
ICSM ISO19115-1 Metadata Good Practice Guide



ICSM ISO19115-1 Metadata Good Practice Guide

ICSM ISO19115-1 Metadata Good Practice Guide

This document was compiled by OpenWork Ltd (OWL) on behalf of and with guidance and contributions from the ICSM Metadata Working Group (MDWG). The purpose of this document is to capture the consensus good practice guidance for the use of recommended ISO 19115-1 metadata elements for organisations in the Australia / New Zealand region. Further this guidance will aid the migration from the retired ANZLIC Metadata Profile of ISO 19115:2003 to the currently endorsed ISO 191125-1:2014 (including Amd.1:2018).



Australian Government

Geoscience Australia



Australian Research Data Commons



Australian Government

Department of the Environment and Energy



Australian Government
Department of Defence



Australian Government
Department of the Environment and Energy
Australian Antarctic Division



Acknowledgements

ICSM Metadata Working Group

- Chair : Irina Bastrakova - irina.bastrakova@ga.gov.au
- Secretariat: Andrew Whiting - andrew.whiting@ga.gov.au
- Secretariat: Graham Logan - graham.logan@ga.gov.au
- ANZLIC: Brian Sloan - Brian.Sloan@ga.gov.au
- ANZLIC: Ann Beaumaris - Ann.Beaumaris@industry.gov.au
- ICSM: Executive Officer - Lesley Waterhouse - lesley.waterhouse@ga.gov.au

Contributors

- Lead Author: Byron Cochrane - OpenWorks Ltd - byron@openwork.nz
- Irina Bastrakova - Geoscience Australia - irina.bastrakova@ga.gov.au
- Shanti Rowlison - Australia Government Dept of Defense - shanti.rowlison@defence.gov.au
- Jenny Mahuika - Terrestrial Ecosystem Research Network (TERN) - j.mahuika@uq.edu.au
- Evert Bleys - ABARES - ejbleys@gmail.com
- Melanie Barlow - Australian Research Data Commons (ARDC)- melanie.barlow@ardc.edu.au
- Aaron Sedgmen - Geoscience Australia - Aaron.Sedgmen@ga.gov.au
- Martin Capobianco - Geoscience Australia - Martin.Capobianco@ga.gov.au
- Dave Connell - Australia Antarctic Division, Dept of the Environment and Energy
- Dave.Connell@aad.gov.au

» *Introduction*

Introduction

This guide is intended to provide a resource for those wishing to implement the AS/NZS ISO 19115.1:2015 metadata standard (including the 2018 Amendment No.1) in the Australia and New Zealand region. While this has been the officially endorsed metadata standard for Australia and New Zealand since 2015, consistency of implementation and the slow development of tools to support this standard have been problems. The development of this document has been undertaken to alleviate these issues and to provide a basis for further work.

This guide is meant to be a living document. At times it does not always provide strong guidance on the use of an element as MDWG discussion about the element usage has need to continue and mature. This document is meant to evolve as use and understanding of the standard matures. It is meant to be an online active resource that can be referenced and grow as needed.

As we are human, absolute agreement about the use of the metadata and elements is not achievable. But we can narrow the difference in understanding through the use of definitions and guidance.

Background

On the 13th June 2018, the Australian and New Zealand, Location Information Metadata Working Group (ANZ MDWG) was re-established by request of the ANZLIC – the Spatial Information Council (ANZLIC) and the Intergovernmental Committee on Surveying and Mapping (ICSM).

The working group will support a wider understanding and consistent application of location information metadata, based on agreed standards.

Terms of Reference

- Actively monitor and assess the impact of future changes to metadata standards, in order to advise ANZLIC on policy impacts and stakeholders on the scale and impact of technical changes, through the managed knowledge of current national capabilities in metadata.
- Create and maintain a roadmap documenting what the MDWG is going to undertake and when.
- Develop, and manage a series of best practice resources (profiles, applications, websites (ANZLIC and ICSM), FAQs, models) to assist both general and technical audiences in understanding, implementing and managing the latest versions of metadata

standards.

- Engage with interested industry organisations (SIBA, ESRI, etc.) to communicate working group developments and directions.
- Provide advice to spatial communities on the value, implementation and management of metadata and associated systems.
- Provide a forum for metadata custodians to share and exchange knowledge related to implementing, maintaining and updating metadata frameworks.
- Provide a forum for inward and outward communication between international (ISO and OGC peak bodies), other interest groups (Australian Government Linked Data Working Group, GeoNetwork community of practice etc.) to inform and seek feedback from core foundation spatial data custodians.
- Govern associated metadata tools, models, vocabularies, and resources, which are published on by ICSM and or ANZLIC.
- Report to ICSM and ANZLIC on key activities, and metadata developments.

» ***Table of Contents***

ICSM Metadata Good Practice - Table of Contents

Guidance

- Introduction
- Pattern guide
- Template

Metadata for Metadata

- Class - MD_Metadata
- Metadata Identifier
- Metadata Linkage
- Metadata Date
- Metadata Responsible Party
- Metadata Default Locale
- Resource Scope
- Metadata Legal Constraints - Includes:
 - Legal constraints
 - Reference for legal
- Metadata Security Constraints - Includes:
 - Security constraints
 - Reference for security
- Parent Metadata

Metadata for Data Resources

- Package Identification Information
 - Resource Default locale
 - Abstract
 - Purpose
 - Status
 - Topic Category
 - Spatial Resolution
 - Resource Point of Contact
 - Additional docs
 - Spatial Representation Type
 - AssociatedResource
 - Format
 - Browse Graphic

- Package - Resource Citation
 - Resource Title
 - Resource Identifier
 - Resource Date
 - Resource Edition
 - Series
 - Resource Cited Responsible Party
- Package Keywords - Including:
 - ABS Field of Research
 - ABARES Keyword
 - AGIFT Keyword
 - Other keywords
- Package Maintenance - Includes:
 - Frequency of Updates
 - Scope for Maintenance
- Package Resource Constraint Information
 - Resource Constraints - Includes:
 - UseLimitations
 - Releasability
 - OtherConstraints
 - Resource Legal Constraints - Includes
 - Legal constraints
 - Reference for legal
 - Resource Security Constraints Includes
 - Security constraints
 - Reference for security
- Package - Extent
 - GeoExtent
 - Extent Geographic Description
 - Extent Bounding Box
 - Extent Vertical
 - Extent Temporal
- Package Lineage
 - Resource Lineage - Includes:
 - Statement
 - Source
- Package ReferenceSystemInfo
 - Spatial Reference System

- Package Distribution Information
 - DistributionInfo Includes
 - Format
 - Distributor
 - Online Resource
 - Offline Resource

Classes

- CI_Citation
- CI_Date
- CI_OnlineResource
- CI_Responsibility
- MD_BrowseGraphic
- MD_Constraints
- MD_DataIdentification
- MD_Metadata
- MD_Identification
- MD_Identifier
- MD_LegalConstraints
- MD_Scope
- MD_SecurityConstraints
- PT_Locale

» *Patterns Explained*

Pattern Guide

Approach

Building on previous work by the Metadata Working Group of the ICSM (MDWG), elements previously identified as important are detailed separately but within the context of metadata records for spatial data resources. This was done using a Pattern Language approach as developed by Christopher Alexander, et al in the late 1970s for architecture in the book “A Pattern Language” and later applied to the digital domain most famously in “Design Patterns: Elements of Reusable Object-Oriented Software” (1994) by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides which became the bible for Object Orient Programming. It is a format common in various W3C notes including “Data on the Web Best Practices” and “Spatial Data on the Web Best Practices”.

Elements as Patterns

A design pattern is a general, reusable solution to a commonly occurring problem within a given context. In our case, these are the elements of ISO19115-1 metadata records.

Meaningful Name An entry starts with a meaningful name that provides an anchor to which we can refer. These are associated in our case with the individual element, class or package in the standard. A star rating (1 to 5 stars) indicates the importance or priority of the element in the general ICSM context. In some domains and agencies, these rating will differ. This is followed by a short statement that provides context for the element and why it is useful.

A small table follows that summarises details about the element. These include:

- **Path** - Which provides clear identification about where the element sits in the structure of a metadata record.
- **Governance** - Details what body is most likely to make decisions about how the element is used and populated. Common values are ISO, Common ICSM, Domain, Agency. Sometimes these decisions are made at more than one level.
- **Purpose** - Provides the high-level purpose of the element - for what is it most useful? Common values include: Discovery, Evaluation, Use, Management
- **Audience** - describes with a 1 to 5 star rating how important the element is to the select personas. These personas include:
 - machine resource - for purely digital interactions
 - general - a novice audience
 - resource manager - parties responsible for the management of the data

- specialist - subject matter specialist who know a great deal about the domain.
- **Metadata type** - Which of the three general metadata types does the element belong, *descriptive*, *structural*, or *administrative*
- *ICSM Level of Agreement* - A 5 star rating as to how close to consensus the MDWG is on the description of this item. A low number of stars usually indicates lack of process progress rather than disagreement.

Definition The next section holds a brief in context definition of the element. This is followed by the ISO19115-1 standard rules of cardinality and obligation for the element and the class used to structure the captured information. A brief statement of ICSM Good Practice summarises some further guidance as developed by the MDWG. This includes guidance on the use of the class and its sub-element or at times, siblings.

Discussion This section captures the thinking of the MDWG behind the use of this element. The following aspects in this order are considered:

- Why this element is important?
- What we need it for?
- Who should capture this information?
- Whom is it useful to?
- When should the information be captured?
- Where is it important, with what resource?

Outstanding issues are also captured in this section. This is a living document and we only get to the level of agreement that we can. Capturing these outstanding differences and lack of understanding, allows us to know where to start on the next bit of work.

Recommendations Finally, we come to the recommendations. These are statements capture the what, why, who, when and how MDWG recommend this element be used. They provide an in-context summary of the MDWG guidance and the reasoning behind it.

Crosswalks Included in the Recommendation section are crosswalk concerns when translating metadata between four different standards: ISO19139, Dublin core/CKAN/data.gov.au, DCAT, and RIF-CS.

ISO19139 is the previous standard that ISO19115-3 replaced. It is also the parent to widely used metadata profiles such as ANZLIC and MCP. Many geospatial practitioners currently have metadata in this standard and need to know how to migrate.

Dublin core/CKAN/data.gov.au represents the way that top-level catalogues such as data.gov.au hold their metadata. These are more abbreviated formats focused on data discovery. Knowing how to share metadata with these platforms while not losing the important additional information held in ISO19115-1 is of high importance.

DCAT is a newer metadata standard developed by the W3C and based on linked data principles like RDF and formal ontologies. It can be thought of as a wrapper around other standards that make the sharing of metadata between standards easier through the use of well understood tags. The use of this standard continues to grow and is important for metadata exchange.

RIF-CS stands for Registry Interchange Format - Collections and Services. It is an XML vocabulary for representing metadata about data collections and related entities based on ISO 2146. Similar to how MARC standards are used by library systems to describe books, RIF-CS is used to describe data collections. For example, a RIF-CS record can describe a spreadsheet containing experimental results: it might contain the title, description, creator, keywords, date the experiment was conducted and a URL to obtain the actual spreadsheet. RIF-CS is the format required by Research Data Australia.

Related Links Related links are captured in a section titled “Also Consider”. This section contains references to additional useful information. Usually, these are other elements, packages and classes in this good practice document. But these may also be links to other external related resources.

Examples Each entry closes with an example section. It is hoped that contents here grow over time as more exemplars are contributed. When available, contributing organisations are cited and the example is given. Almost all entries include a reference example in XML. This section and the document closes with a UML diagram captured from the official ISO TC211 conceptual model repository at <https://www.isotc211.org/hmmg/HTML/ConceptualModels/>.

How To Use This Document

An example of how this document might be used to provide guidance by an organisation on the use of ISO19115-1 is given below. This example is of how we might use this to provide a user support for capturing discovery level metadata as guided by the document “AS/NZS ISO 19115.1:2015 Amendment No. 1 appended”. The following was extracted from “Annex F Table F.1 — Metadata for the discovery of geographic datasets and series.”

Metadata for discovery of geographic datasets - guidance

Metadata element	Guidance Link
Metadata reference information:	Metadata Identifier
Resource title:	Resource Title
Resource reference date:	Resource Date
Resource identifier:	Resource Identifier
Resource point of contact:	Resource Point of Contact
Geographic location:	Extent Bounding Box
Resource language:	Resource Default locale
Resource topic category:	Topic Category
Spatial resolution:	Spatial Resolution
Resource type:	Resource Scope
Resource abstract:	Abstract
Resource lineage:	Resource Lineage
Keywords:	Keywords
Constraints on resource access and use:	Resource Constraints
Metadata date stamp:	Metadata Date
Metadata point of contact:	Metadata Responsible Party

» *Patterns Template*

{Element or Package Title} ★★★★★

{stars indicate level of ICSM importance / priority}

{A brief description about the problem this element addresses - why we need it. Where it sits in the metadata hierarchy.} ||||—|—|| **Element Name** | serviceTypeVersion || **Parent** || MD_Metadata.identificationInfo>SV_ServiceIdentification || **Class/Type** | characterString || **Governance** | Domain, Agency || **Purpose** | Discovery, Evaluation, Use || **Audience** | machine resource - ★★ || general - ★★★ || resource manager - ★★★ || specialist - ★★★ || **Metadata type** | descriptive || **ICSM Level of Agreement** | ★★★ |

Definition

{In context definition}

ISO Requirements

{Verbal description with links of the cardinality (e.g. [1-*]) and obligation of the element and its class}

Discussion

{This section captures the thinking behind the use of this element. The following aspects in this order are considered:

- Why this element is import?
- What we need it for?
- Who should capture this information?
- Whom is it useful to?
- When should the information be captured?
- Where is it important, with what resource?}

ICSM Recommendations

{Therefore - statement about what, why, who, when and how MDWG recommend this element be used} {A brief statement of MDWG guidance on use of this element}

Recommended Sub-Elements

{MDWG recommended sub-elements and how to populate them. May be nested.}

- **{sub-elementName}** - (*type* - {name of type}) [{cardinality}] - {brief guidance statement}
- **{sub-elementName}** - (*codelist* - {name of codelist}) [{cardinality}] - {brief guidance statement}
- **{sub-elementName}** - (*class* - {name of class}) [{cardinality}] - {brief guidance statement} -
 - **{sub-elementName for above class}** - (*type* - {name of type}) [{cardinality}] - {brief guidance statement}
 - **{sub-elementName for above class}** - (*codelist* - {name of codelist}) [{cardinality}] - {brief guidance statement}
 - **{sub-elementName for above class}** - (*class* - {name of class}) [{cardinality}] - {brief guidance statement}

Also Consider

{Links to additional useful information. Usually other elements, packages and classes in this good practice document. May also link to other external resources.}

{element name} - {description of importance and utility with any links}

{element name} - {description of importance and utility with any links}

{class name} - {description of importance and utility with any links}

Outstanding Issues

{Unresolved issues of discussion are captured here in Markdown Notes format}

CORE ISSUE:

{If there is any major issue of concern, Name it and discuss here}

{Issue Name} {Issue discussion points and items which need resolution}

Other discussion

{from other sources of note - other standards and implementations. In Markdown Notes format. Such as:}

{DCAT Notes} - {Discussion of issue}

{From data.govt.au} - {Discussion of issue}

Crosswalk considerations

ISO19139

{Discussion of issues, if any, to guide migration from ISO19139}

Dublin core / CKAN / data.gov.au {if any}

{mapping to DC element and discussion}

DCAT

{mapping to DCAT element and discussion, if any}

RIF-CS

{mapping to RIF-CS element and discussion, if any}

Examples

GA

{example - if any useful}

ABARES

{example - if any useful}

Others

{### who - example - if any useful} }

XML -

```
<mdb:MD_Metadata>
...
{<in context xml/>}
...
</mdb:MD_Metadata>
```

UML diagrams

{Captured from official ISO documentation at <https://www.isotc211.org/hmmg/HTML/ConceptualModels/index.htm?goto=Recomm>

Recommended elements highlighted in yellow

{Name}

class - MD_Metadata

In order to create consistent structured metadata to describe spatial resources, we need a schema to provide a structure and a class to hold it. MD_Metadata provides this for ISO19115-1.

- **Governance - ISO**
- **Metadata Type - structural**
- **ICSM Level of Agreement - ******

Definition

Root entity which defines metadata about a resource or resources

Child packages

ICSM recommended

- **resourceLineage** - (class - Li_Lineage) [0..*]
- **referenceSystemInfo** - (class - MD_ReferenceSystem)
- **metadataConstraints** - (abstract class MD_Constraints) [0..*] see:
 - **Metadata Security Constraints**
 - **Metadata Legal Constraints**
- **identificationInfo** - (abstract class - MD_Identification) [1..*] see:
 - **Data Identification** - (class MD_DataIdentification) > ?create Entry?
 - **Service Identification** - (class SV_ServiceIdentification) > To Be Completed
- **distributionInfo** - (class - MD_Distribution) [0..*]

Other packages - not yet addressed by MDWG

- **metadataMaintenance** - (class MD_MaintenanceInformation) [0..1]
- **spatialRepresentationInfo** - (abstract class - MD_SpatialRepresentation) [0..*]
- **metadataExtensionInfo** - (class - MD_MetadataExtensionInformation) [0..*]
- **applicationSchemaInfo** - (class - MD_ApplicationSchemaInformation) [0..*]
- **portrayalCatalogInfo** - (class - MD_ProtrayalCatalogueReference) [0..*]
- **contentInfo** - (abstract class - MD_ContentInformation) [0..*]
- **dataQualityInfo** - (class - DQ_DataQuality (from ISO19157)) [0..*]

Atributes

MDWG Recomended Attributes -

- **metadataIdentifier** - (*class - MD_Identifier*) [0..1]
- **dateInfo** - (*class - CI_Date*) [1..*]
- **contact** - (*class - CI_Responsibility*) [0..1]
- **defaultLocale** - (*class - PT_Locale*)[0..1]
- **metadataLinkage** - (*class - CI_OnlineResource*)[0..*]
- **parentMetadata** - (*class - CI_Citation* [0..1]
- **metadataScope** - (*class - MD_MetadataScope*)[0..*]
- **metadataStandard** - (*class - CI_Citation*) [0..*] AS/NZS ISO 19115-3 > recommended but not yet detailed by MDWG
- **metadataProfile** - (*class - CI_Citation*) [0..*] > recommended but not yet detailed by MDWG

Other attributes - not yet addressed by MDWG

- **otherLocale** - (*class - PT_Locale*)[0..*]
- **alternativeMetadataReference** - (*class - CI_Citation* [0..*]

Discussion

The MD_Metadata package defines the schema for describing the complete metadata about a resource and metadata about the metadata itself. It is composed through an aggregate of 12 additional metadata classes as shown above. The MD_Metadata class also contains attributes providing information about the metadata record itself. Those recommended attributes are covered in other sections as cited above

Recommendations

Therefore - it is recommended that all spatial metadata utilise the structure provided by the ISO19115-1 MD_Metadata class and follow the guidance provided. While ISO 19115-1 allows for such a metadata to describe more than one spatial resource, in order to reduce confusion and ease the integration with other metadata systems, it is recommended that each metadata record describes one and only one resource and that each resource have one metadata record of class MD_Metadata.

UML diagrams

Recommended elements highlighted in yellow

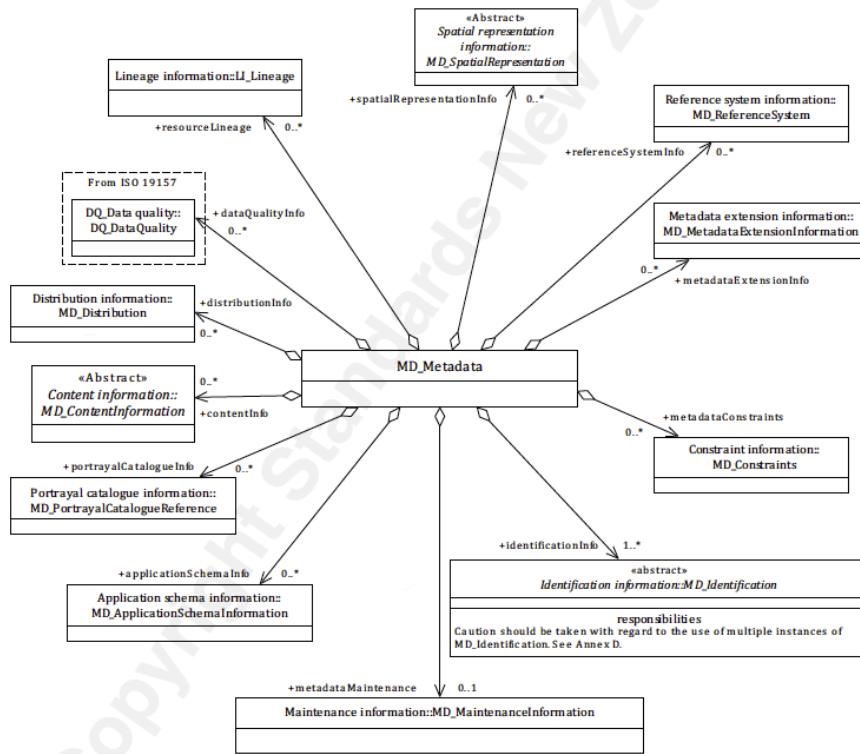


Figure 1: MD_Metadata.png

Metadata Identifier ★★★★★

In order for machines and people to distinguish a metadata record from all others a Metadata record MD_Metadata needs a unique identifier.

Element Name	<i>metadataIdentifier</i>
Parent	<i>MD_Metadata</i>
Class/Type	<i>MD_Identification</i>
Governance	<i>Common ICSM</i>
Purpose	<i>Linkage, Identification</i>
Audience	machine resource - ★★★ general - ★ resource manager - ★★★ specialist - ★★
Metadata type	<i>administrative</i>
ICSM Level of Agreement	★★★★

Definition

The persistent unique alphanumeric identifier for the metadata record that describes a spatial resource.

ISO Obligation

- There should be zero or one [0..1] metadataIdentifier for the cited resource in the *MD_Metadata* package of class *MD_Identifier*.

ICSM Good Practice

- This element should be populated in all metadata records

Discussion

Every metadata record needs a unique identifier so as to provide certainty as to the identity of the record and to provide a primary key for linkages. This element should hold UUID, preferably in the form of a resolvable URI (either standalone or in combination with another element e.g. <mcc:codespace>). This provides the machine-readable (and human) ability to determine if this is the same or different to other metadata records. It is useful in machine to machine activities such as metadata harvesting. It is also at times useful to data managers and others to determine if a record is the same as another.

This identifier must never change, irrespective of where that metadata record is stored. This allows linkages to a metadata record to persist.

The equivalent of this field was recommended as mandatory in the previous ANZLIC Standard. Common practice is to record a UUID in this field.

ICSM Recommendations

Therefore - it is Highly Recommended that every metadata record should have one and only one metadata identifier (MD_Metadata > mdb:metadataIdentifier > MD_Identifier). The child element <mcc:code> should contain the persistent uid for the metadata record. While the child element <mcc:codespace> should contain the reference URL path by which, when combined with the uid, this metadata record can be retrieved. It is beneficial to populate other sibling elements as needed such as <mcc:authority> to indicated the authority that minted the uid.

ICSM Recommended Sub-Elements

From class *MD_Identifier*

- **code** - (*type - charStr*) [1..1] a UUID, mandatory when identifier is provided
- **codespace** - (*type - charStr*) [0..1] ideally a URL path by which, when combined with the uid, the full metadata can be retrieved.
- **authority** - (*class - CI_Citation*) [0..1] optional, the provider of the UUID

Also Consider

- **Resource Identifier** - provides unique identifier to the resource. This may be the same as the metadata identifier when the metadata resource in a catalogue serves as the landing page for a resource.
- **Metadata Linkage** - is most often used to provide a point of truth linkage (landing page) to the metadata record.
- **CI_Citation (Authority)** - Information authority responsible for minting the UUID, be it the software package or other mechanism, may be captured in the Authority subelement using the CI_Citation package general guidance.
- **MD_Identifier** General Guidance for the package used to hold the metadata identifier information. This package can be used to provide identity to a large number of other metadata elements.

Outstanding Issues

CORE ISSUE: In ISO the identifier for the Metadata can differ from that of the data. This is not necessarily the case in other metadata standards such as Dublin Core or DCAT.

Resolvable URIs Of note - the ISO conceptual reference model for ISO 19115-1 available at <https://www.isotc211.org/hmmg/HTML/ConceptualModels/EARoot/EA1/EA12/EA2/EA4095.0>. This includes a description that differs slightly from previous description - “Unique Identifier and onlineResource for this metadata record” In many ways it would be preferable if this field were populated with a URI that ultimately resolved to a point of truth for the metadata record. Some issues remain in software that incorrectly prohibit characters needed by URIs. The nested tag that actually holds the UUID character string is `mcc:code`. This is noted in the UML for this element: “NOTE: avoid characters that are not legal in URLs”. This would suggest that URIs of type URL are to be allowed. While I would not currently recommend URIs in this field, due to software limitations, it is a practice that would likely be encouraged in the future when linked data is more prevalent. A recommended solution is to populate codespace with the path by which, when combined with the uuid, the metadata can be retrieved. In practice metadataLinkage (Link) often contains the online linkage (to the point of truth metadata record).

Geonetwork usage By default GeoNetwork calculates a unique value for the subelement `code` and populates the `codespace` element with “urn::uuid”. These fields are not editable once generated.

Other Discussion

DCAT Notes DCAT 2 makes several recommendations about the use of identifiers. From the specification’s Dereferencable identifiers section:

- “DCAT primarily relies on persistent HTTP URIs as an effective way of making identifiers actionable. Notably, quite a few identifier schemes can be encoded as dereferenceable HTTP URIs, and some of them are also returning machine-readable metadata (e.g., DOIs and ORCIDs).”
- The CrossRef and DataCite display guidelines recommend displaying DOIs as full URL link in the form <https://doi.org/10.xxxx/xxxxx/>.
- “...data providers still might need to refer to legacy identifiers, non-HTTP dereferenceable identifiers, locally minted or third-party-provided identifiers.”

DCAT 2 suggests some ways of improving non-HTTP dereferenceable identifiers:

- “Proxy dereferenceable URIs can be used when resources have not HTTP dereferenceable IDs. For example <https://example.org/proxyid> is a proxy for id.”
- DCAT uses adms:schemaAgency and dct:creator to represent the authority that defines the identifier scheme (e.g., the DOI foundation in the example), adms:schemaAgency is used when the authority has no URI associated.

The concept captured by DCAT 2 using adms:schemaAgency or dct:creator is the **authority** in this specification.

From data.gov.au The fileIdentifier for a metadata record must never change, irrespective of where that metadata record is stored. Should be system generated. In CKANs case the UUID is common to dataset and metadata record, and takes the UUID with it across new systems. Automatically generated unique ID. Decided against DOI as unique ID already generated in CKAN. DOI records created in ANDS can be leveraged for those who want them given data.gov.au metadata to be harvested by ANDS.

Crosswalk considerations

ISO19139

In iso19115-1 Data type CI_ResponsibleParty (iso19115:2004) changed to type CI_Responsibility such as in MD_Metadata.contact, MD_DataIdentification.pointOfContact, or CI_Citation.citedResponsibleParty

Dublin core / CKAN / data.gov.au

Maps to `metadata` URI

DCAT

Maps to `dct:identifier` or `adms:identifier`. From DCAT 2: “The property adms:identifier can express other locally minted identifiers or external identifiers, like DOI, ELI, arXiv for creative works and ORCID, VIAF, ISNI for actors such as authors and publishers, as long as the identifiers are globally unique and stable.” and “adms:schemaAgency is used when the authority has no URI associated.”

RIF-CS

Maps to `Key Identifier`

Examples

Other

data.gov.au <http://data.gov.au/dataset/559708e5-480e-4f94-8429-c49571e82761>

XML

```
<mdb:MD_Metadata>
  ...
    <mdb:metadataIdentifier>
      <mcc:MD_Identifier>
        <mcc:code>
          <gco:CharacterString>
            314eb989-3771-4c24-a399-d22631973279
          </gco:CharacterString>
        </mcc:code>
        <mcc:codeSpace>
          <gco:CharacterString>
            https://geodata.nz/geonetwork/srv/metadata/
          </gco:CharacterString>
        </mcc:codeSpace>
      </mcc:MD_Identifier>
    </mdb:metadataIdentifier>
  ...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

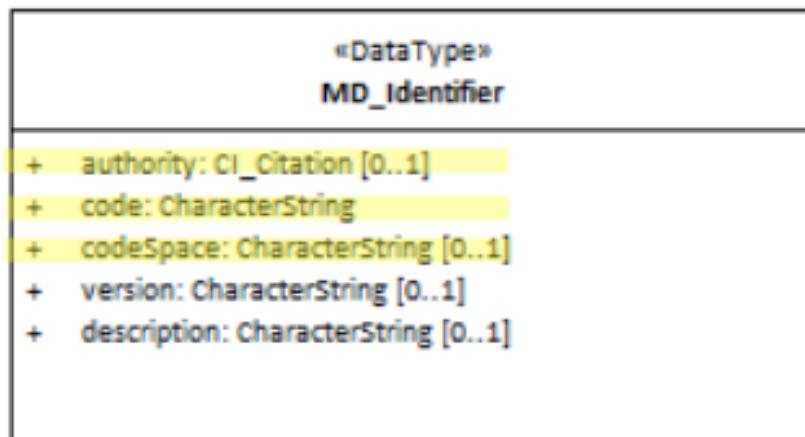


Figure 2: MDIdentifier

Metadata Linkage ★★★★☆

Metadata records generally live in federated systems where metadata are harvested from catalogue to catalogue or collected from remote sources by other means. This can lead to confusion since through the harvesting and collection processes, different versions of the same metadata may co-exist. It is useful that a metadata record contains a link to the source metadata so that a point of truth version can be determined.

Element Name	<i>metadataLinkage</i>
Parent	<i>MD_Metadata</i>
Class/Type	<i>CI_OnlineResource</i>
Governance	<i>Common ICSM</i>
Purpose	<i>Linkage, Identification</i>
Audience	machine resource - ★★★ general - ★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>administrative</i>
ICSM Level of Agreement	★★★★

Definition

Allows unambiguous specification of the online location where the metadata is available.

ISO Obligation

- There should be zero to many [0..*] *metadataLinkage* elements for the cited resource in the *MD_Metadata* package of class *CI_OnlineResource* in a metadata record.

Discussion

The most common use of *metadataLinkage* is to record a “point of truth” location of the source authoritative metadata record. It is in the nature of metadata to be highly distributed. This is commonly done through federated systems that harvest (or otherwise collect) metadata from other sources. Sometimes this process gets out of sync. Sometimes the metadata is modified in the process. In order to retain an authoritative understanding of a metadata record, it is useful to provide a linkage to the source as a reference.

Alternatively, `metadataLinkage` may be used to record the location of the metadata in its current catalogue. The *Description* field should be used to indicate if this differs from other instances of the metadata record that may reside elsewhere. However, if alternate versions are not in ISO19115 format, such locations should be captured in `alternativeMetadataReference`.

The use of this field to hold the local of the metadata record in the local catalogue could be better accomplished through the options provided in `metadataIdentifier`.

ICSM Recommendations

Therefore - there should be a “point of truth” url to a metadata record provided under `metadataLinkage`. Alternatively, this could be the full path to this metadata record. There may be multiple endpoints containing copies of this metadata record, one captured with the description of “Point of Truth URL for this metadata record” is recommended. All `metadataLinkage` elements should have a function code of “Complete Metadata”.

As for multiple locations for the same metadata, it is useful to look at `MD_Metadata/alternativeMetadataReference`. This allows pointers to metadata for the same resource that may be in multiple schemas. (ISO def - “reference to alternative metadata, e.g Dublin Core, FGDC, or metadata in a non-ISO standard for the same resource”) Of course, this does not suggest that it be used for different versions of the metadata in the same standard, but perhaps at least different profiles?

Recommended Sub-Elements

Follow the general guidance for class - `CI_OnlineResource` with the following additional guidance:

- **description** - (*type - charStr*) [0..1] when `metadataLinkage` is used as a “point of truth” location of the authoritative metadata, use this field to indicate this.
- **function** - (*codelist - CI_OnlineFunctionCode*) [0..1] This should be populated with the value “completeMetadata”.

Also Consider

- **onlineResource** - (`MD_Distribution.transferOptions>MD_DigitalTransferOptions.online`) is used to provide online linkage to the resource
- **MetadataIdentifier** - is the preferred element to be used to provide linkage to the metadata record

- **alternativeMetadataReference** - (*class* - *CI_Citation*)[0..*] *Page 37 - ISO 19115.1:2015* - reference to alternative metadata, e.g Dublin Core, FGDC, or metadata in a non-ISO standard for the same resource
- **class** - **CI_OnlineResource** - provides a standardised way of collecting links to online resources

Outstanding Issues

Point of Truth Issue: The use of a standardised term for “point of truth” has been suggested. While this could be applied to the *description* element it could be placed elsewhere such as an expanded *CI_OnlineFunctionCode* codelist

Crosswalk considerations

ISO19139

As this is a new element to allow unambiguous specification of the online location where the metadata is available, there are no reliable elements to crosswalk.

Dublin core / CKAN / data.gov.au

In Dublin Core, the identifier element is described as holding a reference to the resource (not the metadata). However, in the case of metadata records harvested by a higher level CKAN like catalogue, we view the complete metadata record as the resource. It is also a standard practice that the DC Identifier field to be resolvable. For a Dublin Core metadata record harvested via CSW from an ISO 19115-1 record, it is important that that record links to something that can be dereferenced. That something is held in the identifier field and should be the location URL/URI for the metadata. IF the ISO 19115-1 identifier element is only an unresolvable UUID, the metadataLinkage element may be a better choice to populate the DC Identifier field.

DCAT

May map to `dct:identifier` if `metadataIdentifier` is unresolvable

RIF-CS

May map to `Key Identifier` if `metadataIdentifier` is unresolvable

Examples

XML

```
<mdb:MD_Metadata>
....
<mdb:metadataLinkage>
  <cit:CI_OnlineResource>
    <cit:linkage>
      <gco:CharacterString>
        http://geodata.nz/geonetwork/srv/eng/metadata/
        314eb989-3771-4c24-a399-d22631973279
      </gco:CharacterString>
    </cit:linkage>
    <cit:description>
      <gco:CharacterString>Point of truth URL of this metadata record
      </gco:CharacterString>
    </cit:description>
    <cit:function>
      <cit:CI_OnLineFunctionCode
        codeList="https://schemas.isotc211.org/19115/resources/Codelist/cat
        /codelists.xml#CI_OnLineFunctionCode" codeListValue="completeMetadata"/>
    </cit:function>
  </cit:CI_OnlineResource>
</mdb:metadataLinkage>
....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

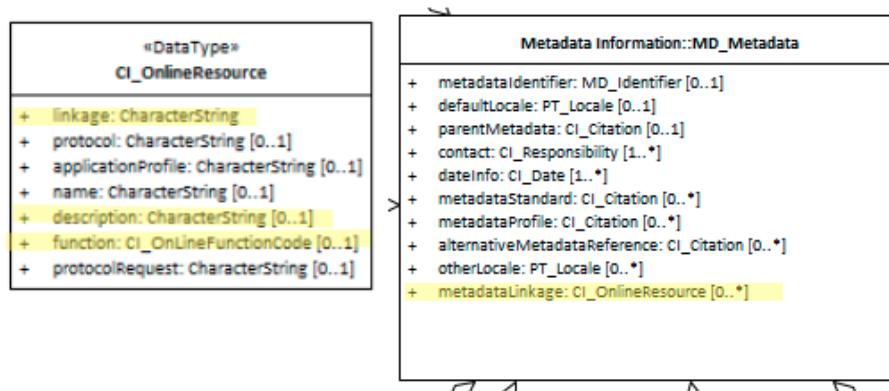


Figure 3: MDLinkage

Metadata Date Info ★★★★★

In order to manage metadata and harvesting mechanism as giving updates to users it is useful to include in our metadata temporal information relating to metadata creation, publication, revision, etc.

Element Name	<i>dateInfo</i>
Parent	<i>MD_Metadata</i>
Class/Type	<i>CI_Date</i>
Governance	<i>Common ICSM</i>
Purpose	<i>Discovery, Data Management</i>
Audience	machine resource - ★★★ general - ★★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★

Definition

A named and dated event associated with the metadata record. (In ISO 8601 format).

ISO Obligation

- There can be one to many [1..*] *dateInfo* entries for the cited resource in the *MD_Metadata* package of class *CI_Date* in a metadata record. One of these must be of *dateType creation*.

Discussion

According to ISO guidance, there must be at least one instance of *dateInfo* in a metadata record (*creation*), but there may be multiple.

The *CI_DateType* CodeList contains 16 values. Which values are of most import needs further discussion.

The ability to crosswalk easily with CKAN and DCAT is of high concern. These external catalogues commonly have a single date field. Which *dateType* we map to this field is of interest in discussions regarding the recommended *dateTypes* used.

Relation of metadata dateInfo to resource reference date needs to be discussed. The resource reference date (*MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.date*) is documented as the date that should be used for discovery of resources other than services. (For services *MD_Metadata.identificationInfo > SV_ServiceIdentification.citation > CI_Citation.date* is used.)

When does the metadata dataInfo require updating? For instance, is it okay to not update the metadata dataInfo when the resource reference date is updated if nothing else has changed? Our good practice guide should address these and related issues.

ICSM Recommendations

Therefore - in order to provide an idea of the age, validity and other time dependant properties of a metadata record, it is important to capture the important events that happened or will happen to a particular metadata record in the *MD_Metadata.dateInfo* element. One of these important events must be of dateType “creation”. This is often referred to as a “Metadata date stamp”.

This element should be updated in a consistent yet to be agreed upon manner. We recommend GeoNetwork’s current approach. GeoNetwork updates the **revision date** for the metadata record automatically on every save. This supports systems such as notifications and harvesting regimes that rely on the capture of the date that a metadata record was last modified.

Recommended Sub-Elements

Follow the general guidance for class - **CI_Date** with the following additional guidance:

- **date** - (Mandatory) the reference *DateTime* for the metadata record.
- **dateType** - One entry must be of this value *creation*.
- **dateType** - (Mandatory for Revision when a revision is made) the event type to which the date refers. Populated from the *CI_DateTypeCode* codelist.

Also Consider

- **Resource Date** - Dates associated with the resource
- **CI_Date** - the class by which dates are expressed

Other Discussion

Date and DateTime: When is it okay to use Date as opposed to DateTime?

DCAT: encoded using the relevant ISO 8601 Date and Time compliant string [DATETIME] and typed using the appropriate XML Schema datatype [XMLSHEMA11-2]

Crosswalk considerations

ISO19139

The element dateStamp was replaced with dateInfo to allow other types of metadata date information to be recorded in addition to the creation date. The type and cardinality of this element were changed in order to allow associating more than one type of date with a metadata record.

Dublin core / CKAN / data.gov.au

Maps to publish and update date

DCAT

Maps to dct:issued and dct:modified

RIF-CS

Maps to @dateAccessioned

Examples

XML -

```
<mdb:MD_Metadata>
  ...
<mdb:dateInfo>
  <cit:CI_Date>
    <cit:date>
      <gco:DateTime>2019-05-30T15:30:05</gco:DateTime>
    </cit:date>
    <cit:dateType>
      <cit:CI_DateTypeCode
        codeList="https://schemas.isotc211.org/19115/resources/Codelist
        /cat/codelists.xml#CI_DateTypeCode"
        codeListValue="revision"/>
```

```
</cit:dateType>
</cit:CI_Date>
</mdb:dateInfo>
<mdb:dateInfo>
  <cit:CI_Date>
    <cit:date>
      <gco:DateTime>2005-03-31T19:13:30</gco:DateTime>
    </cit:date>
    <cit:dateType>
      <cit:CI_DateTypeCode codeList="codeListLocation#CI_DateTypeCode"
        codeListValue="creation">creation</cit:CI_DateTypeCode>
    </cit:dateType>
  </cit:CI_Date>
</mdb:dateInfo>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

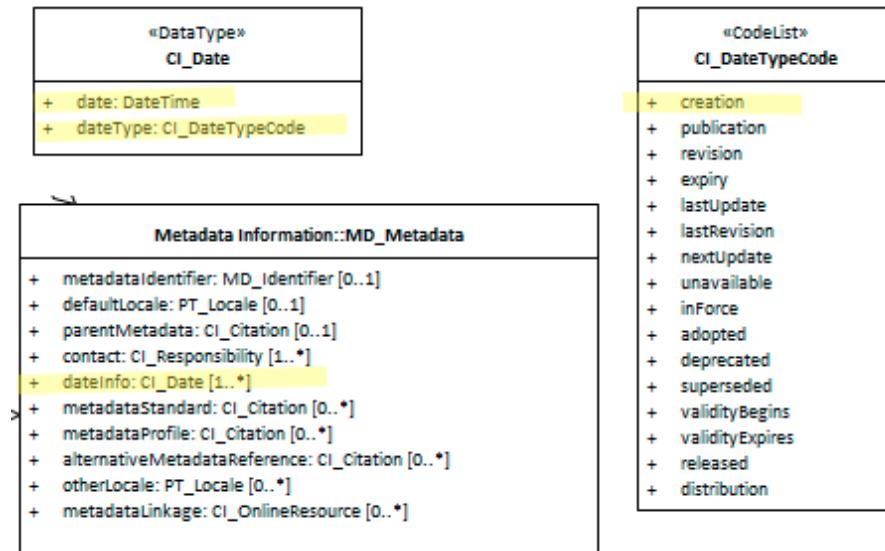


Figure 4: dateInfo

Metadata Responsible Party ★★★★☆

A contact for the person responsible for a metadata record is useful to current and future users and managers of the resource and catalogue.

Element Name	<i>contact</i>
Parent	<i>MD_Metadata</i>
Class/Type	<i>CI_Responsibility</i>
Governance	<i>Common ICSM, Agency</i>
Purpose	<i>Discovery, Data Management, Communications</i>
Audience	machine resource - ★★ general - ★★★★★ resource manager - ★★★★★ specialist - ★★★
Metadata type	<i>administrative</i>
ICSM Level of Agreement	★★★★

Definition

Name and contact information about the organisation, role and individual who is responsible for the metadata record.

ISO Obligation

- There must be one or more [1..*] *contact* packages for the cited resource in the *MD_Metadata* package provided in a metadata record for those responsible for the metadata itself. These will be of class *CI_Responsibility*.

Discussion

This element refers to the party responsible for the metadata record itself and the maintenance of this metadata record. It does not refer to the party responsible for the resource the metadata describes.

This is a compound element of type *CI_Responsibility*. At least one must be present. Recommended role value - “PointOfContact” with attached email; other roles can be added as required

ICSM Recommendations

Therefore - in order to meet ICSM good practice, in all metadata records, at least one contact should be given for the party responsible for the metadata itself. One entry should be role code “Point of Contact”. In addition, for minimal conformity, `name` (of organisation preferred), `positionName` and `electronicMailAddress` should also be populated. The use of the new `partyIdentifier` element added in the 2018 amendment to the standard is encouraged by all parties.

Recommended Sub-Elements Follow the general guidelines for CI_Responsibility.

- One value of `role` should be “Point of Contact”.

Also Consider

- **Resource Point of Contact** Contact information for the recommended party to contact about the resource
- **Resource Cited Responsible Party** contact information for the parties otherwise responsible for aspects of the resource creation and maintenance.
- **DistributionInfo** Includes Distributor contact information.

Crosswalk considerations

ISO19139

See discussion at CI_Responsibility

Dublin core / CKAN / data.gov.au

Maps to `contact`

DCAT

Maps to `dcat:contactPoint`

RIF-CS

Maps to `Related Party`

Examples

XML -

```
<mdb:MD_Metadata>
...
<mdb:contact>
  <cit:CI_Responsibility>
    <cit:role>
      <cit:CI_RoleCode
        codeList="https://schemas.isotc211.org/19115/resources/Codelist/cat
        /codelists.xml#CI_RoleCode"
        codeListValue="pointOfContact"/>
    </cit:role>
    <cit:party>
      <cit:CI_Organisation>
        <cit:name>
          <gco:CharacterString>OpenWork Ltd</gco:CharacterString>
        </cit:name>
        <cit:contactInfo>
          <cit:CI_Contact>
            <cit:address>
              <cit:CI_Address>
                <cit:electronicMailAddress>
                  <gco:CharacterString>name@email.org</gco:CharacterString>
                </cit:electronicMailAddress>
              </cit:CI_Address>
            </cit:address>
          </cit:CI_Contact>
        </cit:contactInfo>
        <cit:individual>
          <cit:CI_Individual>
            <cit:name>
              <gco:CharacterString>Metadata Bob</gco:CharacterString>
            </cit:name>
            <cit:positionName gco:nilReason="missing">
              <gco:CharacterString/>
            </cit:positionName>
          </cit:CI_Individual>
```

```
</cit:individual>
</cit:CI_Organisation>
</cit:party>
</cit:CI_Responsibility>
</mdb:contact>
....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

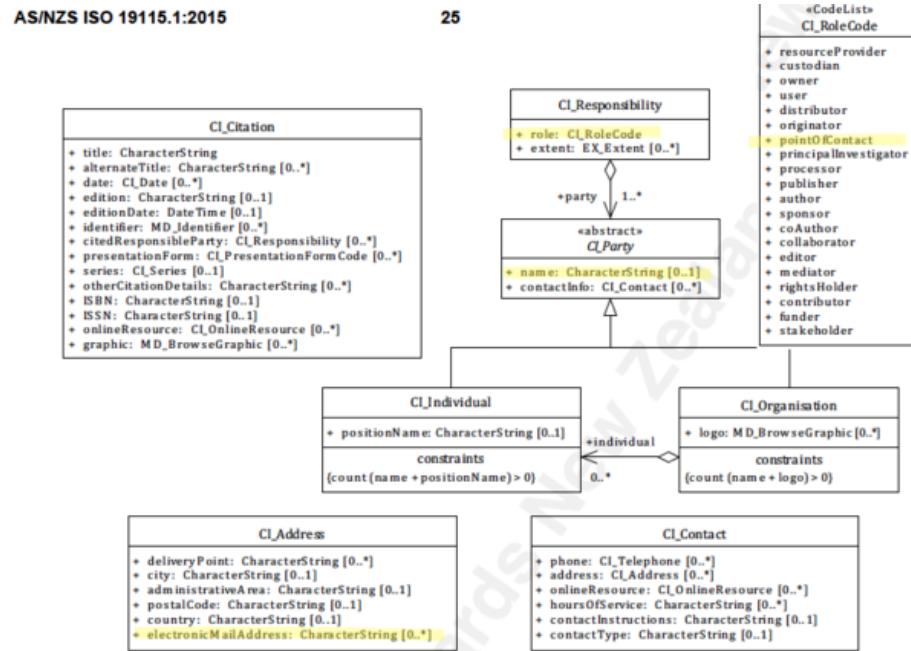


Figure 20 — Citation and responsible party information classes

Figure 5: Responsibility

Metadata Default Locale ★★★★

Metadata may be captured in different languages in different locations. For users, it is important that the language of the metadata be known. MD_Metadata.defaultLocale provide a way to record the primary language of the metadata.

