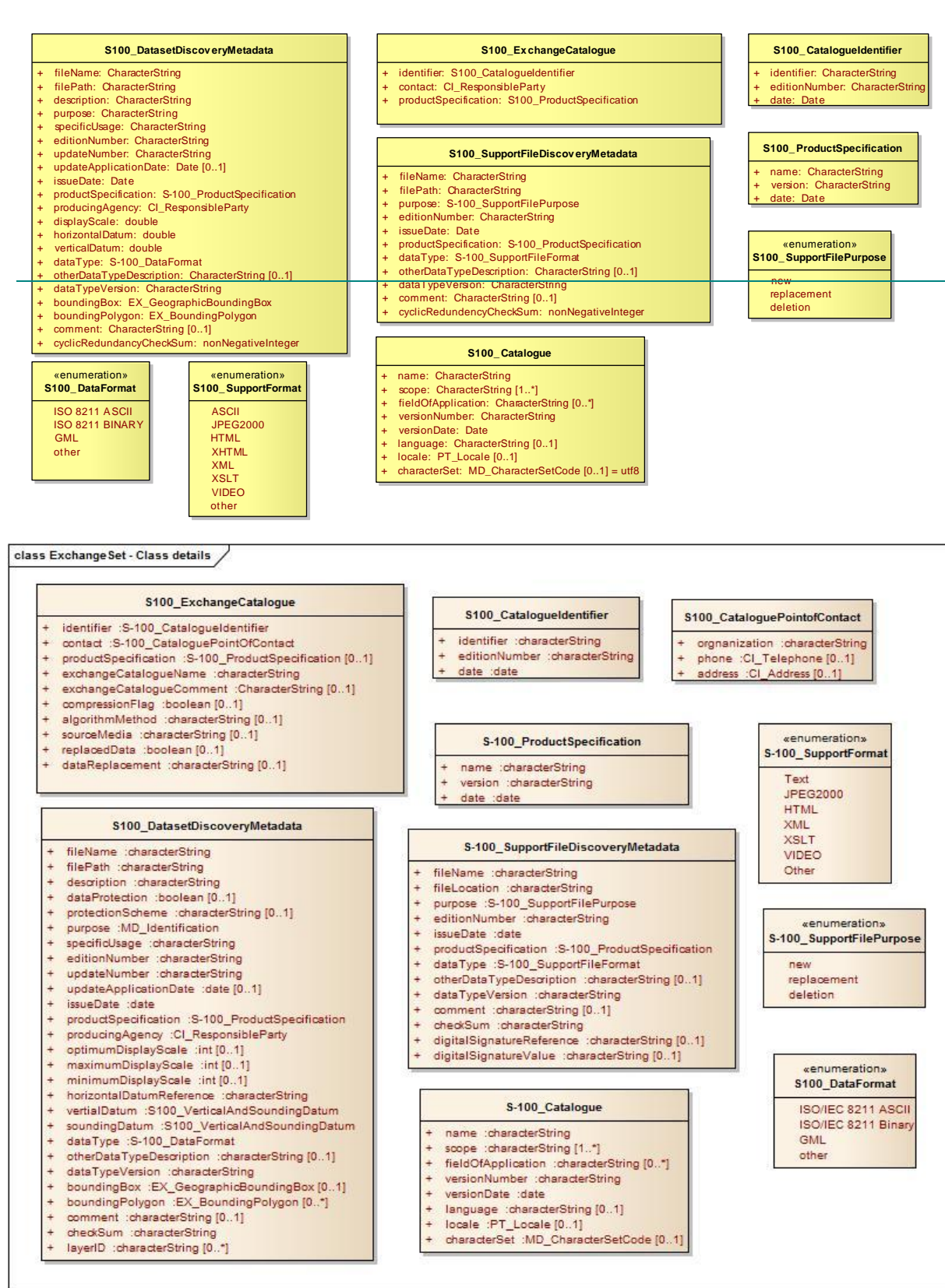


Figure 4a-D3D4S100 Exchange Set - class details

D-2 Elements of the exchange set

D-2.1 S100_ExchangeSet

An S-100 Exchange Set is an aggregation of all the various elements required to support the interchange of geospatial data and metadata. The MultiAggregation association introduces the concept of using subsets which could be domain oriented e.g. packaged by scale, producer, region etc.