Element Name	<i>defaultLocale</i>
Parent	<i>MD_Metadata</i>
Class/Type	<i>PT_Locale</i>
Governance	<i>Common ICSM</i>
Purpose	<i>Discovery, Data Management</i>
Audience	machine resource - ★★★★ general - ★★★★ resource manager - ★★★★★ specialist - ★★★★
Metadata type	<i>Discovery</i>
ICSM Level of Agreement	★★★

Definition

Language and character set used for documenting metadata.

ISO Obligation

- There can be one and only one [1..1] *defaultLocale* entries for the cited resource in the *MD_Metadata* package in the metadata record of class *PT_Locale*.

Discussion

There may be only one default locale identified in one metadata record. This element only describes the default language of the metadata. Any language elements used in the described spatial resource may have a different default language and would be captured in the element *MD_Identification.defaultLocale*. The element “otherLocale” can be used to provide information about alternatively used localised character strings.

ICSM Recommendations

Therefore - in order to provide metadata in a consistent manner for the users in our region, it is recommended that English be chosen as the value for language using the ISO 639-2, 3-alphabetic digits code “eng”.

Recommended Sub-Elements

Follow the general guidance for class - PT_Locale

Recommended Sibling Elements -

- **otherLocale** - *class - PT_Locale [0..*]* when a metadata record has information in additional languages

Also Consider

- **MD_Metadata.otherLocale** - *(codelist - PT_Locale) [0..*]* provides information about alternatively used localised character strings provides information about alternatively used localised character strings
- **MD_DataIdentification.defaultLocale** (*codelist - PT_Locale*) [0..1] contains the language and character set used within the resource, such as map labels or other text.
- **MD_DataIdentification.otherLocale** - *(codelist - PT_Locale) [0..*]* alternate localised language(s) and character set (s) used within the resource

Crosswalk considerations

ISO19139

MD_Metadata/language moved to MD_Metadata/defaultLocale:PT_Locale - Make use of the newly added Language and character set localization package for defining local language and character set.

Dublin core / CKAN / data.gov.au

Maps to language CKAN has one field for language that maps to both Metadata and Resource language fields. ISO 19115 recommends 639-2 3 letter codes. Data.gov.au recommends IETF RFC4646 2 letter codes as primary. See <https://www.loc.gov/standards/iso639-2/faq.html#6> for discussion of the differences

DCAT

Maps to dct.language

RIF-CS

No identified mapping

Examples

XML -

```
<mdb:MD_Metadata>
....
<mdb:defaultLocale>
  <lan:PT_Locale id="EN">
    <lan:language>
      <lan:LanguageCode
        codeList="http://www.loc.gov/standards/iso639-2/"
        codeListValue="eng"/>
    </lan:language>
    <lan:characterEncoding>
      <lan:MD_CharacterSetCode
        codeList="https://schemas.isotc211.org/19115/resources/Codelist/cat
        /codelists.xml#MD_CharacterSetCode" codeListValue="utf8"/>
    </lan:characterEncoding>
  </lan:PT_Locale>
</mdb:defaultLocale>
....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

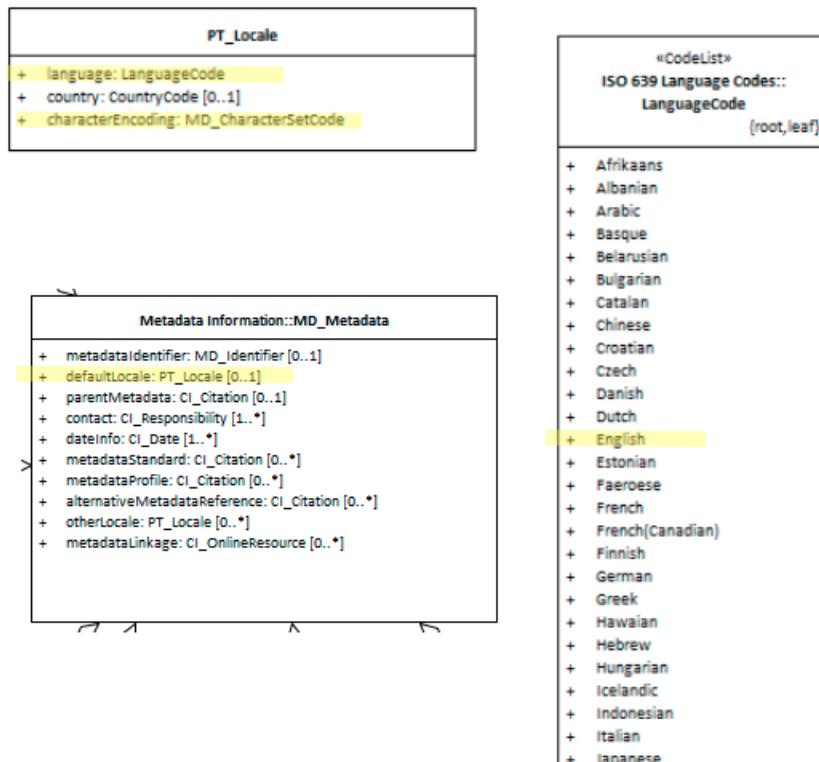


Figure 6: MDdefaultLocale

Metadata Scope ★★★★

In order to quickly find, categorise and evaluate the fitness of a resource to our needs it is useful to include in our metadata a high level description of the scope of the resource our metadata is describing.

- **Path** - *MD_Metadata.metadataScope*
- **Governance** - *Common ICSM*
- **Purpose** - *discovery*
- **Audience** -
 - machine resource - ***
 - general - ****
 - data manager - *****
 - specialist - ***
- **Metadata type** - *descriptive*
- *ICSM Level of Agreement* - ***

Definition

A resource code identifying the type of resource, e.g. service, a collection, an application which the metadata describes

ISO Obligation

- There can be zero to many [0..*] *metadataScope* entries for the cited resource in the *MD_Metadata* package of class *MD_MetadataScope* for the metadata record.

ICSM Good Practice

- At least one instance of this element should be populated in all metadata records.

Recommended Sub-Elements

From class - *MD_MetadataScope*

- **resourceScope** - (*codelist* - *MD_ScopeCode*) [1..1] Mandatory when using *MD_MetadataScope*. Default value “dataset”. see *MD_Scope* for more value options
- **name** - (*type* - *charStr*) [0..1] description of the scope. Mandatory if *resourceScope* is not equal to “dataset”

Discussion

MetadataScope contains information that describes the scope of the resource that this metadata record documents. The standard allows multiple scopes per metadata record, but we have no examples to date to illustrate this use. Current thought is that ICSM recommendation would be the one and only one entry for `metadataScope`. `MetadataScope` replaces `hierarchyLevel` in the previous version of ISO19115. This was done to avoid ambiguity in cases where multiple scope codes and names are associated with a single record. The word `hierarchy` was dropped from the names because scopes can be used in non-hierarchical structures. This element, like a number of others, are essentially keywords, albeit of a special type, and are generally treated as such when records are harvested to other non ISO 19115 based catalogues.

Outstanding Issues

Metadata for resources other than datasets: This element definition may warrant revision as we extend our work to cover metadata for services and other resources other than datasets.

ISO Comment: The values in the `MD_ScopeCode` list are intentionally general and details of their application are left to the data provider. In order to foster interoperability, the usage of the scope codes should be carefully documented in any community of practice. Clause E.5 (ISO 19115.1-2014) outlines possible applications of codes from the `MD_ScopeCode` codelist and related codes included in ISO/TS 19139 as part of the `MX_ScopeCode` list. These examples are meant to provide reasonable starting points and are certainly not exhaustive.

DCAT advice: Typically, the subject will be represented using keywords, key phrases, or classification codes. Recommended best practice is to use a controlled vocabulary.

Recommendations

Therefore - in order to provide top level categorisation of entries in a catalogue, it is recommended that `metadataScope` be populated. The default value of `MD_MetadataScope.resourceScope` should be *dataset*. When the value of `resourceScope` is other than dataset, `MD_MetadataScope.name` must be populated.

Crosswalk considerations

ISO19139 MetadataScope replaces hierarchyLevel in the previous version of ISO19115. This was done to avoid ambiguity in cases where multiple scope codes and names are associated with a single record. The word hierarchy was dropped from the names because scopes can be used in non-hierarchical structures. Changed elements include

- MD_Metadata.hierarchyLevel changed to MD_Metadata.metadataScope>MD_MetadataScope.resourceS
- MD_Metadata.hierarchyLevelName changed to MD_Metadata.metadataScope>MD_MetadataScope.name

These two elements were moved to the new MD_MetadataScope class to avoid ambiguity in cases where multiple scope codes and names are associated with a single record. The word hierarchy was dropped from the names because scopes can be used in non-hierarchical structures.

Dublin core / CKAN / data.gov.au In Dublin core the identifier element is described as holding a reference to the resource (not the metadata). However in the case of metadata records harvested by a higher level CKAN like catalogue, we view the complete metadata record as the resource. It is also standard practice that the DC Identifier field be resolvable. For a Dublin Core metadata record harvested via CSW from an ISO 19115-1 record, it is important that that record links to something that can be dereferenced. That something is held in the identifier field and should be the location URL/URI for the metadata. If the ISO 19115-1 identifier element is only a unresolvable UUID, the metadataLinkage element may be a better choice to populate the DC Identifier field.

DCAT May map to dct:identifier if metadataIdentifier is unresolvable

RIF-CS May map to Key Identifier if metadataIdentifier is unresolvable

Also Consider

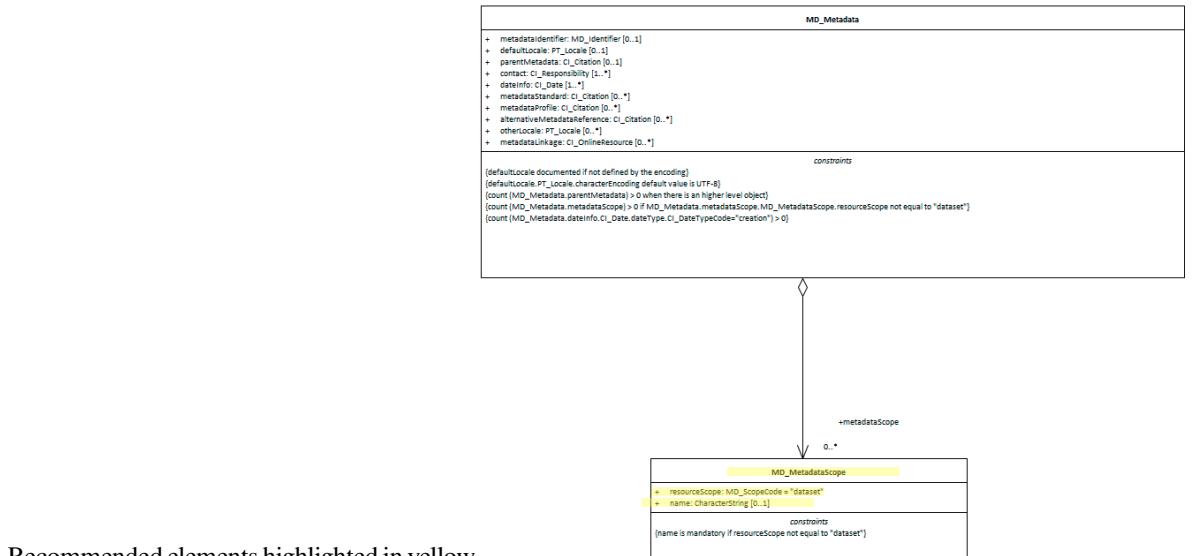
- **keywords** - words or phrases describing the resource to be indexed and searched by web crawlers.
- **Topic Category** - is the preferred element to be used to provide linkage to the metadata record.

Examples

XML -

```
<mdb:MD_Metadata>
  ...
    <mdb:metadataScope>
      <mdb:MD_MetadataScope>
        <mdb:resourceScope>
          <mcc:MD_ScopeCode
            codeList="https://schemas.isotc211.org/19115/resources/Codelist/cat
            /codelists.xml#MD_ScopeCode" codeListValue="dataset"/>
        </mdb:resourceScope>
        <mdb:name gco:nilReason="missing">
          <gco:CharacterString/>
        </mdb:name>
      </mdb:MD_MetadataScope>
    </mdb:metadataScope>
  ...
</mdb:MD_Metadata>
```

UML diagrams



Recommended elements highlighted in yellow

Metadata Legal Constraints ★★★

The presence (or absence) of legal restrictions such as copyright, on a metadata record is important to document. Potential users need to be informed of rights, restrictions and responsibilities that apply to the use of such metadata.

Element Name	<i>metadataConstraints>MD_LegalConstraints</i>
Parent	<i>MD_Metadata</i>
Class/Type	<i>MD_LegalConstraints</i>
Governance	<i>Agency</i>
Purpose	<i>Resource use</i>
Audience	machine resource - ★ general - ★★★★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>Administrative</i>
ICSM Level of Agreement	★★★

Definition

Legal restrictions on the access and use of this metadata record e.g. copyright.

ISO Obligation

- There may be zero to many [0..*] *metadataConstraints* entries for the cited resource in the *MD_Metadata* package of class *MD_LegalConstraints* applied to a metadata record,

Discussion

Information about constraints on the access and use of a resource or its metadata is of high importance to document as this information strongly impacts on the usability of the resource to the user. Constraints may be security (*MD_SecurityConstraints*), legal (*MD_LegalConstraints*) or other (*MD_Constraints*).

A restriction may be applicable to a particular aspect of the resource. In this case capture this scope in *constraintApplicationScope* using a value from *MD_Scope*

Almost all created resources (including metadata) carry some legal rights, restrictions and responsibility regarding their access and use. For instance, in most jurisdictions, copyright

is automatically granted to the creator of creative work. Legal restrictions such as licences and end-user agreements need to be documented for users and resource managers along with the identity of the holder of these rights. Each agency needs to develop consistent guidance on the use of such a statement and share a clear understanding of its meaning. This is often done by reference to an external body that manages the definitions of the legal constraints applied.

There is often general confusion over the restraints fields and to what they apply; metadata, resource, distribution, etc. This is a topic needing further discussion and clarification. In ISO 19115-1 two types of constraints are recognised metadataConstraints (restrictions on the access and use of metadata) and resourceConstraints (information about constraints which apply to the resources). Here we are only addressing constraints on Metadata.

For more discussion on the types of common legal restrictions see Resource Legal Constraints.

ICSM Recommendations

Therefore - the MDWG recommends populating this element metadataConstraints with legal constraint information to sufficient level to determine the legal rights, responsibilities and restrictions on a metadata record. It is important to capture any legal constraints that may apply to a metadata record. This should include licences, end-user agreements, etc. If the resource is public domain, this should be cited appropriately. Many jurisdictions encourage the use of open data and Creative Commons licenses. This should be encouraged through the use of copyright licenses such as CC0 or CC-BY. Provide the user links to additional information about such constraints, their use and meaning. In addition, document the holder of such rights and how to contact for more information. As legal restrictions such as copyright are tied to the creator of an intellectual resource, make sure that users have access to their information.

Recommended Sub-Elements

Follow the general guidance for MD_LegalConstraints.

Also Consider

- **Resource Legal Constraints** contains legal restrictions that apply to the resource cited by the metadata.
- **Metadata Security Constraints** A sibling to metadata legal constraints. Contains information regarding any security restriction on the metadata.

Outstanding Issues

Are legal restrictions on metadata useful? Some good legal advice on this would be very helpful! I am having some difficulty understanding the value of capturing legal restrictions on the metadata record itself. To restrict a metadata record in a catalogue largely defeats its purpose and if not open to being freely copied may be contrary to itself. What happens if a restricted metadata record is harvested? By putting a metadata record in a public catalogue are you not effectively negating any restriction on that metadata record? Boiler plate stating the openness of the metadata would be useful.

Note BC 5-7: The issue of automated harvesters gathering metadata that by legal restriction should not (a rare case I would hope) could possibly be addressed by recommending appropriate filters on the harvesters. This would need research.

Crosswalk considerations

ISO19139

See guidance provided in MD_Constraints

DCAT

Maps to dct.rights as does resource legal constraints. > Note BC 22-7: Does DCAT make a distinction?

RIF-CS

Aggregated into Description 'notes'

Examples

XML -

```
<mdb:MD_Metadata>
...
<mdb:metadataConstraints>
  <mco:MD_LegalConstraints>
    <mco:useLimitation>
      <gco:CharacterString>Public</gco:CharacterString>
```

```
</mco:useLimitation>
<mco:constraintApplicationScope>
  <mcc:MD_Scope>
    <mcc:level>
      <mcc:MD_ScopeCode
        codeList="https://schemas.isotc211.org/19115/resources/Codelist/
        cat/codelists.xml#MD_ScopeCode"
        codeListValue="metadata"/>
    </mcc:level>
  </mcc:MD_Scope>
</mco:constraintApplicationScope>
<mco:reference>
  <cit:CI_Citation>
    <cit:title>
      <gco:CharacterString>Creative Commons 4.0 International Licence
      </gco:CharacterString>
    </cit:title>
    <cit:alternateTitle>
      <gco:CharacterString>CC By</gco:CharacterString>
    </cit:alternateTitle>
    <cit:edition>
      <gco:CharacterString>4.0 International Licence</gco:CharacterString>
    </cit:edition>
    <cit:onlineResource>
      <cit:CI_OnlineResource>
        <cit:linkage>
          <gco:CharacterString>https://creativecommons.org/licenses/by/4.0/
          </gco:CharacterString>
        </cit:linkage>
        <cit:protocol gco:nilReason="missing">
          <gco:CharacterString/>
        </cit:protocol>
        <cit:name gco:nilReason="missing">
          <gco:CharacterString/>
        </cit:name>
        <cit:description gco:nilReason="missing">
          <gco:CharacterString/>
        </cit:description>
      </cit:CI_OnlineResource>
    </cit:onlineResource>
  </cit:CI_Citation>
</mco:reference>
```

```
<cit:function>
  <cit:CI_OnLineFunctionCode
    codeList="https://schemas.isotc211.org/19115/resources/
    Codelist/cat/codelists.xml#CI_OnLineFunctionCode"
    codeListValue="" />
  </cit:function>
</cit:CI_OnlineResource>
</cit:onlineResource>
<cit:graphic>
  <mcc:MD_BrowseGraphic>
    <mcc:fileName>
      <gco:CharacterString>cc_icon_white_x2.png</gco:CharacterString>
    </mcc:fileName>
    <mcc:linkage>
      <cit:CI_OnlineResource>
        <cit:linkage>
          <gco:CharacterString>https://creativecommons.org/images/
            deed/cc_icon_white_x2.png</gco:CharacterString>
        </cit:linkage>
        <cit:protocol gco:nilReason="missing">
          <gco:CharacterString/>
        </cit:protocol>
        <cit:name gco:nilReason="missing">
          <gco:CharacterString/>
        </cit:name>
        <cit:description gco:nilReason="missing">
          <gco:CharacterString/>
        </cit:description>
        <cit:function>
          <cit:CI_OnLineFunctionCode
            codeList="https://schemas.isotc211.org/19115/resources/Codelist/
            cat/codelists.xml#CI_OnLineFunctionCode"
            codeListValue="" />
        </cit:function>
      </cit:CI_OnlineResource>
    </mcc:linkage>
  </mcc:MD_BrowseGraphic>
</cit:graphic>
```

```
</cit:CI_Citation>
</mco:reference>
<mco:responsibleParty>
  <cit:CI_Responsibility>
    <cit:role>
      <cit:CI_RoleCode
        codeList="https://schemas.isotc211.org/19115/resources/Codelist/
        cat/codelists.xml#CI_RoleCode"
        codeListValue="owner"/>
    </cit:role>
    <cit:party>
      <cit:CI_Organisation>
        <cit:name>
          <gco:CharacterString>OpenWork Ltd</gco:CharacterString>
        </cit:name>
        <cit:contactInfo>
          <cit:CI_Contact>
            <cit:address>
              <cit:CI_Address>
                <cit:electronicMailAddress>
                  <gco:CharacterString>info@openwork.nz
                  </gco:CharacterString>
                </cit:electronicMailAddress>
              </cit:CI_Address>
            </cit:address>
          </cit:CI_Contact>
        </cit:contactInfo>
      </cit:CI_Organisation>
    </cit:party>
  </cit:CI_Responsibility>
</mco:responsibleParty>
<mco:useConstraints>
  <mco:MD_RestrictionCode
    codeList="https://schemas.isotc211.org/19115/resources/Codelist/cat
    /codelists.xml#MD_RestrictionCode" codeListValue="copyright"/>
</mco:useConstraints>
</mco:MD_LegalConstraints>
</mdb:metadataConstraints>
```

....
</mdb:MD_Metadata>

UML diagrams

Recommended elements highlighted in yellow

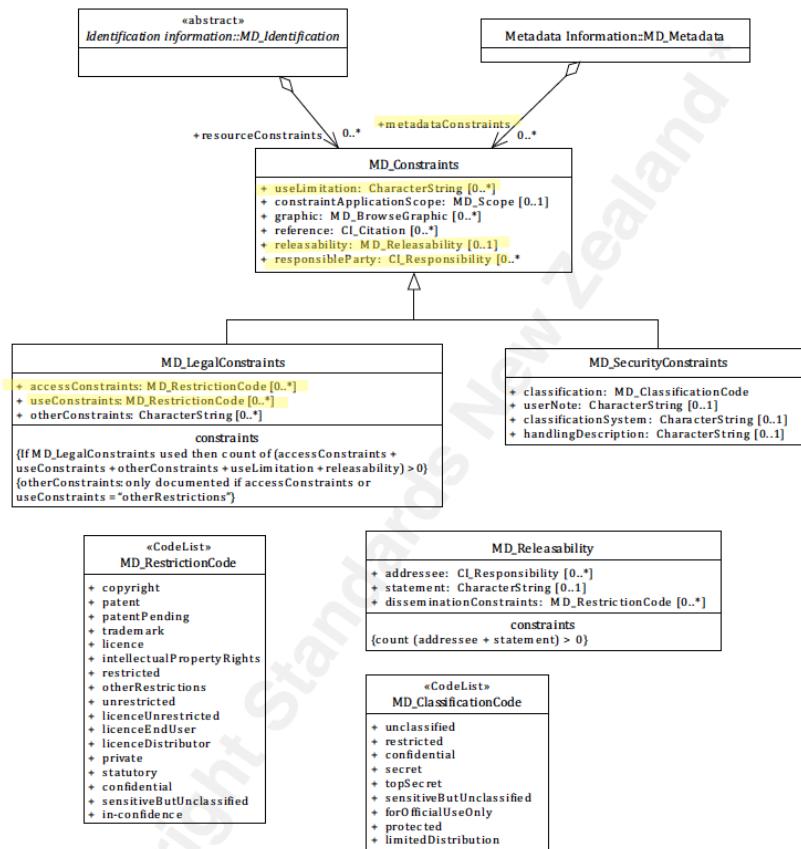


Figure 7: MetdataConstraints_Legal

Metadata Security Constraints ★★

The presence (or absence) of security restrictions on a metadata record may be important to document. Potential users need to be informed of any restrictions and responsibilities that apply to the use of such metadata.

Element Name	<i>metadataConstraints>MD_SecurityConstraints</i>
Parent	<i>MD_Metadata</i>
Class/Type	<i>MD_SecurityConstraints</i>
Governance	<i>National, Agency</i>
Purpose	<i>Resource use</i>
Audience	machine resource - ★ general - ★★★★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>Administrative</i>
ICSM Level of Agreement	★★★

Definition

Handling restrictions imposed on this metadata record for national security or similar concerns e.g. commercial sensitivity, privacy considerations.

ISO Obligation

- There may be zero to many [0..*] *metadataConstraints* entries for the cited resource in the *MD_Metadata* package of class *MD_SecurityConstraints* applied to a metadata record,

Discussion

This field is about recording any security restrictions on the metadata record itself - not the resource that it documents. Security constraints on metadata records are uncommon. Security is more commonly an issue with the cited resource. Resource security should be captured in Resource Security Constraints. For some agencies, it may be important to capture under security constraints that there are no constraints. Reference for metadata security would include the name (primary and alternate) and version by which this security restriction on the access and use of this metadata record is known.

ICSM Recommendations

Therefore - when needed, it is important to capture any security constraints that apply to a metadata record. Provide the user links to additional information about such constraints, their use and meaning. Include the name (primary and alternate) and version by which this security restriction on the access and use of this metadata record is known. For example, when using the Australian Protective Security Policy Framework, provide access to materials from this linked website to explain this framework. (<https://www.protectivesecurity.gov.au/Pages/default.aspx>). In addition, document the holder of such rights and how to contact for more information. If your agency has requirements for stating that the metadata has no security constraints, do so in this element.

Recommended Sub-Elements

Follow the general guidance for MD_SecurityConstraints.

Also Consider

- **Resource Security Constraints** contains security restriction information that applies to the resource cited by the metadata.
- **Metadata Legal Constraints** A sibling to metadata security constraints. Contains information regarding any legal restriction on the metadata.
- **Protective Security Policy Framework** provides information about the new security policy framework for Australia.

Outstanding Issues

How common are security constraints on metadata? A strong use case need be cited for putting security restraints on metadata to inform readers of this document when it is important.

Other security frameworks support There will be cases where other security frameworks and classification systems need to be cited, such as for New Zealand Defence. Instructions for how to include these are needed. Should such guidance be prescriptive or general?

Crosswalk considerations

RIF-CS

Aggregated into Description 'notes'

Examples

XML - Geoscience Australia

Includes reference to the constraint document - Australia Protective Security Policy Framework

```
<mdb:metadataConstraints
  xmlns:gmd="http://standards.iso.org/iso/19115/-3/gmd/1.0"
  xmlns:geonet="http://www.fao.org/geonetwork">
  <mco:MD_SecurityConstraints>
    <mco:reference>
      <cit:CI_Citation>
        <cit:title>
          <gco:CharacterString>
            The Protective Security Policy Framework
          </gco:CharacterString>
        </cit:title>
        <cit:editionDate>
          <gco:DateTime>2018-11-01T00:00:00</gco:DateTime>
        </cit:editionDate>
        <cit:onlineResource>
          <cit:CI_OnlineResource>
            <cit:linkage>
              <gco:CharacterString>
                https://www.protectivesecurity.gov.au/Pages/default.aspx
              </gco:CharacterString>
            </cit:linkage>
            <cit:protocol>
              <gco:CharacterString
                xsi:type="gco:CodeType"
                codeSpace="http://pid.geoscience.gov.au/def/schema/ga
                /ISO19115-3-2016/codelist
                /ga_profile_codelists.xml#gapCI_ProtocolTypeCode">
                WWW:LINK-1.0-http--link
              </gco:CharacterString>
            </cit:protocol>
          </cit:CI_OnlineResource>
        </cit:onlineResource>
      </cit:CI_Citation>
```

```
</mco:reference>
<mco:classification>
  <mco:MD_ClassificationCode
    codeList="codeListLocation#MD_ClassificationCode"
    codeListValue="unclassified"/>
</mco:classification>
</mco:MD_SecurityConstraints>
</mdb:metadataConstraints>
```

UML diagrams

Recommended elements highlighted in yellow

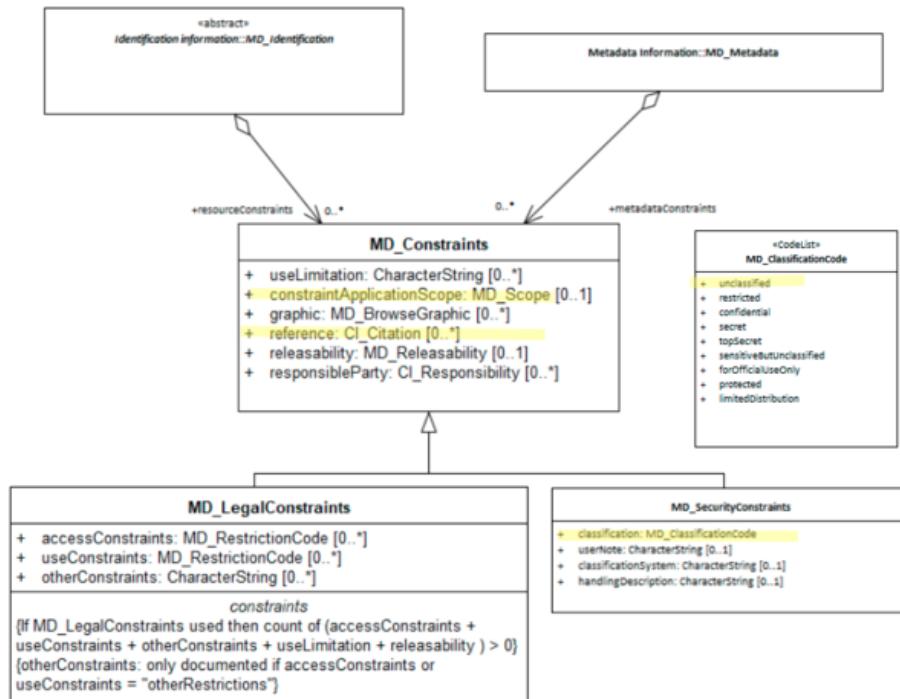


Figure 8: MetdataSecurityConstraints

Parent Metadata ★★

When a metadata record inherits information from a parent record, it is important to capture sufficient information so that this parent record can be found an the hierarchy preserved.

- **Path** - *MD_Metadata.parentMetadata*
- **Governance** - *Agency, Domain*
- **Purpose** - *discovery, data management*
- **Audience** -
 - machine resource - ***
 - general - ***
 - data manager - *****
 - specialist - ****
- **Metadata type** - *discovery, administrative*
- *ICSM Level of Agreement* - **

Definition

Citation to a parent metadata record, to enable construction of hierarchical relations.

ISO Obligation

- There may be zero or one [0..1] *MD_Metadata.parentMetadata* entries for the cited resource in the *MD_Metadata* package of class *CI_Citation* in a metadata record.

ICSM Good Practice

- The element *parentMetadata* may be populated to sufficient level to allow discovery if the metadata has a child relationship to another metadata record. Before doing so consider if other elements such as 'AssociatedResource' which has more flexibility, is a more appropriate way to capture this information.

Recommended Sub-Elements Follow the general guidance for *CI_Citation*

Discussion

There currently exists very little guidance for what qualifies as a parent metadata and when this element should be used. This could work well for feature level metadata where the parent is a dataset and the child a feature. Or a map series where the series is the parent

and the tiles the children. Does the parent child hierarchical relation exist between the resources or the metadata records? (One metadata record could inherit attributes from a parent without such a relation between the resources being documented.) The cardinality rules only allow one parent, but it is conceivable that a metadata record could inherit parts from multiple parents.

Outstanding Issues

What qualifies a metadata record as a parent? If we include this as a recommended element, the MDWG should provide some guidance as to what qualifies as a parent metadata record. This is a CI_Citation element so it has all the capabilities of that package. We need to decide which fields are necessary given that a requirement should be a link to the parent metadata record.

Recommendations

TBD - insufficient clarity exists as to what qualifies a metadata record as “parent”. Use cases need to be defined to illustrate yet to be determined good practice for parentMetadata.

Crosswalk considerations

RIF-CS Maps to RelatedInfo/relation='partOf'

Also Consider

- **AssociatedResource** - Used when the resource is part of a larger whole
- **additionalDocumentation** - other documentation associated with the resource, e.g. related articles, publications, user guides, data dictionaries.
- **resourceLineage** - Information about the provenance, source(s), and/or the production process(es) applied to the resource.
- **browseGraphic** - associates to a large number of packages to provide linkage to associated image files, such as business or product icons and logos
- **supplementalInformation** - a free text field that is defined as “any other descriptive information about the resource”.

Examples

Example Current Use

XML -

```
<mdb:MD_Metadata>
  ...
  <mdb:parentMetadata>
    <cit:CI_Citation>
      <cit:title>
        <gco:CharacterString>Geographical Data Series</gco:CharacterString>
      </cit:title>
      <cit:identifier>
        <mcc:MD_Identifier>
          <mcc:code>
            <gco:CharacterString>8668cb6b-b594-4394-8e2c-f554bace859f
            </gco:CharacterString>
          </mcc:code>
        </mcc:MD_Identifier>
      </cit:identifier>
      <cit:onlineResource>
        <cit:CI_OnlineResource>
          <cit:linkage>
            <gco:CharacterString>
              https://geodata.nz/geonetwork/srv/eng/catalog.search#
              /metadata/8668cb6b-b594-4394-8e2c-f554bace859f
            </gco:CharacterString>
          </cit:linkage>
          <cit:protocol gco:nilReason="missing">
            <gco:CharacterString/>
          </cit:protocol>
          <cit:name gco:nilReason="missing">
            <gco:CharacterString/>
          </cit:name>
          <cit:description gco:nilReason="missing">
            <gco:CharacterString/>
          </cit:description>
          <cit:function>
            <cit:CI_OnLineFunctionCode>
```

```
    codeList="https://schemas.isotc211.org/19115/resources
    /Codelist/cat/codelists.xml#CI_OnLineFunctionCode"
    codeListValue="""/>
  </cit:function>
</cit:CI_OnlineResource>
</cit:onlineResource>
</cit:CI_Citation>
</mdb:parentMetadata>
....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

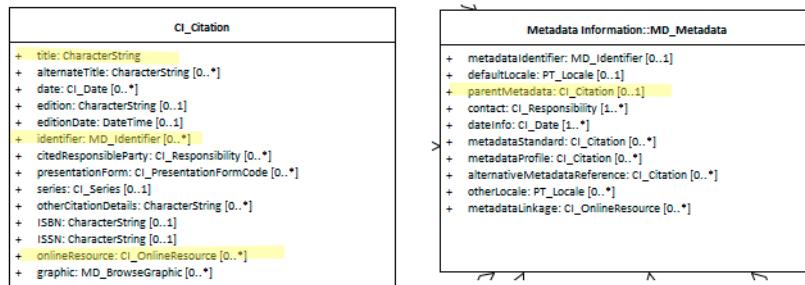


Figure 9: ParentMetadata

Class - MD_DataIdentification

When capturing information on a spatial resource, it is important to identify and categorise information as pertaining to the data resource and to distinguish these information from that which applies to the metadata itself or service resources. *MD_DataIdentification* extends the abstract class *MD_Identification* to document a spatial data resource.

- **Governance - ISO**
- **Metadata Type - structural**
- **ICSM Level of Agreement - ****

Definition -

basic information required to uniquely identify a data resource.

ISO Associations

MD_Identification is an abstract class that is parent to

- **MD_DataIdentification** It is a child of
- **MD_Metadata.identificationInfo**

Atributes and packages

the following provides additional guidance to *MD_Identification*.

MDWG Recomended - In addition to all the attributes of *MD_Identification*, the additional recommended elements apply -

- **Locale - (class - *PT_Locale*) [0..1]**
- **Extents - (class - *EX_Extent*) [0..*]** High-level thematic classifications to assist in the grouping and searching of data. Required when the hierarchyLevelName scopeCode is ‘dataset’.

Additional optional attributes

- **otherLocale - (class - *PT_Locale*) [0..*]**
- **environmentDescription - (type - *charStr*) [0..1]** description of the resource in the producer’s processing environment, including items such as the software, the computer operating system, file name, and the dataset size
- **supplementalInformation - (type - *charStr*) [0..1]** any other descriptive information about the resource

Discussion

Identification information about a resource is of high importance to document as this information strongly impacts on the ability of a user to assess the resource fitness to use. MD_DataIdentification instantiates the abstract class MD_Identification for use with data resources.

Recommendations

Related Classes

- **MD_Identification** the abstract parent class to MD_DataIdentification
- See guidances for the composite elements.

UML diagrams

Recommended elements highlighted in yellow

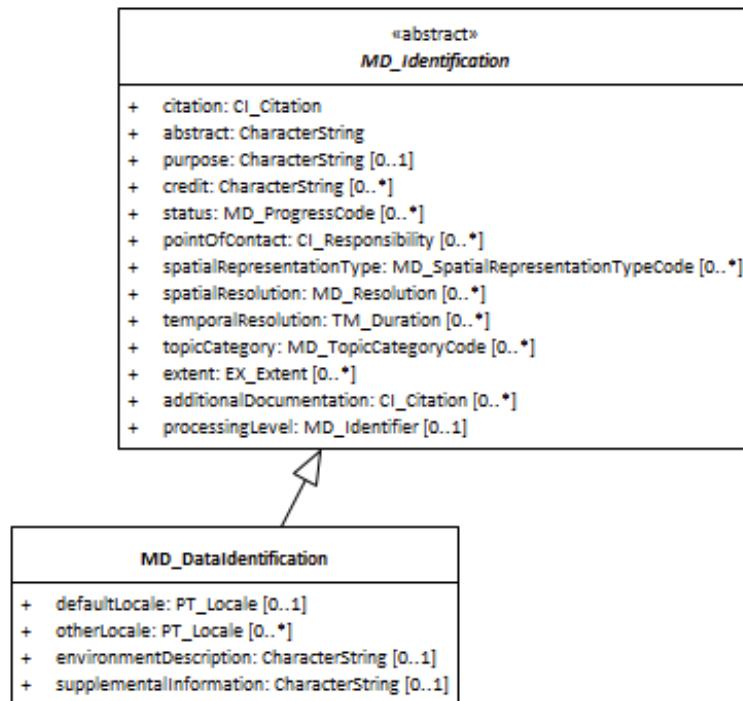


Figure 10: MD_DataIdentification

Resource Default Locale ★★★★☆

Most spatial resources contain some textual information written in particular languages. For users it is important that the language of the resource be shared. Default Locale provide a way to record the primary language of the metadata.

Path - *MD_Metadata.identificationInfo>MD_DataIdentification.defaultLocale* - **Governance** - Common ICSM - **Purpose** - discovery, data management - **Audience** - machine resource - ★★ - general - ★★★★ - data manager - ★★★ - specialist - ★★★ - **Metadata type** - descriptive - ICSM Level of Agreement - ★★★

Definition

Designation of the language used within the cited resource.

ISO Obligation

- There may be only one [0..1] *defaultLocale* entries for the resource in the metadata *MD_DataIdentification* package. This must be of class *PT_Locale*.

ICSM Good Practice

- The default language in our region is English and it is recommended to be used as the language in metadata records using the 3 letter code “eng”.

Recommended Sub-Elements

- Follow the general guidance for class - *PT_Locale*

Recommended Sibling Elements

- **otherLocale** - *class* - *PT_Locale* [0..*] when a resource has information in additional languages
 - Follow the general guidance for class - *PT_Locale*

Discussion

There may be only one default locale for a resource identified in a metadata record. The element “otherLocale” can be used to provide information about alternatively used localised character strings

Recommendations

Therefore - in order to meet ICSM good practice, in metadata for data resources, one default language of the resource should be captured if the resource contains language elements, and its character set encoding in `MD_DataIdentification.defaultLocale`. For the users in our region, English should be the default value for language using the ISO 639-2, 3-alphabetic digits code “eng” and the character encoding should be *UTF8*. If the resource contains multiple languages, capture the dominant one in `defaultLocale` and populate the sibling element `otherLocale` with information describing these additional languages in the same manner.

Crosswalk considerations

ISO19139 `MD_DataIdentification/language` and `MD_DataIdentification/characterSet` moved to `MD_DataIdentification/defaultLocale:PT_Locale` - Make use of the newly added Language and character set localization package for defining local language and character set.

Dublin core / CKAN / data.gov.au Maps to language

CKAN has one field for language that maps to both Metadata and Resource language fields. ISO 19115 recommends 639-2 3 letter codes. Data.gov.au recommends IETF RFC4646 2 letter codes as primary. See <https://www.loc.gov/standards/iso639-2/faq.html#6> for discussion of the differences

DCAT Maps to `dct.language`.

Note BC 19-7: It is unclear if DCAT makes a distinction between the meta-data language and the resource language

RIF-CS No identified mapping

Also Consider

- **MD_DataIdentification.otherLocale** - (*codelist - PT_Locale*) [0..*] alternate localised language(s) and character set (s) used within the resource
- **Metadata Default Locale** (*codelist - PT_Locale*) [0..1] contains the language and character set used in the metadata
- **MD_Metadata.otherLocale** - (*codelist - PT_Locale*) [0..*] provides information about alternatively used localised character strings provides information about alternatively used localised character strings

Examples

XML -

```
<mdb:MD_Metadata>
...
    <mdb:identificationInfo>
        <mri:MD_DataIdentification>
            ...
                <mri:defaultLocale>
                    <lan:PT_Locale>
                        <lan:language>
                            <lan:LanguageCode
                                codeList="http://www.loc.gov/standards/iso639-2/"
                                codeListValue="eng"/>
                        </lan:language>
                        <lan:characterEncoding>
                            <lan:MD_CharacterSetCode
                                codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#MD_CharacterSetCode"
                                codeListValue="utf8"/>
                        </lan:characterEncoding>
                    </lan:PT_Locale>
                </mri:defaultLocale>
            ...
        </mri:MD_DataIdentification>
    </mdb:identificationInfo>
...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

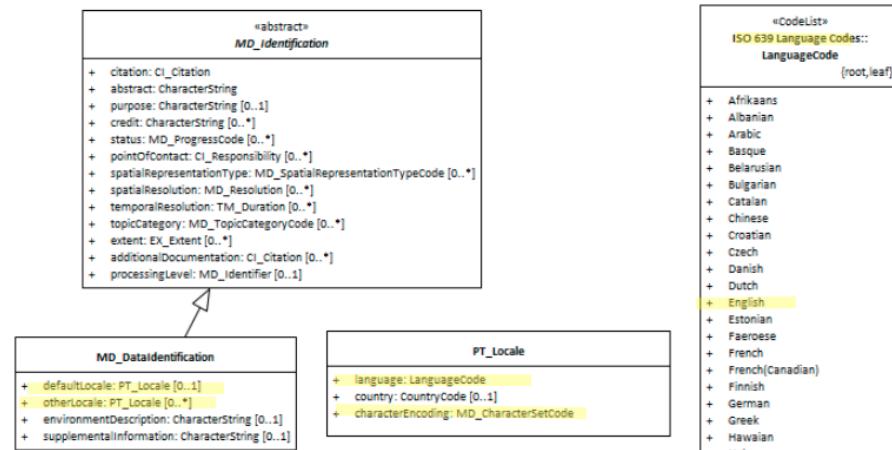


Figure 11: resourceDefaultLocale

Abstract ★★★★☆

In order to quickly find, categorise and evaluate the fitness of a resource to our needs it is useful to include in our metadata a human-readable narrative description of the resource. This is often the most important tool for users for first-pass evaluation.

Element Name	<i>abstract</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>character string</i>
Governance	<i>Common ICSM, Agency, Domain</i>
Purpose	<i>Discovery, Evaluation</i>
Audience	machine resource - ★★ general - ★★★★★ resource manager - ★★★★ specialist - ★★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★

Definition

A brief narrative summary of the cited resource.

ISO Obligation

- There must be one and only one [1..1] *abstract* entries for the spatial resource in the metadata *MD_Identification* package of type *character String* in a metadata record.

Discussion

Abstract is a mandatory element. It contains a human-readable description of the resource that gives a user a first understanding of the resource. Typically, an abstract is several sentences long. The resource may be data or service, *MD_DataIdentification* or *SV_ServiceIdentification*.

Consideration needs to be given to the audience and what they need to know about the resource to decide the utility for them.

ICSM Recommendations

Therefore - an abstract should be written in a style that your human audience will easily comprehend. As this is a top-level field for harvested records to general-purpose catalogues, common language should be used that most people could understand. If there is a need for more technical language to describe the resource, this should be included at the end of the abstract.

The contents of an abstract should address the 5Ws What is it; Who generated it; When was it generated; Why was it generated; and Where is the place that it deals with (Time and Location). But in a general way with the most common language possible while still containing sufficient information.

Also Consider

- **Purpose** - provides a brief summary of the intentions with which the resource was developed. Some overlap of usage with **abstract** may exist. The MDWG should provide some guidance as to what belongs in **abstract** and what belongs in **purpose**
- **MD_DataIdentification.supplimentalInformation** - provides a description of the resource in the producer's processing environment, including items such as the software, the computer operating system, file name, and the dataset size.

Outstanding Issues

Dublin core / CKAN / data.gov.au Also defines this element as additional information describing or analysing the data. But while this can be static it also can be an editable wiki which anyone can contribute to instantly or via admin moderation. This latter approach is currently difficult to support in ISO 19115-1.

DCAT This element may also contain a table of contents, a graphical representation, or a free-text account of the resource.

element - Purpose Some guidance needs to be developed to guide users as to what belongs in **abstract** and what belongs in **purpose**.

Crosswalk considerations

Dublin core / CKAN / data.gov.au

Maps to **description**

DCAT

Maps to `dct.description`

RIF-CS

Maps to `Description['full']`

Examples**ABARES**

TOPO_2.5M is a national seamless data product aimed at regional or national applications. The data are suitable for location or distribution mapping at a small scale and can be readily combined with other data products. TOPO_2.5M is an intermediate product between AUSLIGs TOPO_10M (data at 1:10 million scale) and TOPO_250K (data at 1:250 000 scale). It has been specifically designed for map production and does not carry the additional attributes which support GIS analysis. TOPO_2.5M is topologically structured including closed polygons and properly intersecting lines and is comprised of the following themes Built-up Areas, Framework, Localities, Roads, Railways, Streams, Waterbodies and Reefs. The user guide can be accessed at a link provided below. Link to licence and licence conditions [//Baldric/publicmetadata/data/glompr_gm_001/glompr_gm00111a00pdf](http://Baldric/publicmetadata/data/glompr_gm_001/glompr_gm00111a00pdf)/licence_template.pdf. The licence allows the use of the data for any maps (including Internet applications) but the data itself must not be supplied to any third party. All products must include an appropriate copyright statement.

GA

Publicly available bathymetry and geophysical data have been used to map geomorphic features of the Antarctic continental margin and adjoining ocean basins at scales of 1:1-2 million. The key bathymetry datasets used were GEBCO08 andETOPO2 satellite bathymetry (Smith & Sandwell 1997), in addition to seismic lines in key areas. Twenty-seven geomorphic units were identified based on interpretation of the seafloor bathymetry with polygons digitised by hand in ArcGIS. Seafloor features were classified largely based on the International Hydrographic Organisation (2001) classification of undersea features and expanded to include additional features, including those likely to have specific substrate types and influence on oceanography. This approach improves the technique as a predictor of physical conditions that

may influence seafloor communities. The geomorphic map has been used for developing a benthic bioregionalisation and for developing a representative system of Marine Protected Areas for East Antarctica. Slight modifications have been made since the original publication in O'Brien et al. 2009 and Post et al. 2014. These include: - updating of some feature names; - combining "wave affected banks" with "shelf banks" - Combining "coastal terrane" with "island coastal terrane" as "Coastal/Shelf Terrane" - replacing canyon vectors with polygons by using a buffer around the vectors Further details of the original mapping can be found in: O'Brien, P.E., Post, A.L., Romeyn, R., 2009. Antarctic-wide geomorphology as an aid to habitat mapping and locating Vulnerable Marine Ecosystems, Commission for the Conservation of Antarctic Marine Living Resources Vulnerable Marine Ecosystems Workshop, Paper WS-VME-09/10. CCAMLR, La Jolla, California, USA. Post, A.L., Meijers, A.J.S., Fraser, A.D., Meiners, K.M., Ayers, J., Bindoff, N.L., Griffiths, H.J., Van de Putte, A.P., O'Brien, P.E., Swadling, K.M., Raymond, B., 2014. Chapter 14. Environmental Setting, In: De Broyer, C., Koubbi, P., Griffiths, H.J., Raymond, B., d'Udekem d'Acoz, C., et al. (Eds.), Biogeographic Atlas of the Southern Ocean. Scientific Committee on Antarctic Research, Cambridge, pp. 46-64.

AAD

This dataset is a collection of aerial images taken from a camera mounted in the fuselage of the CASA-212 400 aircraft used to survey for pygmy blue whales. Line transect data from that survey are also available (but see Gill, P.C., Pirzl, R., Morrice, M.G. and Lawton, K. (2015). "Cetacean diversity of the continental shelf and slope off southern Australia." The Journal of Wildlife Management 79(4): 672-681 for more details). The digital images were taken with a Nikon D200 camera, using a 35mm lens. The survey altitude was approximately 1500 ft. Images have full EXIF data attached. Image footprints are approximately 204 m along-track by 306 m across track, with some image overlap. Aerial images; downward facing images along track from a line transect survey. There are ~41K jpeg images. Images taken with Nikon D200 camera, with 35 mm lens. Aerial survey altitude was approximately 1500 ft. Each image has a water-surface footprint of 204 m along-track by 306 m across track; there is some image overlap along-track. The EXIF data for each image is populated. Images taken in January 2012 along the Bonney Upwelling, along the south-east coast of Australia, an area known to be a summer (Nov-May) feeding ground for pygmy blue

whales; the surveys focussed on the area bounded by 138.0-145.0°E and 36.6-40.3°S.

TERN

The Cumberland Plain flux station is located in a dry sclerophyll forest in the Hawkesbury Valley in central New South Wales. Operation commenced for the station in September 2012 and is managed by the Hawkesbury Institute for the Environment at Western Sydney University. The Cumberland Plain Woodland is now an endangered ecological community that encompasses distinct groupings of plants growing on clayey soils. The canopy is dominated by Eucalyptus moluccana and Eucalyptus fibrosa, which host an expanding population of mistletoe. Average canopy height is 23m, the elevation of the site is 20m and mean annual precipitation is 800mm. Fluxes of water vapour, carbon dioxide and heat are quantified with the open-path eddy flux technique from a 30 m tall mast. Additional measurements above the canopy include temperature, humidity, wind speed and direction, rainfall, incoming and reflected shortwave and longwave radiation and net, diffuse and direct radiation and the photochemical reflectance index. In addition, profiles of humidity and CO₂ are measured at eight levels within the canopy, as well as measurements of soil moisture content, soil heat fluxes, soil temperature, and 10-hr fuel moisture dynamics. In addition, regular monitoring of understory species abundance, mistletoe infection, leaf area index and litterfall are also performed.

data.gov.au

The Department of Human Services Service Centre locator contains information updated weekly, a search function and maps.

XML

```
<mdb:MD_Metadata>
...
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    ...
    <mri:abstract>
      <gco:CharacterString>
        This is an example dataset to demonstrate the use of ISO 19115-3.
    </gco:CharacterString>
  </mri:MD_DataIdentification>
</mdb:identificationInfo>
```

Below is a sample abstract reprinted from the document AS/NZS ISO 19115.1:2015. Location of all current mineral Exploration Licences issued under the Mining Act, 1971. Exploration Licences provide exclusive tenure rights to explore for mineral resources for up to a maximum of 5 years. Comment is sought on applications for Exploration Licences from numerous sources before granting. Exploration programs are subject to strict environmental and heritage conditions. Exploitation of identified resources must be made under separate mineral production leases.