Role Name	Name	Description	Mult	Type	Remarks
Class	S100_ExchangeSet	Aggregation of the elements comprising an exchange set for the transfer of data	-	-	-
Role	aggregateFile	Collection of support files in the exchange set	0..*	-	
Role	partOf	Collection of datasets which are part of the exchange set	0..*	-	
Role	aggregateCatalogue	Collection of catalogues	0..*	-	
Role	superSet	The master container exchange set which can contain a subSet of exchange sets			
Role	subSet	Exchange set which is part of the superSet			

D-2.2 S100_ExchangeCatalogue

Each exchange set has a single S-100_ExchangeCatalogue which contains meta information for the data and support files in the exchange set.

Role Name	Name	Description	Mult	Type	Remarks
Class	S-100_ExchangeCatalogue	An exchange catalogue contains the discovery metadata about the exchange datasets and support files	-	-	-
Attribute	identifier	Uniquely identifies this exchange catalogue	1	S-100_CatalogueIdentifier	
Attribute	contact	Details about the issuer of this exchange catalogue	1	S-100_CataloguePointOfContact	
Attribute	productSpecification	Details about the product specifications used for the datasets contained in the exchange catalogue	0..1	S-100_ProductSpecification	Conditional on all the datasets using the same product specification
Attribute	<u>exchangeCatalogueName</u>	<u>Catalogue filename</u>	<u>1</u>	<u>CharacterString</u>	<u>In S-101 it would be CATLOG.101</u>
Attribute	<u>exchangeCatalogueDescription</u>	<u>Description of what the exchange catalogue contains</u>	<u>1</u>	<u>CharacterString</u>	

<u>Attribute</u>	<u>eExchangeCatalogueComment</u>	<u>Any additional Information</u>	<u>0..1</u>	<u>CharacterString</u>	
<u>Attribute</u>	<u>compressionFlag</u>	<u>Is the data compressed</u>	<u>0..1</u>	<u>Boolean</u>	<u>Yes or No</u>
<u>Attribute</u>	<u>algorithmMethod</u>	<u>Type of compression algorithm</u>	<u>0..1</u>	<u>CharacterString</u>	<u>Eg. RAR or ZIP</u>
<u>Attribute</u>	<u>sourceMedia</u>	<u>Distribution media</u>	<u>0..1</u>	<u>CharacterString</u>	
<u>Attribute</u>	<u>replacedData</u>	<u>If a data file is cancelled is it replaced by another data file</u>	<u>0..1</u>	<u>Boolean</u>	
<u>Attribute</u>	<u>dataReplacement</u>	<u>Cell name</u>	<u>0..1</u>	<u>CharacterString</u>	

D-2.3 S100_CatalogueIdentifier

Role Name	Name	Description	Mult	Type	Remarks
Class	S-100_CatalogueIdentifier	An exchange catalogue contains the discovery metadata about the exchange datasets and support files	-	-	-
Attribute	identifier	Uniquely identifies this exchange catalogue	1	CharacterString	
Attribute	editionNumber	The edition number of this exchange catalogue	1	CharacterString	
Attribute	date	Creation date of the exchange catalogue	1	Date	

D-2.4 S100_CataloguePointofContact

Role Name	Name	Description	Mult	Type	Remarks
Class	S-100_CataloguePointOfContact	Contact details of the issuer of this exchange catalogue	-	-	-
Attribute	organization	The organization distributing this exchange catalogue	1	CharacterString	This could be an individual producer, value added reseller, etc.
Attribute	phone	The edition number of this exchange catalogue	0..1	CI_Telephone	
Attribute	address	Creation date of the exchange catalogue The Address of the organization	0..1	CI_Address	

D-2.5 S100_Dataset

Role Name	Name	Description	Mult	Type	Remarks
Class	S100_Dataset		-	-	-
Role	composedOf	An exchange set is composed of 0 or more datasets	0..*	-	
Role	datasetCatalogue	Catalogue which is related to this dataset	0..*	-	

D-2.6 S100_DatasetDiscoveryMetaData

Role Name	Name	Description	Mult	Type	Remarks
Class	S-100_DatasetDiscoveryMetadata	Metadata about the individual datasets in the exchange catalogue	-	-	-
Attribute	fileName	Dataset file name	1	CharacterString	
Attribute	filePath	Full path from the exchange set root directory	1	CharacterString	
Attribute	description	Short description giving the area or location covered by the dataset	1	CharacterString	E.g. a harbour or port name, between two named locations etc.
Attribute	dataProtection	Indicates if the data is encrypted	0..1	Boolean	e.g. Encrypted or Unencrypted
Attribute	protectionScheme		0..1	CharacterString	Eg S-63
Attribute	purpose	The purpose for which the dataset has been issued	1	MD_Identification>purpose CharacterString	E.g. new, re-issue, new edition, update etc.
Attribute	specificUsage	The use for which the dataset is intended	1	CharacterString	E.g. in the case of ENCs this would be a navigation purpose classification.
Attribute	editionNumber	The edition number of the dataset	1	CharacterString	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	updateNumber	Update number assigned to the dataset and increased by one for each subsequent update	1	CharacterString	Update number 0 is assigned to a new dataset.
Attribute	updateApplicationDate	this date is only used for the base cell files (i.e. new data sets, re-issue and new edition), not update cell files. All updates dated on or before this date must have been applied by the producer	0..1	Date	
Attribute	issueDate	date on which the data was made available by the data producer	1	Date	
Attribute	productSpecification	The product specification used to create this dataset	1	S-100_ProductSpecification	
Attribute	producingAgency		1	CI_ResponsibleParty	
Attribute	optimumDisplayScale	The modulus of the display scale. The scale with which the data is optimally displayed	0..1	IntegerDouble	Example: A scale of 1:25000 is encoded as 25000
Attribute	maximumDisplayScale	The maximum scale with which the data is displayed	0..1	IntegerDouble	
Attribute	minimumDisplayScale	The minimum scale with which the data is	0..1	IntegerDouble	

Role Name	Name	Description	Mult	Type	Remarks
		<u>displayed</u>			
Attribute	<u>horizontalDatum</u>	Value taken from the attribute <u>HORDAT</u> .	4	double	
Attribute	<u>horizontalDatumReference</u>	Reference to the register from which the horizontal datum value is taken	1	characterString	<u>EPSG</u>
Attribute	<u>horizontalDatumValue</u>	Horizontal Datum of the entire dataset	1	Integer	<u>4326</u>
Attribute	verticalDatum	Vertical Datum of the entire dataset Value taken from the attribute <u>VERDAT</u> .	1	<u>S100_VerticalAndSoundingDatumdouble</u>	
Attribute	soundingDatum	Value taken from the attribute <u>VERDAT</u> . Sounding Datum of the entire dataset	1	<u>S100_VerticalAndSoundingDatum</u>	
Attribute	dataType	The encoding format of the dataset	1	S-100_DataFormat	
Attribute	otherDataTypeDescription	Encoding format other than those listed.	0..1	CharacterString	
Attribute	dataTypeVersion	The version number of the dataType.	1	CharacterString	
Attribute	boundingBox	The extent of the cell limits	0..1	EX_GeographicBoundingBox	
Attribute	boundingPolygon	A polygon which defines the actual data limit	0..*	EX_BoundingPolygon	
Attribute	comment		0..1	CharacterString	
Attribute	<u>cyclicRedundancyCheckcheckSum</u>	The Cyclic Redundancy Checksum for the file	1	CharacterString	
Attribute	<u>layerId</u>	Identifies the relationship to other layers that are required to view the complete data set.	0+..*	CharacterString	<u>Eg – Scale Independent or Depends</u>