```
</gco:CharacterString>
</mri:abstract>
....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

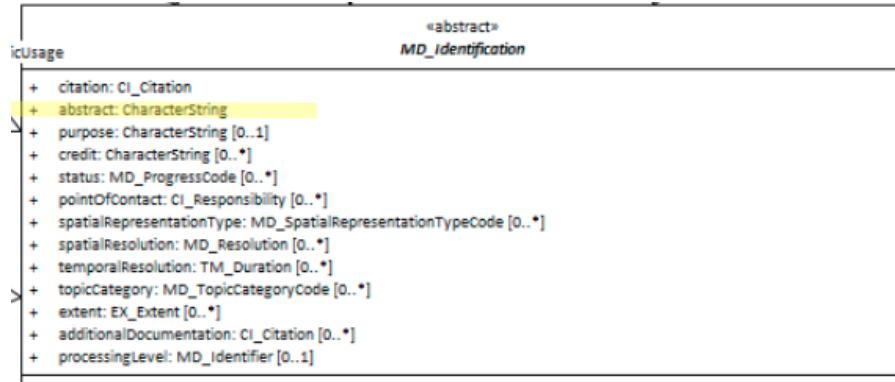


Figure 12: abstract

Purpose ★★★★☆

One of the useful ways to evaluate the fitness of a resource to our needs is to examine the purpose for which the resource was created and how well it fulfilled its intended purpose. The MD_DataIdentification.purpose element is designed to hold such information.**

Element Name	<i>purpose</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>characterString</i>
Governance	<i>Domain, Agency</i>
Purpose	<i>Discovery, Evaluation, Use</i>
Audience	- machine resource - * general - * * * * * resource manager - * * * * * specialist - * * * * *
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	* * * *

Definition

A brief summary of the intentions with which the resource was developed

ISO Obligation

- There may be no more than one [0..1] *purpose* entries for the resource in the *MD_DataIdentification* package of type *character string* in a metadata record.

Discussion

A purpose statement provides a brief description of the reason a resource was created. Knowing this can give a good guide to the potential usefulness of a resource to other potential users. The resource may be a data or service, *MD_DataIdentification* or *SV_ServiceIdentification*.

Consideration needs to be given to the audience and what they need to know about the resource to decide the utility for them.

A purpose statement is generally shorter than an abstract and should be written in a style that your human audience will easily comprehend. The purpose should capture the “why” a dataset was created and to what end it is used. Common language should be used that

most people could understand. If there is a need for more technical language to describe the resource, this should be included at the end of the purpose statement.

ICSM Recommendations

Therefore - keep the purpose statement generally shorter than your abstract and write in a style that your human audience will easily comprehend. Capture the “why” a resource was created and to what end it is used. Use common language that most people could understand. If there is a need for more technical language to describe the resource, this should be included at the end of the purpose statement.

Populate the *purpose* element and provide enough narrative to give the reader a good understanding of the intent for which the resource was created. Use common language as far as possible as the readers may come from a different domain. The contents of a purpose should include as much information as would be useful to indicate the alignment of the original purpose and potential users’ requirements.

Also Consider

- **Abstract** provides a somewhat more lengthy verbal summary description of the resource. Some overlap of usage with **purpose** may exist. The MDWG should provide some guidance as to what belongs in **abstract** and what belongs in **purpose**.
- **MD_DataIdentification.supplementalInformation** - provides a description of the resource in the producer’s processing environment, including items such as the software, the computer operating system, file name, and the dataset size.
- **Resource Lineage** - may contain information related to purpose.

Outstanding Issues

DCAT The description may include but is not limited to: an abstract, a table of contents, a graphical representation, or a free-text account of the resource.

element - purpose vs abstract Some guidance needs to be developed to guide users as to what belongs in **abstract** and what belongs in **purpose**.

Crosswalk considerations

Dublin core / CKAN / data.gov.au

Maps to *description*?

DCAT

Maps to *dct.description* (as does *abstract*)

RIF-CS

Maps to *dct.description*

Examples

ABARES

The Australian Surveying and Land Information Group (AUSLIG) has the responsibility for providing topographic mapping information at a national scale. AUSLIG has undertaken the Australian Geographic Database program to enhance this topographic map information so it is suitable for use in Geographic Information Systems. The data resulting from this program are known as GEODATA. Each GEODATA product incorporates characteristics such as customer focus, national consistency, assured quality and comprehensive documentation.

TERN

The purpose of the Cumberland Plain flux station is: to quantify the exchanges of carbon dioxide, water vapour and energy in a dry sclerophyll forest. to characterize the functional behaviour and sensitivity of the different components contributing to the ecosystem carbon balance from sub-daily to multi-annual temporal scales and under climatic variability. to identify the role of hydraulic limitations on constraining ecosystem productivity. to quantify the impact of mistletoe on plant physiological processes and whole ecosystem water vapour and carbon dioxide exchange. to validate remote sensing estimates of different radiation components to obtain accurate regional predictions of fuel moisture and to understand how wood traits and microbial diversity interact to determine rates of wood decay.

XML -

```
<mdb:MD_Metadata>
...
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
```

```
....  
<mri:purpose>  
  <gco:CharacterString>  
    This is a sample purpose statement reprinted from the document  
    AS/NZS ISO 19115.1:2015:  
    This dataset was developed to record information necessary for the  
    administration of the Mining Act.  
  </gco:CharacterString>  
</mri:purpose>  
....  
</mri:MD_DataIdentification>  
</mdb:identificationInfo>  
....  
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

Usage	«abstract» <i>MD_Identification</i>
+ citation: CI_Citation + abstract: CharacterString + purpose: CharacterString [0..1] Yellow Box + credit: CharacterString [0..*] + status: MD_ProgressCode [0..*] + pointOfContact: CI_Responsibility [0..*] + spatialRepresentationType: MD_SpatialRepresentationTypeCode [0..*] + spatialResolution: MD_Resolution [0..*] + temporalResolution: TM_Duration [0..*] + topicCategory: MD_TopicCategoryCode [0..*] + extent: EX_Extent [0..*] + additionalDocumentation: CI_Citation [0..*] + processingLevel: MD_Identifier [0..1]	

Figure 13: purpose

Resource Status ★★★★

In order to quickly find, categorise and evaluate the fitness of a resource to our needs it is useful to include in our metadata a high-level description of the progress status of the resource our metadata describes.

Element Name	<i>status</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>MD_ProgressCode</i>
Governance	<i>Common ICSM</i>
Purpose	<i>Discovery, Management</i>
Audience	machine resource - ★★★ general - ★★★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>Descriptive, Administrative</i>
ICSM Level of Agreement	★★★

Definition

The status of the resource populated from a domain of values

ISO Obligation

- There can be zero to many [0..*] *status* entries for the cited resource in the *MD_DataIdentification* package selected from codelist *MD_ProgressCode*.

Discussion

According to the ISO model, a resource may exist in many states. Not all values are mutually exclusive. This element is optional and has only been lightly discussed. As it has been determined a valuable element we may want to increase these recommendations.

The resource may be data or service, *MD_DataIdentification* or *SV_ServiceIdentification*.
Recommendations

Therefore - The status of a resource is valuable information to those who may want to use it. It is recommended that the status field be populated and regularly updated as needed. At least one instance of this element should be populated in all metadata records.

As the harvesting of metadata to more general-purpose catalogues is desirable, some thought needs to be given to crosswalk with boolean values (CKAN) or those that only accept one occurrence of this element. Values for this element must come from the *MD_ProgressCode* codelist. ### Possible Values for **status** (*codelist - MD_ProgressCode*)

- *completed* - has been completed
- *historicalArchive* - stored in an offline storage facility
- *obsolete* - no longer relevant
- *onGoing* - continually being updated
- *planned* - fixed date has been established upon or by which the resource will be created or updated
- *required* - needs to be generated or updated
- *underDevelopment* - currently in the process of being created
- *final* - progress concluded and no changes will be accepted
- *pending* - committed to, but not yet addressed
- *retired* - item is no longer recommended for use. It has not been superseded by another item
- *superseded* - replaced by new
- *tentative* - provisional changes likely before resource becomes final or complete
- *valid* - acceptable under specific conditions
- *accepted* - agreed to by the sponsor
- *notAccepted* - rejected by sponsor
- *withdrawn* - removed from consideration
- *proposed* - suggested that development needs to be undertaken
- *deprecated* - resource superseded and will become obsolete, use only for historical purposes

Outstanding Issues

Abstract Class - MD_Identification

SpatialRepresentationType is one of many elements belonging to the abstract class MD_Identification. MD_Identification is only instantiated as MD_DataIdentification or SV_ServiceIdentification. At this stage we are not addressing service metadata, we are assuming all metadata is for data resources. At a later time, when we include service metadata guidance, a separate discussion of MD_Identifier should be made.

CKAN It has been indicated that CKAN records in its related field boolean values for this item. Boolean does not map well to ISO domain values. Some options in the MD_ProgressCode are noncompatible some are compatible.

Clarification and validation would be useful.

Crosswalk considerations

Dublin core / CKAN / data.gov.au

Maps to `data_status`

Examples

XML -

```
<mdb:MD_Metadata>
  ...
    <mdb:identificationInfo>
      <mri:MD_DataIdentification>
        ...
          <mri:status>
            <mri:status>
              <mcc:MD_ProgressCode
                codeList="https://schemas.isotc211.org/19115/resources/Codelist/cat
                /codelists.xml#MD_ProgressCode"
                codeListValue="underDevelopment"/>
            </mri:status>
            <mri:status>
              <mcc:MD_ProgressCode
                codeList="https://schemas.isotc211.org/19115/resources/Codelist/cat
                /codelists.xml#MD_ProgressCode"
                codeListValue="tentative"/>
            </mri:status>
            ...
          </mri:status>
        </mri:MD_DataIdentification>
      </mdb:identificationInfo>
    ...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

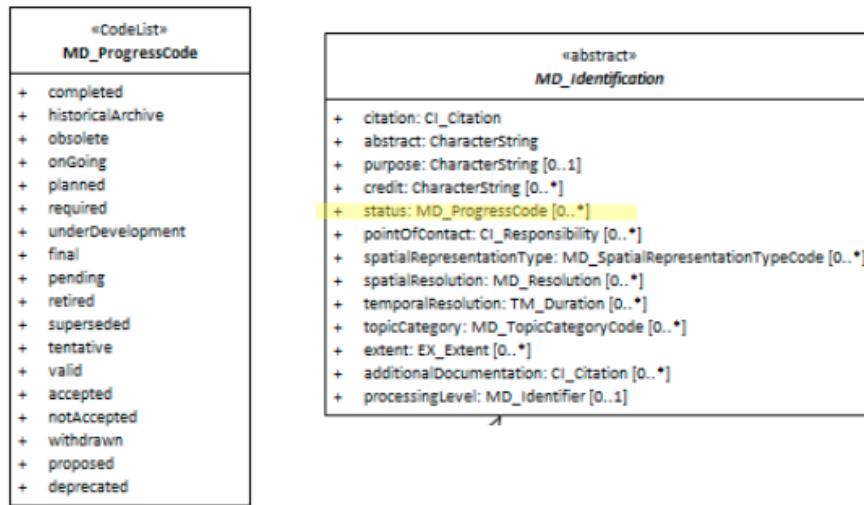


Figure 14: status

Topic Category ★★★★☆

Categorisation of a resource against a standardised thematic keyword list provides a useful way to filter and discover resources.

Element Name	<i>topicCategory</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>MD_TopicCategoryCode</i>
Governance	<i>Common ICSM, Domain, Agency</i>
Purpose	<i>Discovery, Evaluation</i>
Audience	machine resource - ★★★★ general - ★★★★★ resource manager - ★★★★★ specialist - ★★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★

Definition

The main themes of the resource populated from a fixed domain of values

ISO Obligation

- There may zero to many [0..*] *topicCategory* entries for the cited resource in the *MD_DataIdentification* package in a metadata record selected from the enumeration *MD_TopicCategoryCode*.

Discussion

The Resource Topic Category is recommended in ISO 19115.1-2015 as a metadata element to be used for discovery of geospatial resources. It provides high-level filtering of data using standardised terms from the enumeration *MD_TopicCategoryCode*. This enumeration cannot be extended and should not be as it is the fixed nature that makes this element of particular value. These values allow metadata aggregated from anywhere in the world to be sorted and filtered into like categories - such as is done in a faceted search interface. Search results can be easily sorted by humans and machines. If this list were extensible, this would not be as effective.

Many resources may fit into multiple categories. ISO19115-1 allows multiple instances of *topicCategory* to accommodate such instances. Discussions need to be made as to when an aspect of the resource is too minor to include an instance of the *MD_TopicCategoryCode* value.

Topic categories are essentially keywords but of a particular enumeration. Like other keywords, search engines and indices use these to provide search support. If a topic category code satisfies the need for a particular keyword, it is probably unbeneficial to include that value as part of your Keywords.

The resource to which the Topic Category applies may be data or service, *MD_DataIdentification** or **SV_ServiceIdentification*

ICSM Recommendations

Therefore - in order to comply with ICSM best guidance, include at least one instance of *topicCategory* in the metadata for your resource to provide high-level filtering and categorisation of data. Multiple values may be captured and this is encouraged to avoid the lack of discovery due to too narrow categorisations. This field is particularly useful in faceted search interfaces such as GeoNetwork.

It is not recommended that this list be extended as its value is in part due to the standardised values it contains. Extended values, if needed are better captured in other keyword fields.

Possible Values for *topicCategory*

Type enumeration - MD_TopicCategoryCode

- **farming** - rearing of animals and/or cultivation of plants
 - Examples: agriculture, irrigation, aquaculture, plantations, herding, pests and diseases affecting crops and livestock
- **biota** - flora and/or fauna in the natural environment
 - Examples: wildlife, vegetation, biological sciences, ecology, wilderness, sealife, wetlands, habitat
- **boundaries** - legal land descriptions
 - Examples: political and administrative boundaries
- **climatology****Meteorology****Atmosphere** - processes and phenomena of the atmosphere
 - Examples: cloud cover, weather, climate, atmospheric conditions, climate change, precipitation
- **economy** - economic activities, conditions and employment
 - Examples: production, labour, revenue, commerce, industry, tourism and eco-tourism, forestry, fisheries, commercial or subsistence hunting, exploration and exploitation of resources such as minerals, oil and gas
- **elevation** - height above or below a vertical datum
 - Examples: altitude, bathymetry, digital elevation models, slope, derived products
- **environment** - environmental resources, protection and conservation
 - Examples: environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape
- **geoscientificInformation** - information pertaining to earth sciences
 - Examples: geophysical features and processes, geology, minerals, sciences dealing with the composition, structure and origin of the earth's rocks, risks of earthquakes, volcanic activity, landslides, gravity information, soils, permafrost, hydrogeology, erosion
- **imageryBaseMapsEarthCover** - base maps
 - Examples: land cover, topographic maps, imagery, unclassified images, annotations
- **intelligenceMilitary** - military bases, structures, activities
 - Examples: barracks, training grounds, military transportation, information collection

- **inlandWaters** - inland water features, drainage systems and their characteristics
- Examples: rivers and glaciers, salt lakes, water utilisation plans, dams, currents, floods, water quality, hydrographic charts
- **location** - positional information and services
- Examples: addresses, geodetic networks, control points, postal zones and services, place names
- **oceans** - features and characteristics of saltwater bodies (excluding inland waters)
- Examples: tides, tidal waves, coastal information, reefs
- **planningCadastral** - information used for appropriate actions for future use of the land
- Examples: land use maps, zoning maps, cadastral surveys, land ownership
- **society** - characteristics of society and cultures
- Examples: settlements, anthropology, archaeology, education, traditional beliefs, manners and customs, demographic data, recreational areas and activities, social impact assessments, crime and justice, census information
- **structure** - man-made construction Examples: buildings, museums, churches, factories, housing, monuments, shops, towers
- **transportation** - means and aids for conveying persons and/or goods
- Examples: roads, airports/airstrips, shipping routes, tunnels, nautical charts, vehicle or vessel location, aeronautical charts, railways
- **utilitiesCommunication** - energy, water and waste systems and communications infrastructure and services
- Examples: hydroelectricity, geothermal, solar and nuclear sources of energy, water purification and distribution, sewage collection and disposal, electricity and gas distribution, data communication, telecommunication, radio, communication networks
- **extraTerrestrial** - region more than 100 km above the surface of the Earth
- **disaster** - Information related to disasters
- Examples: site of the disaster, evacuation zone, disaster-prevention facility, disaster relief activities

Also Consider

- **Keywords** provides a more lengthy flexible system to attach keywords - including from custom thesauri and free text
- **Metadata Scope** holds keyword identifying the type of resource, e.g. service, a collection, an application which the metadata describes
- **Spatial Representation Type** holds keywords related to the spatial type of the

resource, such as vector, grid, tin, etc.

Crosswalk considerations

ISO19139

This element, along with spatialRepresentationType and spatialResolution, were moved from MD_DataIdentification to MD_Identification in order to allow their use for service identification. Two new values were added to this enumeration: *extraTerrestrial* and *disaster* from the ISO19139 version.

Dublin core / CKAN / data.gov.au

Maps to *ISO 19115 topic*

DCAT

Maps to *dcat:keyword*

RIF-CS

Maps to *Subject*

Examples

XML

```
<mdb:MD_Metadata>
  ...
  <mdb:identificationInfo>
    <mri:MD_DataIdentification>
      ...
      <mri:topicCategory>
        <mri:MD_TopicCategoryCode>environment</mri:MD_TopicCategoryCode>
      </mri:topicCategory>
      <mri:topicCategory>
        <mri:MD_TopicCategoryCode>biota</mri:MD_TopicCategoryCode>
      </mri:topicCategory>
      <mri:topicCategory>
        <mri:MD_TopicCategoryCode>inlandWaters</mri:MD_TopicCategoryCode>
      </mri:topicCategory>
```

```
....  
</mri:MD_DataIdentification>  
</mdb:identificationInfo>  
....  
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

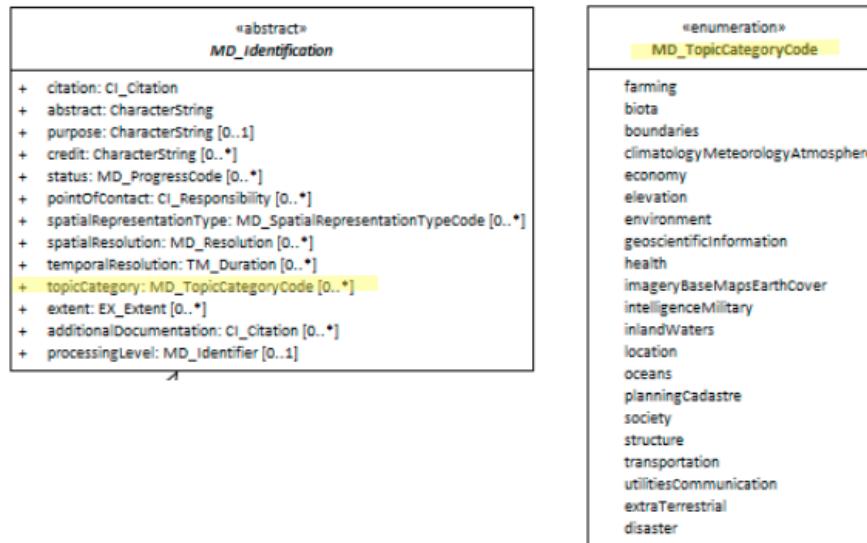


Figure 15: topicCategory

Spatial Resolution ★★★★★

To be useful for its given purpose geospatial data is recorded at an appropriate level of generalisation. This helps reduce overhead and can give a more useful product for the scale it is designed to be used. Too much data can be as much a problem as too little. Providing users with this information allows better judgement as to the fitness of the resource to their purpose.

Element Name	<i>spatialResolution</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>MD_Resolution</i>
Governance	<i>Common ICSM</i>
Purpose	<i>Discovery, Evaluation</i>
Audience	machine resource - ★★ general - ★★★★★ resource manager - ★★★ specialist - ★★★★
Metadata type	<i>structural</i>
ICSM Level of Agreement	★★★

Definition

The nominal scale and/or spatial resolution of the resource.

ISO Obligation

- There may zero to many [0..*] *spatialResolution* entries for the cited resource in the *MD_DataIdentification* package of class *MD_Resolution* in a metadata record.

Discussion

Scale is a fundamental concept of spatial resource be they data or service (*MD_DataIdentification** or *SV_ServiceIdentification*). *SpatialResolution** is the element that captures this.

SpatialResolution is most commonly represented as a factor which provides a general understanding of the density of spatial data in the resource or describes the range of resolutions in which a digital resource may be used. This element should be repeated when describing the upper and lower range.

SpatialResolution is recommended in ISO 19115.1-2015 as a metadata element to be used for discovery of geospatial resources.

SpatialResolution has no value of its own. The spatialResolution type are selectable from the class MD_Resolution.

Outstanding Issues

Scale has little meaning in digital context The most common way of capturing spatial resolution is as a denominator value using `equivalentScale`. While this made intuitive sense in the days of paper maps printed at a particular size, scales such as 1:20,000 have little real meaning when the size of a map is totally dependent on the display screen. Will younger spatial professionals who may only have a passing knowledge of fixed scale maps relate to this value? Will it have meaning to the young neo-geo? It would be useful to work towards expressing scale, a fundamental concept in geospatial data, in a more digitally friendly way. Perhaps something like standardised zoom levels? Would “distance”, sampling size be of greater use? Most relatable would be something like “zoom level” which could be captured in “level of detail” but there is currently a lack of standardisation as to what terms like “zoom level” mean. Also, the `levelOfDetail` option lacks citation to support that would be needed to make this usable in such a manner. Work on Discrete Global Grid Systems (DGGS) may provide some guidance to this topic.

Recommendations

Therefore - The *spatialResolution* package should be populated with enough information to give the reader a good understanding of the spatial scale at which the resource was designed to be used. Capturing the spatial resolution of a resource is useful information for determining the fitness to the purpose of geospatial data. Data gathered at too high or too low a resolution may make it unfit to your needs. Mixing data of different resolutions can give uncertain results. The spatial resolution provides a rough guide to the precision and accuracy of a resource. (Data quality elements should be used to document precision and accuracy more fully.)

Spatial resolution can be documented in many ways. For ISO19115-1, these are limited to the methods itemised in the class MD_Resolution and documented above. Equivalent scale is the default of many systems, including supplied templates in GeoNetwork. It is captured with a single denominator value such as “20,000” as in a 1:20,000 map.

Note BC 19-7: Do we recommend equivalent scale as default?

Recommended Sub-Elements

MD_Resolution [1..1] is a class of type *Union* (meaning only one attribute from the available list can be used) that provides level of detail expressed as a scale factor, a distance or an angle. Similar to codelist, one and only one [1..1] must be chosen per *spatialResolution* instance. Possible attribute choices include:

- **equivalentScale** - (*class* - *MD_RepresentativeFraction*)
 - level of detail expressed as the scale of a comparable hardcopy map or chart
 - *MD_RepresentativeFraction* derived from ISO/TS 19103 Scale where *MD_RepresentativeFraction.denominator* = 1 / *Scale.measure* And *Scale.targetUnits* = *Scale.sourceUnits*
 - denominator - integer - the number below the line in a vulgar fraction
 - **distance** - (*type* - *Distance*)
 - horizontal ground sample distance
 - Distance: This class is documented in full in ISO/TS 19103. Includes *unitOfMeasure* attribute
 - UnitOfMeasure: This class is documented in full in ISO/TS 19103
 - **vertical** - (*type* - *Distance*)
 - vertical sampling distance
 - Distance: This class is documented in full in ISO/TS 19103. Includes *unitOfMeasure* attribute
 - UnitOfMeasure: This class is documented in full in ISO/TS 19103
 - **angularDistance** - (*type* - *Angle*)
 - angular sampling measure
 - Angle: Amount of rotation needed to bring one line or plane into coincidence with another, generally measured in radians or degrees. This class is documented in full in ISO/TS 19103
 - UnitOfMeasure: This class is documented in full in ISO/TS 19103
 - **levelOfDetail** - (*type* - *charStr*)
 - brief textual description of the spatial resolution of the resource

Also Consider

- **Spatial Representation Type** Documents the method used to spatially represent geographic information
- **dataQualityInfo>MD_DataQuality - TBD** - From ISO19157 - quality information for the data specified by a data quality scope

Examples

ABARES

```
<mri:spatialResolution><mri:MD_Resolution>
  <mri:distance><gco:Distance uom="metre">123</gco:Distance>
  </mri:distance>
</mri:MD_Resolution></mri:spatialResolution>
<mri:spatialResolution><mri:MD_Resolution>
  <mri:angularDistance>
    <gco:Angle uom="degreeLatitude">0.1</gco:Angle>
  </mri:angularDistance>
</mri:MD_Resolution></mri:spatialResolution>
<mri:spatialResolution>
  <mri:MD_Resolution>
    <mri:angularDistance>
      <gco:Angle uom="degreeLongitude">0.05</gco:Angle>
    </mri:angularDistance>
  </mri:MD_Resolution>
</mri:spatialResolution>
<mri:spatialResolution>
  <mri:MD_Resolution>
    <mri:vertical>
      <gco:Distance uom="metre">123</gco:Distance>
    </mri:vertical>
  </mri:MD_Resolution>
</mri:spatialResolution>
```

GA

```
<mri:spatialResolution>
  <mri:MD_Resolution>
    <mri:levelOfDetail>
```

```
<gco:CharacterString>1:1000000 to 1:2000000</gco:CharacterString>
</mri:levelOfDetail>
</mri:MD_Resolution>
</mri:spatialResolution>
```

Note BC 11-6: This example from GA, shown here as levelOfDetail, would more appropriately be captured as equivalentScale. But interestingly, this information is sharing the range in which the data are useful. This is a useful approach, but is this standard sufficiently able to support this?

XML -

```
<mdb:MD_Metadata>
...
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    ...
      <mri:spatialResolution>
        <mri:MD_Resolution>
          <mri:distance>
            <gco:Distance uom="m">1</gco:Distance>
          </mri:distance>
        </mri:MD_Resolution>
      </mri:spatialResolution>
    ...
  </mri:MD_DataIdentification>
</mdb:identificationInfo>
...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

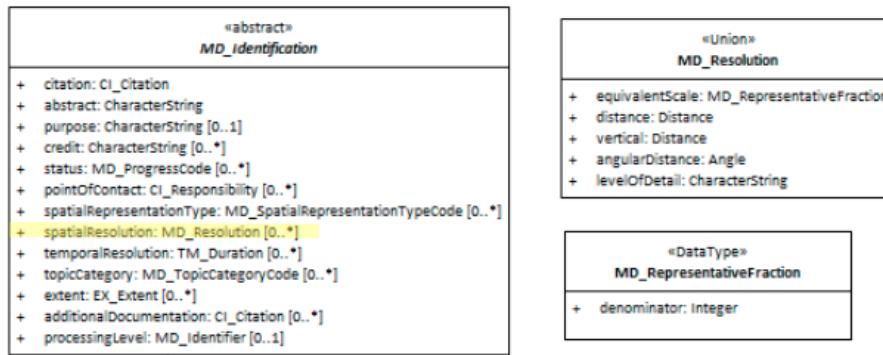


Figure 16: spatialResolution

Resource Point of Contact ★★★★★

One of the most important pieces of information that can be shared in a metadata record is the resource Point of Contact. By retrieving the means to access the party responsible for questions about the resource, all other information should be able to be obtained even if it is not in the metadata.

Element Name	<i>pointOfContact</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>CI_Responsibility</i>
Governance	<i>Agency</i>
Purpose	<i>Discovery, Evaluation, Communications</i>
Audience	machine resource - ★★ general - ★★★★★ resource manager - ★★★★★ specialist - ★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★★

Definition

The name and contact information for the organisation, role and/or individual that serves as the point of contact for the cited resource.

ISO Obligation

- There may be one or more [0..*] *pointOfContact* packages for the cited resource in the *MD_DataIdentification* package for those responsible for the resource. These will be of class *CI_Responsibility*.

Discussion

This element exists for the provision of a set of attributes for identification of, and means of communication with, person(s) and organisation(s) associated with the resource be they data or service (*MD_DataIdentification* or *SV_ServiceIdentification*). This element refers to the party responsible for the resource itself and the maintenance of this resource. It does not refer to the party responsible for the metadata or the distribution of the resource.

This is a compound element of type *CI_ResponsibleParty*. At least one should be present.

Recommended role value - “PointOfContact” with attached email. Other contacts can be added as required. Other role values are acceptable.

Recommendations

Therefore - to meet ICSM good practice, in all metadata records, at least one point of contact should be given for the party responsible for the cited resource. These should default to role code “Point of Contact”. In addition, for minimal conformity, name (of organisation preferred), positionName and electronicMailAddress should also be populated. The use of the new partyIdentifier element added in the 2018 amendment to the standard is encouraged by all parties.

Recommended Sub-Elements

Follow the general guidelines for CI_Responsibility.

- One value of `role` should be “Point of Contact”, but may be another depending on agency guidance, e.g. if a custodian is also the primary point of contact, *custodian* may be the most appropriate choice for `role`.
- **partyIdentifier** - (*class - MD_Identifier*) [0..*] identifier for the party, usually a URI such as an ORCID. Use of this package is recommended when this option exists. > Note BC 30-7: Do we have some regional alternatives to ORCID to recommend?

Also Consider

- **Metadata Responsible Party** Contact information for the recommended party to contact about the metadata.
- **Resource Cited Responsible Party** contact information for the parties otherwise responsible for aspects of the the resource creation and maintenance.
- **DistributionInfo** Includes Distributor contact information.

Crosswalk considerations

ISO19139

See discussion at CI_Responsibility

Dublin core / CKAN / data.gov.au

Maps to contact > Note BC 19-7: These map to the same elements as Metadata Contact. Is this a problem?

DCAT

Maps to dcat:contactPoint

RIF-CS

Maps to Related Party

Examples

XML

```
<mdb:MD_Metadata>
....
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
  ....
    <mri:pointOfContact>
      <cit:CI_Responsibility>
        <cit:role>
          <cit:CI_RoleCode
            codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#CI_RoleCode"
            codeListValue="custodian"/>
        </cit:role>
      <cit:party>
        <cit:CI_Organisation>
          <cit:name>
            <gco:CharacterString>OpenWork Ltd</gco:CharacterString>
          </cit:name>
          <cit:contactInfo>
            <cit:CI_Contact>
              <cit:address>
                <cit:CI_Address>
                  <cit:electronicMailAddress>
                    <gco:CharacterString>email@mail.com
                    </gco:CharacterString>
                  </cit:electronicMailAddress>
                </cit:CI_Address>
              </cit:address>
            </cit:CI_Contact>
          </cit:contactInfo>
        </cit:party>
      </mri:MD_DataIdentification>
    </mri:pointOfContact>
  </mri:MD_DataIdentification>
</mrb:MD_Metadata>
```

```
</cit:CI_Contact>
</cit:contactInfo>
<cit:individual>
<cit:CI_Individual>
<cit:name>
<gco:CharacterString>Metadata Bob
</gco:CharacterString>
</cit:name>
<cit:positionName>
<gco:CharacterString>GIS Guru
</gco:CharacterString>
</cit:positionName>
</cit:CI_Individual>
</cit:individual>
</cit:CI_Organisation>
</cit:party>
</cit:CI_Responsibility>
</mri:pointOfContact>
.....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

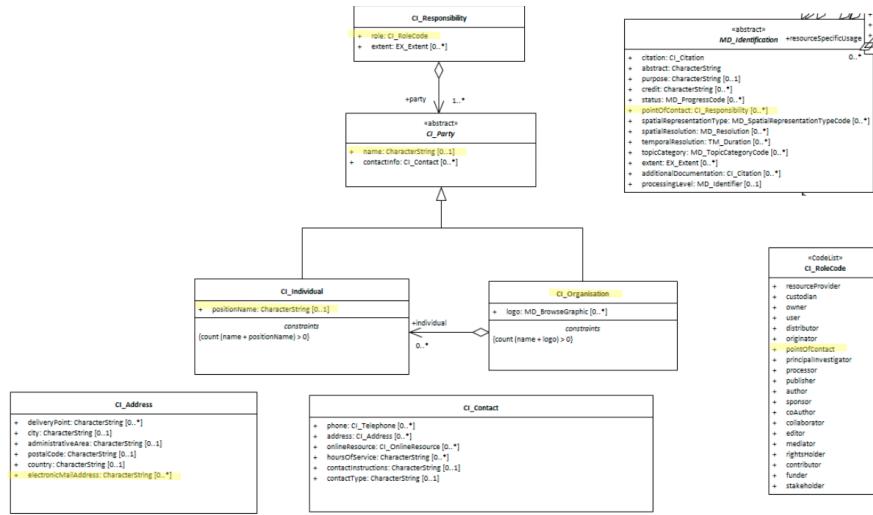


Figure 17: Responsibility

Additional Documentation ★★★

A cited resource may have any number of related documents such as articles, publications, user guides, data dictionaries that are useful in applying the resource to desired purposes. Often these are difficult to discover and manage. Capturing these in the metadata is recommended.

Element Name	<i>additionalDocumentation</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>CI_Citation</i>
Governance	<i>Domain, Agency</i>
Purpose	<i>Data Management, Resource Use</i>
Audience	machine resource - ★ general - ★★★ resource manager - ★★★★ specialist - ★★★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★

Definition

Citation of other documentation associated with the resource, e.g. related articles, publications, user guides, data dictionaries

ISO Obligation

There may be zero to many [0..*] *additionalDocumentation* packages for the cited resource in the *MD_DataIdentification* package of class *CI_Citation* in the metadata record.

Discussion

To make the best use of a given resource, additional documentation may be useful or required. Providing instructions for accessing these documents can greatly enhance the value of a resource to its users and providers. Capturing these additional documents in the metadata is also helpful to resource managers who need to properly track the linkages between a resource and its documentation. The resource may be data or service, *MD_DataIdentification** or **SV_ServiceIdentification*

ICSM Recommendations

Therefore - to make the best use of a given resource capturing the links to additional documentation related to this resource is highly recommended. Capture those documents of the highest value to your most likely community of users. If possible, include some reference to documentation or its metadata that can be easily understood by laypeople and label this accordingly.

This element should be populated in all metadata records with a minimum of **title**, **identifier**, **date** and **citedResponsibleParty**. If possible, use the link to the metadata for the cited additional documentation as the resource landing page.

Recommended Sub-Elements

- **title** - (*type - charStr*) [1..1] mandatory for citations, the name by which the cited resource is known
- **date** - (*class - CI_Date*) recommended, the reference date for the cited resource In addition, some direction should be given about how to access the cited additional resource
- **onlineResource** - (*class CI_OnlineResource*) [0..*] a description of how to access the cited additional resource online
- **citedResponsibleParty** - (*class CI_Responsibility*) [0..*] contact information for someone who can give guidance about accessing the cited additional resource

Also Consider

- **MD_DataIdentification.supplementalInformation** - is defined as “any other descriptive information about the resource”
- **MD_AssociatedResource** - contains information about resources of which this resource is a piece. Association types are taken from the DS_AssociationTypeCode

Outstanding Issues

DCAT Previously captured DCAT related documentation on these elements calls what is considered the equivalent “A free-text account of the catalog.”
Mapping seems incorrect.

Crosswalk considerations

DCAT

Maps to `dct.description` free-text

RIF-CS

Maps to Description 'notes'

Examples

XML

```
<mdb:MD_Metadata>
  ...
  <mdb:identificationInfo>
    <mri:MD_DataIdentification>
      ...
      <mri:additionalDocumentation>
        <cit:CI_Citation>
          <cit:title>
            <gco:CharacterString>Usage guide</gco:CharacterString>
          </cit:title>
          <cit:date>
            <cit:CI_Date>
              <cit:date>
                <gco:Date>2019-07-01</gco:Date>
              </cit:date>
              <cit:dateType>
                <cit:CI_DateTypeCode
                  codeList="https://schemas.isotc211.org/19115/resources/Codelist/
                  cat/codelists.xml#CI_DateTypeCode"
                  codeListValue="creation"/>
              </cit:dateType>
            </cit:CI_Date>
          </cit:date>
          <cit:citedResponsibleParty>
            <cit:CI_Responsibility>
              <cit:role>
                <cit:CI_RoleCode
                  codeList="https://schemas.isotc211.org/19115/resources
                  /Codelist/cat/codelists.xml#CI_RoleCode"
                  codeListValue="custodian"/>
              </cit:role>
            </cit:CI_Responsibility>
          </cit:citedResponsibleParty>
        </cit:CI_Citation>
      </mri:additionalDocumentation>
    </mri:MD_DataIdentification>
  </mdb:identificationInfo>
</mdb:MD_Metadata>
```

```
<cit:party>
  <cit:CI_Organisation>
    <cit:name>
      <gco:CharacterString>OpenWork Ltd</gco:CharacterString>
    </cit:name>
    <cit:contactInfo>
      <cit:CI_Contact>
        <cit:address>
          <cit:CI_Address>
            <cit:electronicMailAddress>
              <gco:CharacterString>info@openwork.nz
              </gco:CharacterString>
            </cit:electronicMailAddress>
          </cit:CI_Address>
        </cit:address>
      </cit:CI_Contact>
    </cit:contactInfo>
    <cit:individual>
      <cit:CI_Individual>
        <cit:name>
          <gco:CharacterString>Byron Cochrane
          </gco:CharacterString>
        </cit:name>
      </cit:CI_Individual>
    </cit:individual>
  </cit:CI_Organisation>
</cit:party>
</cit:CI_Responsibility>
</cit:citedResponsibleParty>
<cit:onlineResource>
  <cit:CI_OnlineResource>
    <cit:linkage>
      <gco:CharacterString>https://openwork-nz.github.io
      /Resources/2019/04/25/gn-plugins.html
      </gco:CharacterString>
    </cit:linkage>
    <cit:protocol gco:nilReason="missing">
      <gco:CharacterString/>
```

```
</cit:protocol>
<cit:name gco:nilReason="missing">
  <gco:CharacterString/>
</cit:name>
<cit:description gco:nilReason="missing">
  <gco:CharacterString/>
</cit:description>
<cit:function>
  <cit:CI_OnLineFunctionCode codeList=
    "https://schemas.isotc211.org/19115/resources/Codelist
     /cat/codelists.xml#CI_OnLineFunctionCode"
    codeListValue="" />
</cit:function>
</cit:CI_OnlineResource>
</cit:onlineResource>
</cit:CI_Citation>
</mri:additionalDocumentation>
...
</mri:MD_DataIdentification>
</mdb:identificationInfo>
...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

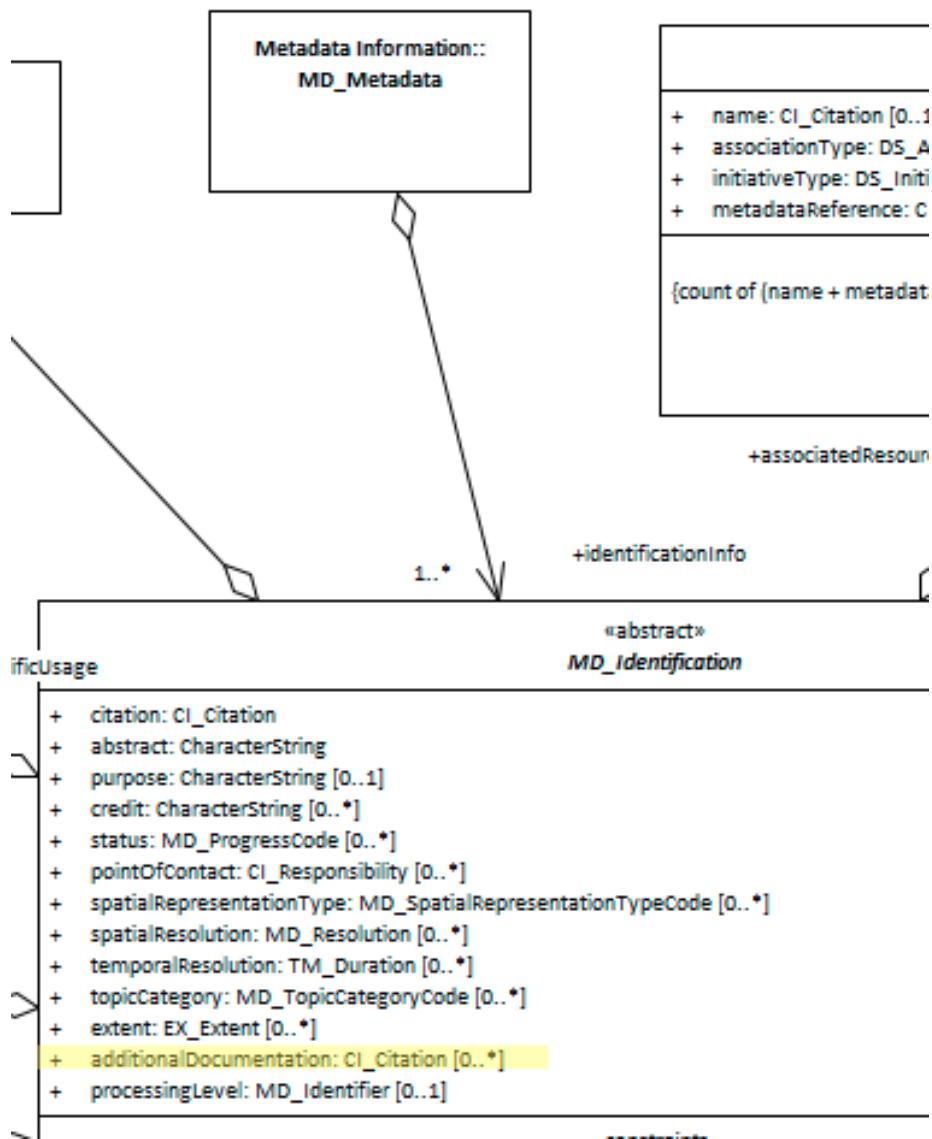


Figure 18: additionalDoc

Spatial Representation Type ★★★★☆

In order to quickly find, categorise and evaluate the fitness of a resource to our needs it is useful to include in our metadata a high-level description of the type or format of spatial data the resource contains.

Element Name	<i>spatialRepresentationType</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>characterString</i>
Governance	<i>Common ICSM, Domain</i>
Purpose	<i>Discovery</i>
Audience	machine resource - ★★★ general - ★★★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>Structural</i>
ICSM Level of Agreement	★★★

Definition

The method used by the resource to spatially represent geographic information.

ISO Obligation

- There can be zero to many [0..*] *spatialRepresentationType* entries for the cited resource in the *MD_DataIdentification* package selected from codelist *MD_SpatialRepresentationTypeCode*.

Discussion

A resource may consist of many spatial representation types. It may also contain no spatial representation types. Most commonly, a geospatial resource will consist of a single representation type. The resource may be data or service, *MD_DataIdentification* or *SV_ServiceIdentification*.

ICSM Recommendations

Therefore - If a resource contains spatial representations, to provide guidance to users, the type of spatial representation(s) should be captured using this element. Further Spatial

representation details could be captured in the optional `spatialRepresentationInfo` package. At least one instance of this element should be populated in all metadata records describing spatial resources.

Values for this element must come from the `MD_SpatialRepresentationTypeCode` codelist.

Possible Values for `spatialRepresentationType`

From codelist - `MD_SpatialRepresentationTypeCode`

- `vector` - vector data is used to represent geographic data
- `grid` - grid data is used to represent geographic data
- `textTable` - textual or tabular data is used to represent geographic data
- `tin` - triangulated irregular network
- `stereoModel` - three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images
- `video` - scene from a video recording

Also Consider

- `MD_Metadata.spatialRepresentationInfo` - Abstract class that describes the digital mechanism used to represent spatial information. Not detailed by MDWG

Crosswalk considerations

ISO19139

`MD_DataIdentification/spatialRepresentationType` moved from `MD_DataIdentification` to `MD_Identification` in order to allow their use for service identification. In practice, when creating metadata for data, this change is not noticeable.

Examples

XML -

```
<mdb:MD_Metadata>
  ...
  <mdb:identificationInfo>
    <mri:MD_DataIdentification>
      ...
      <mri:spatialRepresentationType>
```

```

<mcc:MD_SpatialRepresentationTypeCode
codeList="https://schemas.isotc211.org/19115/resources/Codelist/cat
/codelists.xml#MD_SpatialRepresentationTypeCode"
codeListValue="vector"/>
</mri:spatialRepresentationType>
....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
....
</mdb:MD_Metadata>

```

UML diagrams

Recommended elements highlighted in yellow

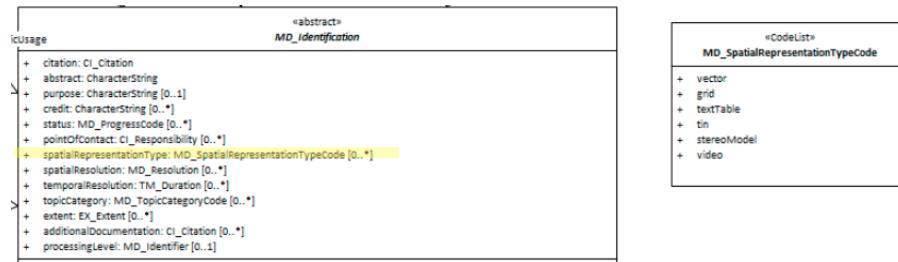


Figure 19: spatialRepresentationType

Associated Resource ★★★

Geospatial data and service often are part of a larger collection of resources. Geospatial practitioners need to be provided linkages to these associated resources of which a given resource is a part. There are many types of associated resources, spatial and non-spatial. Associated resources can also provide a useful path for discovery.

Element Name	<i>associateResource</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>MD_AssociatedResource</i>
Governance	<i>Resource use, Discovery</i>
Purpose	<i>Discovery, Identification</i>
Audience	machine resource - ★★ general - ★★★ resource manager - ★★★★ specialist - ★★★★★
Metadata type	<i>administrative, descriptive</i>
ICSM Level of Agreement	★★★

Definition

An entity to indicate an association between resources and records related to the resources when part of a larger collection

ISO Obligation -

- In a metadata record there should be zero to many [0..*] *associatedResources* packages for the cited resource in the *MD_DataIdentification* package of class *MD_AssociatedResource* that relate a resource to other resources. These should be of type *DS_AssociationTypeCode*.

Discussion

When important aspects or information about a spatial resource are derived by the association of this resource to others of which it is part, it is useful that these associations be documented in the metadata so as these can be captured and discovered. Doing so provides important avenues for additional data discovery. Some resources are truly of little use unless combined with others of which they are a part.

ICSM Recommendations

Therefore - to provide an effective way to document, preserve and provide discovery of associated resources, these relations should be documented in the metadata. At a minimum, this should include a name, description of the relationship and link to the resource or its metadata. In contrast to additionalDocumentation which can be thought of as outputs used to describe and understand a cited resource, an associatedResource is something that is of a piece of, or input to, the cited resource.

Recommended Sub-Elements

- **associationType** - (*codelist - DS_AssociationTypeCode*) [1..1] Mandatory for associated resource citations - one name for the type of relationship
- crossReference - reference from one resource to another
- largerWorkCitation - reference to a master resource of which this one is a part
- partOfSeamlessDatabase - part of same structured set of data held in a computer
- stereoMate - part of a set of imagery that when used together, provides three-dimensional images
- isComposedOf - reference to resources that are parts of this resource
- collectiveTitle - common title for a collection of resources
- series - associated through a common heritage such as produced to a common product specification
- dependency - associated through a dependency
- revisionOf - resource is a revision of associated resource
- **name** - (*class - CI_Citation*) {0..*}] - citation information about the associated resource
- *Optional sub elements*
- **initiativeType** - (*codelist - DS_InitiativeTypeCode*) [0..1] - type of initiative under which the associated resource was produced
- **metadataReference** - (*class - CI_Citation*) [0..1] - reference to the metadata of the associated resource

Outstanding Issues

Geonetwork support Support of associated resources for iso19115-3 in GeoNetwork 3.6 seems limited and perhaps broken. This needs investigation.

Other discussion

DCAT Def - *A resource with an unspecified relationship to the catalogued*

item. Notes - Use only if more specific subproperty is not available. Sub-properties of dct:relation in particular dcat:distribution, dct:hasPart, (and its sub-properties dcat:catalog, dcat:dataset, dcat:service), dct:isPartOf, dct:conformsTo, dct:isFormatOf, dct:hasFormat, dct:isVersionOf, dct:hasVersion, dct:replaces, dct:isReplacedBy, dct:references, dct:isReferencedBy, dct:requires, dct:isRequiredBy

Also Consider

- **additionalDocumentation** - other documentation associated with the resource, e.g. related articles, publications, user guides, data dictionaries.
- **resourceLineage** - Information about the provenance, source(s), and/or the production process(es) applied to the resource.
- **browseGraphic** - associates to a large number of packages to provide linkage to associated image files, such as business or product icons and logos
- **supplementalInformation** - a free text field that is defined as “any other descriptive information about the resource”.

Crosswalk considerations

ISO19139

MD_AssociatedResource replaces MD_AggregateInformation to clarify its role as a mechanism for associating resources. Changes include:

- MD_AssociatedResource/name:CI_Citation replaces MD_AggregateInformation/aggregateDatasetName
- The name this role was simplified along with the change to the name of the class.
- MD_AggregateInformation/aggregateDataSetIdentifier
- This MD_Identifier was removed because the MD_Identifier in the name:CI_Citation can be used to provide an identifier for the associated resource.
- MD_AssociatedResource /metadataReference:CI_Citation was added
- This new element was added to avoid ambiguity about whether the name:CI_Citation refers to a resource or to metadata for that resource. Now it is clear that name:CI_Citation refers to the resource and the metadataReference refers to metadata for that resource.

Dublin core / CKAN / data.gov.au

TBD {mapping to DC element and discussion???

DCAT

Maps to dct:relation

RIF-CS

Maps to “Related Information”

Examples

XML

```
<mdb:MD_Metadata>
....
</mdb:identificationInfo>
</mri:MD_DataIdentification>
....
<mri:associatedResource>
  <mri:MD_AssociatedResource>
    <mri:name>
      <cit:CI_Citation>
        <cit:title>
          <gco:CharacterString>Big Project</gco:CharacterString>
        </cit:title>
      </cit:CI_Citation>
    </mri:name>
    <mri:associationType>
      <mri:DS_AssociationTypeCode codeList="https://schemas.isotc211.org
        /19115/resources/Codelist/cat/codelists.xml#DS_AssociationTypeCode"
        codeListValue="largerWorkCitation"/>
    </mri:associationType>
  </mri:MD_AssociatedResource>
</mri:associatedResource>
....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

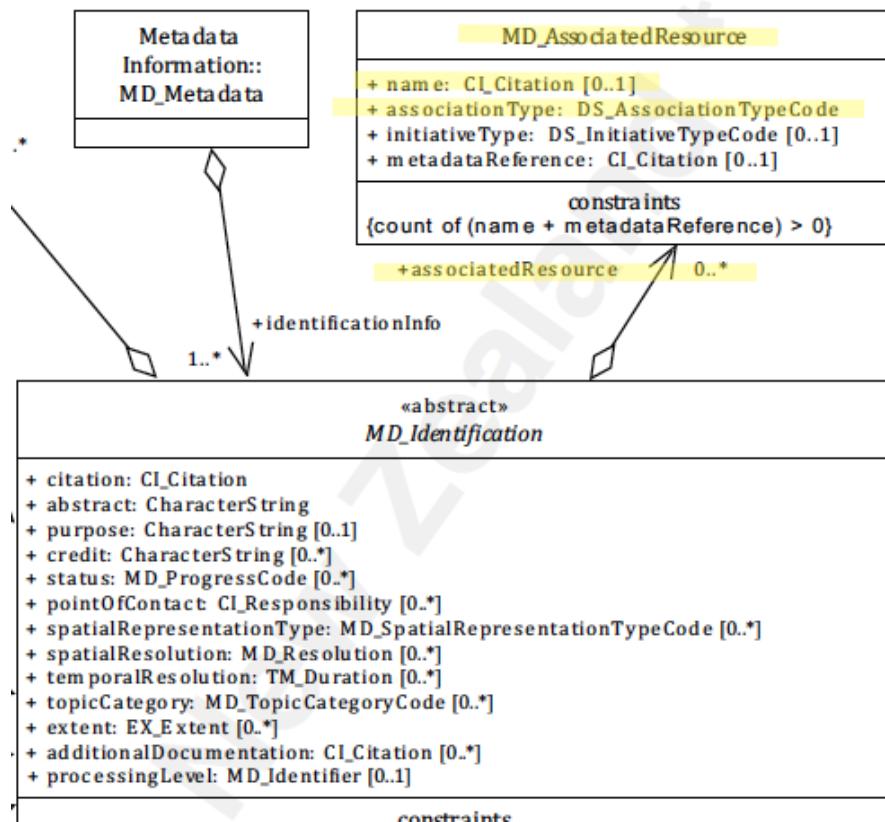


Figure 20: associateResource

Resource Format ★★★

Information about how a cited spatial resource is kept on the host system can be useful to individuals such as subject matter specialist and data managers. General audiences will be more interested in the distribution format.

- **Path** - *MD_Metadata.identificationInfo>MD_DataIdentification.resourceFormat*
- **Governance** - *Agency*
- **Audience** -
 - machine resource - ****
 - general - *
 - data manager - *****
 - specialist - ***
- **Metadata type** - *administrative*
- *ICSM Level of Agreement* - ***

Definition

Description of the computer language construct that specifies the representation of the data objects in a record, file, message, storage device, or transmission channel

ISO Obligation

There may be zero or many [0..*] *resourceFormats* for the cited resource in the *MD_DataIdentification* package of class *MD_Format* described in a metadata record.

ICSM Good Practice

This element should be populated in all metadata records with information about the format in which the resource is stored and managed within the agency, This is not about the format in which the resource is distributed which often differs.

Recommended Sub-Elements From class - *MD_Format*

- **formatSpecificationCitation** - (*class - CI_Citation*) citation/URL of the specification for the format
- **medium** - (*class - MD_Medium*) medium used by the format

Discussion

Knowledge of the native format of a resource provides a user that has direct access to such a great deal of insight as to how the resource might fit their need. It also provides a specialist user insight as to the technical limitations and capabilities of the resource. It is of high value to data managers as it provides invaluable information about the storage and use of these resources which the manager can use to know how to provide future support. Most external users would likely be more interested in the distribution format.

Outstanding Issues

CORE ISSUE: This element seems to be about the native format in which the data is kept by an organisation. This may or may not be the same as the distribution format. It is the distribution format that most people would want to know from a metadata record (except internal users).

Applied to SV_ServiceIdentification This element makes more sense when applied to service metadata. In that case, the resource format is what is of interest as the service is the distribution channel.

Recommendations

Therefore - it is recommended that format information about a resource be captured in the metadata. The details to include are to be at the best judgement of the managers and direct users of the resource.

It is not recommended, except in the case of service information metadata, that this element be used to hold distribution format information. That is better conveyed in a *distributionFormat* element under MD_Distribution.

Crosswalk considerations

Dublin core / CKAN / data.gov.au likely unneeded unless a service

DCAT mapping as yet unknown

Also Consider

- **MD_Distribution.distributionFormat** - holds information about the format in which the data is distributed.

Examples

XML

```
<mdb:MD_Metadata>
.....
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    .....
    <mri:resourceFormat>
      <mrd:MD_Format>
        <mrd:formatSpecificationCitation>
          <cit:CI_Citation>
            <cit:title>
              <gco:CharacterString>PostGIS</gco:CharacterString>
            </cit:title>
          </cit:CI_Citation>
        </mrd:formatSpecificationCitation>
        <mrd:medium>
          <mrd:MD_Medium>
            <mrd:name>
              <cit:CI_Citation>
                <cit:title>
                  <gco:CharacterString>My Cloud
                  </gco:CharacterString>
                </cit:title>
              </cit:CI_Citation>
            </mrd:name>
          </mrd:MD_Medium>
        </mrd:medium>
      </mrd:MD_Format>
    </mri:resourceFormat>
    .....
  </mri:supplementalInformation>
</mri:MD_DataIdentification>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

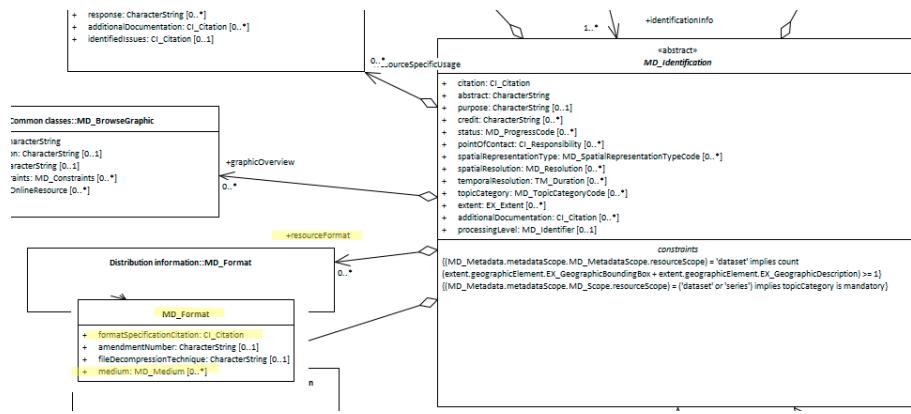


Figure 21: resourceFormat

Resource Graphic Overview ★★★

Geospatial data and service are largely visual by nature. Geospatial practitioners tend to be visually oriented. Browse graphics are a way of including in the metadata visual clues as to the nature and usefulness of resources.

Element Name	<i>graphicOverview</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>MD_BrowseGraphic</i>
Governance	<i>Common ICSM, Agency, Domain</i>
Purpose	<i>Discovery, Identification</i>
Audience	machine resource - ★ general - ★★★★★ resource manager - ★★ specialist - ★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★

Definition

A graphic that provides an illustration of a resource

NOTE - Should include a legend for the graphic, if applicable.

EXAMPLE - A dataset thumbnail image, an organisation logo, security constraint or citation graphic.

ISO Obligation

In a metadata record there should be zero to many [0..*] *graphicOverview* packages for the cited resource in the *MD_DataIdentification* package of class *MD_BrowseGraphic* in a metadata record.

Discussion

Geospatial professionals by nature, rely to a large extent on visual information to gain an understanding of resources. Browse graphics provide in the metadata a way to communicate with users visually.

ICSM Recommendations

Therefore - to provide a quick way for users to discover and identify the resource they need, provide a graphic overview of the metadata. At a minimum, this should include a name and link to the image.

Recommended Sub-Elements From class *MD_BrowseGraphic*

- **fileName** - (*type - CharStr*) [1..1] Mandatory for browse graphic elements - name of the file that contains a graphic that provides an illustration of the resource.
- **linkage** - (*class - CI_OnlineResource*) [0..*] - link to browse graphic.
- Optional:
- **imageConstraints** - (*class - MD_Constraints*) [0..*] - restriction on access and/or use of browse graphic
- **fileType** - (*type - CharStr*) [0..*] - format in which the illustration is encoded (e.g.: EPS, GIF, JPEG, PBM, PS, TIFF, PDF)
- **extent** - (*class - EX_Extent*) [0..*] Information about the horizontal, vertical and temporal extent of the resource specified by the scope

Also Consider

- **MD_BrowseGraphic** - associates to a large number of packages for different purposes, such as business or product icons and logos
- **CL_OnLineFunctionCode** - This codelist contains an option *browseGraphic*

Crosswalk considerations

ISO19139

browseGraphic is a new package in iso19115-1. New elements include: - **MD_BrowseGraphic.imageConstraint** (*class - MD_Constraints*) - *This new element was added in order to allow the specification of constraints on a browse graphic associated with a resource.* - **MD_BrowseGraphic.linkage** (*class - CI_OnlineResource*) - This new element was added in order to allow a straightforward specification of the link to the browse graphic and the capability to add additional information (name, description, ...) about that graphic.

Examples

XML -

```
<mdb:MD_Metadata>
```

```
....  
<mdb:identificationInfo>  
  <mri:MD_DataIdentification>  
    <mri:citation>  
      <cit:CI_Citation>  
        ....  
        <cit:graphic>  
          <mcc:MD_BrowseGraphic>  
            <mcc:fileName>  
              <gco:CharacterString>  
                https://static.wixstatic.com/media  
                /414fd2_2f712656fb5547f39a08a53aab98cc29~mv2.png/v1  
                /fill/w_92,h_146,al_c,q_80,usm_0.66_1.00_0.01  
                /IFaGR9yg.webp</gco:CharacterString>  
            </mcc:fileName>  
            <mcc:linkage>  
              <cit:CI_OnlineResource>  
                <cit:linkage>  
                  <gco:CharacterString>  
                    https://static.wixstatic.com/media  
                    /414fd2_2f712656fb5547f39a08a53aab98cc29~mv2.png  
                    /v1/fill/w_92,h_146,al_c,q_80,usm_0.66_1.00_0.01  
                    /IFaGR9yg.webp  
                  </gco:CharacterString>  
                </cit:linkage>  
                <cit:protocol>  
                  <gco:CharacterString>  
                    WWW:LINK-1.0-http--link  
                  </gco:CharacterString>  
                </cit:protocol>  
                <cit:name gco:nilReason="missing">  
                  <gco:CharacterString/>  
                </cit:name>  
                <cit:description gco:nilReason="missing">  
                  <gco:CharacterString/>  
                </cit:description>  
                <cit:function>  
                  <cit:CI_OnLineFunctionCode codeList=
```

```
"https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#CI_OnLineFunctionCode"
codeListValue="browseGraphic"/>
</cit:function>
</cit:CI_OnlineResource>
</mcc:linkage>
</mcc:MD_BrowseGraphic>
....
</cit:CI_Citation>
</mri:citation>
</mri:MD_DataIdentification>
</mdb:identificationInfo>
....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

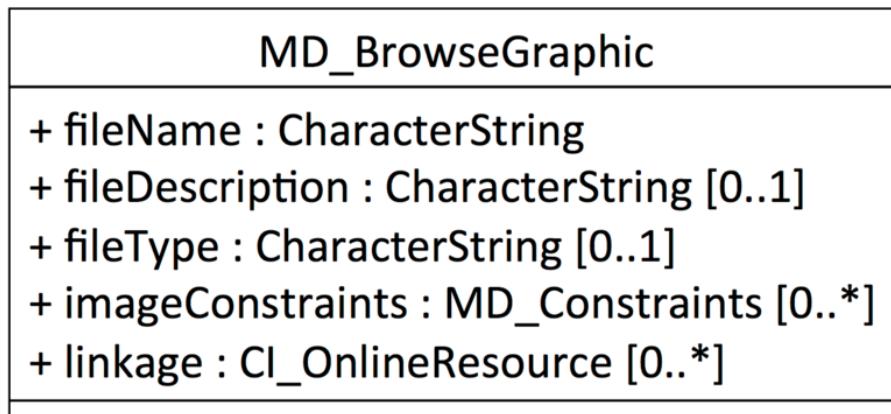


Figure 22: browseGraphic

Resource Citation ★★★★★

Some of the most basic needs of users of a resource is citation information. This basic information includes title, edition, identifier, dates, responsible parties, etc. In ISO 19115-1 we capture this information in MD_identification.citation.

Element Name	<i>citation</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification</i>
Class/Type	<i>CI_Citation</i>
Governance	<i>Common ICSM, Agency, Domain</i>
Purpose	<i>Discovery, Identification</i>
Audience	machine resource - ★★★★ general - ★★★★★ resource manager - ★★★★★ specialist - ★★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★★

Definition

Citation information for the spatial resource.

ISO Obligation

There must be one and only one [1..1] *MD_Metadata.identificationInfo>MD_Identification.citation* package for the cited resource in a metadata record. This must be of class *CI_Citation*. The resource may be of type data *MD_DataIdentification* or of type service *SV_ServiceIdentification*.

Discussion

The citation package contains multiple elements from *CI_Citation*. Only child elements contain content. Follow the links on the child elements recommendations for further instruction. Aspects of the contents of this package may be governed at different levels.

ICSM Recommendations

Therefore - for potential users to find and identify spatial resources, these must be well-cited with information that includes a minimum of **title**, **identifier**,

date (of type creation, plus revision and issued when appropriate) and citedResponsibleParty (for author or creator, plus publisher and contributor when appropriate).

Because many of the elements of MD_Identification.citation are mandatory and are important for identification and harvesting of metadata, it is recommended that the guidance provided in each of these six sub-elements (title, date, edition, identifier, citedResponsibleParty, and series) be followed. Other available CI_Citation elements should be used if needed to properly document your resource. Consult your metadata governance team on such use.

This element should be populated in all service metadata records.

Recommended Sub-Elements

Follow the general guidance for **CI_Citation** with emphasis on the following elements:

- **title** - (type - charStr)[1..1] mandatory - name by which the cited resource is known
- **date** - (class - *CI_Date*) [0..*] reference date for the cited resource. Should include at a minimum, the creation date for the resource.
- **edition** - (type - charStr) [0..1] version of the cited resource if appropriate
- **identifier** - (class - *MD_Identifier*) [0..*] value uniquely identifying an object within a namespace. Recommend provision of a resolvable URI following the *MD_Identifier* guidance.
- **citedResponsibleParty** - (class - *CI_Responsibility*)[0..*] roles, name, contact, and position information for an individual or organisation that is responsible for the resource. It is recommended that a party with the role “Point of Contact” be provided as well as an entry for “author” or “publisher”.
- **series** - (class - *CI_Series*) [0..1] If needed, information about the series, or aggregate resource, of which the resource is a part should be included.
- **onlineResource** - class - *CI_OnlineResource* [0..*] Highly Recommended for Service Resources. Should contain the URL Link for the landing page of the service. May also be recorded in *Distribution-Info* or *ResourceIdentifier*

Other Sub-Elements

- **alternateTitle** - (type - charStr) [0..*] short name or other language name by which the cited service is known, e.g. DCW as an alternative title for Digital Chart of the World. Recommended whenever there are alternate names commonly in use
- **series** - (class - *CI_Series*) [0..1] If needed, information about the series, or aggregate resource, of which the resource is a part should be included

Also Consider

- **DistributionInfo** - can contain information about how the resource is distributed. like *onlineResource* should contain landing page linkages to the resource but can also store additional information
- **metadataLinkage** - for links that provide a download of the metadata
- **browseGraphic** - associates to a large number of packages to provide linkage to associated image files, such as business or product icons and logos
- **ContainsOperations** - for service resources, this element can provide online access instructions
- **CI_Citation** - the class guidance for more options.

Outstanding Issues

CORE ISSUE:

Core to any metadata record is access to the described resource. There are several options where this may be expressed in an ISO19115-1 metadata record. The MDWG has not agreed to a consistent approach. Inside the resource citation package, the **identifier** and **onlineResource** may provide this functionality. The package **DistributionInfo** is, of course, a common way to capture such information - particularly for data resources. For service resources **ContainsOperations** is another common location for resource access information. Further discussion and guidance are needed to resolve this issue to support machine readability and reduce confusion.

Examples

XML

Data Resource example

```
<mdb:MD_Metadata>
  ...
  <mdb:identificationInfo>
    <mri:MD_DataIdentification>
      ...
      <mri:citation>
        <cit:CI_Citation>
          <cit:title>
            <gco:CharacterString>OpenWork geographical data
            </gco:CharacterString>
          </cit:title>
          <cit:date>
            <cit:CI_Date>
              <cit:date>
                <gco:Date>2019-07-18</gco:Date>
              </cit:date>
              <cit:dateType>
                <cit:CI_DateTypeCode
                  codeList="https://schemas.isotc211.org/19115/resources
                  /Codelist/cat/codelists.xml#CI_DateTypeCode"
                  codeListValue="creation"/>
              </cit:dateType>
            </cit:CI_Date>
          </cit:date>
          <cit:date>
            <cit:CI_Date>
              <cit:date>
                <gco:Date>2019-07-18</gco:Date>
              </cit:date>
              <cit:dateType>
                <cit:CI_DateTypeCode
                  codeList="https://schemas.isotc211.org/19115/resources
                  /Codelist/cat/codelists.xml#CI_DateTypeCode"
                  codeListValue="publication"/>
              </cit:dateType>
            </cit:CI_Date>
          </cit:date>
        </cit:CI_Citation>
      </mri:citation>
    </mri:MD_DataIdentification>
  </mdb:identificationInfo>
</mdb:MD_Metadata>
```

```
</cit:CI_Date>
</cit:date>
<cit:edition>
  <gco:CharacterString>Version 0.1</gco:CharacterString>
</cit:edition>
<cit:editionDate>
  <gco:Date>2019-07-18</gco:Date>
</cit:editionDate>
<cit:identifier>
  <mcc:MD_Identifier>
    <mcc:code>
      <gco:CharacterString>
        9547e07e-6a15-403b-8b19-488778fe0cf0
      </gco:CharacterString>
    </mcc:code>
    <mcc:codeSpace>
      <gco:CharacterString>
        http://202.49.243.69:8080/geonetwork/srv/eng/metadata/
      </gco:CharacterString>
    </mcc:codeSpace>
  </mcc:MD_Identifier>
</cit:identifier>
<cit:citedResponsibleParty>
  <cit:CI_Responsibility>
    <cit:role>
      <cit:CI_RoleCode
        codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#CI_RoleCode"
        codeListValue="author"/>
    </cit:role>
    <cit:party>
      <cit:CI_Organisation>
        <cit:name>
          <gco:CharacterString>OpenWork Ltd
        </gco:CharacterString>
        </cit:name>
      <cit:contactInfo>
        <cit:CI_Contact>
```

```
<cit:address>
  <cit:CI_Address>
    <cit:electronicMailAddress>
      <gco:CharacterString>info@openwork.nz
      </gco:CharacterString>
    </cit:electronicMailAddress>
  </cit:CI_Address>
</cit:address>
</cit:CI_Contact>
</cit:contactInfo>
</cit:CI_Organisation>
</cit:party>
</cit:CI_Responsibility>
</cit:citedResponsibleParty>
<cit:citedResponsibleParty>
  <cit:CI_Responsibility>
    <cit:role>
      <cit:CI_RoleCode
        codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#CI_RoleCode"
        codeListValue="publisher"/>
    </cit:role>
    <cit:party>
      <cit:CI_Individual>
        <cit:name>
          <gco:CharacterString>Byron Cochrane
          </gco:CharacterString>
        </cit:name>
        <cit:contactInfo>
          <cit:CI_Contact>
            <cit:address>
              <cit:CI_Address>
                <cit:electronicMailAddress>
                  <gco:CharacterString>byron@openwork.nz
                  </gco:CharacterString>
                </cit:electronicMailAddress>
              </cit:CI_Address>
            </cit:address>
          </cit:CI_Contact>
        </cit:contactInfo>
      </cit:CI_Individual>
    </cit:party>
  </cit:CI_Responsibility>
</cit:citedResponsibleParty>
```

```
</cit:CI_Contact>
</cit:contactInfo>
</cit:CI_Individual>
</cit:party>
</cit:CI_Responsibility>
</cit:citedResponsibleParty>
</cit:CI_Citation>
</mri:citation>
.....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
.....
</mdb:MD_Metadata>
```

Service Resource example

```
<mdb:MD_Metadata>
.....
<mdb:identificationInfo>
<srv:SV_ServiceIdentification>
<mri:citation>
<cit:CI_Citation>
<cit:title>
<gco:CharacterString>Sample service metadata 2020-05-28</gco:CharacterString>
</cit:title>
<cit:date>
<cit:CI_Date>
<cit:date>
<gco:DateTime>2019-09-01T00:00:00</gco:DateTime>
</cit:date>
<cit:dateType>
<cit:CI_DateTypeCode codeList="http://standards.iso.org/iso/19115/resources/CodeListValueTable.xml" codeListValue="creation"/>
</cit:dateType>
</cit:CI_Date>
</cit:date>
<cit:date>
<cit:CI_Date>
<cit:date>
```

```
<gco:DateTime>2019-12-01T00:00:00</gco:DateTime>
</cit:date>
<cit:dateType>
<cit:CI_DateTypeCode codeList="http://standards.iso.org/iso/19115/resources/Codelists.xml"
codeListValue="revision"/>
</cit:dateType>
</cit:CI_Date>
</cit:date>
<cit:edition>
<gco:CharacterString>2nd Revision</gco:CharacterString>
</cit:edition>
<cit:editionDate>
<gco:DateTime>2019-12-01T00:00:00</gco:DateTime>
</cit:editionDate>
<cit:identifier>
<mcc:MD_Identifier>
<mcc:code>
<gcx:Anchor xlink:href="https://my.webite.io/cgi-bin/wfs-map-site" xlink:type="simple"/>
</mcc:code>
</mcc:MD_Identifier>
</cit:identifier>
<cit:citedResponsibleParty>
<cit:CI_Responsibility>
<cit:role>
<cit:CI_RoleCode codeList="http://standards.iso.org/iso/19115/resources/Codelists.xml"
codeListValue="contributor"/>
</cit:role>
<cit:party>
<cit:CI_Organisation>
<cit:name>
<gco:CharacterString>OpenWork Ltd</gco:CharacterString>
</cit:name>
<cit:contactInfo>
<cit:CI_Contact>
<cit:address>
<cit:CI_Address>
<cit:electronicMailAddress>
<gco:CharacterString>info@openwork.nz</gco:CharacterString>
```

```
        </cit:electronicMailAddress>
      </cit:CI_Address>
    </cit:address>
  </cit:CI_Contact>
</cit:contactInfo>
</cit:CI_Organisation>
</cit:party>
</cit:CI_Responsibility>
</cit:citedResponsibleParty>
<cit:citedResponsibleParty>
  <cit:CI_Responsibility>
    <cit:role>
      <cit:CI_RoleCode codeList="http://standards.iso.org/iso/19115/resources/Codelist"
                      codeListValue="publisher"/>
    </cit:role>
    <cit:party>
      <cit:CI_Organisation>
        <cit:name>
          <gco:CharacterString>ICSM MDWG</gco:CharacterString>
        </cit:name>
        <cit:contactInfo>
          <cit:CI_Contact>
            <cit:address>
              <cit:CI_Address>
                <cit:electronicMailAddress>
                  <gco:CharacterString>mdwg@icsm-au.org</gco:CharacterString>
                </cit:electronicMailAddress>
              </cit:CI_Address>
            </cit:address>
          </cit:CI_Contact>
        </cit:contactInfo>
      </cit:CI_Organisation>
    </cit:party>
  </cit:CI_Responsibility>
</cit:citedResponsibleParty>
<cit:onlineResource>
  <cit:CI_OnlineResource>
    <cit:linkage>
```

```
<gco:CharacterString>https://my.webite.io/</gco:CharacterString>
</cit:linkage>
<cit:protocol gco:nilReason="missing">
<gco:CharacterString/>
</cit:protocol>
<cit:name>
<gco:CharacterString>OWL WFS Sample site</gco:CharacterString>
</cit:name>
<cit:description>
<gco:CharacterString>Landing page for Spatial Service</gco:CharacterString>
</cit:description>
<cit:function>
<cit:CI_OnLineFunctionCode codeList="http://standards.iso.org/iso/19115/resource"
                               codeListValue="" />
</cit:function>
</cit:CI_OnlineResource>
</cit:onlineResource>
</cit:CI_Citation>
</mri:citation>
.....
</mri:SV_ServiceIdentification>
</mdb:identificationInfo>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

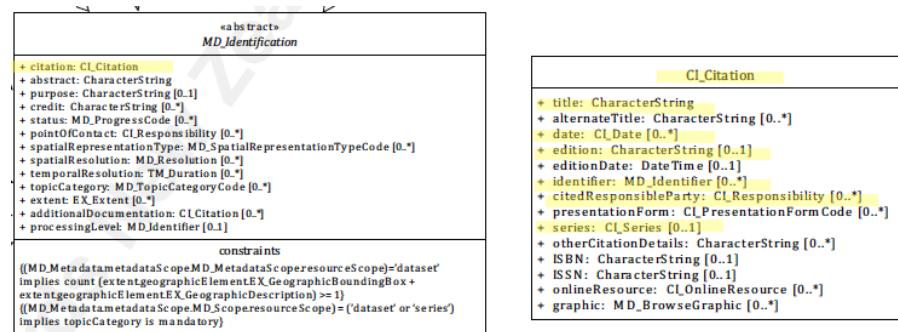


Figure 23: ResourceCitation

Resource Title ★★★★★

The most important component of the Resource Citation is the ***title*** element. To easily communicate about a resource and at least locally differentiate it from others, it is useful that the resource has a common name. This name is captured in the Resource Citation ***title*** element.

Element Name	<i>title</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification.citation>CI_Citation</i>
Class/Type	<i>characterString</i>
Governance	<i>Common ICSM, Agency, Domain</i>
Purpose	<i>Discovery, Identification</i>
Audience	machine resource - ★ general - ★★★★★ resource manager - ★★★ specialist - ★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	****

Definition

The most common useful name by which the resource is known.

ISO Obligation

- There must be one and only one [1..1] *title* element for the cited resource in the *MD_Identification.citation* package in a metadata record of type *character string*. The resource may be of type Data *MD_DataIdentification* or of type Service *[SV_ServiceIdentification].

Discussion

The value of the title field should be the most common name by which the resource is known by your largest perceived audience. It should be relatively unique or made so by the inclusion of expanded title elements such as edition numbers or agency name.

There can be multiple alternate titles captured for a resource in the sibling element *alternateTitle*. These should be populated with other known names or variations of the name.

ICSM Recommendations

Therefore - there must be one title given for a resource. The value of the title field should be the most common name by which the resource is known by your largest perceived audience. It should be relatively unique or made so by the inclusion of expanded title elements such as edition numbers or agency name.

Use the sibling element `alternateTitle` to capture other names by which the resource may be known. Index both `title` and `alternateTitle` in the same index to increase the likelihood that the resource may be found by the title that others may know it.

If the title is not a common language name, at least one alternate title should be common language title such as a layperson may identify it.

ICSM Good Practice

- All metadata records must have the element `MD_Metadata.identificationInfo>MD_Identification.citation>CI_Citation`. populated with the most common useful name by which the resource is known.

Also Consider

- **alternateTitle** - (`type - charStr`) [0..*] Sibling to `title`. A short name or another language name by which the cited information is known. Example: DCW as an alternative title for Digital Chart of the World. Recommended whenever there are alternate names commonly in use.
- **ResourceCitation** - parent to this element

Crosswalk considerations

Dublin core / CKAN / data.gov.au

Maps to `title`

DCAT

Maps to `dct.title`

RIF-CS

Maps to `Title`

Examples

Example Current Use

ABARES “2.5M Topographical Series 1998 MAPDATA TOPO_2.5M Scale 1:2.5 Million”

GA “Geomorphic features of the Antarctic and Southern Ocean 2012”

Data.gov.au Location of Medicare Offices

XML

```
<mdb:MD_Metadata>
  ...
    <mdb:identificationInfo>
      <mri:MD_DataIdentification>
        <mri:citation>
          <cit:CI_Citation>
            <cit:title>
              <gco:CharacterString>OpenWork geographical data<
              /gco:CharacterString>
            </cit:title>
            <cit:alternateTitle>
              <gco:CharacterString>geodata by OpenWork</gco:CharacterString>
            </cit:alternateTitle>
            ...
          </cit:CI_Citation>
        </mri:citation>
        ...
      </mri:MD_DataIdentification>
    </mdb:identificationInfo>
  ...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

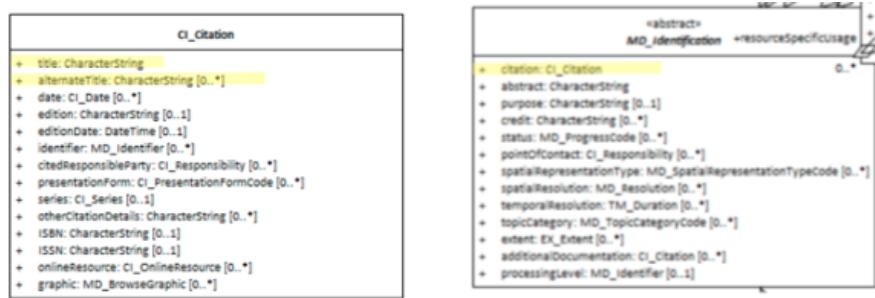


Figure 24: title

Resource Identifier ★★★★

An important component of the Resource Citation is the resource identification element. Similar to the Metadata Identifier, this element holds a code that uniquely identifies the resource and differentiates it from all others. With this, machines and humans can differentiate, reference and link to the resource without ambiguity

Element Name	<i>identifier</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification>CI_Citation</i>
Class/Type	<i>MD_Identifier</i>
Governance	<i>Common ICSM, Agency, Domain</i>
Purpose	<i>Linkage, Identification</i>
Audience	machine resource - ★★★★ general - ★ resource manager - ★★★ specialist - ★★
Metadata type	<i>administrative</i>
ICSM Level of Agreement	****

Definition

Alphanumeric identifier uniquely identifying this cited resource.

ISO Obligation

- This is an ISO optional element. There may be zero or many [0..*] *identifier* entries for the cited resource in the *MD_DataIdentification.citation* package of class *MD_Identifier* in a metadata record. The resource may be of type data *MD_DataIdentification* or of type service *SV_ServiceIdentification*.

Discussion

The Resource Identifier is an identifier for the dataset, not the metadata record. The Metadata Identifier provides an identifier for the metadata. A failure to distinguish between these two elements - especially as they apply to crosswalk between standards such as Dublin Core leads to a great deal of confusion and misunderstanding.

Commonly, standards like Dublin Core do not make a distinction between the metadata identifier and the resource identifier. Emerging practice, such as Google data search beta,

suggests that the distinction is useful. Harvested metadata should point to a source metadata record - a ‘point of truth’ or the resource from which the record was harvested. Using this logic, the resource identifier URI would not need to be harvested by a high-level catalogue such as data.gov.au.

A common practice in GA and ABARES is for this identifier to be the same as the metadata identifier. In these cases, it can be said the authoritative metadata serves as the landing page for the data resource.

In the case where a resource may have multiple identifiers, additional instances of this element can be created. The **description** element must be populated in such situations to distinguish the meaning of the different identifiers.

ICSM Recommendations

Therefore - it is recommended that this element be populated, preferably once, but more often if there are multiple identifier systems for the same resource. In the case of multiple identifiers, the **description** element must be populated in such situations to distinguish the meaning of the different identifiers. **Code** must be populated in all records and it is recommended that **codeSpace** be populated as well.

Common practice has been to populate this field that is the same as or resolves to the metadata record itself. In this case, the metadata can be said to be the landing page for the resource.

If the metadata record is for a resource that contains more than one dataset, a best practice way to document that in the metadata needs be developed. This case may better be addressed through related metadata records.

Development of URI naming conventions to describe how the reference to the resource and the reference to metadata for that resource would be useful. This would allow easy discovery of not only the data from the metadata but solve the often more difficult problem of discovery of the metadata for a given dataset.

Recommended Sub-Elements

Follow the general guidance for **MD_Identifier** with emphasis on the following elements:

- **code** - (*type - charstr*) [1..1] **Mandatory** An alphanumeric value identifying an instance in the namespace.
- **codespace** - (*type - charstr*) [0..1] An optional but recommended namespace in which the code is valid. Ideally a URL path by which, when combined with the

UUID, the full path to the resource landing page is provided.

- **description** - (*type - charstr*) [0..1] An optional but recommended natural language description of the meaning of the code value. Usually prepopulated in the metadata template.

Also Consider

- **onlineResource** - (MD_Distribution.transferOptions>MD_DigitalTransferOptions.online) is used to provide online linkage to the resource.
- **MetadataIdentifier** - is the preferred element to be used to provide linkage to the metadata record.
- **Resource Citation** - parent to this element.

Crosswalk considerations

Dublin core / CKAN / data.gov.au

Maps to **identifier** > Note BC 18-7 - may relate to issues involving confusion between metadata identifiers and resource identifiers in DC and other metadata systems.

DCAT

Maps to **dcat:identifier**

RIF-CS

Maps to **Identifier**

Examples

ABARES

MD_Identifier > code : 942d6f4e-17b0-41fd-a623-c2c78d107e6d **MD_Identifier > codespace** : UUID **MD_Identifier > description** : The UUID for this resource, its citation and its metadata

GA

MD_Identifier > code : <http://pid.geoscience.gov.au/dataset/ga/102441> **MD_Identifier > codespace** : Geoscience Australia Persistent Identifier

data.gov.au

URN:UUID (example 559708e5-480e-4f94-8429-c49571e82761)

XML

```
<mdb:MD_Metadata>
  ....
  <mdb:identificationInfo>
    <mri:MD_DataIdentification>
      ....
      <mri:citation>
        <cit:CI_Citation>
          ....
          <cit:identifier>
            <mcc:MD_Identifier>
              <mcc:code>
                <gco:CharacterString>9547e07e-6a15-403b-8b19-488778fe0cf0
                </gco:CharacterString>
              </mcc:code>
              <mcc:codeSpace>
                <gco:CharacterString>
                  http://202.49.243.69:8080/geonetwork/srv/eng/metadata/
                </gco:CharacterString>
              </mcc:codeSpace>
            </mcc:MD_Identifier>
          </cit:identifier>
          ....
        </cit:CI_Citation>
      </mri:citation>
      ....
    </mri:MD_DataIdentification>
  </mdb:identificationInfo>
  ....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

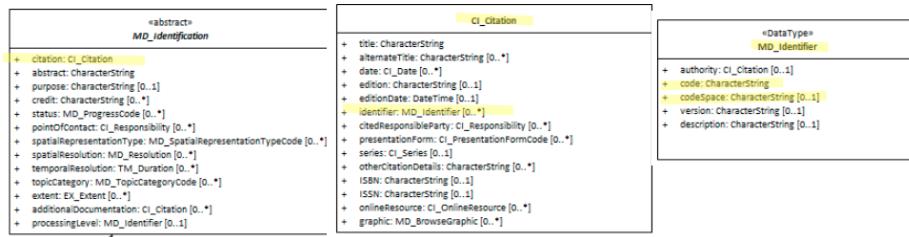


Figure 25: resourceIdentifier

Resource Reference Date ★★★★★

To manage resource and notification systems such as giving updates to users it is useful to include in our metadata temporal information relating to resource creation, publication, revision, etc.

Element Name	<i>date</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identificationcitation>CI_Citation</i>
Class/Type	<i>CI_Date</i>
Governance	<i>Agency, Domain</i>
Purpose	<i>Discovery, Identification</i>
Audience	machine resource - ★★★ general - ★★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	***

Definition

A named and dated event associated with the cited resource (in ISO 8601 format)

ISO Obligation

- There can be zero to many [0..*] *resource reference date* entries for the cited resource in the *MD_Identification.citation* package of class *CI_Date* in a metadata record. One of these must be of *dateType creation*. The resource may be of type Data *MD_DataIdentification* or of type Service *[*SV_ServiceIdentification*].

Discussion

There should be at least one instance of a resource reference date in a metadata record (*dateType - creation*), but there should be multiple - including *publication* and as many *lastUpdate* entries as needed

The *CI_DateType* CodeList contains 16 values. Which values are of most import needs further discussion. The ability to crosswalk easily with CKAN and DCAT is of high concern. These external catalogues commonly have a single date field. Which *dateType* we map to this field is of interest in discussions regarding the recommended *dateTypes* used.

Relation of Metadata dateInfo to resource reference date needs to be discussed. The resource reference date is documented as the date that should be used for the discovery of resources other than services. (For services MD_Metadata.identificationInfo>SV_ServiceIdentification.citation>CI_Citation.date is used.)

When does the metadata dataInfo require updating? For instance, is it okay to not update the metadata dataInfo when the resource reference date is updated if nothing else has changed? Our good practice guide should address these and related issues.

Recommendations

Therefore - to provide an idea of the age, validity and other time dependant properties of a resource, it is important to capture the important events that happened or will happen to a particular resource in the resource reference date element. One of these important events must be of dateType “creation”. Creation is a significant date in regards to copyright. Other important date types are “publication” and “lastUpdate”.

Recommended Sub-Elements

It is recommended that Resource Date include -

- **date** - (Mandatory) the reference DateTime for the metadata record.
- **dateType** - Highly recommended. There should be multiple entries for the resource reference date in a metadata record. These should include dateType entries for:
- **Creation date** - This is important for intellectual property and other reasons
- **Publication date** - Is the most common date type captured by an agency
- **Update date** - Allows notifications and resource management. All updates to metadata should also include the date of last revision to the metadata. This can be an automated process.

This element should be updated in a consistent yet to be agreed upon manner. We recommend GeoNetwork’s current approach. GeoNetwork updates the **revision date** for the metadata record automatically on every save. This supports systems such as notifications and harvesting regimes that rely on the capture of the date that a metadata record was last modified.

Also Consider

- **Metadata Date** - for dates related to the metadata record itself and not the cited resource
- **CI_Date** - for general information about the class CI_Date

- **Resource Citation** - parent to this element

Other discussion

Date and DateTime: When is it okay to use Date as opposed to DateTime?