D-2.7 S100_DataFormat

Role Name	Name	Description	Mult	Type	Remarks
Class	S-100_DataFormat	The encoding format	-	-	-
Value	ISO/IEC 8211 ASCII		-	-	-
Value	ISO/IEC 8211 BINARY		-	-	-
Value	GML		-	-	-
Value	Other		-	-	-

D-2.8 S100_ProductSpecification

Role Name	Name	Description	Mult	Type	Remarks
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Class	S-100_ProductSpecificationCataloguePointOfContact	An exchange catalogue contains the discovery metadata about the exchange datasets and support files 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	1	CharacterString	
Attribute	version	The version number of the product specification	1	CharacterString	
Attribute	date	The version date of the product specification	1	Date	

D-2.9 S100_SupportFile

Role Name	Name	Description	Mult	Type	Remarks
Class	S100_SupportFile		-	-	-
Role	aggregateFile	Collection of support files	0..*	-	
Role	supportFile	File which has information about a dataset	0..*	-	

D-2.10 S100_SupportFileDiscoveryMetadata

Role Name	Name	Description	Mult	Type	Remarks
Class	S-100_SupportFileDiscoveryMetadata	Metadata about the individual support files in the exchange catalogue	-	-	-
Attribute	fileName	Full path from the exchange set root directory Name of the support file	1	CharacterString	
Attribute	fileLocation	Full location from the exchange set root directory	<u>1</u>	CharacterString	
Attribute	purpose	The purpose for which the dataset has been issued	1	S-100_SupportFilePurpose	E.g. new, re-issue, new edition, update etc.
Attribute	editionNumber	The edition number of the dataset	1	CharacterString	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	1	Date	
Attribute	productSpecification	The product specification used to create this file	1	S-100_ProductSpecification	
Attribute	dataType	The encoding format of the dataset	1	S-100_SupportFileFormat	
Attribute	otherDataTypeDescription	Encoding format other than those listed.	0..1	CharacterString	
Attribute	dataTypeVersion	The version number of the dataType.	<u>1</u>	CharacterString	
Attribute	comment		0..1	CharacterString	
Attribute	cyclicCheckSum	The Cyclic Redundancy Checksum for the file	1	CharacterString	
Attribute	digitalSignatureReference	Digital Signature of the file	<u>0..1</u>	CharacterString	Reference to the appropriate digital signature algorithm
Attribute	digitalSignatureValue	Value derived from the digital signature	<u>0..1</u>	CharacterString	

D-2.11 S100_SupportFileFormat

Role Name	Name	Description	Mult	Type	Remarks
Class	S-100_SupportFormat	The format used in the support file	-	-	-
Value	Text		-	-	
Value	JPEG2000		-	-	
Value	HTML		-	-	

Value	XML		-	-	
Value	XSLT		-	-	
Value	VIDEO		-	-	
Value	Other		-	-	

D-2.12 S100_SupportFilePurpose

Role Name	Name	Description	Mult	Type	Remarks
Class	S-100_SupportFilePurpose	The format used in the support file	-	-	-
Value	new	A file which is new	-	-	Signifies a new file.
Value	replacement	A file which replaces an existing file	-	-	Signifies a replacement for a file of the same name
Value	deletion	Deletes an existing file	-	-	Signifies deletion of a file of that name

D-2.13 S100_Catalogue

Role Name	Name	Description	Mult	Type	Remarks
Class	S-100_Catalogue		-	-	-
Attribute	name	The name for the catalogue	1	CharacterString	
Attribute	scope	Subject domain of the catalogue	1..*	CharacterString	
Attribute	fieldOfApplication	Description of the use to which this catalogue may be put	0..*	CharacterString	
Attribute	versionNumber	The version number of the product specification	1	CharacterString	
Attribute	versionDate	The version date of the product specification	1	Date	
Attribute	language	The language used for this catalogue	0..1	CharacterString	
Attribute	locale		0..1	PT_Locale	
Attribute	characterSet	Character set used in the catalogue	0..1	MD_CharacterSetCode	value=utf8