DCAT: encoded using the relevant ISO 8601 Date and Time compliant string [DATETIME] and typed using the appropriate XML Schema datatype [XMLSHEMA11-2]

Crosswalk considerations

Dublin core / CKAN / data.gov.au

Maps to date (publication, update)

DCAT

Maps to dct:issued* and *dct:modified

RIF-CS

Maps to Date

Examples

XML

```
</mdb:MD_Metadata>
....
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    <mri:citation>
      <cit:CI_Citation>
        ....
        <cit:date>
          <cit:CI_Date>
            <cit:date>
              <gco:Date>2018-06-11</gco:Date>
            </cit:date>
            <cit:dateType>
              <cit:CI_DateTypeCode>
```

```
    codeList="https://schemas.isotc211.org/19115/resources
    /CodeList/cat/codelists.xml#CI_DateTypeCode"
    codeListValue="creation"/>
  </cit:dateType>
</cit:CI_Date>
</cit:date>
<cit:date>
  <cit:CI_Date>
    <cit:date>
      <gco:Date>2019-06-11</gco:Date>
    </cit:date>
    <cit:dateType>
      <cit:CI_DateTypeCode
        codeList="https://schemas.isotc211.org/19115/resources
        /CodeList/cat/codelists.xml#CI_DateTypeCode"
        codeListValue="lastUpdate"/>
    </cit:dateType>
  </cit:CI_Date>
</cit:date>
.....
</cit:CI_Citation>
</mri:citation>
.....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

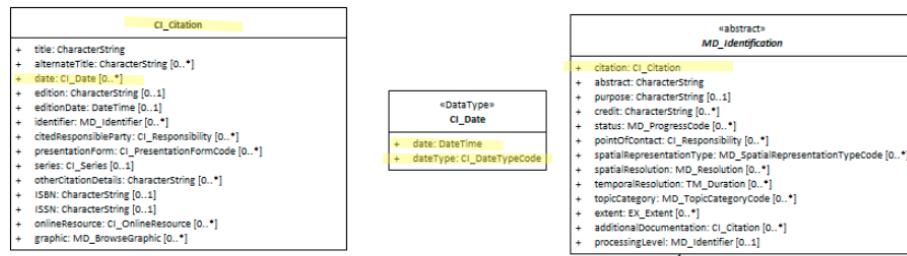


Figure 26: resourceDate

Resource Edition ★★★★

For resources that change over time, it is important to users and resource managers that the edition changes be tracked in the metadata. This informs the user if they have the particular edition they need for their purpose.

Element Name	<i>edition</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification.citation>CI_Citation</i>
Class/Type	<i>characterString</i>
Governance	<i>Common ICSM, Agency, Domain</i>
Purpose	<i>Discovery, Identification</i>
Audience	machine resource - ★★★ general - ★★★★ resource manager - ★★★★ specialist - ★★
Metadata type	<i>descriptive, administrative</i>
ICSM Level of Agreement	****

- **Path** - *MD_Metadata.identificationInfo>MD_DataIdentification.citation>CI_Citation.edition*
- **Governance** - *Agency, Domain*
- **Purpose** - *Discovery, identification*
- **Audience** -
- machine resource - ★★★
- general - ★★★★
- data manager - ★★★
- specialist - ★★
- **Metadata type** - *descriptive, administrative*
- **ICSM Level of Agreement** - ****

Definition

Version of the cited resource.

ISO Obligation

- There can be at most one [0..1] *edition* entries for the cited resource in the *MD_Identification.citation* package in a metadata record. These are of type *characterString*. The resource may be of type Data *MD_DataIdentification* or of type Service *[*SV_ServiceIdentification*]

Discussion

The [0..1] cardinality of `edition` and `editionDate` means that release of a new edition of a resource requires the creation of a new metadata record. When such is the case, these two elements should be populated. The population of the `edition` element mandates the population of the `editionDate` element.

This element should be used wherever there's a usable edition/version as it is invaluable to know where this resource fits into a sequence. As "version" is often synonymous with "edition", it is advised that this field also be used for new tracked versions of resources.

Recommendations

Therefore - when a new edition of a resource is created, a new metadata record needs to be created. This new metadata record needs the *resource edition* element populated with the edition name or identifier. When such is the case, the sibling `CI_Citation.editionDate` field should also be populated.

The `edition` element should be populated with the edition name.

This element should be updated in a consistent yet to be agreed upon manner within an agency.

Recommended Sibling Elements

- **editionDate** - (*type - DateTime*)[0..1] date of the edition. Should be populated with the date of the publication of the new edition.

Also Consider

- **Resource Date** - and `dateType` field.
- **Metadata Date** - and `dateType` field.
- **Resource Citation** - parent to this element

Outstanding Issues

Updates vs. Editions As discussed, new editions require a new metadata record. Updates to an existing resource do not. Do we need some guidance on when some change warrants a new edition rather than an update? Or should this be at the discretion of the agency or domain?

Crosswalk considerations

DCAT

Maps to dct:confirmsTo

RIF-CS

Maps to Version

Examples

XML

```
</mdb:MD_Metadata>
....
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    <mri:citation>
      <cit:CI_Citation>
        ....
        <cit:edition>
          <gco:CharacterString>2nd new and improved edition
          </gco:CharacterString>
        </cit:edition>
        <cit:editionDate>
          <gco:Date>2019-06-11</gco:Date>
        </cit:editionDate>
        ....
      </cit:CI_Citation>
    </mri:citation>
    ....
  </mri:MD_DataIdentification>
</mdb:identificationInfo>
....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

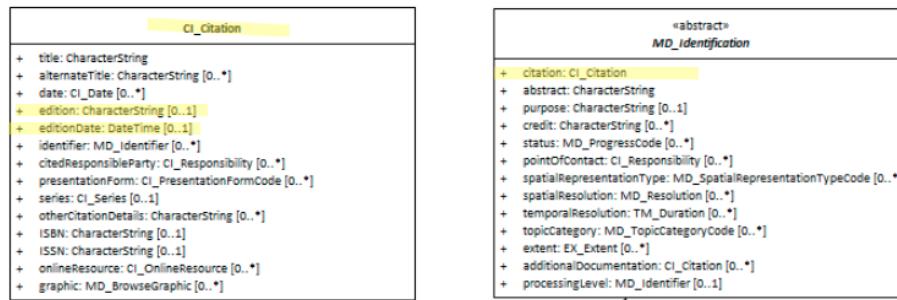


Figure 27: edition

Resource Series ★★★

Very often, resources identified in a catalogue are part of a larger body of work. When this is the case it is useful to document such a relation in the metadata. The resource metadata element **series** is designed for this purpose.

- **Path** - *MD_Metadata.identificationInfo>MD_DataIdentification.citation>CI_Citation.series*
- **Governance** - Agency, Domain
- **Purpose** - Discovery, identification
- **Audience** -
 - machine resource - ***
 - general - *****
 - data manager - ****
 - specialist - ***
- **Metadata type** - descriptive
- **ICSM Level of Agreement** - **

Definition

Information about the series, or aggregate resource, of which the resource is a part.

ISO Obligation

- There may be one [0..1] *series* package for the cited resource in the *MD_DataIdentification.citation* package of class *CI_Series* in a metadata record.

ICSM Good Practice

- This element should be populated in all metadata records where the resource is one part of a series.

Recommended Sub Elements From class *CI_Series*

- **name** - (*type* - *charStr*) [0..1] name of the series, or aggregate resource, of which the resource is a part
- **issueIdentification** - (*type* - *charStr*) [0..1] information identifying the issue of the series
- **page** - (*type* - *charStr*) [0..1] Mostly not recommended as not common. Details on which pages of the publication the article was published

Discussion

The content of all three *CI_Series* elements are free text and optional. How one would link back to the series metadata is unclear. It could be captured in “Name” as a resolvable URI. Perhaps through the Parent Metadata element? What is the relation between “Series” and “Parent Metadata”

It is conceivable that there may be more than one series to which a dataset may belong. The dataset may be part of a time series while also part of a thematic series. But, by the standard, a resource may only belong to one cited series. Guidance needs to be developed for users on this topic.

Recommendations

Series has proven to be a difficult element to pin down for a number of reasons. Below is a list of issues that should be included in good practice guidance on this element:

- Definition of this element needs to be expanded to include a definition of “series” in our context.
- When a cardinality of zero to one, we need this well defined since it is conceivable that a resource may be part of multiple series depending on the definition and post of view.
- Good practices of how one captures links to series metadata needs development.
- The relation (if any) between series and parent metadata needs discussion.
- The use of the three *CI_Series* elements are not well defined for the spatial context in which they reside. Further discussion is recommended.

Until these topics are resolved I would not recommend the inclusion of series as recommended elements. If series information is to be captured, the minimum information needed would be *CI_Series* > name.

It may be better to use other elements such as *parentMetadata* or *associatedResource* to capture series type relationships.

Crosswalk considerations

DCAT Maps to `prov:wasMemberOf`

RIF-CS Maps to Context

Also Consider

- **Parent Metadata** - hierarchical relations of metadata records
- **AssociatedResource** - information about aggregate data and related resources
- **Resource Citation** - parent to this element

Examples

XML

```
<mdb:MD_Metadata>
  ...
    <mdb:identificationInfo>
      <mri:MD_DataIdentification>
        ...
          <mri:citation>
            <cit:CI_Citation>
              ...
              <cit:series>
                <cit:CI_Series>
                  <cit:name>
                    <gco:CharacterString>OpenWork GeoData Series
                    </gco:CharacterString>
                  </cit:name>
                  <cit:issueIdentification gco:nilReason="missing">
                    <gco:CharacterString/>
                  </cit:issueIdentification>
                </cit:CI_Series>
              </cit:series>
              ...
            </cit:CI_Citation>
          </mri:citation>
          ...
        </mri:MD_DataIdentification>
      </mdb:identificationInfo>
    ...
  </mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

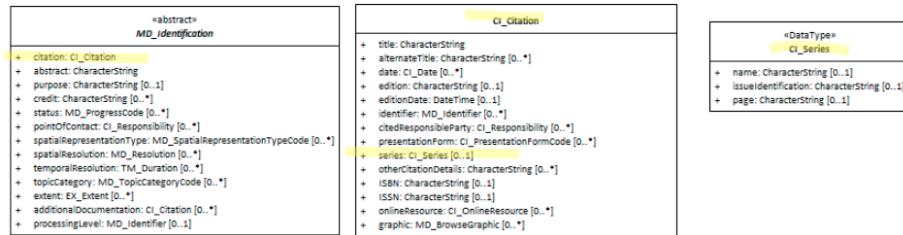


Figure 28: dataCitationSeries

Resource Responsible Party ★★★★★

Contact information for the parties responsible for various aspects of a resource is useful to users and managers of the resource and improves the ability of these parties to communicate. Some of the most basic users needs of a cited resource are to know who to contact for more information for information about different aspects of the resource. In ISO 19115-1 we capture this information in MD_identification.citation.

Element Name	<i>citedResponsibleParties</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identificationcitation>CI_Citation</i>
Class/Type	<i>CI_Responsibility</i>
Governance	<i>Common ICSM, Agency, Domain</i>
Purpose	<i>Discovery, Identification, Communication</i>
Audience	machine resource - *** general - ***** resource manager - **** specialist - ***
Metadata type	<i>descriptive, administrative</i>
ICSM Level of Agreement	****

Definition

Name, role, and instructions for contacting the organisation, role and/or individual responsible for the cited resource.

ISO Obligation

- There may be zero or more [0..*] *citedResponsibleParties* provided for the cited resource in the *MD_Identification.citation* package. These will be of class *CI_Responsibility*. The resource may be of type Data *MD_DataIdentification* or of type Service *[*SV_ServiceIdentification*]

Discussion

This element captures contact information for those parties responsible for various aspects of the cited resource. It does not refer to the party responsible for the metadata record itself. General contact information for the resource should be captured in Resource Point of Contact.

There may be multiple responsible parties who hold different responsibilities. The responsibility of each party is captured in the element CI_Responsibility > role. Entries for “author” and “publisher” are recommended.

ICSM Recommendations

Therefore - to meet ICSM good practice, in all metadata records, contact information should be given for the parties responsible for different aspects of the creation, management and maintenance of the resource. Entries for “author” and “publisher” should be provided. In addition, for minimal conformity, name (of organisation preferred), positionName and electronicMailAddress should also be populated. The use of the new partyIdentifier element added in the 2018 amendment to the standard is encouraged by all parties.

This element should be populated in all metadata records with a minimum of role, name (of organisation preferred), positionName and electronicMailAddress.

Recommended Sub-Elements

Follow the general guidelines for CI_Responsibility.

- Recommended role values should include (but not be limited to) include “Point of Contact” as well as an entry for “publisher”, “author” or “publisher”.

Also Consider

- **Resource Point of Contact** - contact information for the recommended party to contact about the resource
- **Metadata Responsible Party** - contact information for the recommended party to contact about the metadata
- **DistributionInfo** - includes distributor contact information
- **Citation** - the parent package of which resource responsible party is a part
- **Resource Citation** - parent to this element

Crosswalk considerations

ISO19139

See discussion at CI_Responsibility

Dublin core / CKAN / data.gov.au

Maps to publisher

DCAT

Maps to dct:publisher

RIF-CS

Maps to Publisher

Examples

XML

```
<mdb:MD_Metadata>
....
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    ...
      <mri:citation>
        <cit:CI_Citation>
          <cit:title>
            <gco:CharacterString>OpenWork geographical data
            </gco:CharacterString>
          </cit:title>
          <cit:date>
            <cit:CI_Date>
              <cit:date>
                <gco:Date>2019-07-18</gco:Date>
              </cit:date>
              <cit:dateType>
                <cit:CI_DateTypeCode
                  codeList="https://schemas.isotc211.org/19115/resources
                  /Codelist/cat/codelists.xml#CI_DateTypeCode"
                  codeListValue="creation"/>
              </cit:dateType>
            </cit:CI_Date>
          </cit:date>
        <cit:date>
```

```
<cit:CI_Date>
  <cit:date>
    <gco:Date>2019-07-18</gco:Date>
  </cit:date>
  <cit:dateType>
    <cit:CI_DateTypeCode
      codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#CI_DateTypeCode"
      codeListValue="publication"/>
  </cit:dateType>
</cit:CI_Date>
</cit:date>
<cit:edition>
  <gco:CharacterString>Version 0.1</gco:CharacterString>
</cit:edition>
<cit:editionDate>
  <gco:Date>2019-07-18</gco:Date>
</cit:editionDate>
<cit:identifier>
  <mcc:MD_Identifier>
    <mcc:code>
      <gco:CharacterString>9547e07e-6a15-403b-8b19-488778fe0cf0
      </gco:CharacterString>
    </mcc:code>
    <mcc:codeSpace>
      <gco:CharacterString>
        http://202.49.243.69:8080/geonetwork/srv/eng/metadata/
      </gco:CharacterString>
    </mcc:codeSpace>
  </mcc:MD_Identifier>
</cit:identifier>
<cit:citedResponsibleParty>
  <cit:CI_Responsibility>
    <cit:role>
      <cit:CI_RoleCode
        codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#CI_RoleCode"
        codeListValue="author"/>
```

```
</cit:role>
<cit:party>
  <cit:CI_Organisation>
    <cit:name>
      <gco:CharacterString>OpenWork Ltd
      </gco:CharacterString>
    </cit:name>
    <cit:contactInfo>
      <cit:CI_Contact>
        <cit:address>
          <cit:CI_Address>
            <cit:electronicMailAddress>
              <gco:CharacterString>info@openwork.nz
              </gco:CharacterString>
            </cit:electronicMailAddress>
          </cit:CI_Address>
        </cit:address>
      </cit:CI_Contact>
    </cit:contactInfo>
  </cit:CI_Organisation>
</cit:party>
<cit:CI_Responsibility>
</cit:citedResponsibleParty>
<cit:citedResponsibleParty>
  <cit:CI_Responsibility>
    <cit:role>
      <cit:CI_RoleCode
        codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#CI_RoleCode"
        codeListValue="publisher"/>
    </cit:role>
    <ci
      t:party>
      <cit:CI_Individual>
        <cit:name>
          <gco:CharacterString>Byron Cochrane
          </gco:CharacterString>
        </cit:name>
```

```
<cit:contactInfo>
  <cit:CI_Contact>
    <cit:address>
      <cit:CI_Address>
        <cit:electronicMailAddress>
          <gco:CharacterString>byron@openwork.nz
          </gco:CharacterString>
        </cit:electronicMailAddress>
      </cit:CI_Address>
    </cit:address>
  </cit:CI_Contact>
</cit:contactInfo>
</cit:CI_Individual>
</cit:party>
</cit:CI_Responsibility>
</cit:citedResponsibleParty>
</cit:CI_Citation>
</mri:citation>
...
</mri:MD_DataIdentification>
</mdb:identificationInfo>
...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

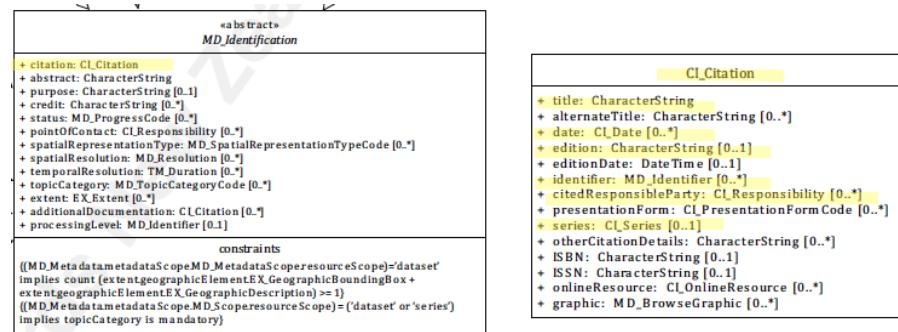


Figure 29: ResourceCitation

Keywords ★★★★☆

Keywords are the important ideas and topics that summarise and define what your resource is about. In most search engines, these are indexed and typically normalised to resemble the base word in order to capture variations. Keywords are useful in discovering and organising resources.

- **Path** - *MD_Metadata.identificationInfo>MD_DataIdentification.descriptiveKeywords*
- **Governance** - *Common ICSM, Agency, Domain*
- **Primary use** - *Discovery, Data management*
- **Audience** -
 - machine resource - *****
 - general - *****
 - data manager - *****
 - specialist - *****
- **Metadata type** - *descriptive*
- *ICSM Level of Agreement* - ***

Definition -

Words or phrases describing the resource to be indexed and searched.

ISO Obligation

- There can be zero or many [0..*] descriptive keywords for the cited resource in the *MD_DataIdentification* package of class *MD_Keywords* in a metadata record.

ICSM Good Practice

- There should be multiple keywords selected from a referenced thesaurus present in a metadata record for a spatial resource.

Recommended Sub-Elements From class *MD_Keywords*

- **keyword** - *(type - charStr) Mandatory, preferably chosen from a thesaurus
- **type** - (*codelist - MD_KeywordTypeCode*) highly recommended - 15 options (substantial increase from iso19139)
 - *discipline* - keyword identifies a branch of instruction or specialized learning
 - *place* - keyword identifies a location

- *stratum* - keyword identifies the layer(s) of any deposited substance or levels within an ordered system
- *temporal* - keyword identifies a time period related to the dataset
- *theme* - keyword identifies a particular subject or topic
- *dataCentre* - keyword identifies a repository or archive that manages and distributes data
- *featureType* - keyword identifies a resource containing or about a collection of feature instances with common characteristics
- *instrument* - keyword identifies a device used to measure or compare physical properties
- *platform* - keyword identifies a structure upon which an instrument is mounted
- *process* - keyword identifies a series of actions or natural occurrences
- *product* - keyword identifies a type of product
- *project* - keyword identifies an endeavour undertaken to create or modify a product or service
- *service* - keyword identifies an activity carried out by one party for the benefit of another
- *subTopicCategory* - refinement of a topic category for the purpose of geographic data classification
 - *taxon* - keyword identifies a taxonomy of the resource
- **thesaurusName** - (*class* - *CI_Citation*) highly recommended if thesaurus is used.
Must include at minimum the title of the thesaurus.
- **keywordClass** - (*class* - *MD_KeywordClass*) recommended for enhanced ontology support. Includes the following subelements
 - **className** - (*type* - *charStr*) [1..1] Mandatory for *MD_KeywordClass*. A character string to label the keyword category in natural language
 - **conceptIdentifier** - (*type* - *URI*) [0..1] Recommended. URI of concept in ontology specified by the ontology attribute; this concept is labeled by the

className: CharacterString.

- **ontology** - (*class - CI_Citation*) [1..1] Mandatory for MD_KeywordClass. A reference that binds the keyword class to a formal conceptualisation of a knowledge domain for use in semantic processing. NOTE: Keywords in the associated MD_Keywords keyword list must be within the scope of this ontology

Discussion

Keywords are a foundational technology for organising and discovering resources. ISO19115-1 provides powerful tools to expand on these capabilities but these tools are most often very lightly used. The use of thesauri to normalise and standardise terms helps greatly. Ontologies and registries in which the definitions of these terms may be stored and linked help ensure consistent use and understanding. In Australia several agencies have developed and implemented thesauri and mandated their use. These include:

- "*ABS Field of Research* - The Australian and New Zealand Standard Research Classification (ANZSRC), 2008 defined field or fields of research relevant to the dataset.
- *ABARES Keywords* - (Need Definition)
- *AGIFT Keyword* - Australian Governments' Interactive Functions Thesaurus (AGIFT) that describes the high-level business functions carried out across Commonwealth, state and local governments in Australia.
- *GCMD Keywords* - The Global Change Master Directory (GCMD) Keywords are a hierarchical set of controlled Earth Science vocabularies that help ensure Earth science data, services, and variables are described in a consistent and comprehensive manner and allow for the precise searching of metadata and subsequent retrieval of data, services, and variables.

NOTE - When the resource described is a service, one instance of MD_Keyword should refer to the service taxonomy defined in ISO 19119.

Ontology support with keywordClass A keywordClass role is an association of a MD_Keywords instance with a MD_KeywordClass used to provide user-defined categorisation of groups of keywords that extend or are orthogonal to the standardised KeywordTypeCodes and are associated with an ontology that allows additional semantic query processing. The thesaurus citation specifies a collection of instances from some ontology, but is not an ontology. It might be a list of places that include rivers, mountains, counties and cities. There might be a Laconte county, the city of Laconte, the Laconte River, and Mt. Laconte; when searching it is useful for the user to be able to restrict

the search to only rivers. the addition of keywordClass provides support for this functionality.

Outstanding Issues

CORE ISSUE: Current practice in most agencies in use of keywords is not good. Thesauri are too often not used. Comma delimited list are common in some shops where others have separate entries. Good practice guidance development and training is needed and should be a special focus area.

Thesaurus citation: What is important to capture beside the mandatory title element in the citation of a thesaurus?

Tech issue needs fix - GN Thesaurus builder References the old Keyword-TypeCode list

Recommendations

Therefore - it is highly recommended that the metadata for spatial resources contains as many keywords as needed to provide ease of discovery and improved data management practices. Capture keywords for multiple audiences, general, domain or agency specific to aid the different users of the resource. However, excessive use of keywords that target minor aspects of a resource should be avoided. Consider providing a limit to the number of keywords used and focus on those of most importance.

It is recommended that all keywords have a topic category assigned. These must be sourced from the 15 values in the MD_KeywordTypeCode. Helps understand the keywords in context and further categorise resources.

In addition, while free text keywords are allowed, it is recommended that well managed thesauri be used to increase consistency of how keywords are used and understood. Thesauri should be used whenever possible, and where they do not exist they should be created.

The new keywordClass package should be explored to allow the greater use of semantic principles in search and data management.

Crosswalk considerations

ISO19139 MD_KeywordClass was added to allow further categorisation of keywords

Dublin core / CKAN / data.gov.au Mapping not yet discussed.

DCAT ISO 19115 can group keywords according to type (theme, place, temporal, discipline and stratum), or according to thesaurus; this information is lost in DCAT. DCAT keywords are mapped to ISO 19115 keywords without type or thesaurus.

Also Consider

There are several elements outside the keywords class that are in effect keywords. These include:

- **Topic Category** - The main themes of the resource populated from a fixed domain of values mandated by ISO19115-1
- **Extent Geographic Description** - verbal description of place by names
- **Spatial Representation Type** - holds a set of values from a domain that provides keyword values about the technical method used by the resource to spatially represent geographic information.

Examples

XML -

```
<mdb:MD_Metadata>
...
<mdb:identificationInfo>
    <mri:MD_DataIdentification>
        ...
            <mri:descriptiveKeywords>
                <mri:MD_Keywords>
                    <mri:keyword gco:nilReason="missing">
                        <gco:CharacterString/>
                    </mri:keyword>
                    <mri:type>
                        <mri:MD_KeywordTypeCode codeListValue="theme"
                            codeList="https://schemas.isotc211.org/19115/resources
                            /Codelist/cat/codelists.xml#MD_KeywordTypeCode"/>
                    </mri:type>
                </mri:MD_Keywords>
            </mri:descriptiveKeywords>
            <mri:descriptiveKeywords>
                <mri:MD_Keywords>
                    <mri:keyword>
```

```
<gco:CharacterString>
World
</gco:CharacterString>
</mri:keyword>
<mri:type>
<mri:MD_KeywordTypeCode codeListValue="place"
codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#MD_KeywordTypeCode"/>
</mri:type>
</mri:MD_Keywords>
</mri:descriptiveKeywords>
<mri:descriptiveKeywords>
<mri:MD_Keywords>
<mri:keyword>
<gco:CharacterString>Tasman Sea</gco:CharacterString>
</mri:keyword>
<mri:type>
<mri:MD_KeywordTypeCode
codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#MD_KeywordTypeCode"
codeListValue="place"/>
</mri:type>
<mri:thesaurusName>
<cit:CI_Citation>
<cit:title>
<gco:CharacterString>
Continents, countries, sea regions of the world.
</gco:CharacterString>
</cit:title>
<cit:date>
<cit:CI_Date>
<cit:date>
<gco:Date>2015-07-17</gco:Date>
</cit:date>
<cit:dateType>
<cit:CI_DateTypeCode
codeList="https://schemas.isotc211.org/19115
/resources/Codelist/cat
```

```
    /codelists.xml#CI_DateTypeCode"
    codeListValue="publication"/>
  </cit:dateType>
</cit:CI_Date>
</cit:date>
<cit:identifier>
  <mcc:MD_Identifier>
    <mcc:code>
      <gcx:Anchor
        xlink:href="http://202.49.243.69:8080/geonetwork
        /srv/eng/thesaurus.download?ref=
        external.place.regions">
        geonetwork.thesaurus.external.place.regions
      </gcx:Anchor>
    </mcc:code>
  </mcc:MD_Identifier>
</cit:identifier>
</cit:CI_Citation>
</mri:thesaurusName>
</mri:MD_Keywords>
</mri:descriptiveKeywords>
.....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

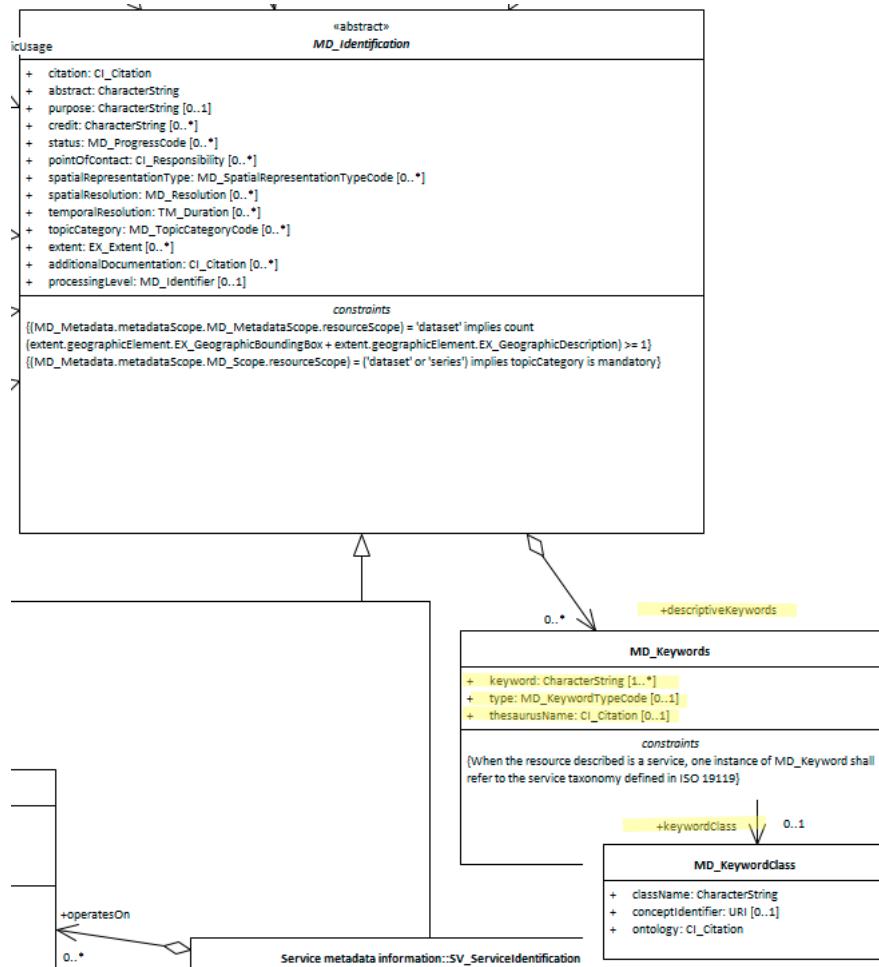


Figure 30: keywords

Resource Maintenance ★★★★

A great deal of geospatial data and service exist as living changing resources. It is often the timeliness that these cycles provide that make these resources so valuable. These update and maintenance schedules are important to document and share so that those who wish to use such resources know how to arrange their work flows to best suit.

- **Path** - *MD_Metadata.identificationInfo>MD_DataIdentification.resourceMaintenance*
- **Governance** - *Agency*
- **Purpose** - *Resource use*
- **Audience** -
 - machine resource - ***
 - general - **
 - resource manager - ****
 - specialist - **
- **Metadata type** - *administrative*
- *ICSM Level of Agreement* - ***

Definition

Information about the frequency of resource updates, and the scope of those updates.

ISO Obligation

- There should be zero to many [0..*] *resourceMaintenance* packages for the cited resource in the *MD_DataIdentification* package of class *MD_MaintenanceInformation* in a metadata record.

ICSM Good Practice

- Maintenance information about a cited resource should be documented. This should include descriptions of the update and maintenance frequency and scope.

Recommended Sub-Elements From class *MD_MaintenanceInformation*

- **maintenanceAndUpdateFrequency** - (*codelist* - *MD_MaintenanceFrequencyCode*) [0..1] frequency with which changes and additions are made to the resource after the initial resource is completed.

- **userDefinedMaintenanceFrequency** - (*class - TM_PeriodDuration*) [0..1] alternate maintenance period other than those defined. Use when MD_MaintenanceFrequencyCode do not suit.
- **maintenanceScope** - (*class - MD_Scope*) [0..*] type of resource(s) and/or extent to which the maintenance information applies. Recommended subelements include:
 - **level** - (*codelist - MD_ScopeCode*) [1..1] Mandatory for MD_Scope. The target resource covered
 - **extent** - (*class - EX_Extent*) Information about the horizontal, vertical and temporal extent of the resource specified by the scope
 - **levelDescription** - (*union - MD_ScopeDescription*) [0..*] detailed description/listing of the items specified by the level. As a union, only one value may be selected per instance

Discussion

In order for users of a resource to know when the next update will occur or to know how many cycles old a particular version may be, resource owners and custodians should document in the metadata the maintenance and update frequency of a resource. If this frequency changes, this change should be reflected in the metadata. If the scope of the update is less than the whole resource, the scope limitation needs to be recorded.

Recommendations

Therefore - custodians of a resource should capture in the metadata the frequency and scope of update and maintenance of a resource. If none are planned, then record this fact.

Crosswalk considerations

ISO19139 in ISO19115-1 attributes were replaced to provide a more flexible and unambiguous description of maintenance dates and scope.

- **MD_MaintenanceInformation.dateOfNextUpdate** was replaced by **MD_MaintenanceInformation.maintenance**
 - This role was replaced by maintenanceDate in order to enable inclusion of a CI_DateTypeCode to describe the type of the date. Note that nextUpdate was added to that code list.
- **MD_MaintenanceInformation.updateScope** and **MD_MaintenanceInformation.updateScopeDescription** were replaced by **MD_MaintenanceInformation.maintenanceScope**
 - These two roles were combined into maintenance-Scope: MD_Scope [0..*] in order to allow specifying a scope that includes a spatial and temporal extent.

Dublin core / CKAN / data.gov.au {if any} Maps to update frequency

RIF-CS Maps to Description 'lineage'

Also Consider

- **metadataMaintenance** - documents the update and maintenance of the metadata record and not the resource. There are many reasons the two may not be in sync. It is usually more important to document the update cycles of the resource than the metadata. (Not included in MDWG Guidance.)

Examples

XML

```
<mdb:MD_Metadata>
  ...
    <mdb:identificationInfo>
      <mri:MD_DataIdentification>
        ...
          <mri:resourceMaintenance>
            <mmi:MD_MaintenanceInformation>
              <mmi:maintenanceAndUpdateFrequency>
                <mmi:MD_MaintenanceFrequencyCode
                  codeListValue="irregular"
                  codeList="https://schemas.isotc211.org/19115/resources
                  /Codelist/cat/codelists.xml#MD_MaintenanceFrequencyCode"/>
              </mmi:maintenanceAndUpdateFrequency>
              <mmi:maintenanceScope>
                <mcc:MD_Scope>
                  <mcc:level>
                    <mcc:MD_ScopeCode
                      codeList="https://schemas.isotc211.org/19115/resources
                      /Codelist/cat/codelists.xml#MD_ScopeCode"
                      codeListValue="attribute"/>
                  </mcc:level>
                </mcc:MD_Scope>
              </mmi:maintenanceScope>
            </mmi:MD_MaintenanceInformation>
```

```
</mri:resourceMaintenance>  
....  
</mri:MD_DataIdentification>  
<mdb:identificationInfo>  
....  
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

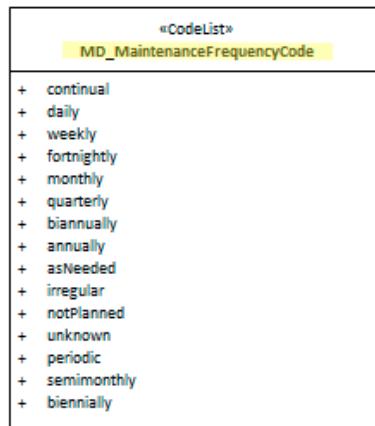
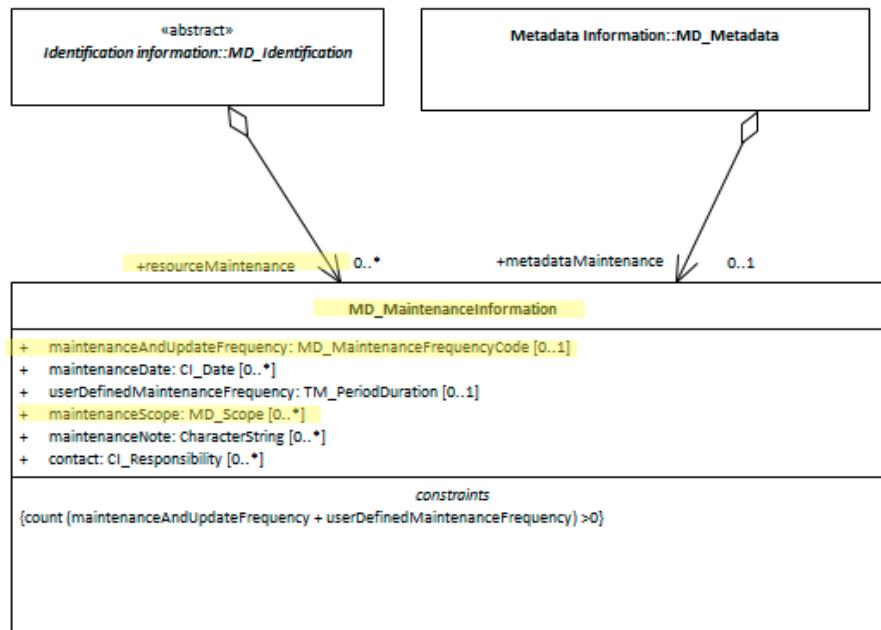


Figure 31: resourceMaintenance

Resource Other Constraints ★★★★

The presence (or at times absence) of constraints (other than those of legal or security nature) on a spatial resource is important to document. Potential users need to be informed of rights, restrictions and responsibilities that apply to the use of such resources. These include use limitations and releasability constraint information.**

Element Name	<i>resourceConstraints</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification.resourceConstraints</i>
Class/Type	<i>MD_Constraints</i>
Governance	<i>Agency</i>
Purpose	<i>Resource use</i>
Audience	machine resource - ★ general - ★★★★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>administrative</i>
ICSM Level of Agreement	★★★

Definition -

*Rights, restrictions, and responsibilities for the access and use of this cited resource. While these may optionally be of subtypes legal (*MD_LegalConstraints*) or security (*MD_SecurityConstraints*) there are other types of constraints to consider that exist under the more general class *MD_Constraints* including useLimitations* and releasability restrictions**

ISO Obligation

- There should be zero to many [0..*] *resourceConstraints* recorded for the cited resource in the *MD_DataIdentification* or *SV_ServiceIdentification* package of class *MD_Constraints* in a metadata record,

ICSM Good Practice

- The MDWG recommends populating *resourceConstraints* with *useLimitation*, *releasability* and other constraint information to sufficient level to determine the limits and restrictions on a cited resource.

Recommended Sub-Elements

- **useLimitation** - (*type - charstr*) [0..*] limitation(s) affecting the fitness for use of the resource or metadata. Example, “not to be used for navigation”. If legal by nature, use as parent subtype MD_LegalConstraints. If security by nature, use as parent subtype MD_SecurityConstraints. Otherwise, use MD_Constraint.
- **reference** - (*class - CI_Citation*) [0..*] citation/URL for the limitation or constraint, eg. copyright statement, license agreement, security classification system, etc.
- **title** - (*type - charstr*) [1..1] Mandatory for CI_Citation The name of the constraint.
- **alternateTitle** - (*type - charstr*) [0..*] Other title the constraint may be known by, if needed
- **edition** - (*type - charstr*) [0..1] the version of the constraint, if needed
- **citedResponsibleParty** - (*class - CI_Responsibility*) [0..*] the party responsible for governance of the constraint standard referenced
- **releasability** - (*class - MD_Releasability*) [0..*] information concerning the parties to whom the resource can or cannot be released
- **addressee** - (*type CI_Responsibility*) [0..*] party to which the release statement applies
- **statement** - (*type - charstr*) [0..*] release statement
- **disseminationConstraints** - (*codelist - MD_RestrictionCode*) [0..*] component in determining releasability. A Limitation placed upon the access or use of the data
- **responsibleParty** - (*class CI_Responsibility*) [0..*] contact information for those responsible for managing the security of the cited resource.

Discussion

Almost all spatial resources carry some rights, restrictions and responsibility regarding their access and use. These may be legal, security or other. These must be recorded and shared with existing and potential users. Each agency needs to develop consistent guidance on the use of such statements and share clear understanding of their meaning. This is often done by reference to an external body that manages the definitions of the constraints applied.

Recommendations

Therefore - for users to understand the administrative constraints applied to a cited resource, the details of these constraints, together with sufficient information and linkages to provide access to further information as to the deeper meaning and implications of such

constraints, needs to be capture in the metadata about the resource.

Crosswalk considerations

ISO19139 See guidance provided in *MD_Constraints*

RIF-CS Maps to the aggregate Rights/@accessRights

Also Consider

- **Resource Security Constraints** contains security restrictions that apply to the resource cited by the metadata
- **Resource Legal Constraints** A sibling to resource security constraints. Contains information regarding any legal restriction on the use or access of the resource.

Examples

XML

```
<mdb:MD_Metadata>
...
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    ...
      <mri:resourceConstraints>
        <mco:MD_Constraints>
          <mco:useLimitation>
            <gco:CharacterString>Not to be used for measurement</gco:CharacterString>
          </mco:useLimitation>
          <mco:reference>
            <cit:CI_Citation>
              <cit:title>
                <gco:CharacterString>My own list of constraints
                </gco:CharacterString>
              </cit:title>
            </cit:CI_Citation>
          </mco:reference>
          <mco:releasability>
            <mco:MD_Releasability>
              <mco:addresssee>
```

```
<cit:CI_Responsibility>
  <cit:role>
    <cit:CI_RoleCode
      codeList="https://schemas.isotc211.org/19115
      /resources/Codelist/cat/codelists.xml#CI_RoleCode"
      codeListValue="resourceProvider"/>
  </cit:role>
</cit:CI_Responsibility>
</mco:addressee>
<mco:statement>
  <gco:CharacterString>not useful to others
  </gco:CharacterString>
</mco:statement>
</mco:MD_Releasability>
</mco:releasability>
<mco:responsibleParty>
  <cit:CI_Responsibility>
    <cit:role>
      <cit:CI_RoleCode
        codeList="https://schemas.isotc211.org/19115/resources
        /Codelist/cat/codelists.xml#CI_RoleCode"
        codeListValue="publisher"/>
    </cit:role>
    <cit:party>
      <cit:CI_Organisation>
        <cit:name>
          <gco:CharacterString>OpenWork Ltd
          </gco:CharacterString>
        </cit:name>
        <cit:contactInfo>
          <cit:CI_Contact>
            <cit:address>
              <cit:CI_Address>
                <cit:electronicMailAddress>
                  <gco:CharacterString>info@openwork.nz
                  </gco:CharacterString>
                </cit:electronicMailAddress>
              </cit:CI_Address>
            </cit:address>
          </cit:CI_Contact>
        </cit:contactInfo>
      </cit:CI_Organisation>
    </cit:party>
  </cit:CI_Responsibility>
</mco:responsibleParty>
```

```
</cit:address>
</cit:CI_Contact>
</cit:contactInfo>
</cit:CI_Organisation>
</cit:party>
</cit:CI_Responsibility>
</mco:responsibleParty>
</mco:MD_Constraints>
</mri:resourceConstraints>
...
</mri:MD_DataIdentification>
</mdb:identificationInfo>
...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

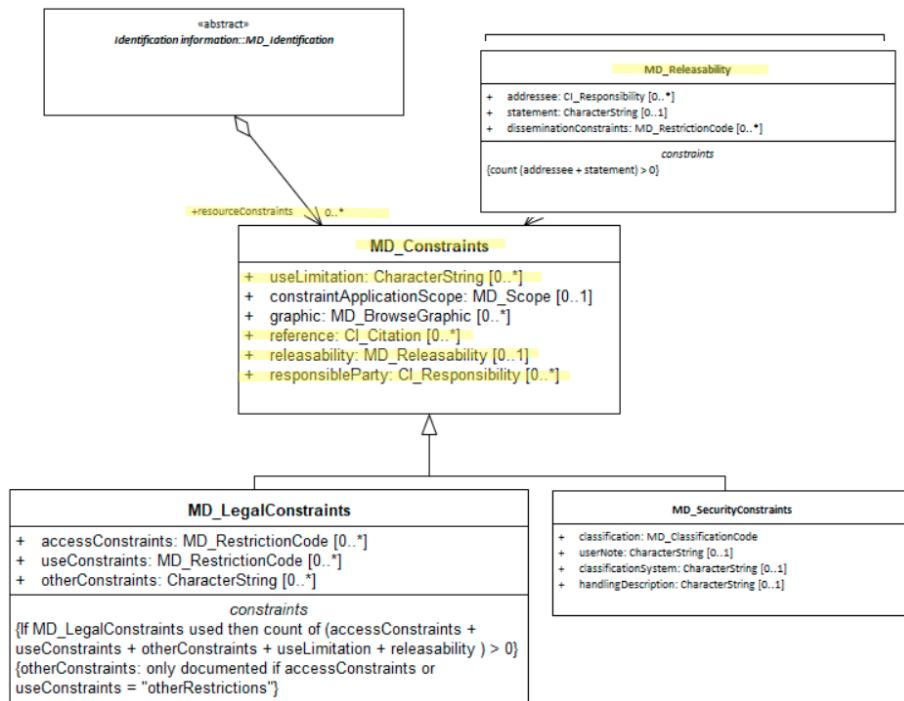


Figure 32: constraints

Resource Legal Constraints ★★★★☆

When constraints (MD_Constraints) on a spatial resource MD_Identification are of a legal nature it is important to document these.. Potential users need to be informed of rights, restrictions and responsibilities (or lack thereof) that apply to the use of such resources.

Element Name	<i>resourceConstraints</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification.resourceConstraints</i>
Class/Type	<i>MD_LegalConstraints</i>
Governance	<i>Agency</i>
Purpose	<i>Resource use</i>
Audience	machine resource - ★ general - ★★★★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>Resource use</i>
ICSM Level of Agreement	★★★

Definition

Legal restrictions on the access and use of this cited resource e.g. copyright

ISO Obligation

- There may be zero to many [0..*] *legalConstraints* recorded for the cited resource in the *MD_DataIdentification* or *SV_ServiceIdentification* package of class *MD_LegalConstraints* in a metadata record,

ICSM Good Practice

- The MDWG highly recommends populating this element *legalConstraints* to sufficient level to determine the legal rights, responsibilities and restrictions on a cited resource.

Recommended Sub-Elements Follow the general guidance for *MD_LegalConstraints*

Discussion

Almost all spatial resources carry some legal rights, restrictions and responsibility regarding their access and use. For instance, in most jurisdictions, copyright is automatically

granted to the creator of a creative work (which includes spatial resources). These legal restrictions such as licences and end user agreements, need be documented for users and resource managers along with the identity of the holder of these rights. Each agency needs to develop consistent guidance on the use of such statement and share clear understanding of their meaning. This is often done by reference to a external body that manages the definitions of the legal constraints applied. The legal rights, restrictions and responsibilities associated with a spatial resource are important to document and share with users, distributors, managers and other who may have some use of or responsibility over a spatial resource. A standardised way to capture such information make it more easy to understand, access and use. There is often general confusion over the restraints fields and to what they apply, be it metadata, resource, distribution, etc. This is a major topic needing clarification in MDWG. In ISO 19115-1 two types of constraints are recognised metadataConstraints (restrictions on the access and use of metadata) and resourceConstraints (information about constraints which apply to the resources). Here we are only address constraints on Metadata. (A third application of constraints in ISO 19115-1 applies to browse images.)

A few of the most common applications of legal restrictions for spatial resources include:

Copyright Applies to expressions of ideas. Wikipedia - Copyright is a form of intellectual property that grants the creator of an original creative work an exclusive legal right to determine whether and under what conditions this original work may be copied and used by others. The most important thing to capture about copyright is “who holds the copyright” and the year it was granted to determine when it expires. The identity of the Author is also useful as copyright temporal applicability is determined by the author’s life plus a certain number of years. Copyrights are property that can be traded and sold. Copyrights accrue to the the creator and apply to the intellectual resource created. Mechanisms for sharing copyrighted material include licenses and contracts.

Copyright License Creative Commons is a copyright license. Licenses most appropriately apply to distributions. Different distributions of a resource may be made under different license arrangements.

End User License Agreement Not a true license in itself, but a contractual agreement between the Copyright holder and other parties. It grants to these other parties rights responsibilities and restrictions on the use of a copyrighted resources

Recommendations

Therefore - it is important to capture all legal constraints that apply to a spatial resource. This should include licences, end user agreements, etc. If the resource is public domain, this should be cited appropriately. Many jurisdictions encourage the use of open data and Creative Commons license. This should be encouraged through the use of copyright licenses such as CC0 or CC By. Provide the user links to additional information about such constraints, there use and meaning. Also, it is important to document the holder of such rights and how to contact for more information.

Crosswalk considerations

ISO19139 See guidance provided in MD_Constraints and MD_LegalConstraints

Dublin core / CKAN / data.gov.au Maps to rights Reference for legal maps to licence

DCAT Maps to dct.rights as does metadata legal constraints > Note BC 22-7: Does DCAT make a distinction? Reference for legal maps to dct.license

RIF-CS Maps to Rights/@licence

Also Consider

- **Resource Security Constraints** - contains security restrictions that apply to the resource cited by the metadata
- **Metadata Legal Constraints** - A sibling to metadata legal constraints. Contains information regarding any security restriction on the metadata.

Examples

XML

```
<mdb:MD_Metadata>
...
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    ...
      <mri:resourceConstraints>
        <mco:MD_LegalConstraints>
```

```
<mco:responsibleParty>
  <cit:CI_Responsibility>
    <cit:role>
      <cit:CI_RoleCode
        codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#CI_RoleCode"
        codeListValue="author"/>
    </cit:role>
    <cit:party>
      <cit:CI_Organisation>
        <cit:name>
          <gco:CharacterString>OpenWork Ltd
          </gco:CharacterString>
        </cit:name>
        <cit:contactInfo>
          <cit:CI_Contact>
            <cit:address>
              <cit:CI_Address>
                <cit:electronicMailAddress>
                  <gco:CharacterString>info@openwork.nz
                  </gco:CharacterString>
                </cit:electronicMailAddress>
              </cit:CI_Address>
            </cit:address>
          </cit:CI_Contact>
        </cit:contactInfo>
        <cit:individual>
          <cit:CI_Individual>
            <cit:name>
              <gco:CharacterString>Byron Cochrane
              </gco:CharacterString>
            </cit:name>
          </cit:CI_Individual>
        </cit:individual>
      </cit:CI_Organisation>
    </cit:party>
  </cit:CI_Responsibility>
</mco:responsibleParty>
```

```
<mco:accessConstraints>
  <mco:MD_RestrictionCode codeListValue="copyright"
    codeList="https://schemas.isotc211.org/19115/resources/Codelist
    /cat/codelists.xml#MD_RestrictionCode"/>
</mco:accessConstraints>
<mco:useConstraints>
  <mco:MD_RestrictionCode codeListValue="otherRestrictions"
    codeList="https://schemas.isotc211.org/19115/resources/Codelist
    /cat/codelists.xml#MD_RestrictionCode"/>
</mco:useConstraints>
<mco:otherConstraints gco:nilReason="missing">
  <gco:CharacterString/>
</mco:otherConstraints>
</mco:MD_LegalConstraints>
</mri:resourceConstraints>
<mri:resourceConstraints>
  <mco:MD_SecurityConstraints>
    <mco:classification>
      <mco:MD_ClassificationCode
        codeList="https://schemas.isotc211.org/19115/resources/Codelist
        /cat/codelists.xml#MD_ClassificationCode"
        codeListValue="unclassified"/>
    </mco:classification>
  </mco:MD_SecurityConstraints>
</mri:resourceConstraints>
<mri:resourceConstraints>
  <mco:MD_Constraints>
    <mco:useLimitation>
      <gco:CharacterString>Not to be used for navigation
      </gco:CharacterString>
    </mco:useLimitation>
  </mco:MD_Constraints>
</mri:resourceConstraints>
.....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

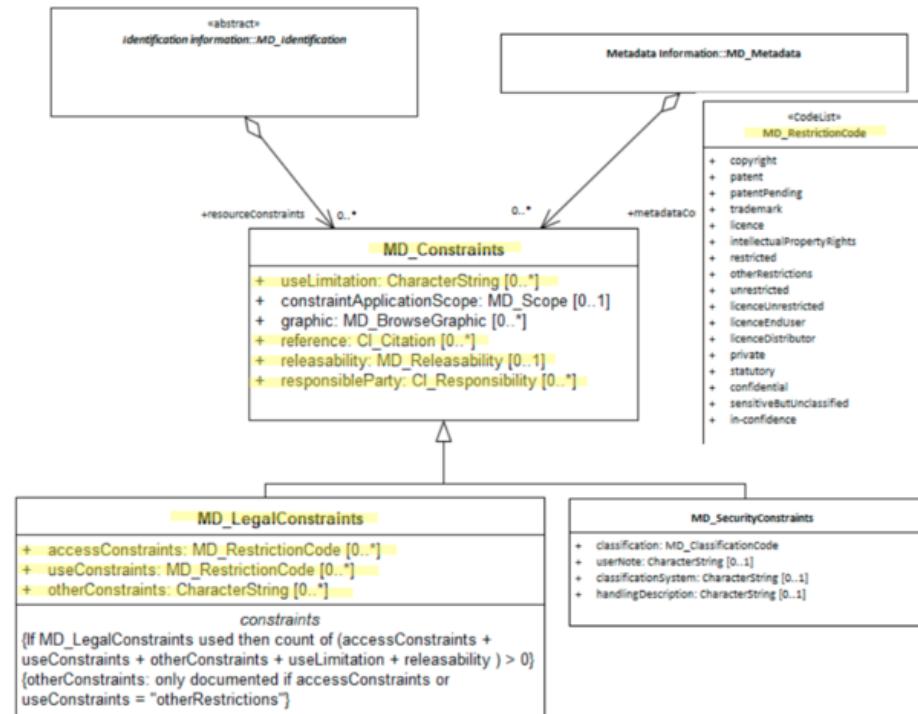


Figure 33: resourceLegalConstraints

Resource Security Constraints ★★★★☆

When constraints (MD_Constraints) on a spatial resource [MD_Identification] concern security it is important to document these. Potential users need to be informed of the presence or absence of concerns about security that apply to the use of such resources.

Element Name	<i>resourceConstraints</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification.resourceConstraints</i>
Class/Type	<i>MD_SecurityConstraints</i>
Governance	<i>Common ICSM, Agency, Domain</i>
Purpose	<i>Discovery, Identification</i>
Audience	machine resource - ★ general - ★★★★★ resource manager - ★★★★ specialist - ★★★
Metadata type	<i>administrative</i>
ICSM Level of Agreement	★★★

Definition

Handling restrictions imposed on this cited resource for national security or similar concerns e.g. commercial sensitivity, privacy considerations.

ISO Obligation

- There should be zero to many [0..*] security related *resourceConstraints* recorded for the cited resource in the *MD_DataIdentification* or *SV_ServiceIdentification* package of class *MD_SecurityConstraints* in a metadata record.

Discussion

Many spatial resources carry some security restrictions regarding their access and use, such as national security, financial or commercial sensitivity, or privacy concerns as is common with census data. These security restrictions need to be documented for users and resource managers along with the identity of the applier of these constraints. Each agency needs to develop consistent guidance on the use of such a statement and share a clear understanding of its meaning. This is often done by reference to an external body that manages the definitions of the security constraints applied.

Outstanding Issues

Australian security classification codes The official codes used in Australia as mandated by Australian Protective Security Policy Framework, differ from those in the MD_RestrictionCode codelist. How to address using codes other than those supplied by MD_RestrictionCode needs to be discussed. For interoperability, should we include the MD_RestrictionCode as well as the PSPF?

Other security frameworks support There will be cases where other security frameworks and classification systems need to be cited, such as for New Zealand Defence. Instructions for how to include these are needed. Should such guidance be prescriptive or general?

ICSM Recommendations

Therefore - it is important to capture all security constraints that apply to a spatial resource. If there be none it may be useful to capture such, particularly if your organisation does regularly handle sensitive resources. Agencies should develop consistent guidance on the use of security classifications and share a clear understanding of their meaning with users.

The MDWG recommends populating `resourceConstraints` with security constraint information to a sufficient level to determine the security structures and restrictions on a cited resource.

At a minimum, the name (primary and alternate) and version by which this security restriction on the access and use of this cited resource is known should be captured along with the classification value selected from the codelist - MD_RestrictionCode, or the codelist mandated by your agency, e.g. Australian Protective Security Policy Framework

Recommended Sub-Elements

- **useLimitation** - (*type - charstr*) [0..*] when a limitation(s) affecting the fitness for use of the resource is of a security nature.
- **classification** - (*codelist - MD_RestrictionCode* [0..*]) name of the handling restrictions on the resource
- **userNote** - (*type - charstr*) 0 to 1 - explanation of the application of the legal constraints or other restrictions and legal prerequisites for obtaining and using the resource or metadata. Use when needed

- **classificationSystem** - (*type - charstr*) 0 to 1 - name of the classification system.
Use when needed
- **handlingDescription** - (*type - charstr*) 0 to 1 - additional information about the restrictions on handling the resource or metadata. Use when needed
- See guidance provided in MD_Constraints for the following elements:
- **reference** - (*class - CI_Citation*) [0..*] can be used to cite the Protective Security Policy Framework
- **releasability** - (*class - MD_Releasability*) [0..*] use when some parties have special considerations for use or access of the cited resource
- **responsibleParty** - (*class CI_Responsibility*) [0..*] contact information for those responsible for managing the security of the cited resource.

Also Consider

- **Metadata Security Constraints** contains security restriction information that apply to the metadata that cites the resource.
- **Resource Legal Constraints** A sibling to resource security constraints. Contains information regarding any legal restriction on the use or access of the resource.
- **Other Constraints** other constraints that apply to the access and use of a cited resource

Crosswalk considerations

ISO19139

See guidance provided in MD_Constraints

RIF-CS

Maps to the aggregate Rights/@accessRights

Examples

XML

```
<mdb:MD_Metadata>
...
<mdb:identificationInfo>
```

```
<mri:MD_DataIdentification>
  ....
  <mri:resourceConstraints>
    <mco:MD_LegalConstraints>
      <mco:useLimitation>
        <gco:CharacterString>Not to be used for navigation
        </gco:CharacterString>
      </mco:useLimitation>
      <mco:reference>
        <cit:CI_Citation>
          <cit:title>
            <gco:CharacterString>
              "Creative Commons Attribution 4.0 International
              Licence"
            </gco:CharacterString>
          </cit:title>
          <cit:citedResponsibleParty>
            <cit:CI_Responsibility>
              <cit:role>
                <cit:CI_RoleCode
                  codeList="https://schemas.isotc211.org/19115
                  /resources/Codelist/cat/codelists.xml#CI_RoleCode"
                  codeListValue="rightsHolder"/>
              </cit:role>
              <cit:party>
                <cit:CI_Organisation>
                  <cit:name>
                    <gco:CharacterString>OpenWork Ltd
                    </gco:CharacterString>
                  </cit:name>
                  <cit:contactInfo>
                    <cit:CI_Contact>
                      <cit:address>
                        <cit:CI_Address>
                          <cit:electronicMailAddress>
                            <gco:CharacterString>
                              info@openwork.nz
                            </gco:CharacterString>
                          </cit:electronicMailAddress>
                        </cit:CI_Address>
                      </cit:address>
                    </cit:CI_Contact>
                  </cit:contactInfo>
                </cit:CI_Organisation>
              </cit:party>
            </cit:CI_Responsibility>
          </cit:citedResponsibleParty>
        </cit:CI_Citation>
      </mco:reference>
    </mco:MD_LegalConstraints>
  </mri:resourceConstraints>
</mri:MD_DataIdentification>
```

```
</cit:electronicMailAddress>
</cit:CI_Address>
</cit:address>
</cit:CI_Contact>
</cit:contactInfo>
</cit:CI_Organisation>
</cit:party>
</cit:CI_Responsibility>
</cit:citedResponsibleParty>
</cit:CI_Citation>
</mco:reference>
<mco:accessConstraints>
<mco:MD_RestrictionCode
codeListValue="copyright"
codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#MD_RestrictionCode"/>
</mco:accessConstraints>
<mco:useConstraints>
<mco:MD_RestrictionCode
codeListValue="otherRestrictions"
codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#MD_RestrictionCode"/>
</mco:useConstraints>
<mco:otherConstraints>
<gco:CharacterString>For non-commercial purposes only
</gco:CharacterString>
</mco:otherConstraints>
</mco:MD_LegalConstraints>
</mri:resourceConstraints>
.....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

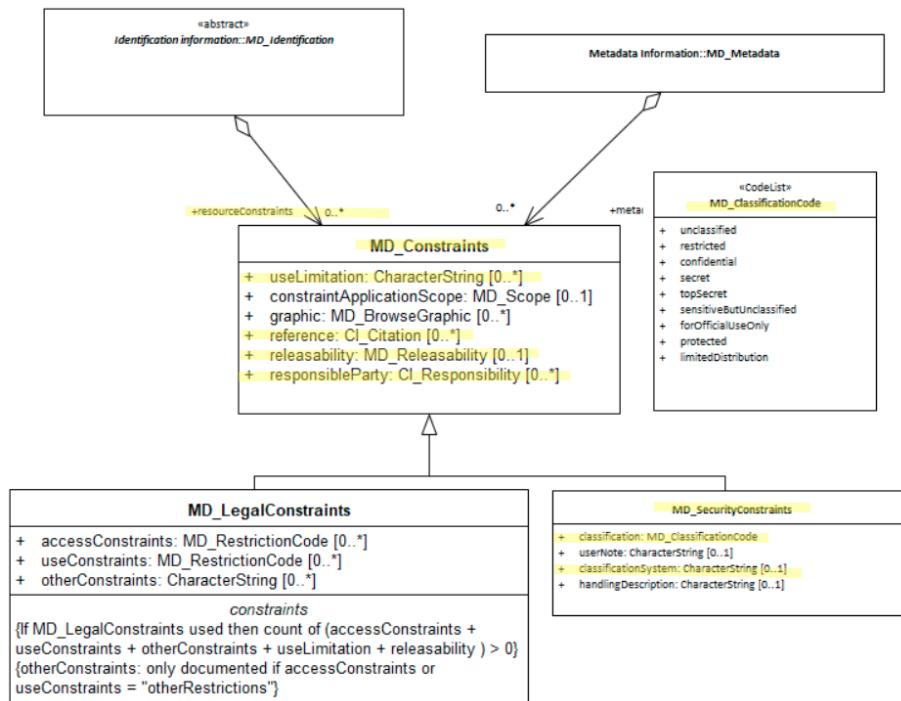


Figure 34: resourceSecurityConstraints

Geographic Extent ★★★★

To quickly determine the general location of spatial features included in a cited resource it is useful that the extent information is provided in such a way so that the geographical extent of the resource can be easily understood.

Element Name	<i>geographicElement</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification.extent</i>
Class/Type	<i>EX_GeographicExtent</i>
Governance	<i>Common ICSM, Domain</i>
Purpose	<i>Discovery</i>
Audience	machine resource - ★★★★ general - ★★★★ resource manager - ★★ specialist - ★★★ (higher if domain specific placenames are used)
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★

Definition

A description of the spatial area of the resource. These may be of the type Bounding Box, Geographic Description, or Bounding Polygon.

ISO Obligation

- There can be zero to many [0..*] *Geographical Extent* packages for the cited resource in the *Resource Extent* package. These may be of the type *Bounding Box* (*EX_GeographicBoundingBox*), *Geographic Description* (*EX_GeographicDescription*), or *Bounding Polygon* (*EX_BoundingPolygon*).

Discussion

Every metadata record describing geographic resources should contain descriptions that explain the area of interest of the resource. These may be in the form of place names, bounding box coordinate values and lastly, bounding polygons. With these, those searching for resources can be provided with a quick visual of the usable location of the resource. Catalogue software can use these descriptions to analyse and narrow searches to particular areas of interest.

The use of multiple geographic extents is recommended for more complicated geometries, including exclusion areas.

As these extents are meant to be used to give a general rough comparison to other geospatial data from sources, coordinates values should be captured in WGS 84 (EPSG 4326)

Recommendations

Therefore - it is strongly recommended that to support the discovery of resources, every metadata record that describes a geographic resource contains geographic descriptions of the area of interest for the resource. At a minimum one description needs be in bounding box coordinate values. If there be any exclusion areas, the use of the boolean extentTypeCode (set to “0”) is recommended.

The MDWG recommends populating as many instances of Geographical Extent packages as needed to give a common understanding of the spatial coverage of the cited resource.

Recommended Sub Types EX_GeographicExtent is an abstract class that is expressed by one of the three options

- **Geographic Bounding Box** - (*class - EX_GeographicBoundingBox*) highly recommended for resources with geographic extent. An approximate geographic position of the resource using EPSG 4326 coordinate pairs with a precision of up to two decimal places
- **Geographic Description** - (*class - EX_GeographicDescription*) highly recommended for resources with geographic extent. A description of the geographic area using identifiers
- **Bounding Polygon** - (*class EX_BoundingPolygon*) optional - not recommended by MDWG except in cases where the other options do not suit
- Use **extentTypeCode** (*Boolean*) [0..1] with a value of “0” to indicate exclusions

Also Consider

- **EX_GeographicExtents** is an abstract class that can be expressed three ways:
- **EX_GeographicBoundingBox** - at least one of these should be present for resources that describe geographic resources
- **EX_GeographicDescription** - One of these should be present for resources that describe geographic resources
- **EX_BoundingPolygon** While very useful, particularly in describing irregular areas, this element is not described by the MDWG as a recommended element due to the

difficulties that many systems have in implementing it.

- **EX_Extent** The class that contains all extent information about the cited resource
 - vertical, geographical or temporal.
- **EX_TemporalExtent** Contains temporal extent information for the cited resource
- **EX_VerticalExtent** - captures the vertical range of a resource.

Other Discussion

data.gov.au guidance Free text with a mandatory requirement to use one of the following:

- a point/polygon (WKT);
- an administrative boundary API; or,
- a reference URL (website address) from the National Gazetteer. Gazetteer reference URLs can be found by searching for a place at <http://www.ga.gov.au/placenames/> then clicking through to the most appropriate location “Reference ID”, and then copying and pasting the URL from the page into the Geospatial field in data.gov.au.

Crosswalk considerations

Dublin core / CKAN / data.gov.au

Maps to jurisdiction or geospatial coverage

DCAT

Maps to dct.spatial

RIF-CS

Maps to Coverage/Spatial

Examples

UML diagrams

Recommended elements highlighted in yellow

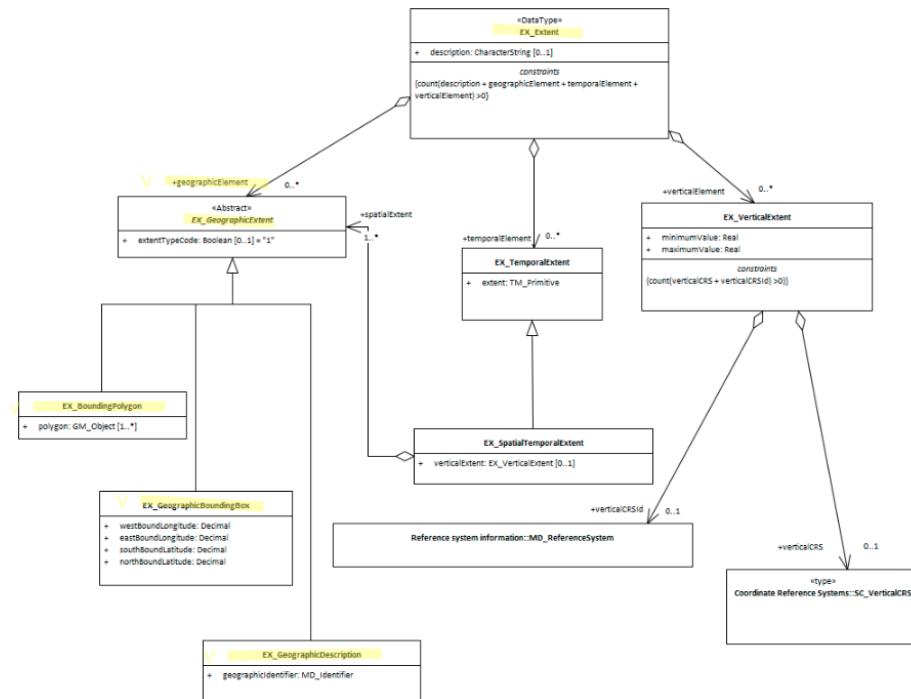


Figure 35: geographicExtent

Extent Geographic Description ★★★★

To quickly determine the general location of spatial features included in a cited resource, it is useful that the extent information contains a verbal description of the geographic extent using common (to your community) place names.

Element Name	<i>geographicIdentifier</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identificationextent>EX_Extent.geographicElement></i>
Class/Type	<i>EX_GeographicDescription</i>
Governance	<i>Common ICSM, Domain</i>
Purpose	<i>Discovery</i>
Audience	machine resource - ★★★★ general - ★★★★ resource manager - ★★ specialist - ★★★ (higher if domain specific placenames are used)
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★

Definition

A Geographic description or placename which describes the location of the resource.

ISO Obligation

- A metadata record may have zero to many [0..*] *geographicIdentifier* elements for the cited resource in the *GeographicExtent* package of class *EX_GeographicDescription* that described the geographic extent of a cited resource.

Discussion

To provide a quick guide as to the spatial area of interest for a cited resource, every metadata record describing geographic resources should contain a descriptor that indicates the location of the area of interest of the resource. Catalogue software can use this information to analyse and narrow searches to particular areas of interest.

The use of multiple descriptors is recommended for more complicated geometries, including exclusion areas.

ICSM Recommendations

Therefore - it is highly recommended that to support the discovery of resources, every metadata record that describes a geographic resource contains geographic descriptions of the area of interest for the resource. This description must contain a *code* that holds the value of the geographic descriptor and should contain in the *codespace* the codelist or domain from which it was derived. The *authority* element may contain additional documentation of the codelist.

The MDWG recommends including as many instances of Geographical Extent packages as useful to give a common understanding of the spatial coverage of the cited resource. These names may be particular to your domain.

Recommended Sub-Elements

Use **extentTypeCode** (*type - Boolean*) [0..1] with a value of “0” to indicate exclusions class **MD_Identifier**

- **code** - (*type - charStr*) mandatory for **MD_Identifier**
- **codespace** - (*type - charStr*) ?a codelist that contains the code?
- **authority** - (*class - CI_Citation*) optional, may contain the provider of the codelist of placenames

Also Consider

- **EX_Extent** The class that contains all extent information about the cited resource - vertical, geographical or temporal.
- **EX_GeographicExtents** is an abstract class and the parent of **EX_GeographicDescription**
- **EX_GeographicBoundingBox** - a sibling to this element.
- **EX_BoundingPolygon** While very useful, particularly in describing irregular areas, this element is not described by the MDWG as a recommended element due to the difficulties that many systems have in implementing it.
- **EX_TemporalExtent** Contains temporal extent information for the cited resource
- **EX_VerticalExtent** - captures the vertical range of a resource.
- **GeoNames** - Provides a free geographical database is available for download free of charge under a creative commons attribution license. It contains over 25 million geographical names and consists of over 11 million unique features whereof 4.8 million populated places and 13 million alternate names. All features are categorized into one out of nine feature classes and further subcategorized into one out of 645 feature codes.

Outstanding Issues

GeoNetwork use of EX_Extent.description The “*description*” element of EX_Extent offers a freeform way of describing the extent of a resource. GeoNetwork uses it to provide a codelist delimited set of values by which the EX_GeographicBoundingBox elements are populated. It would seem more correct to use EX_GeographicDescription and its MD_Identifier element to this purpose.

Crosswalk considerations

Dublin core / CKAN / data.gov.au {if any}

Mapping geographic extents to CKAN and Dublin core elements, particularly as used by data.gov.au needs discussion

Examples

XML

```
<mdb:MD_Metadata>
  ...
  <mdb:identificationInfo>
    <mri:MD_DataIdentification>
      ...
      <mri:extent>
        <gex:EX_Extent>
          <gex:temporalElement>
            <gex:EX_TemporalExtent>
              <gex:extent>
                <gml:TimePeriod gml:id="A1234">
                  <gml:beginPosition/>
                  <gml:endPosition/>
                </gml:TimePeriod>
              </gex:extent>
            </gex:EX_TemporalExtent>
          </gex:temporalElement>
        </gex:EX_Extent>
      </mri:extent>
    <mri:extent>
```

```
<gex:EX_Extent>
  <gex:geographicElement>
    <gex:EX_GeographicBoundingBox>
      <gex:westBoundLongitude>
        <gco:Decimal>110.70922852</gco:Decimal>
      </gex:westBoundLongitude>
      <gex:eastBoundLongitude>
        <gco:Decimal>157.79663086</gco:Decimal>
      </gex:eastBoundLongitude>
      <gex:southBoundLatitude>
        <gco:Decimal>-39.32048764</gco:Decimal>
      </gex:southBoundLatitude>
      <gex:northBoundLatitude>
        <gco:Decimal>-10.68489957</gco:Decimal>
      </gex:northBoundLatitude>
    </gex:EX_GeographicBoundingBox>
  </gex:geographicElement>
  <gex:geographicElement>
    <gex:EX_GeographicDescription>
      <gex:geographicIdentifier>
        <mcc:MD_Identifier>
          <mcc:code>
            <gco:CharacterString>
              Australia
            </gco:CharacterString>
          </mcc:code>
        </mcc:MD_Identifier>
      </gex:geographicIdentifier>
    </gex:EX_GeographicDescription>
  </gex:geographicElement>
  </gex:EX_Extent>
</mri:extent>
...
</mri:MD_DataIdentification>
</mdb:identificationInfo>
...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

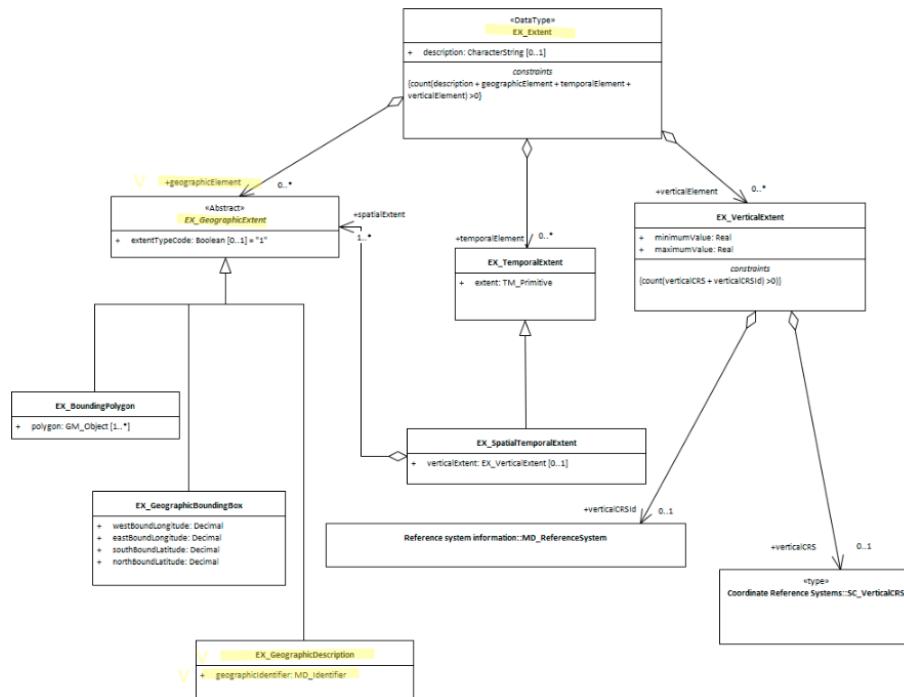


Figure 36: ExGeoDescription

Extent Bounding Box ★★★★☆

*To quickly determine the general location of spatial features included in a cited resource it is useful that the extent information includes a minimal set of coordinate values that form a bounding box containing all the features of the resource.**

Element Name	<i>geographicElement</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identificationextent>EX_Extent.geographicElement></i>
Class/Type	<i>EX_GeographicBoundingBox</i>
Governance	<i>Common ICSM, Domain</i>
Purpose	<i>Discovery</i>
Audience	machine resource - ★★★★ general - ★★★★ resource manager - ★★ specialist - ★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★★

Definition

A minimal set of geographic coordinates describing the geographic position of the resource. This is only an approximate reference so specifying the coordinate reference system is unnecessary and need only be provided with a precision of up to two decimal places

ISO Obligation

- A metadata record may have zero to many [0..*] *geographicIdentifier* elements for the cited resource in the *GeographicExtent* package of class *EX_GeographicBoundingBox* that described the geographic extent of a cited resource.

Discussion

Every metadata record describing geographic resources should contain a bounding box description that covers the location which describes the area of interest of the resource. Those searching for resources can be provided with a quick visual of the usable location of the resource. Catalogue software can use these boxes to do overlay analyses and narrow

searches to particular areas of interest. To ensure ease of use with metadata from other sources that may contain data in any number of projections, these bounding box needs to be expressed in a common WGS 84 projection.

Because of the simple mathematics involved in calculating overlap with two coordinate pairs, bounding box descriptions provide a lightweight way that those without GIS tools can tell if the resource overlaps with another.

The use of multiple bounding boxes is recommended for more complicated geometries, including exclusion areas.

ICSM Recommendations

Therefore - it is strongly recommended that to support the discovery of resources, every metadata record that describes a geographic resource contains at a minimum one bounding box description of the resource area of interest. To ensure commonality with other catalogued data, the coordinates of such need be captured in WGS 84. If there be any exclusion areas, the use of the boolean extentTypeCode (set to “0”) is recommended.

The MDWG recommends populating as many instances of Geographical Extent packages as needed to give a common understanding of the spatial coverage of the cited resource.

Recommended Sub Elements

Use **extentTypeCode** (*Boolean*) [0..1] with a value of “0” to indicate exclusions All four following subelements must be included in a bounding box description

- **westBoundLongitude** - (*type - Decimal*) western-most coordinate of the limit of the resource extent, expressed in longitude in decimal degrees (positive east - WGS 84)
- **eastBoundLongitude** - (*type - Decimal*) eastern-most coordinate of the limit of the resource extent, expressed in longitude in decimal degrees (positive east - WGS 84)
- **southBoundLatitude** - (*type - Decimal*) southern-most coordinate of the limit of the resource extent, expressed in latitude in decimal degrees (positive north - WGS 84)
- **eastBoundLongitude** - (*type - Decimal*) northern-most, coordinate of the limit of the resource extent expressed in latitude in decimal degrees (positive north - WGS 84)

Also Consider

- **EX_Extent** The class that contains all extent information about the cited resource
 - vertical, geographical or temporal.
- **EX_GeographicExtents** is an abstract class and the parent of **EX_GeographicBoundingBox**
- **EX_GeographicDescription** - a sibling to this element.
- **EX_BoundingPolygon** While very useful, particularly in describing irregular areas, this element is not described by the MDWG as a recommended element due to the difficulties that many systems have in implementing it.
- **EX_TemporalExtent** Contains temporal extent information for the cited resource
- **EX_VerticalExtent** - captures the vertical range of a resource.

Outstanding Issues

Projections Geospatial data may be held and maintained by an organisation in any number of projections. Capturing the bounding box in common WGS 84 coordinates may require reprojection of coordinates. Workflows and tools need to be available to the metadata authors to simplify this task and reduce transcription errors.

180 degree problem To capture a bounding box that describes the area of the country of New Zealand, one must draw across 180 degrees Longitude. This creates an issue with most software descriptions of bounding boxes and results in a bounding box that circles the world and excludes New Zealand. One common solution is to split into two such bounding boxes at +/-180 degree latitude.

Crosswalk considerations

Dublin core / CKAN / data.gov.au

Maps to geospatial coverage

DCAT

Maps to dct.spatial

RIF-CS

Maps to the aggregate element Coverage/Spatial

Examples

XML

```
<mdb:MD_Metadata>
...
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    ...
      <gex:EX_Extent>
        <gex:geographicElement>
          <gex:EX_GeographicBoundingBox>
            <gex:westBoundLongitude>
              <gco:Decimal>110.70922852</gco:Decimal>
            </gex:westBoundLongitude>
            <gex:eastBoundLongitude>
              <gco:Decimal>157.79663086</gco:Decimal>
            </gex:eastBoundLongitude>
            <gex:southBoundLatitude>
              <gco:Decimal>-39.32048764</gco:Decimal>
            </gex:southBoundLatitude>
            <gex:northBoundLatitude>
              <gco:Decimal>-10.68489957</gco:Decimal>
            </gex:northBoundLatitude>
          </gex:EX_GeographicBoundingBox>
        </gex:geographicElement>
      </gex:EX_Extent>
    ...
  </mri:MD_DataIdentification>
</mdb:identificationInfo>
...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

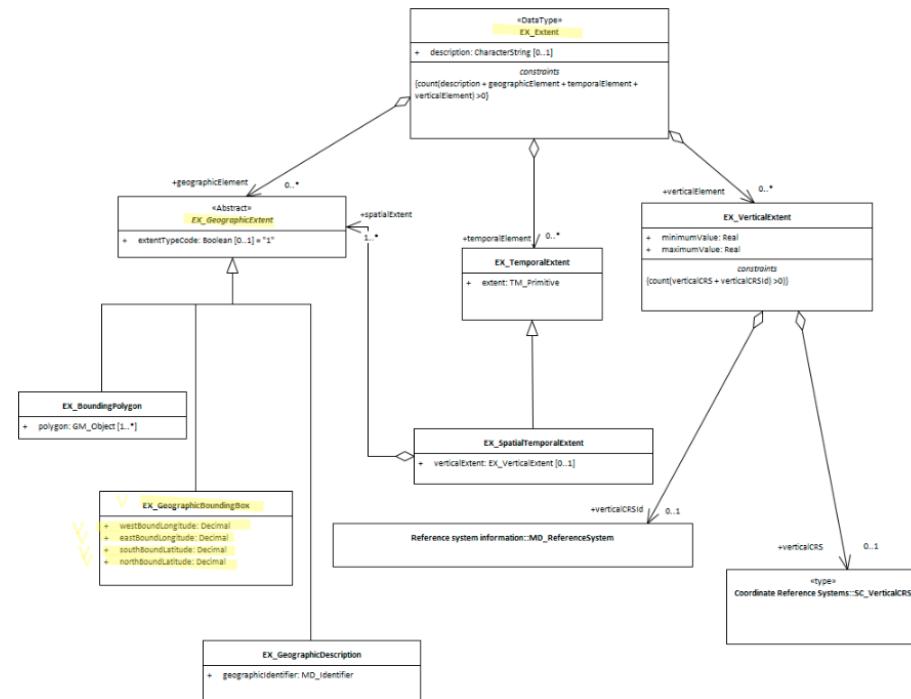


Figure 37: EXBoundBox

Vertical Extent ★★★

To quickly determine the general location of features included in an identified resource it is useful that the extent information include any descriptions vertical extents.

Element Name	<i>verticalElement</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification.extent</i>
Class/Type	<i>EX_VerticalExtent</i>
Purpose	<i>Discovery</i>
Audience	machine resource - ★★★★ general - ★★★★ resource manager - ★★ specialist - ★★★ (higher if domain specific time periods are used)
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★

Definition

Provides vertical component of the extent of the resource to aid discovery.

ISO Obligation

- There can be zero to many [0..*] *verticalElements* packages for the cited resource in the *Resource Extent* package of class *EX_VerticalExtent* for a resource cited in a metadata record.

Discussion

Every metadata record describing resources which contain height or depth information should describe the limits of that extent. These extent descriptions should include units of measure and other information so that those searching for resources can be provided with a quick idea of the vertical range of the resource.

The use of multiple vertical extents is useful for describing more complicated resources.

ICSM Recommendations

Therefore - it is strongly recommended that to support the discovery of resources, every metadata record contains, as needed vertical extent description of the resource area of interest. Capture the units of measure and the datum used.

The MDWG recommends, when the heights and depths of a resource are important to the resource, populating as many instances of Vertical Extent packages as needed to give a common understanding of the depth and elevation coverage of the cited resource.

Recommended Sub-Elements

- **minimumValue** - (*type - Real*) The minimum vertical extent to which the resource is designed to be used
- **maximumValue** - (*type - Real*) The maximum vertical extent to which the resource is designed to be used
- **verticalCRSId** - (*class - SC_VerticalCRS*) Identifies the vertical coordinate reference system used for the minimum and maximum values

Also Consider

- **EX_Extent** The class that contains all extent information about the cited resource - vertical, geographical or temporal.
- **EX_GeographicExtents** is an abstract class that can be express three ways:
- **EX_GeographicBoundingBox** - at least one of these should be present for resources that describe geographic resources
- **EX_GeographicDescription** - One of these should be present for resources that describe geographic resources
- **EX_BoundingPolygon** While very useful, particularly in describing irregular areas, this element is not described by the MDWG as a recommended element due to the difficult that many systems have in implementing it.
- **EX_TemporalExtent** Contains temporal extent information for the cited resource

Outstanding Issues

verticalCRS The vertical CRS can be captured here or under the SpatialReferenceSystem package. We need to decide when to recommend capturing it here. As other extent parameters do not include the CRS, I would make a recommendation that we treat vertical the same and capture this info in the SRS section. Note BC 21-9: GN in the 19115-3 plugin captures the extent info as the old RS_Identifier instead of MD_Identifier

Units of measure These are not specified. I would suggest that we use metres relative to sea level WGS 84 as the universal units for vertical extents. As with the mandate of WGS 84 for the projection for bounding box extents, it

is important to have as a close to a universally common reference frame as we can get to compare disparate resources.

Datum Issues What is “zero” is an open question. There may be little common between domains. In 3D cadastre, the level above ground may be the measure. There also is no agreement between land vertical datums and those for the sea.

Crosswalk considerations

Dublin core / CKAN / data.gov.au

Mapping to CKAN and Dublin core elements, particularly as used by data.gov.au needs discussion

DCAT

Maps to dct.spatial

RIF-CS

Maps to Coverage/Spatial

Examples

XML

```
<mdb:MD_Metadata>
  ...
  <mdb:identificationInfo>
    <mri:MD_DataIdentification>
      ...
      <mri:extent>
        <gex:EX_Extent>
          <gex:verticalElement>
            <gex:EX_VerticalExtent>
              <gex:minimumValue>
                <gco:Real>-1000</gco:Real>
              </gex:minimumValue>
              <gex:maximumValue>
                <gco:Real>1000</gco:Real>
```

```
</gex:maximumValue>
<gex:verticalCRSId>
<mrs:MD_ReferenceSystem>
  <gmd:referenceSystemInfo xmlns:gmd="http://www.isotc211.org/2005/gmd">
    <gmd:MD_ReferenceSystem>
      <gmd:referenceSystemIdentifier>
        <gmd:RS_Identifier>
          <gmd:code>
            <gco:CharacterString
              xmlns:gco="http://www.isotc211.org/2005/gco">
              WGS 84 (EPSG:4326)</gco:CharacterString>
            </gmd:code>
          <gmd:codeSpace>
            <gco:CharacterString
              xmlns:gco="http://www.isotc211.org/2005/gco">
              EPSG
            </gco:CharacterString>
          </gmd:codeSpace>
        <gmd:version>
          <gco:CharacterString
            xmlns:gco="http://www.isotc211.org/2005/gco">
            8.6
          </gco:CharacterString>
        </gmd:version>
      </gmd:RS_Identifier>
    </gmd:referenceSystemIdentifier>
  </gmd:MD_ReferenceSystem>
  </gmd:referenceSystemInfo>
</mrs:MD_ReferenceSystem>
</gex:verticalCRSId>
</gex:EX_VerticalExtent>
</gex:verticalElement>
</gex:EX_Extent>
</mri:extent>

...
</mri:MD_DataIdentification>
</mdb:identificationInfo>
...
```

</mdb:MD_Metadata>

UML diagrams

Recommended elements highlighted in yellow

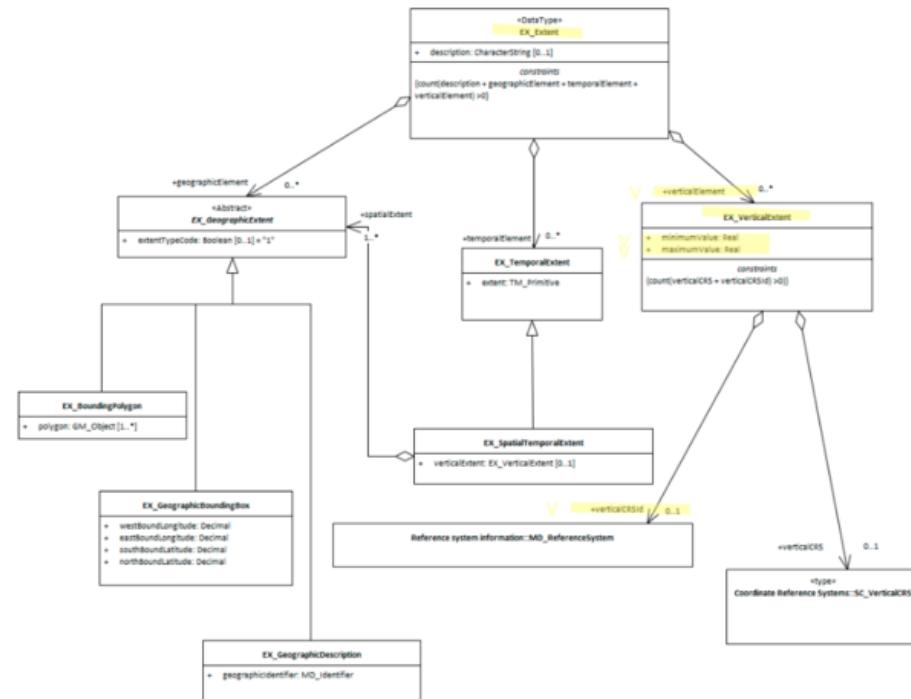


Figure 38: ExVertical

Temporal Extents ★★★

To quickly determine the temporal range of features included in an identified resource it is useful that the extent information include any temporal extents and limitations.

Element Name	<i>temporalElement</i>
Parent	<i>MD_Metadata.identificationInfo>MD_Identification.extent</i>
Class/Type	<i>EX_TemporalExtent</i>
Governance	<i>Common ICSM, Domain</i>
Purpose	<i>Discovery</i>
Audience	machine resource - ★★★★ general - ★★★★ resource manager - ★★ specialist - ★★★
Metadata type	<i>descriptive</i>
ICSM Level of Agreement	★★★

Definition

This element provides a temporal component of the extent of the resource to aid discovery.

ISO Obligation

- There can be zero to many [0..*] *temporalElements* packages for the cited resource in the *Resource Extent* package of class *EX_TemporalExtent* for a cited resource. The attribute type is of class *TM_Primitive*. Temporal Extents may be of type *Time instant*, *Time period*, *Time node*, or *Time edge*.

Discussion

Every metadata record describing resources should describe the temporal validity of the resource.

The use of multiple temporal extents is useful for describing more complicated resources. Where these are tied to and vary by spatial dimensions in the resource these may be expressed using *EX_SpatialTemporalExtent*.

With the advent of dynamic datums for high precision applications of spatial data, temporal information becomes even more important.

ICSM Recommendations

Therefore - it is strongly recommended that to support discovery of resources, and ensure the resource is fit to purpose, every metadata record contains, as needed, temporal extent description of the resource period of interest. Dates may be captured as type *date* or *dateTime* depending on your need and tools. If your data is of high precision then capture temporal extents to support dynamic datums. the capture of *timePeriod* information is highly recommended.

The MDWG recommends populating as many instances of temporalExtent packages as needed to give a common understanding of the temporal coverage of the cited resource.

Recommended Temporal Extent types

- **Time instant** - (*class* - *gml:TimeInstance*) The instant is the 0-dimensional geometric primitive in time, equivalent to a point in space. An instant shall occupy a single temporal position in a given temporal reference system
- **timePosition** - (*type* - *date* or *dateTime*)
- **Time period** - (*class* - *gml:TimePeriod*) Mandatory elements are:
- **beginPosition** (*type* - *date* or *dateTime*)
- **endPosition** (*type* - *date* or *dateTime*)
- **duration** (*type* - *duration*)
- **timeInterval** (*type* - *decimal*)

Also Consider

- **EX_Extent** The class that contains all extent information about the cited resource - vertical, geographical or temporal.
- **EX_GeographicExtents** is an abstract class that can be express three ways:
- **EX_GeographicBoundingBox** - at least one of these should be present for resources that describe geographic resources
- **EX_GeographicDescription** - One of these should be present for resources that describe geographic resources
- **EX_BoundingPolygon** While very useful, particularly in describing irregular areas, this element is not described by the MDWG as a recommended element due to the difficulties that many systems have in implementing it.
- **EX_VerticalExtent** - captures the vertical range of a resource.

Outstanding Issues

Our understanding of temporal metadata is poor and the documentation of such is weak and by reference in ISO19115-1. There is the use of GML

elements when these are described as being TM_Primitives. What is the relation? Also, What about Time node and Time edge? Need help with this timey whimey stuff.

Crosswalk considerations

Dublin core / CKAN / data.gov.au {if any}

Mapping to CKAN and Dublin core elements, particularly as used by data.gov.au needs discussion

Examples

XML

```
<mdb:MD_Metadata>
...
<mdb:identificationInfo>
  <mri:MD_DataIdentification>
    ...
    <mri:extent>
      <gex:EX_Extent>
        <gex:temporalElement>
          <gex:EX_TemporalExtent>
            <gex:extent>
              <gml:TimePeriod gml:id="d5078594e414a1056030">
                <gml:begin>
                  <gml:TimeInstant gml:id="d5078594e416a1056030">
                    <gml:timePosition>2019-07-01</gml:timePosition>
                  </gml:TimeInstant>
                </gml:begin>
                <gml:end>
                <gml:TimeInstant gml:id="d5078594e420a1056030">
                  <gml:timePosition>2019-07-31</gml:timePosition>
                </gml:TimeInstant>
              </gml:end>
            </gml:TimePeriod>
          </gex:extent>
        </gex:EX_TemporalExtent>
      </gex:temporalElement>
    </mri:extent>
  </mri:MD_DataIdentification>
</mdb:identificationInfo>
</mdb:MD_Metadata>
```

```
</gex:EX_Extent>
</mri:extent>
.....
</mri:MD_DataIdentification>
</mdb:identificationInfo>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

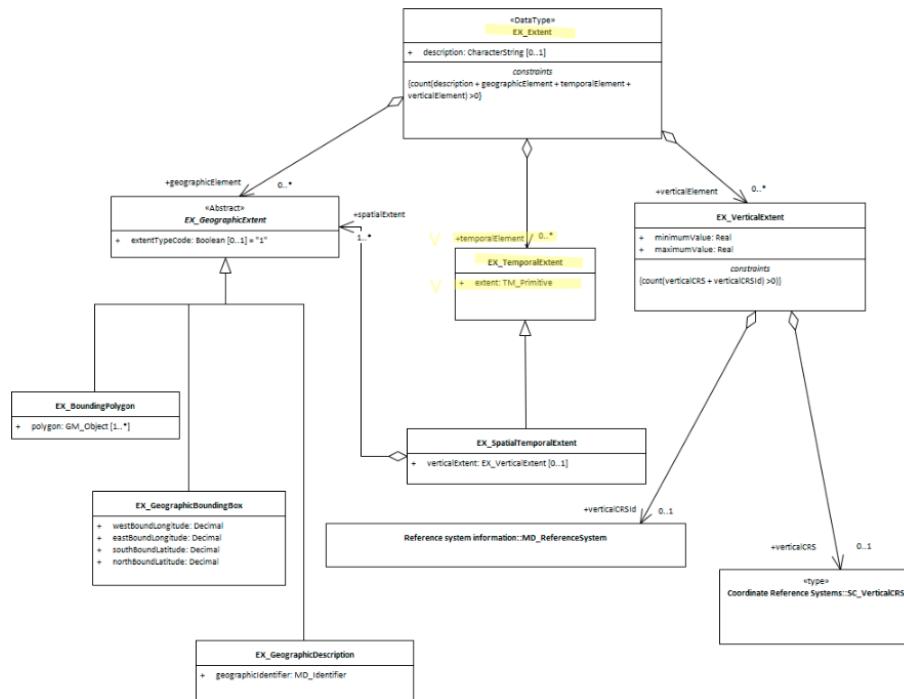


Figure 39: temporalExtent

Resource Lineage ★★★★

Every spatial resource has a history and was built upon other work. Lineage documentation specifies a resource's source data, transformations, and input/output specifications. Such information is inherently causal, communicating the purpose, theory and meaning embodied in a resource.

- **Path** - *MD_Metadata.resourceLineage>LI_Lineage*
- **Governance** - *Agency, Domain*
- **Purpose** - *Resource use*
- **Audience** -
 - machine resource - *
 - general - **
 - resource manager - ****
 - specialist - *****
- **Metadata type** - *descriptive*
- **ICSM Level of Agreement** - ***

Definition

Information about the provenance, source(s), and/or the production process(es) applied to the resource.

ISO Obligation

- A metadata record should contain zero to many [0..*] *resourceLineage* packages for the cited resource in the *MD_Metadata* package of class *LI_Lineage*.

ICSM Good Practice

- Lineage information should be documented and include a descriptive statement of the resource provenance and its scope as an level from a hierarchy *MD_Scope*.

Recommended Sub-Elements

- **statement** - (*type - charstr*) 0 to 1 - Recommended by MDWG. A general explanation of the data producer's knowledge about the lineage of a resource.
- **source** - (*class - LI_Source*) 0 to many - information about the source resource used in creating the data specified by the scope
- **description** - (*type - CharStr*) 0 to 1 - detailed description of the source

- **scope** - (*class - MD_Scope*) optional - 0 to many - type of resource and/or extent to which the lineage information applies
 - **level** - (*class - MD_ScopeCode*) target resource covered
 - **extent** - (*class - EX_Extent*) Information about the horizontal, vertical and temporal extent of the resource specified by the scope
 - **levelDescription** - (*class - MD_ScopeDescription*) detailed description/listing of the items specified by the level

Discussion

Lineage metadata provides the user with information about the events, parameters, and source data which constructed the resource, and information about the responsible parties. It provides a good understanding of the original intent and limitations of a resource. It also allows one to reproduce the process or avoid reproducing a process where unnecessary. Lineage information can help specialist users avoid the problem of too heavily citing the same resource by not knowing their sources share common provenance. Lineage information can help custodians more intelligently manage their resources.

Outstanding Issues

CORE ISSUE: We have had insufficient conversation in MDWG about what we want from Lineage metadata to yet make strong recommendations. The resource identified by this property presents a provenance record about its subject or anchor resource. Need to discuss further and reach agreement as to best practice approach for capturing provenance information.

Recommendations

Therefore - it is strongly recommended, particularly when the resource is authoritative or likely to be used by demanding specialist, that the lineage of the resource be captured in the metadata under *resourceLineage*. A lineage statement should be included with your metadata. If appropriate include process step information for advanced users.

Crosswalk considerations

ISO19139 New attributes were added to improve the description of *LI_Source* and *LI_ProcessStep*.

- **MD_Metadata.resourceLineage** (*class - LI_Lineage*)

- *LI_Lineage(to be included in the metadata without Data Quality information. The Data Quality model was removed in this revision to ISO 19157.
- **LI_Lineage.scope** (*class - MD_Scope*)
 - This element allows the description of the type and/or extent of the lineage information. DQ_Data-Quality scope was moved to ISO 19157.
- **LI_Lineage.additionalDocumentation** (*class - CI_Citation*)
 - This new element cites a publication that documents the process to produce the resource.
- **LI_Source.sourceSpatialResolution** (*class - MD_Resolution*)* [0..1]
 - This new element replaces scaleDenominator inorder to allow more flexibility in the specification of the source spatial resolution.
- **LI_source.scope** (*class - MD_Scope*) [0..1]
 - This new element was added in order to allow description of more details of the scope of a lineage section. This was required, in part, to replace the DQ_Scope from the DQ_DataQuality class that was moved from 19115 to the new data quality standard (ISO 19157).
- **LI_Source.sourceMetadata** (*class - CI_Citation*) [0..*]
 - This new element was added in order to allow an unambiguous reference to the metadata for the source. The sourceCitation now provides a clear reference to the source resource.
- **LI_ProcessStep.stepDateTime** (*type - TM_Primitive*)
 - This new element replaces dateTIme in order to provide more flexible specification of process step times.
- **LI_ProcessStep.reference** (*class - CI_Citation*)
 - This new element was added in order to allow references to more detailed information about a process step.
- **LI_ProcessStep.scope** (*class - MD_Scope*)[./class-MD_Scope])*
 - This new element was added in order to allow description of the scope of a process step independently from the scope of the entire lineage section. This was required, in part, to replace the DQ_Scope from the DQ_DataQuality class that was moved from 19115 to the new data quality standard (ISO 19157).

DCAT MD_Metadata.resourceLineage>LI_Lineage.statement maps to prov:has_Provenance MD_Metadata.resourceLineage>LI_Lineage.source maps to dct:source

RIF-CS Maps to Description 'lineage'

Also Consider

- **AssociatedResource** - contains information about resources related to the creation or use of the cited resource.
- **Abstract** and
- **Purpose** - often contain some brief lineage information

Examples

XML

```
<mdb:MD_Metadata>
  ...
  <mdb:resourceLineage>
    <mrl:LI_Lineage>
      <mrl:statement>
        <gco:CharacterString>this is my resource lineage
        </gco:CharacterString>
      </mrl:statement>
      <mrl:scope>
        <mcc:MD_Scope>
          <mcc:level>
            <mcc:MD_ScopeCode
              codeList="https://schemas.isotc211.org/19115/resources
              /Codelist/cat/codelists.xml#MD_ScopeCode"
              codeListValue="dataset"/>
          </mcc:level>
        </mcc:MD_Scope>
      </mrl:scope>
      <mrl:source>
        <mrl:LI_Source>
          <mrl:description>
            <gco:CharacterString>this is my source description
            </gco:CharacterString>
          </mrl:description>
        </mrl:LI_Source>
      </mrl:source>
    </mrl:LI_Lineage>
  </mdb:resourceLineage>
```

....
</mdb:MD_Metadata>

UML diagrams

Recommended elements highlighted in yellow

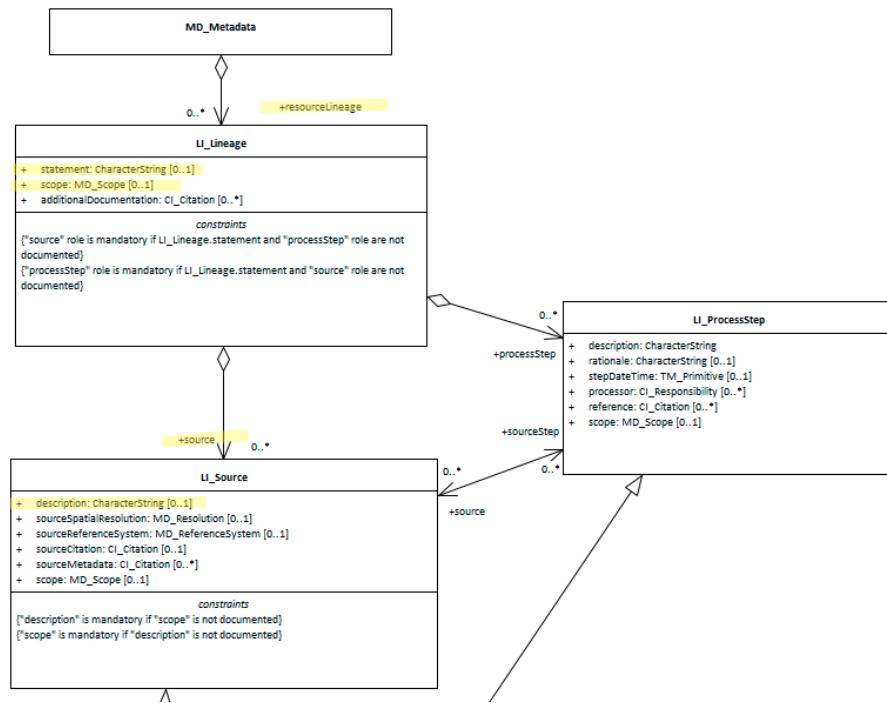


Figure 40: resourceLineage

Spatial Reference System ★★★★☆

In order to be of repeatable use and combined with other resources, geospatial information is most always captured according to a spatial reference system - (SRS). (Also referred to as a Coordinate Reference System - CRS.) Sharing the specifics of the reference systems used allows the resource to be compared and combined with others with precision and accuracy.

Element Name	<i>referenceSystemInfo</i>
Parent	<i>MD_Metadata</i>
Class/Type	<i>MD_ReferenceSystem</i>
Governance	<i>Common ICSM (for acceptable CRS registries)</i> <i>Domain</i> (for acceptable values within a community of users)
Purpose	<i>Usage, Fitness</i>
Audience	machine resource - ★★★★ general - ★★ resource manager - ★★★★ specialist - ★★★★★
Metadata type	<i>Structural</i>
ICSM Level of Agreement	★★★

Definition

The information about the reference systems that define the system use to describe spatial position descriptions in a resource.

ISO Obligation

- There should be zero or many [0..*] *spatialReferenceInfo* packages for the cited resource in the *MD_Metadata* package of class *MD_ReferenceSystem* in a metadata record for spatial resources.

Discussion

In order to common understand of location in geospatial resource, standardised spatial reference systems are used. A spatial reference helps describe where features are located in the real world. Different spatial reference systems are used for different purposes. (The terms spatial reference and coordinate system used interchangeably although they are slightly different.) People and machines that use spatial resources need to be provided in

the metadata the details of the spatial reference systems used by the resource in order to conduct meaningful analysis and to combine this resource with others.

To adequately describe a resource, there may be the need to include multiple SRS in the metadata. Usually, each of these would be of a different type (*referenceSystemType*).

Dynamic (Earth Centric) Datums Real world coordinates do change over time due to movements of the Earth's crust. These changes are significant and need be accounted for when combining data from different time periods. For Australia continental drift accounts for up to 70mm per year or 1.8 metres over the past 26 years. When the SRS is Earth centered as is the case with WGS 84, in order to understand position relative to object captured in the same SRS but at a different date, the *Coordinate Epoch* (time of position information capture) must be recorded. A method of capturing this information within the ISO 19115-1 standard is under development. A best practice way of doing so in the interim is as follows: * Create an additional Instance of *spatialReferenceInfo* of *referenceSystemType - temporal*. The Description should read *Coordinate Epoch*. The *code* value should be the year in decimal degrees of at least 2 decimal places for the value of the coordinate reference frame within which the data is captured. For instance, if the data is captured using a GNSS device, the Coordinate Epoch may be the date at which the Coordinates were captured dependent on the methodology used. If the data is digitised from imagery, the Coordinate Epoch would be the same as that of the source imagery. The user must take care to determine the true coordinate system of their source data or method including its coordinate epoch.

ICSM Recommendations

Therefore - To ensure the usability of your spatial resource, it is important to include the Spatial Reference System used by this resource in its metadata. Doing so will allow the proper use and analysis to occur.

At a minimum the reference system type, the code and the codespace must be captured. In addition the Coordinate Epoch should be captured so changes in coordinate positions due to movements in the earth's crust can be accounted for. Until ISO 19115-1 supports the capture of Coordinate Epoch directly, the creation of a separate instance of MD_Reference system should be created of type *temporal* with the decimal year to at least two places of the coordinate epoch as *code* and "Coordinate Epoch - Horizontal" or "Coordinate Epoch - Vertical" as **description*.

To date the European Petroleum Survey Group (EPSG) holds the most complete and common register of SRS. It is recommended that this source be used as codespace (and

authority?) for SRS information in the metadata.

NOTE - There should be at least two instances of referenceSystemInfo for every resource that contains spatial information referenced to a datum. The first will provide reference to the spatial reference system used by the resource. The second will contain a **Coordinate Epoch**. This will be of *referenceSystemType Temporal* with a *description* of **Coordinate Epoch**. The value of the *code* will be the date of the the Coordinate Epoch in Decimal Year to least two places.

Recommended Sub-Classes

- **referenceSystemType** - (*codelist - MD_ReferenceSystemTypeCode*) 0 to 1 - to describe the type of system used. This value should be
- **referenceSystemIdentifier** - (*class - MD_Identifier*) mandatory - identifier, codespace and authority information for reference system
 - *code* - (type - charStr) mandatory - alphanumeric value identifying an instance in the namespace, e.g. ‘4283’, ‘4326’ . For Coordinate Epoch this code is the date in decimal year up to two decimal places
 - *codespace* - (type - charStr) strongly recommended (except for *coordinate epoch*) - Identifier or namespace in which the code is valid, e.g. EPSG
 - *version* - (type - charStr) optional - use if needed to distinguish a code
 - *description* - (type - charStr) optional - Common language description of the reference system, e.g. ‘WGS84 - World Geodetic System 1984, used in GPS’, ‘NZTM’. For Coordinate Epoch this value should be “Decimal Year”
 - *authority* - (*class - CI_Citation*) optional (GA, ABARES - conditional?) - Information about the party responsible for the spatial or temporal reference system used in this cited resource.
- **description** - Should read Coordinate Epoch when *referenceSystemInfo* instance is describing the *Coordinate Epoch*. Otherwise this field is optional

Related Codelists

MD_ReferenceSystemTypeCode

There are 28 options to choose from in the reference system type code list (MD_ReferenceSystemTypeCode). Many would never be used by a particular professional. The most common for most geospatial professionals is ‘projected’. The list below sorts these options with the most common on top.

- Common

- **projected** - coordinate reference system derived from a two-dimensional geodetic coordinate reference system by applying a map projection e.g. easting, northing
- **temporal** - reference system against which time is measured e.g. time
- **vertical** - one-dimensional coordinate reference system based on a vertical datum (datum describing the relation of gravity-related heights or depths to the Earth) e.g. [gravity-related] height or depth
- **geodeticGeographic2D** - geodetic CRS having an ellipsoidal 2D coordinate system e.g. latitude, longitude
- **geodeticGeographic3D** - geodetic CRS having an ellipsoidal 3D coordinate system e.g. latitude, longitude, ellipsoidal height
- Less common
 - **geodeticGeocentric** - geodetic CRS having a Cartesian 3D coordinate system e.g. [geocentric] X,Y,Z
 - **geographicIdentifier** - spatial reference in the form of a label or code that identifies a location e.g. post code
 - **linear** - reference system that identifies a location by reference to a segment of a linear geographic feature and distance along that segment from a given point e.g. x km along road
- Specialised
 - *compoundGeographic2DTemporal* - compound spatio-temporal coordinate reference system containing a 2 dimensional geographic horizontal coordinate reference system and a temporal reference system e.g. latitude, longitude, time
 - *compoundGeographic2DVertical* - compound coordinate reference system in which one constituent coordinate reference system is a horizontal geodetic coordinate reference system and one is a vertical coordinate reference system e.g. latitude, longitude, [gravity-related] height or depth
 - *compoundGeographic2DVerticalTemporal* - compound spatio-temporal coordinate reference system containing a 2 dimensional geographic horizontal, a vertical, and a temporal coordinate reference system e.g. latitude, longitude, height, time
 - *compoundGeographic3DTemporal* - compound spatio-temporal coordinate reference system containing a 3 dimensional geographic and a temporal coordinate reference system e.g. latitude, longitude, ellipsoidal height, time
 - *compoundGeographic2DParametric* - compound statio-parametric coordinate reference system containing a 2 dimensional geographic horizontal coordinate reference system and a parametric reference system e.g. latitude, longitude,

pressure

- *compoundGeographic2DParametricTemporal* - compound spatio-parametric-temporal coordinate reference system containing a 2 dimensional geographic horizontal, a parametric and a temporal coordinate reference system e.g. latitude, longitude, pressure, time
- *compoundProjected2DParametric* - compound spatio-parametric coordinate reference system containing a projected horizontal coordinate reference system and a parametric reference system e.g. easting, northing, density
- *compoundProjected2DParametricTemporal* - compound spatio-parametric-temporal coordinate reference system containing a projected horizontal, a parametric, and a temporal coordinate reference system e.g. easting, northing, density, time
- *compoundProjectedTemporal* - compound spatio-temporal coordinate reference system containing a projected horizontal and a temporal coordinate reference system e.g. easting, northing, time
- *compoundProjectedVertical* - compound spatial reference system containing a horizontal projected coordinate reference system and a vertical coordinate reference system e.g. easting, northing, [gravity-related] height or depth
- *compoundProjectedVerticalTemporal* - compound spatio-temporal coordinate reference system containing a projected horizontal, a vertical, and a temporal coordinate reference system e.g. easting, northing, height, time
- *engineering* - coordinate reference system based on an engineering datum (datum describing the relationship of a coordinate system to a local reference)e.g. [local] x,y
- *engineeringDesign* - engineering coordinate reference system in which the base representation of a moving object is specified e.g. [local] x,y
- *engineeringImage* - coordinate reference system based on an image datum (engineering datum which defines the relationship of a coordinate system to an image)e.g. row, column
- *parametric* - coordinate reference system based on a parametric datum (datum describing the relationship of a parametric coordinate system to an object) e.g. pressure
- *compoundEngineeringParametric* - compound spatio-parametric coordinate reference system containing an engineering coordinate reference system and a parametric reference system e.g. [local] x, y, pressure
- *compoundEngineeringParametricTemporal* - compound spatio-parametric-temporal coordinate reference system containing an engineering, a parametric, and a temporal coordinate reference system e.g. [local] x, y,

pressure, time

- *compoundEngineeringTemporal* - compound spatio-temporal coordinate reference system containing an engineering and a temporal coordinate reference system e.g. [local] x, y, time
- *compoundEngineeringVertical* - compound spatial reference system containing a horizontal engineering coordinate reference system and a vertical coordinate reference system e.g. [local] x, y, height
- *compoundEngineeringVerticalTemporal* - compound spatio-temporal coordinate reference system containing an engineering, a vertical, and a temporal coordinate reference system e.g. [local] x, y, height, time

Also Consider

- **Spatial representation information** (*class - MD_SpatialRepresentation*) Not discussed by MDWG. Contains detailed information about digital mechanisms used to represent spatial information. Particularly useful for gridded data.

Outstanding Issues

Dynamic (Earth Centric) Datums The latest amendment to ISO 19115-1 includes support for Coordinate Epoch capture as a sibling element to *ReferenceSystemIdentifier*. This guidance will be updated accordingly following the publication and adoption of these modifications

Authority Authority has been indicated as a conditional field by ABARES and GA. But little guidance exist on the use of this element in this context. Should authority be about the owner of the registry (e.g. EPSG) or the provider of the SRS (LINZ in the case of NZTM)?

MD_ReferenceSystemTypeCode This is a long and confusing list. Should we recommend a shortly one?

Crosswalk considerations

Dublin core / CKAN / data.gov.au

No mapping provided

DCAT

Maps to `dct:conformsTo`

RIF-CS

Maps to the aggregate element Coverage/Spatial

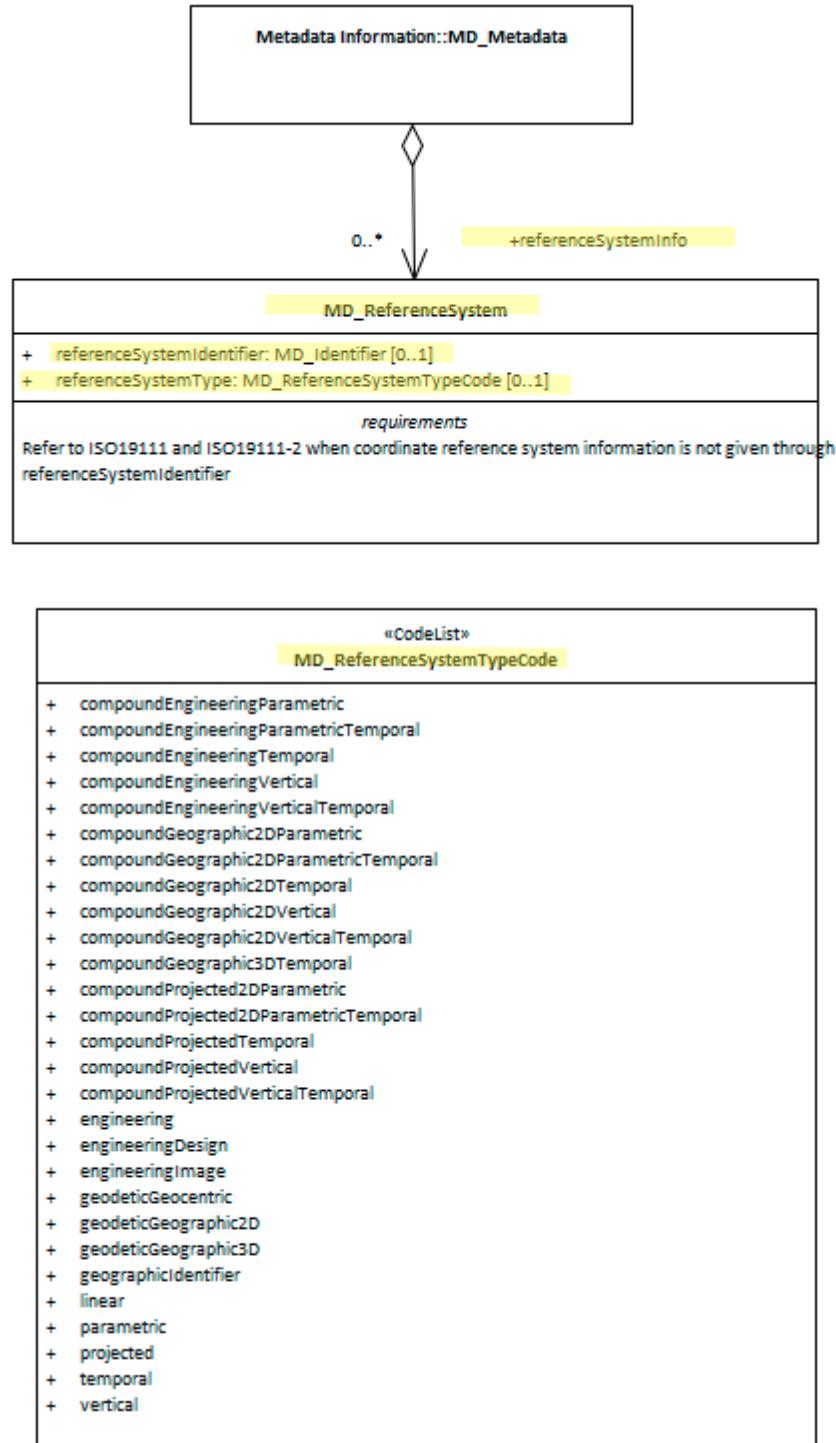
Examples

XML

```
<mdb:MD_Metadata>
  ...
    <mdb:referenceSystemInfo>
      <mrs:MD_ReferenceSystem>
        <mrs:referenceSystemIdentifier>
          <mcc:MD_Identifier>
            <mcc:code>
              <gco:CharacterString>WGS 1984</gco:CharacterString>
            </mcc:code>
          </mcc:MD_Identifier>
        </mrs:referenceSystemIdentifier>
      </mrs:MD_ReferenceSystem>
    </mdb:referenceSystemInfo>
  ...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow



Distribution Info ★★★★☆

Commonly the most important purpose of a catalogue is to provide information by which one can access the resources described. In ISO19115-1 the distributionInfo package contains and provides this information describing both online and offline access methods, contacts, and instructions.

- **Path** - *MD_Metadata.distributionInfo*
- **Governance** - *Agency*
- **Purpose** - *Resource access*
- **Audience** -
 - machine resource - ***
 - general - ***
 - resource manager - ***
 - specialist - *****
- **Metadata type** - *administrative*
- *ICSM Level of Agreement* - ***

Definition

information about the distributor of and options for obtaining the resource

ISO Obligation -

- There should be zero to many [0..*] *distributionInfo* packages for the cited resource in the *MD_Metadata* package of class *MD_Distribution* in a metadata record.

ICSM Good Practice

- The *distributionInfo* package should be populated in all metadata records unless it obviously has no resource to be distributed, e.g. metadata for a series where resources are accessed via the children.

ICSM Recommended Sub-Elements

- **description** - (*type* - *charStr*)[0..1] (highly recommended when more than one distributionInfo package is present) a brief description of a set of distribution options
- **distributor** - (*class* - *MD_Distributor*) [0..*] Name, contact information, and role of the organisation from which this distribution of this cited resource may be obtained.

- **distributorContact** - (*class - CI_Responsibility*) [0..*] (Highly recommended
 - CI_RoleCode should be *distributor*) party from whom the resource may be obtained. This list need not be exhaustive
- **distributionOrderProcess** - (*class - MD_StandardOrderProcess*) [0..*] (recommended when useful) provides information about how the resource may be obtained, and related instructions and fee information
- **transferOptions** - (*class - MD_DigitalTransferOptions*) [0..*] technical means and media by which a resource is obtained from the distributor
 - **onLine** - (*class - CI_OnlineResource*) [0..*] information about online sources from which the resource can be obtained. > TODO Link to CI_OnlineResource discussion
 - **linkage** - (*type - charStr*) [1..1] (required for each online resource) address for on-line access using a URL/URI or similar addressing scheme
 - **protocol** - (*type - charStr*)[0..1] (optional) to document the connection type used.
 - **applicationProfile** - (*type - charStr*)[0..1] (optional) may be useful when the application of this distribution is limited. The name of an application profile that can be used with the online resource
 - **offline** - (*class - MD_Medium*) [0..*] information about offline media on which the resource can be obtained > TODO Link to MD_Medium discussion
 - **distributionFormat** - (*class - MD_Format*) [0..*] The name and version of the specification for the data format by which a distribution of this cited resource is provided
 - **formatSpecificationCitation** - (*class - CI_Citation*) [1..1] citation/URL of the specification for the format
 - **title** - (*type - charStr*)[1..1] name of the data format in which the resource is distributed
 - **edition** - (*type - charStr*)[0..1] version of the distribution format used

Discussion

The distributionInfo package is highly flexible and provides multiple ways to capture information related to the distribution of resources described in a metadata record. In this entry we describe what we have determined to be best practice in the ICSM context. For instance, the format of a distribution could be captured using the path: `MD_Distribution.distributionFormat` or

`MD_Distribution.transferOptions>MD_DigitalTransferOptions.distributionFormat`

We have chosen to recommend the later. This is to provide better clarity of the relation between the cited format to the cited access (online or off). This format element describes the format of the data for a particular distribution of the resource. It does not describe the format of the resource native store or of the metadata. There may be multiple formats for a distribution.

Recommendations

Therefore - this package should contain at least the minimum information necessary to contact the party responsible for this distribution of the resource. We have identified three primary sub-elements to recommend:

- *Distributor*
- *Online resource*
- *Format*

Of these, *distributor* is the most highly recommended.

When needed, instructions for online access should be provided.

It is often unclear as to what qualifies as a different distribute and what is simply a different format of the same distribution. A web feed may qualify as a different distribution than a download, but a different mime type of a download may not. Provide as many distribution options as is useful. Capture of rarely used options or those with only minor differences, unless one wants to encourage their use, is at the discretion of an agency. Do not overload a distribution entry with too many options. If a distribution gets too complex because of too many options available, consider creating multiple distributions. It is recommended that the format details are specific for the distribution. If two different versions of the same format are available they be documented as two different formats. When using a common distribution service that provides all data in a set number of formats, consider using `MD_Distribution.distributor>MD_Distributor.distributorFormat`.

Offline distribution support

Offline access is an important option in many circumstances. For offline access to the resource we recommend the use of `MD_Distribution.transferOptions>MD_DigitalTransferOptions.offline` to capture information about the media on which the resource is stored.

The `MD_Distribution.transferOptions>MD_DigitalTransferOptions.online` with `CI_OnLineresource.function>CI_OnLineFunctionCode` value of `offlineAccess` is to be reserved for instructions (online) about how to access the

resource from the provider offline. Another preferred approach is to provide such instructions via `MD_Distribution.distributor>MD_Distributor.distributionOrderProcess`.

There may also be instances where anonymous free online distribution is not desired for a cited resource. The distribution package may still be of value in providing contact information by which one may discuss obtaining the resource from the provider. In this case we recommend that the description be populated as well as distributor information. In addition population of `MD_Distribution.distributor>MD_Distributor.distributionOrderProcess` is recommended.

Crosswalk considerations

ISO19139

- The cardinality of **MD_Metadata.distributionInfo** was increased to [0..*] in order to allow more flexibility in defining distribution information.
- The new element **MD_Distribution.description** was added to allow a description of distribution options.
- **MD_Format.name**, **MD_Format.version** and **MD_Format.specification** were deleted and replaced with:
 - **MD_Format.formatSpecificationCitation** (*class - CI_Citation*)
 - This new element was added in order to allow more precise descriptions of formats and versions and to allow references to the full specifications of those formats.
- **MD_Format.medium**
 - This new element was added in order to facilitate more precise associations between formats and distribution media.
- **MD_DigitalTransferOptions.transferFrequency**
 - This new element was added in order to allow a distributor to specify how often new members of an on-going resource are made available.
- **MD_DigitalTransferOptions.distributionFormat**
 - This new element was added in order to allow unambiguous association of online resources with formats without requiring a separate **MD_Distributor** or **MD_Format**.
- **MD_Medium.identifier**
 - This new element was added to provide a unique identifier for an instance of the medium.
- **MD_StandardOrderProcess.orderOptionsType** and **MD_StandardOrderProcess.orderOptions**
 - These two new roles were added in order to allow specification of custom ordering options associated with specific resources or implementations.

Dublin core / CKAN / data.gov.au

- Format maps to format - The file format of the distribution. If available in IANA, use Media Type
- OnlineResource (*MD_DigitalTransferOptions.online*) maps to landing page, download URL, access URL

DCAT Recommended property to meet data citation requirement

- distributionInfo maps to dct:distribution
- Format maps to dct:format
- distributor maps to dct:publisher
- OnlineResource (*MD_DigitalTransferOptions.online*) maps to dcat:accessURI/dcat.downloadURL/dcat:en
- distributionFormat - The file format, physical medium, or dimensions of the resource. A subproperty of dct:relation.

RIF-CS

- Format maps to Location/Electronic/@format
- distributor maps to Related Party/relation='distributor'
- OnlineResource (*MD_DigitalTransferOptions.online*) maps to Location/Electronic/@url

Also Consider

- metadataLinkage - for links that provide a download of the metadata
- resourceLineage - Information about the provenance, source(s), and/or the production process(es) applied to the resource.
- browseGraphic - associates to a large number of packages to provide linkage to associated image files, such as business or product icons and logos

Examples

XML

```
<mdb:MD_Metadata>
...
<mdb:distributionInfo>
  <mrd:MD_Distribution>
    <mrd:description>
      <gco:CharacterString>
        A sample distribution record for a dataset
    </gco:CharacterString>
  </mrd:description>
</mrd:MD_Distribution>
</mdb:distributionInfo>
```

```
</gco:CharacterString>
</mrd:description>
<mrd:distributor>
    <mrd:MD_Distributor>
        <mrd:distributorContact>
            <cit:CI_Responsibility>
                <cit:role>
                    <cit:CI_RoleCode
                        codeList="https://schemas.isotc211.org/19115/resources
                        /Codelist/cat/codelists.xml#CI_RoleCode"
                        codeListValue="distributor"/>
                </cit:role>
                <cit:party>
                    <cit:CI_Organisation>
                        <cit:name>
                            <gco:CharacterString>
                                OpenWork Ltd
                            </gco:CharacterString>
                        </cit:name>
                        <cit:contactInfo>
                            <cit:CI_Contact>
                                <cit:address>
                                    <cit:CI_Address>
                                        <cit:electronicMailAddress>
                                            <gco:CharacterString>
                                                info@openwork.nz
                                            </gco:CharacterString>
                                        </cit:electronicMailAddress>
                                    </cit:CI_Address>
                                </cit:address>
                            </cit:CI_Contact>
                        </cit:contactInfo>
                    </cit:CI_Organisation>
                </cit:party>
            </cit:CI_Responsibility>
        </mrd:distributorContact>
        <mrd:distributionOrderProcess>
            <mrd:MD_StandardOrderProcess>
```

```
<mrd:fees>
    <gco:CharacterString>Free</gco:CharacterString>
</mrd:fees>
<mrd:orderingInstructions>
    <gco:CharacterString>
        Contact us at the distributor email address
    </gco:CharacterString>
</mrd:orderingInstructions>
</mrd:MD_StandardOrderProcess>
</mrd:distributionOrderProcess>
</mrd:MD_Distributor>
</mrd:distributor>
<mrd:transferOptions>
    <mrd:MD_DigitalTransferOptions>
        <mrd:onLine>
            <cit:CI_OnlineResource>
                <cit:linkage>
                    <gco:CharacterString>
                        https://data.openwork.nz/samplePath/toResource
                    </gco:CharacterString>
                </cit:linkage>
                <cit:protocol gco:nilReason="missing">
                    <gco:CharacterString/>
                </cit:protocol>
                <cit:name gco:nilReason="missing">
                    <gco:CharacterString/>
                </cit:name>
                <cit:description gco:nilReason="missing">
                    <gco:CharacterString/>
                </cit:description>
                <cit:function>
                    <cit:CI_OnLineFunctionCode
                        codeList="https://schemas.isotc211.org/19115/resources
                        /Codelist/cat/codelists.xml#CI_OnLineFunctionCode"
                        codeListValue="" />
                </cit:function>
            </cit:CI_OnlineResource>
        </mrd:onLine>
```

```
<mrd:distributionFormat>
  <mrd:MD_Format>
    <mrd:formatSpecificationCitation>
      <cit:CI_Citation>
        <cit:title>
          <gco:CharacterString>
            geopackage
          </gco:CharacterString>
        </cit:title>
        <cit:edition>
          <gco:CharacterString>1.2.0</gco:CharacterString>
        </cit:edition>
      </cit:CI_Citation>
    </mrd:formatSpecificationCitation>
  </mrd:MD_Format>
</mrd:distributionFormat>
</mrd:MD_DigitalTransferOptions>
</mrd:transferOptions>
<mrd:transferOptions>
  <mrd:MD_DigitalTransferOptions>
    <mrd:onLine>
      <cit:CI_OnlineResource>
        <cit:linkage>
          <gco:CharacterString>
            https://info.openwork.nz/linkTo/offlineAccess/instructions
          </gco:CharacterString>
        </cit:linkage>
        <cit:protocol>
          <gco:CharacterString>
            WWW:DOWNLOAD-1.0-http--download
          </gco:CharacterString>
        </cit:protocol>
        <cit:name gco:nilReason="missing">
          <gco:CharacterString/>
        </cit:name>
        <cit:description gco:nilReason="missing">
          <gco:CharacterString/>
        </cit:description>
      </cit:CI_OnlineResource>
    </mrd:onLine>
  </mrd:MD_DigitalTransferOptions>
</mrd:transferOptions>
```

```
<cit:function>
  <cit:CI_OnLineFunctionCode
    codeList="https://schemas.isotc211.org/19115/resources
/Codelist/cat/codelists.xml#CI_OnLineFunctionCode"
    codeListValue="" />
  </cit:function>
</cit:CI_OnlineResource>
</mrd:onLine>
<mrd:offLine>
  <mrd:MD_Medium>
    <mrd:name>
      <cit:CI_Citation>
        <cit:title>
          <gco:CharacterString>
            BigProject data
          </gco:CharacterString>
        </cit:title>
      </cit:CI_Citation>
    </mrd:name>
  </mrd:MD_Medium>
</mrd:offLine>
</mrd:MD_DigitalTransferOptions>
</mrd:transferOptions>
</mrd:MD_Distribution>
</mdb:distributionInfo>
...
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

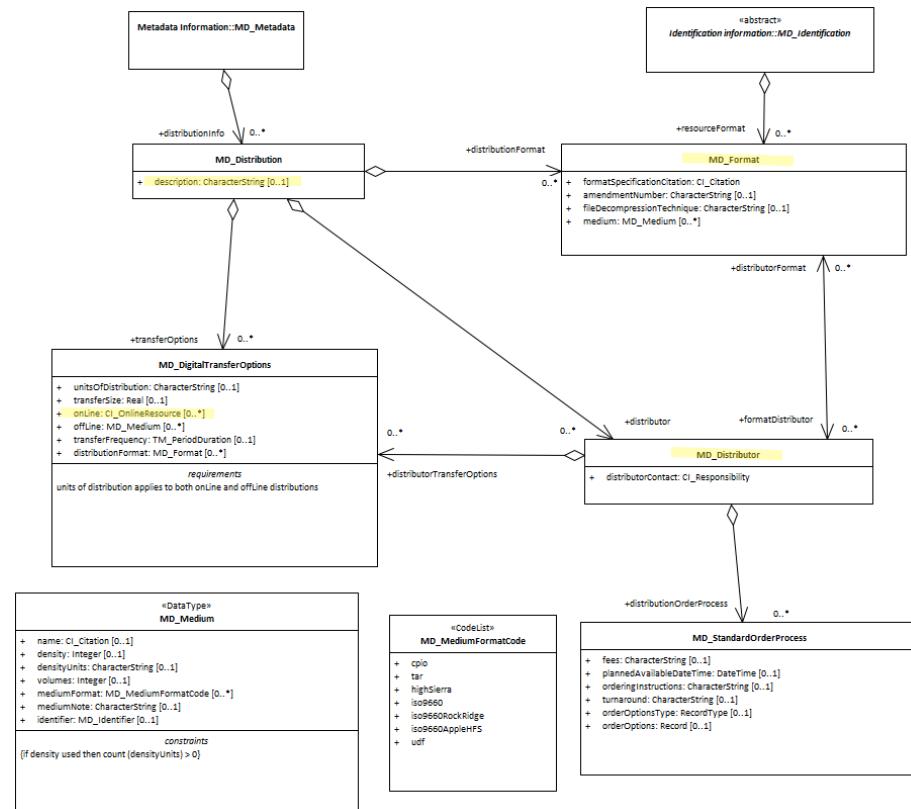


Figure 42: Distribution

class - CI_Citation

In order to provide a standardised way of capturing information related to the various citations described in a metadata record, a schema, by way of the CI_Citation is provided. The provision of a consistent way of structuring this information make it easier to capture and understand.

- **Governance - ISO**
- **Metadata Type - structural**
- **ICSM Level of Agreement - ****

Definition

A standardized resource reference framework.

ISO Associations (May be found in) -

- MD_Metadata.parentMetadata
- MD_Metadata.metadataStandard
- MD_Metadata.metadataProfile
- MD_Metadata.alternativeMetadataReference
- MD_Identification.citation (instantiated as either MD_DataIdentification or SV_ServiceIdentification)
- MD_Identification.additionalDocumentation
- MD_Keywords.thesaurusName
- MD_KeywordsClass.ontology
- MD_Usage.additionalDocumentation
- MD_Usage.identifiedIssues
- MD_AssociatedResource.name
- MD_AssociatedResource.metadataReference
- MD_Constraints.reference
- LI_Lineage.additionalDocumentation
- LI_ProcessStep.reference
- LI_Source.sourceCitation
- LI_Source.sourceMetadata
- MD_Georeferenceable.parameterCitation
- MD_FeatureCatalogueDescription.featureCatalogueCitation
- MD_PortrayalCatalogueReference.portrayalCatalogueCitation
- MD_Format.formatSpecificationCitation
- MD_Medium.name

- MD_ApplicationSchemaInformation.name
- SV_ServiceIdentification.operatedDataset
- SV_ServiceIdentification.profile
- SV_ServiceIdentification.serviceStandard
- SV_CoupledResource.resourceReference
- MD_Identifier.authority
-

Recommended Attributes -

- **title** - (*type - charStr*) [1..1] Mandatory - name by which the cited resource is known
- **alternateTitle** - (*type - charStr*) [0..*] short name or other language name by which the cited information is known. Example: DCW as an alternative title for Digital Chart of the World. Recommended whenever there are alternate names commonly in use.
- **date** - (*class - CI_Date*) [0..*] reference date for the cited resource
- **edition** - (*type - charStr*) [0..1] version of the cited resource
- **editionDate** - (*type - DateTime*) [0..1] date of the edition
- **identifier** - (*class - MD_Identifier*) [0..*] value uniquely identifying an object within a namespace
- **citedResponsibleParty** - (*class - CI_Responsibility*) [0..*] roles, name, contact, and position information for an individual or organisation that is responsible for the resource
- **presentationForm** - (*class - CI_PresentationFormCode*) [0..*] mode in which the resource is represented
- **series** - (*class - CI_Series*) [0..1] information about the series, or aggregate resource, of which the resource is a part
- **otherCitationDetails** - (*type - charStr*) [0..*] other information required to complete the citation that is not recorded elsewhere
- **ISBN** - (*type - charStr*) [0..1] international Standard Book Number
- **ISSN** - (*type - charStr*) [0..1] international Standard Serial Number
- **onlineResource** - (*class - CI_OnlineResource*) [0..*] online reference to the cited resource
- **graphic** - (*class - MD_BrowseGraphic*) [0..*] citation graphic or logo for cited party

Discussion

Citations are used to provide information about citing the resource being described in the metadata or to refer to resources outside of the metadata record. Citations use CI_Citation

and cite the party responsible using CI_Responsibility. CI_Responsibility may be used without CI_Citation. CI_Responsibility is an aggregate of one or more parties (CI_Party). CI_Party may be specified as CI_Individual and/or CI_Organisation.

Recommendations

Therefore - it is recommended that all citation instances follow the general guidance of ISO 19115-1 unless directed otherwise. The mandatory element title must be populated in all instances noting the type and form of the contents in this field is dependent on location in the metadata record.

Note BC 18-7 - MDWG may wish to further standardise the use of
CI_Citation

References

http://wiki.esipfed.org/index.php/CI_Citation

https://geo-ide.noaa.gov/wiki/index.php?title=ISO_Citations#CI_Citation.2B.2B

UML diagrams

Recommended elements highlighted in yellow

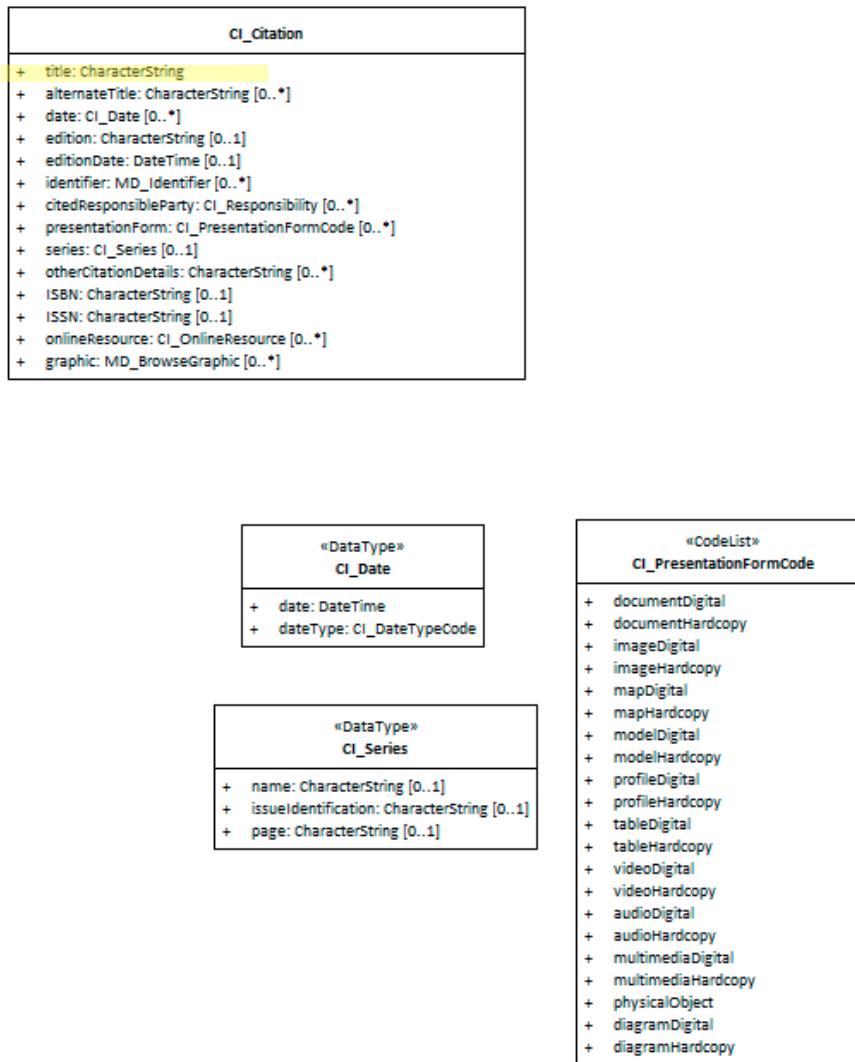


Figure 43: CI_Citation

class - CI_Date

To support and maintain the recording of temporal elements in the metadata it is important to provide consistency of use. The class CI_Date provides this for all temporal elements in a ISO 19115-1 metadata record.

- **Governance - ISO**
- **Metadata type - administrative**
- *ICSM Level of Agreement - ****

Definition

A reference date and event used to describe it

ISO Associations -

- MD_Metadata.dateInfo
- CI_Citation.date
- MD_MaintenanceInformation.maintenanceDate
- PT_LocaleContainer.date

ICSM Recommended Sub-Elements For class CI_OnlineResource

- **date - (type - DateTime) [1..1]** Mandatory for CI_OnlineResource instances. Must be in ISO 8601 format
- **dateType - (codelist - CI_DateTypeCode) [1..1]** Mandatory for CI_OnlineResource instances. Event used for reference date. Options include:
 - creation - date identifies when the resource was brought into existence
 - publication - date identifies when the resource was issued
 - revision - date identifies when the resource was examined or re-examined and improved or amended
 - expiry - date identifies when resource expires
 - lastUpdate - date identifies when resource was last updated
 - lastRevision - date identifies when resource was last reviewed
 - nextUpdate - date identifies when resource will be next updated
 - unavailable - date identifies when resource became not available or obtainable
 - inForce - date identifies when resource became in force
 - adopted - date identifies when resource was adopted
 - deprecated - date identifies when resource was deprecated

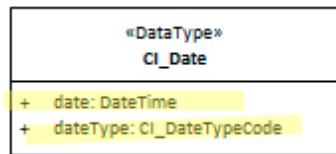
- superseded - date identifies when resource was superseded or replaced by another resource
- validityBegins - time at which the data is considered to become valid. Note: There could be quite a delay between creation and validity begins
- validityExpires - time at which the data is no longer considered to be valid
- released - the date that the resource shall be released for public access
- distribution - date identifies when an instance of the resource was distributed

Recommendations

Therefore - in order to provide the consistency needed to avoid confusion for both machines and humans, it is recommended that all dates included in a metadata record implement the class CI_Date and follow the guidance provided by ISO and ICSM.

UML diagrams

Recommended elements highlighted in yellow



> FIX ME

!

class - CI_OnlineResource

Most metadata contains information about resources that are available online. In order for machines and people to retrieve such resources cited in a Metadata record MD_Metadata, a method of access must be provided. CI_OnlineResources provides a standard way of describing such access wherever such is documented in a metadata record.

- **Governance - ISO**
- **Metadata type - administrative**
- **ICSM Level of Agreement - ****

Definition

information about on-line sources from which the resource, specification, or community profile name and extended metadata elements can be obtained

ISO Associations

- MD_Metadata.metadataLinkage
- MD_DigitalTransferOptions.online
- MD_MetadataExtensionInformation.extensionOnLineResource
- MD_ApplicationSchemaInformation.graphicsFile
- MD_ApplicationSchemaInformation.softwareDevelopmentFile
- SV_OperationMetadata.connectPoint
- CI_Citation.onlineResource
- CI_Contact.onlineResource
- MD_BrowseGraphic.linkage

ICSM Recommended Sub Element for class CI_OnlineResource

- **linkage** - (*type - charStr*) [1..1] Mandatory for class - location (address) for on-line access using a Uniform Resource Locator/Uniform Resource Identifier address or similar addressing scheme
- **protocol** - (*type - charstr*) [0..1] recommended to document the connection type used.
- **function** - (*codelist - CI_OnlineFunctionCode*) [0..1] (optional) code for function performed by the online resource. Options are:
 - download - online instructions for transferring data from one storage device or system to another
 - information - online information about the resource

- offlineAccess - online instructions for requesting the resource from the provider
- order - online order process for obtaining the resource
- search - online search interface for seeking out information about the resource
- completeMetadata - complete metadata provided
- browseGraphic - browse graphic provided
- upload - online resource upload capability provided
- emailService - online email service provided
- browsing - online browsing provided
- fileAccess - online file access provided

Other sub elements

- **applicationProfile** - (*type - charstr*) [0..1] name of an application profile that can be used with the online resource
- **name** - (*type - charstr*) [0..1] name of the online resource
- **description** - (*type - charstr*) [0..1] detailed text description of what the online resource is/does
- **protocolRequest** - (*type - charstr*) [0..1] protocol used by the accessed resource(to be used mainly for POST requests).

Recommendations

It is recommended that the MDWG further develop general advise on the use of CI_OnlineResource - particularly concerning the use of the “Other sub elements” The function element, while optional, can ususally be populated through automated means according to the parent element.ß

UML diagrams

Recommended elements highlighted in yellow

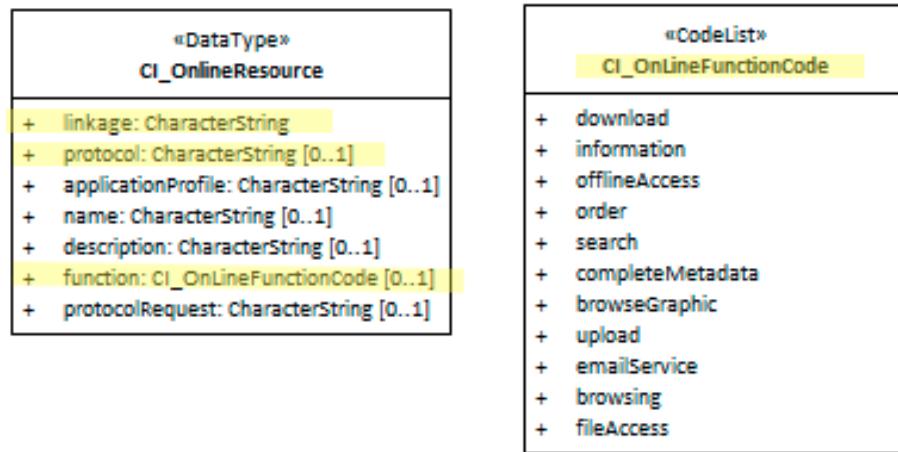


Figure 44: CI_OnlineResource

class - CI_Responsibility

One of the most important benefits of metadata is to allow people to connect over common interest and needs. In order to provide a standardised way of capturing information describing people and organisations when cited in a metadata record, a schema, by way of the CI_Responsibility is provided.

- **Governance - ISO**
- **Metadata Type - structural**
- **ICSM Level of Agreement - ****

Definition

information about the party and their role.

ISO Associations (May be found in)

- MD_Metadata.contact
- MD_Identification.pointOfContact
- MD_Usage.userContactInfo
- MD_Constraints.responsibleParty
- MD_Releasability.addressee
- LI_ProcessStep.processor
- MD_MaintenanceInformation.contact
- MD_Distributor.distributorContact
- MD_ExtendedElementInformation.source
- CI_Citation.citedResponsibleParty

Attributes

CI_Responsibility has at its core three elements:

- **role** - (*codelist - CI_RoleCode*)[1..1] Mandatory - function performed by the responsible party. Options are:
 - *resourceProvider* - party that supplies the resource
 - *custodian* - party that accepts accountability and responsibility for the resource and ensures appropriate care and maintenance of the resource
 - *owner* - party that owns the resource
 - *user* - party who uses the resource
 - *distributor* - party who distributes the resource
 - *originator* - party who created the resource

- *pointOfContact* - party who can be contacted for acquiring knowledge about or acquisition of the resource
- *principalInvestigator* - key party responsible for gathering information and conducting research
- *processor* - party who has processed the data in a manner such that the resource has been modified
- *publisher* - party who published the resource
- *author* - party who authored the resource
- *sponsor* - party who speaks for the resource
- *coAuthor* - party who jointly authors the resource
- *collaborator* - party who assists with the generation of the resource other than the principal investigator
- *editor* - party who reviewed or modified the resource to improve the content
- *mediator* - a class of entity that mediates access to the resource and for whom the resource is intended or useful
- *rightsHolder* - party owning or managing rights over the resource
- *contributor* - party contributing to the resource
- *funder* - party providing monetary support for the resource
- *stakeholder* - party who has an interest in the resource or the use of the resource
- **extent** - (class - Extent) [0..*] spatial or temporal extent of the role
- **party** - (abstract class - [CI_Party])(http://wiki.esipfed.org/index.php/CI_Party)* [1..*] Required - information about the individual and/or organisation of the party.
Instantiated as *CI_Individual* or *CI_Organisation*.
 - **name** - (type - charStr) [0..1] name of the party (individual or organization)
 - **contactInfo** - (class - CI_Contact) [0..*] contact information for the party
 - **phone** - (type - CI_Telephone) [0..*]
 - **address** - (class - CI_Address) [0..*]
 - **deliveryPoint** - (type - charStr) [0..*] address line for the location
 - Example: Street number and name, suite number, etc
 - **city** - (type - charStr) [0..*] city of the location
 - **administrativeArea** - (type - charStr) [0..*] state, province of the location
 - **postalCode** - (type - charStr) [0..*] ZIP or other postal code
 - **country** - (type - charStr) [0..*] country of the physical address
 - **electronicMailAddress** - (type - charStr) [0..*] address of the electronic mailbox of the responsible organisation or individual
 - **onlineResource** - (class - CI_OnlineResource) [0..*]

- **contactInstructions** - (*type - charStr*) [0..*] supplemental instructions on how or when to contact the individual or organisation
- **contactType** - (*type - charStr*) [0..*] type of contact
- **partyIdentifier** - (*class - MD_Identifier*) [0..*] identifier for the party

Associated Classes to CI_Party

- **CI_Individual** - information about the party if the party is an individual
 - **positionName** - (*type - charStr*) [0..1] position of the individual in an organisation
- **CI_Organisation** - information about the party if the party is an organisation
 - **logo** -
 - **individual** - (*class - CI_Individual*) see above

Discussion

CI_Responsibility is a complex class that provides a good deal of flexibility while maintaining structure enough to provide conformity. In the ICSM community, the minimum general guidance for CI_Responsibility is to include the `role`, `name` (of organisation preferred), `positionName` and `electronicMailAddress`. Other requirements exists according to purpose for which it appears in the metadata.

As a codelist, `CI_RoleCode` can be extended as needed. To improve consistancy, in most instances this should done under the the auspices of ICSM MDWG.

Citations use `CI_Citation` and cite the party responsible using `CI_Responsibility`. `CI_Responsibility` may be used without `CI_Citation`. `CI_Responsibility` is an aggregate of one or more parties (`CI_Party`). `CI_Party` may be specified as `CI_Individual` and/or `CI_Organisation`.

The the 2018 ammdement to ISO19115-1 the `partyIdentifier` element was added to `CI_Party` to allow the use of Identifiers for people and organisations such OrcID.

Recommendations

Therefore - to remain in allignment with ICSM good practices, it is recommended that all `CI_Responsibility` instances follow the general guidance of ISO 19115-1 unless directed otherwise. The mandatory element `role` must be populated in all instances noting the the type and form of the contents in this field is dependent on location in the metadata record. In addition, for minimal conformity, `name` (of organisation preferred), `positionName` and `electronicMailAddress` should also be poipulated. The use of

the new `partyIdentifier` element added in the 2018 amendment to the standard is encouraged by all parties.

Note BC 18-7 - MDWG may wish to further standardise the use of `CI_Responsibility`

Crosswalk considerations

ISO19139 In iso19115-1 Data type `CI_ResponsibleParty` (iso19115:2004) changed to type `CI_Responsibility`. The `CI_ResponsibleParty` was restructured in order to allow more flexible associations of individuals, organisations, and roles. The `CI_Responsibility/extent` element was added in order to allow specification of the spatial and temporal extent of a role.

Examples

XML -

```
<mdb:MD_Metadata>
...
    <cit:CI_Responsibility>
        <cit:role>
            <cit:CI_RoleCode
                codeList="https://schemas.isotc211.org/19115/resources/Codelist
                /cat/codelists.xml#CI_RoleCode"
                codeListValue="pointOfContact"/>
        </cit:role>
        <cit:party>
            <cit:CI_Organisation>
                <cit:name>
                    <gco:CharacterString>OpenWork Ltd</gco:CharacterString>
                </cit:name>
                <cit:contactInfo>
                    <cit:CI_Contact>
                        <cit:address>
                            <cit:CI_Address>
                                <cit:electronicMailAddress>
                                    <gco:CharacterString>name@email.org
                                    </gco:CharacterString>
                                </cit:electronicMailAddress>
                            </cit:CI_Address>
                        </cit:address>
                    </cit:CI_Contact>
                </cit:contactInfo>
            </cit:CI_Organisation>
        </cit:party>
    </cit:CI_Responsibility>
</mdb:MD_Metadata>
```

```
        </cit:CI_Address>
    </cit:address>
    </cit:CI_Contact>
</cit:contactInfo>
<cit:individual>
    <cit:CI_Individual>
        <cit:name>
            <gco:CharacterString>Metadata Bob</gco:CharacterString>
        </cit:name>
        <cit:positionName gco:nilReason="missing">
            <gco:CharacterString/>
        </cit:positionName>
    </cit:CI_Individual>
</cit:individual>
    </cit:CI_Organisation>
</cit:party>
</cit:CI_Responsibility>
.....
</mdb:MD_Metadata>
```

UML diagrams

Recommended elements highlighted in yellow

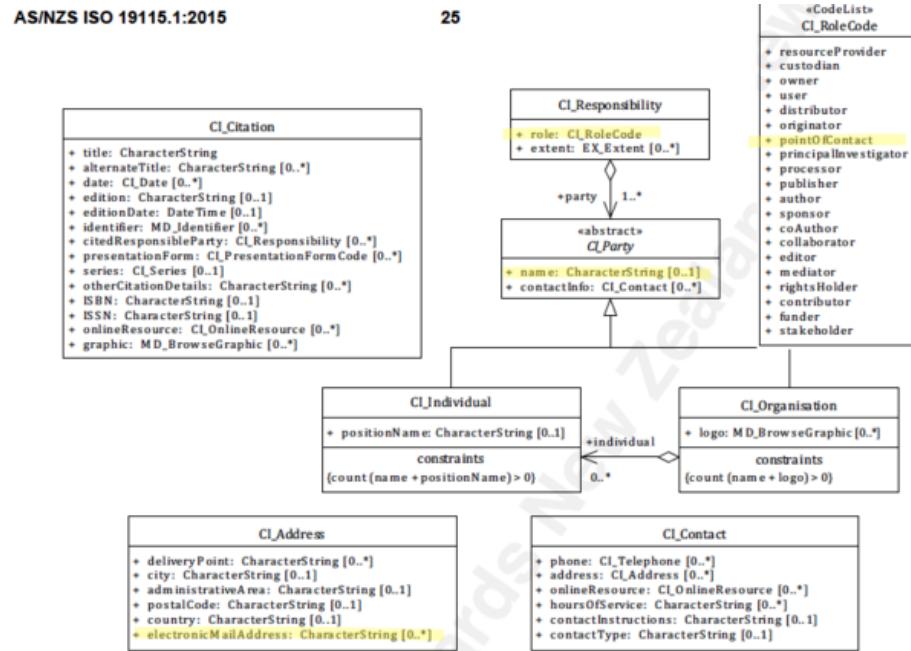


Figure 20 — Citation and responsible party information classes

Figure 45: Responsibility

Class - MD_BrowseGraphic

Geospatial data and service are largely visual by nature. Geospatial practitioners tend to be visually oriented. Browse graphics are a way of including in the metadata visual clues as to the nature and usefulness of resources.

- **Governance** - ISO
- **Metadata type** - *descriptive*
- *ICSM Level of Agreement* - ★★

Definition

A graphic that provides an illustration of a resource

NOTE - Should include a legend for the graphic, if applicable.

EXAMPLE - A dataset, an organisation logo, security constraint or citationgraphic..

ISO Obligation

In a metadata record there should be zero to many {0..*} graphicOverview packages of class MD_BrowseGraphic describing a resource. These should typically include the name linkage to the graphic.

Recommended Sub Elements

- **fileName** - (*type* - CharStr) Mandatory - name of the file that contains a graphic that provides an illustration of the resource.
- **linkage** - (*class* - CI_OnlineResource) 0 to many - link to browse graphic.
- Optional
 - **imageConstraints** - (*class* - MD_Constraints) 0 to many - restriction on access and/or use of browse graphic
 - **fileType** - (*type* - CharStr) f0 to 1 - format in which the illustration is encoded (e.g.: EPS, GIF, JPEG, PBM, PS, TIFF, PDF)
 - **extent** - (*class* - EX_Extent) Information about the horizontal, vertical and temporal extent of the resource specified by the scope

Discussion

Geospatial professionals by nature, rely to a large extent on visual information to gain understanding of resources. Browse graphics provide in the metadata a way to communicate with users visually.

Recommendations

Therefore - in order to provide a quick way for users to discover and identify the resource they need, provide a graphic overview in the metadata. At a minimum this should include a name and link to the image.

Crosswalk considerations

ISO19139 `browseGraphic` is a new package in iso19115-1. New elements include:

- **MD_BrowseGraphic.imageConstraint** (*class - MD_Constraints*)
 - This new element was added in order to allow the specification of constraints on a browse graphic associated with a resource.
- **MD_BrowseGraphic.linkage** (*class - CI_OnlineResource*)
 - This new element was added in order to allow a straightforward specification of the link to the browse graphic and the capability to add additional information (name, description, ...) about that graphic.

Also Consider

- **CI_OnLineFunctionCode** - A property of CI_OnlineResource. This codelist contains an option *browseGraphic*

Examples

UML diagrams

Recommended elements highlighted in yellow

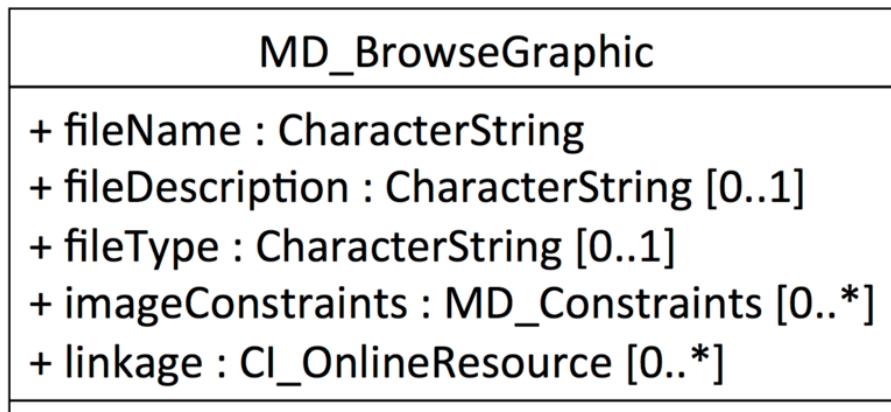


Figure 46: browseGraphic

class - MD_Constraints

When constraints are placed on a spatial resource or its metadata, it is important to document these.. Potential users need to be informed of rights, restrictions and responsibilities (or lack thereof) that apply to the use of such resources.

- **Governance** - ISO, National
- **Metadata Type** - structural
- **ICSM Level of Agreement** - **

Definition

restrictions on the access and use of a resource or metadata.

ISO Associations (May be found in)

- MD_Metadata.metadataConstraints
- MD_Identification.resourceConstraints
- MD_BrowseGraphic.imageConstraints

Attributes -

- **useLimitation** - (*type - charStr*) [0..*] limitation affecting the fitness for use of the resource or metadata. Example, “not to be used for navigation”
- **constraintApplicationScope** - (*class - MD_Scope*) [0..1] the target resource and physical extent for which information is reported
- **graphic** - (*class - MD_BrowseGraphic*) [0..*] graphic /symbol indicating the constraint
- **reference** - (*class - CI_Citation*) [0..*] citation/URL for the limitation or constraint, eg. copyright statement, license agreement, etc
- **releasability** - (*class - MD_Releasability*) [0..1] Requires an addressee or statement - information concerning the parties to whom the resource can or cannot be released
 - **addressee** - (*class - CI_Responsibility*) [0..*] party to which the release statement applies
 - **statement** - (*type - charStr*) [0..1] release statement
 - **disseminationConstraints** - (*codelist - MD_RestrictionCode*) [0..*] component in determining releasability.
- **responsibleParty** - (*class - CI_Responsibility*) [0..*] party responsible for the resource constraints

Associated Classes, Codelists and Unions

MD_RestrictionCode - codelist The name of the handling restrictions on the resource

- *unclassified* - information applies to the dataset
- *restricted* - information applies to the series
- *confidential* - information applies to non-geographic data
- *secret* - information applies to a dimension group
- *topSecret* - information applies to a feature
- *sensitiveButUnclassified* - although unclassified, requires strict controls over its distribution
- *forOfficialUseOnly* - information applies to the characteristic of a feature
- *protected* - information applies to the collection hardware class
- *limitedDistribution* - information applies to the collection session

MD_Scope - class See MD_Scope

MD_BrowseGraphic - class

- **fileName** - (*type - charStr*) Mandatory when using MD_BrowseGraphic - name of the file that contains a graphic that provides an illustration of the resource.
- **linkage** - (*class - CI_OnlineResource*) 0 to many - link to browse graphic.
- **imageConstraints** - (*class - MD_Constraints*) 0 to many - restriction on access and/or use of browse graphic
- **fileType** - (*type - charStr*) 0 to 1 - format in which the illustration is encoded (e.g.: EPS, GIF, JPEG, PBM, PS, TIFF, PDF)
- **extent** - (*class - Extent*) Information about the horizontal, vertical and temporal extent of the resource specified by the scope

Generalisations of MD_Constraints

MD_Constraints may be expressed as:

- **MD_LegalConstraints**
- **MD_SecurityConstraints**

Discussion

Information about constraints on the access and use of a resource or its metadata is of high importance to document as this information strongly impacts on the usability of

the resource to the user. Constraints may be security (*MD_SecurityConstraints*), legal (*MD_LegalConstraints*) or other (*MD_Constraints*).

A restriction may be applicable to a particular aspect of the resource. In this case capture this scope in *constraintApplicationScope* using a value from *MD_Scope*

Outstanding Issues

Good Practice examples lacking There is a need to gain greater consensus as to the general use of *MD_Constraints* across its instances by the MDWG.

Distribution Constraints Currently there are no clear methods to apply different constraints to different distributions. This may be an ISO issue to address. We should develop use cases.

Recommendations

Crosswalk considerations

ISO19139

- *MD_BrowseGraphic.imageConstraint* - This new element was added in order to allow the specification of constraints on a browse graphic associated with a resource.
- *MD_Constraints.constraintApplicationScope* - This new element was added in order to allow description of constraints on a resource that vary in space and/or time and/or level.
- *MD_Constraints.graphic* - This new element was added in order to allow inclusion of a logo or other graphic that is associated with a particular constraint.
- *MD_Constraints.reference* - This new element was added in order to allow inclusion of a reference to more detailed information about a constraint.
- *MD_Constraints.releasability* - This new element was added in order to allow specification of constraints that apply to specific people or organizations.
- *MD_Constraints.responsibleParty* - This new element was added in order to allow specification of people or organisations responsible for the constraints.
- *MD_Releasability* - This new class was added to provide information about resource release constraints

Related Classes

- ***MD_LegalConstraints* An extension to *MD_Constraints* for constraints applied for legal reasons.

- **MD_SecurityConstraints An extension to MD_Constraints for constraints applied for security purposes.

UML diagrams

Recommended elements highlighted in yellow

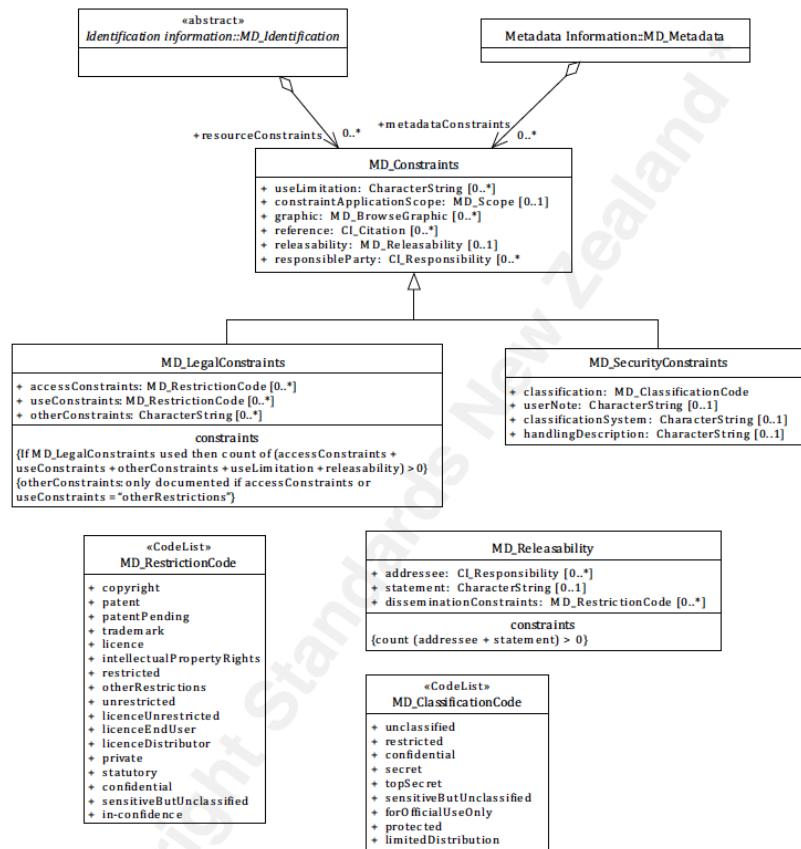


Figure 47: MD_Constraints

Class - MD_DataIdentification

When capturing information on a spatial resource, it is important to identify and categorise information as pertaining to the data resource and to distinguish these information from that which applies to the metadata itself or service resources. *MD_DataIdentification* extends the abstract class *MD_Identification* to document a spatial data resource.

- **Governance - ISO**
- **Metadata Type - structural**
- **ICSM Level of Agreement - ****

Definition -

basic information required to uniquely identify a data resource.

ISO Associations

MD_Identification is an abstract class that is parent to

- **MD_DataIdentification** It is a child of
- **MD_Metadata.identificationInfo**

Atributes and packages

the following provides additional guidance to *MD_Identification*.

MDWG Recomended - In addition to all the attributes of *MD_Identification*, the additional recommended elements apply -

- **Locale - (class - *PT_Locale*) [0..1]**
- **Extents - (class - *EX_Extent*) [0..*]** High-level thematic classifications to assist in the grouping and searching of data. Required when the hierarchyLevelName scopeCode is ‘dataset’.

Additional optional attributes

- **otherLocale - (class - *PT_Locale*) [0..*]**
- **environmentDescription - (type - *charStr*) [0..1]** description of the resource in the producer’s processing environment, including items such as the software, the computer operating system, file name, and the dataset size
- **supplementalInformation - (type - *charStr*) [0..1]** any other descriptive information about the resource

Discussion

Identification information about a resource is of high importance to document as this information strongly impacts on the ability of a user to assess the resource fitness to use. MD_DataIdentification instantiates the abstract class MD_Identification for use with data resources.

Recommendations

Related Classes

- **MD_Identification** the abstract parent class to MD_DataIdentification
- See guidances for the composite elements.

UML diagrams

Recommended elements highlighted in yellow

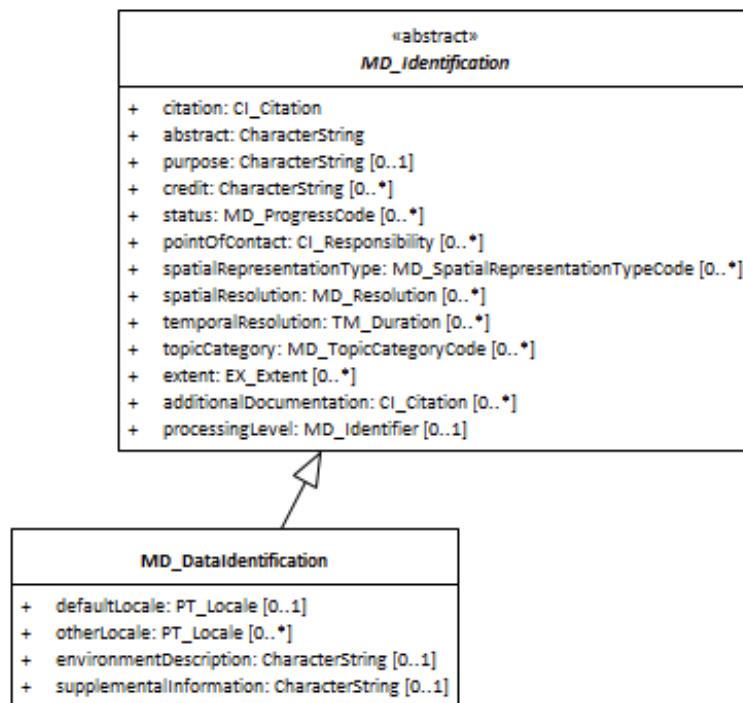


Figure 48: MD_DataIdentification

class - MD_Metadata

In order to create consistent structured metadata to describe spatial resources, we need a schema to provide a structure and a class to hold it. MD_Metadata provides this for ISO19115-1.

- **Governance - ISO**
- **Metadata Type - structural**
- **ICSM Level of Agreement - ******

Definition

Root entity which defines metadata about a resource or resources

Child packages

ICSM recommended

- **resourceLineage** - (class - Li_Lineage) [0..*]
- **referenceSystemInfo** - (class - MD_ReferenceSystem)
- **metadataConstraints** - (abstract class MD_Constraints) [0..*] see:
 - **Metadata Security Constraints**
 - **Metadata Legal Constraints**
- **identificationInfo** - (abstract class - MD_Identification) [1..*] see:
 - **Data Identification** - (class MD_DataIdentification) > ?create Entry?
 - **Service Identification** - (class SV_ServiceIdentification) > To Be Completed
- **distributionInfo** - (class - MD_Distribution) [0..*]

Other packages - not yet addressed by MDWG

- **metadataMaintenance** - (class MD_MaintenanceInformation) [0..1]
- **spatialRepresentationInfo** - (abstract class - MD_SpatialRepresentation) [0..*]
- **metadataExtensionInfo** - (class - MD_MetadataExtensionInformation) [0..*]
- **applicationSchemaInfo** - (class - MD_ApplicationSchemaInformation) [0..*]
- **portrayalCatalogInfo** - (class - MD_ProtrayalCatalogueReference) [0..*]
- **contentInfo** - (abstract class - MD_ContentInformation) [0..*]
- **dataQualityInfo** - (class - DQ_DataQuality (from ISO19157)) [0..*]

Atributes

MDWG Recomended Attributes -

- **metadataIdentifier** - (*class - MD_Identifier*) [0..1]
- **dateInfo** - (*class - CI_Date*) [1..*]
- **contact** - (*class - CI_Responsibility*) [0..1]
- **defaultLocale** - (*class - PT_Locale*)[0..1]
- **metadataLinkage** - (*class - CI_OnlineResource*)[0..*]
- **parentMetadata** - (*class - CI_Citation* [0..1]
- **metadataScope** - (*class - MD_MetadataScope*)[0..*]
- **metadataStandard** - (*class - CI_Citation*) [0..*] AS/NZS ISO 19115-3 > recommended but not yet detailed by MDWG
- **metadataProfile** - (*class - CI_Citation*) [0..*] > recommended but not yet detailed by MDWG

Other attributes - not yet addressed by MDWG

- **otherLocale** - (*class - PT_Locale*)[0..*]
- **alternativeMetadataReference** - (*class - CI_Citation* [0..*]

Discussion

The MD_Metadata package defines the schema for describing the complete metadata about a resource and metadata about the metadata itself. It is composed through an aggregate of 12 additional metadata classes as shown above. The MD_Metadata class also contains attributes providing information about the metadata record itself. Those recommended attributes are covered in other sections as cited above

Recommendations

Therefore - it is recommended that all spatial metadata utilise the structure provided by the ISO19115-1 MD_Metadata class and follow the guidance provided. While ISO 19115-1 allows for such a metadata to describe more than one spatial resource, in order to reduce confusion and ease the integration with other metadata systems, it is recommended that each metadata record describes one and only one resource and that each resource have one metadata record of class MD_Metadata.

UML diagrams

Recommended elements highlighted in yellow

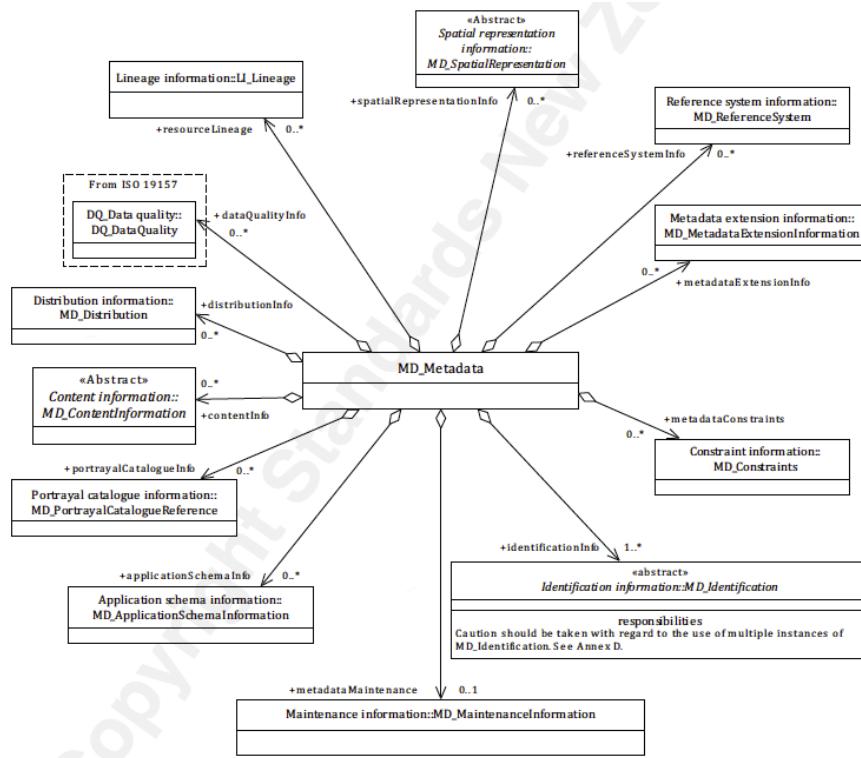


Figure 49: MD_Metadata.png

Class (abstract) - MD_Identification

When capturing information on a spatial resource, it is important to identify and categorise information as pertaining to the data or service resource and to distinguish this information from that which applies to the metadata itself. MD_Identification provide an abstract package, the properties of which can be expressed for data (MD_DataIdentification) or service SV_ServiceIdentification resources.

- **Governance** - ISO
- **Metadata Type** - structural
- **ICSM Level of Agreement** - *

Definition

Basic information required to uniquely identify a resource or resources.

ISO Requirements

At least one [1..*] MD_Identification must be present in a metadata record. This must be instantiated as a MD_DataIdentification or SV_ServiceIdentification instance.

ISO Associations

MD_Identification is an abstract class that can be instantiated as either

- MD_DataIdentification
- SV_ServiceIdentification

It is a child of

- MD_Metadata.identificationInfo

Child packages -

Concrete subclasses of MD_Identification

- **Data Identification** - (*class MD_DataIdentification*) > ?create Entry?
- **Service Identification** - (*class SV_ServiceIdentification*) > To Be Completed at later date

MDWG recommended MD_Identification packages One of

- **Data Identification** - (*class MD_DataIdentification*)

or

- **Service Identification** - (*class SV_ServiceIdentification*)

Plus the following:

- **Extents** - (*class EX_Extent*) [0..*] High-level thematic classifications to assist in the grouping and searching of data.
- **referenceSystemInfo** - (*class MD_ReferenceSystem*)
- **resourceConstraints** - (*abstract class MD_Constraints*) [0..*] see
- **Resource Security Constraints**
- **Resource Legal Constraints**
- **Resource Other Constraints**
- **Spatial Resolution** - (*class MD_Resolution*) [0..*]
- **Resource Lineage** - (*class Li_Lineage*) [0..*]

Other packages - not yet addressed by MDWG

- **resourceMaintenance** - (*class MD_MaintenanceInformation*) [0..1]
- **spatialRepresentationInfo** - (*abstract class MD_SpatialRepresentation*) [0..*]
- **applicationSchemaInfo** - (*class MD_ApplicationSchemaInformation*) [0..*]
- **portrayalCatalogInfo** - (*class MD_ProtrayalCatalogueReference*) [0..*]
- **contentInfo** - (*abstract class MD_ContentInformation*) [0..*]
- **dataQualityInfo** - (*class DQ_DataQuality (from ISO19157)*) [0..*]

Atributes and packages

MDWG Recommended Click on the attribute name for guidance:

- **Citation** - (*class CI_Citation [1..1]*) - Citation for the resource, includes name, publication date, identifiers, originators and publishers.
- **abstract** - (*type - charStr*) [1..*] - A brief narrative summary of the cited resource.
- **purpose** - (*type - charStr*) [0..1] - A brief summary of the intentions with which the resource was developed.
- **status** - (*codelist - MD_ProgressCode*) [0..1] - The status of the resource populated from a domain of values.
- **topicCategory** - (*enumeration - MD_TopicCategoryCode*) [0..*] - The main themes of the resource populated from a fixed domain of values.
- **pointOfContact** - (*class CI_Responsibility*) [0..1] - The name and contact information for the organisation, role and/or individual that serves as the point of contact

for the cited resource.

- **spatialRepresentationType** - (*codelist - MD_SpatialRepresentationTypeCode*) [0..*] - The method used by the resource to spatially represent geographic information.
- **spatialResolution** - (*class - MD_Resolution*) [0..*] - The nominal scale and/or spatial resolution at which the resource is designed to be used.
- **graphicOverview** - (*class - MD_BrowseGraphic*) [0..*] - A graphic that provides a lightweight illustration pertaining a resource.
- **additionalDocumentation** - (*class - CI_Citation*) [0..*] - Citation of other documentation associated with the resource, e.g. related articles, publications, user guides, data dictionaries.
- **associatedResource** - (*class - MD_AssociatedResource*) [0..*] - Used to indicate association between resources and records related to the resources.

Others - not yet addressed by MDWG

- **credit** - (*type - charStr*) [0..*] Recognition of those who contributed to the dataset.
Do not include URLs here. Provide full citations in *MD_AssociatedResource* section.
- **temporalResolution** - (*class - TM_PeriodDuration* [0..*]) The temporal resolution (level of temporal detail) of the dataset.
- **processingLevel** - (*class - MD_Identifier*) [0..*] An identifier code that identifies the level of processing in the producers coding system.
- **resourceSpecificUsage** - (*class - MD_Usage*) [0..*] Basic information about specific application(s) for which the resource(s) has been or is being used by different users.

Discussion

Identification information about a resource is of high importance to document as this information strongly impacts on the ability of a user to asses the resource fitness to use. The **identificationInfo** package must be of either type *data* (*MD_DataIdentification*) or *service* (*SV_ServiceIdentification*).

Recommendations

There must be at least one (and usually just one) **identificationInfo** packages in a metadata record that contains the substantive information about a cited resource.

Related Classes

- **MD_DataIdentification** An instantiation of the abstract class for data resource metadata

UML diagrams

Recommended elements highlighted in yellow

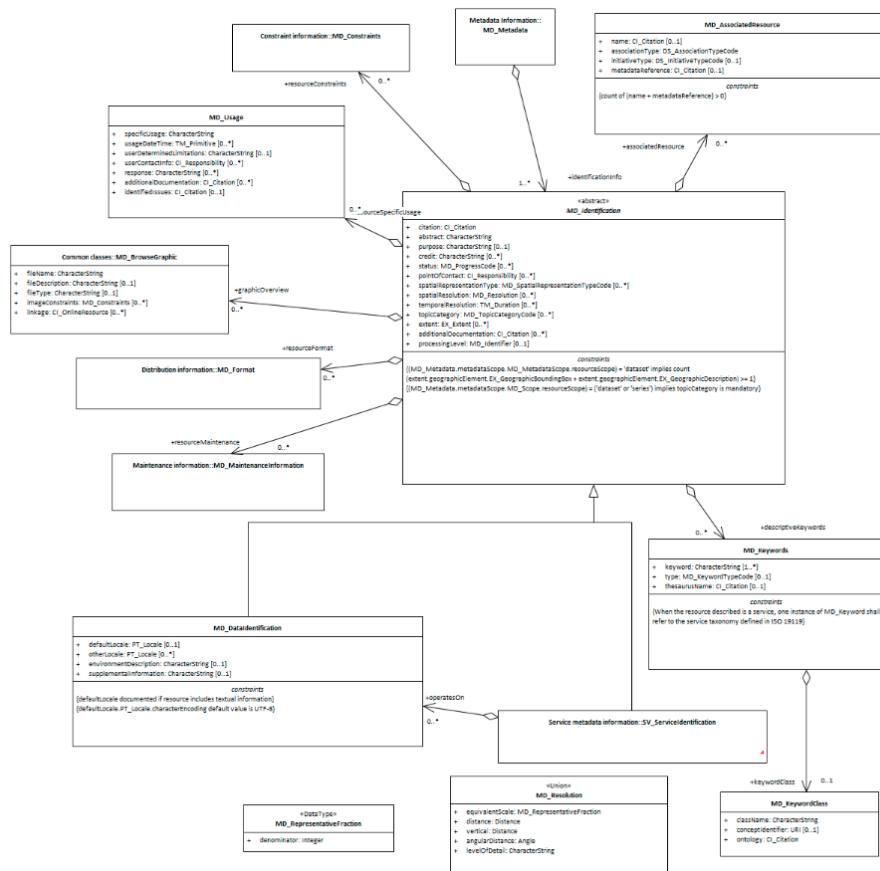


Figure 50: MD_Identification

class - MD_Identifier

In order for machines and people to distinguish singleton elements cited a Metadata record MD_Metadata , a method to provide a unique identifier.

- **Governance - ISO**
- **Metadata type - administrative**
- *ICSM Level of Agreement* - **

Definition

Provides a value uniquely identifying an object within a namespace

ISO Associations

- MD_Metadata.metadataIdentifier
- MD_ReferenceSystem.referenceSystemIdentifier
- MD_Medium.identifier
- MD_RangeDimension.name
- MD_ImageDescription.imageQualityCode
- MD_CoverageDescription.processingLevelCode
- EX_GeographicDescription.geographicIdentifier
- CI_Citation.identifier
- CI_Party.PartyIdentifier

Sub Elements for class MD_Identifier

- **code** - (*type - charStr*) [1..1] alphanumeric value identifying an instance in the namespace, mandatory when identifier is provided
- **codespace** - (*type - charStr*) [0..1] identifier or namespace in which the code is valid. Usually a URL path which, when combined with the id, creates a resolvable (dereferencable) URI.
- **authority** - (*class CI_Citation*) [0..1] the provider of the id
- **version** - (*type - charStr*) [0..1] version identifier for the namespace
- **description** - (*type - charStr*) [0..1] natural language description of the meaning of the code value

Discussion

authorities as agents Some metadata implementations use system information in the **authority** field however *authority* implies agency and the CI_Citation object makes it clear

an *agent* (person or, more likely an organisation) should be recorded here, not a system.

indicating authorities Resolvable identifiers (URLs) for **authority** likely of interest to MDWG members have been established using persistent identifiers by the Australian Government Linked Data Working Group for use in this field:

- <http://linked.data.gov.au/org/ausgin> - Australian Geoscience Information Network. Authorises use of pid.geoscience.gov.au-based URIs
- <http://linked.data.gov.au/org/agldwg> - Australian Government Linked Data Working Group. Authorises use of linked.data.gov.au, the Australian government's departmentally-independent URI domain allocated for persistent data identifiers
- <http://linked.data.gov.au/org/doi> - Digital Object Identifier System. The international not-for-profit membership organization providing Digital Object Identifier (DOI)s used for documents and data
- <http://linked.data.gov.au/org/handle> - the general-purpose digital object identifier system used by many other systems
- <http://linked.data.gov.au/org/igsn> - International Geo Sample Number. The non-profit consortium managing unique identifiers for samples and specimens collected from our natural environment
- <http://linked.data.gov.au/org/psma> - PSMA Australia. Issues identifiers for street addresses in Australia
- <http://linked.data.gov.au/org/ror> - Research Organization Registry Community. A community-led project to develop an open, sustainable, usable, and unique identifier for every research organization in the world

These identifiers may be used in appropriate **authority** fields (i.e. with a CI_Citation XML block) to better indicate authority agencies than either a (likely short-lived) website address or just the name of them in text and street address/phone contact information and so on.

More identifiers for more authorities can be added upon request to the AGLDWG.

Recommendations

It is recommended that the MDWG develop general advise on the use of MD_Identifier - particularly concerning the use of <mcc:codespace> and leverage the ability of combining this element with its mandatory sibling element <mcc:code> to provide a linkage to a cited resource. It would also be beneficial to discuss other sibling elements <mcc:authority>, <mcc:version> and <mcc:description> and develop any

needed advice on their general use.

UML diagrams

Recommended elements highlighted in yellow

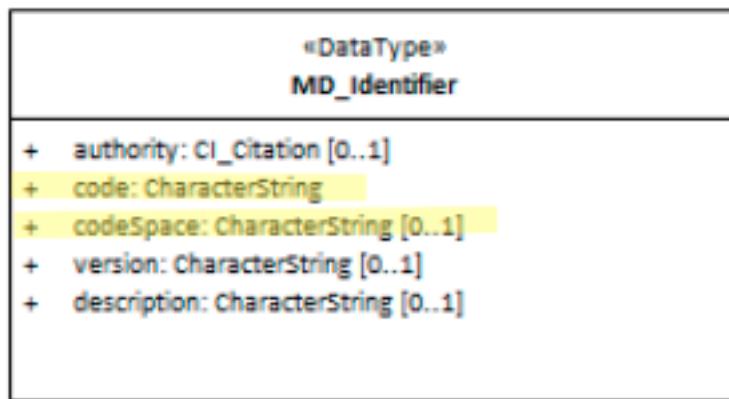


Figure 51: MDIdentifier

Class - MD_LegalConstraints

When constraint (*MD_Constraints*) are of a legal nature they should be captured using the class **MD_LegalConstraints**.

- **Governance** - ISO
- **Metadata type** - structural
- **ICSM Level of Agreement** - **

Definition

restrictions and legal prerequisites for accessing and using the resource or metadata.

ISO Associations

The class, *MD_LegalConstraints* is a specialisation of *MD_Constraints*. Follow the guidance provided for that class plus the following additional guidance.

ISO Constraints When *MD_LegalConstraints* is used the at least one of the elements *accessConstraints*, *useConstraints*, *useLimitation*, *releasability* and *otherConstraints* must be present. When using *otherConstraints*, either *accessConstraints* or *useConstraints* must equal *otherRestrictions*.

Attributes Has all the attributes of *MD_Constraints* plus the following:

- **accessConstraints** - (*codelist - MD_RestrictionCode*) [0..*] access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource or metadata
- **useConstraints** - (*codelist - MD_RestrictionCode*) [0..*] constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource or metadata
- **otherConstraints** - (*type - charStr*) [0..*] other restrictions and legal prerequisites for accessing and using the resource or metadata

Discussion

Information about constraints on the access and use of a resource or its metadata is of high importance to document as this information strongly impacts on the usability of the resource to the user. Constraints may be security (*MD_SecurityConstraints*), legal (*MD_LegalConstraints*) or other (*MD_Constraints*).

A restriction may be applicable to a particular aspect of the resource. In this case capture this scope in *constraintApplicationScope* using a value from *MD_Scope*

Almost all created resources (including metadata) carry some legal rights, restrictions and responsibility regarding their access and use. For instance, in most jurisdictions, copyright is automatically granted to the creator of a creative work. Legal restrictions such as licences and end user agreements, need be documented for users and resource managers along with the identity of the holder of these rights. Each agency needs to develop consistent guidance on the use of such statement and share clear understanding of their meaning. This is often done by reference to a external body that manages the definitions of the legal constraints applied.

Outstanding Issues

Good Practice examples lacking There is a need to gain greater consensus as to the general use of MD_LegalConstraints across its instances by the MDWG.

Distribution Constraints Currently there are no clear methods to apply different legal constraints to different distributions. This may be an ISO issue to address. We should develop use cases.

Recommendations

Therefore - it is important to capture all legal constraints that apply to a resource. This should include licences, end user agreements, etc. If the resource is public domain, this should be cited appropriately. Many jurisdictions encourage the use of open data and Creative Commons license. This should be encouraged through the use of copyright licenses such as CC0 or CC By. Provide the user links to additional information about such constraints, there use and meaning. In addition, document the holder of such rights and how to contact for more information.

Crosswalk considerations

ISO19139 See guidance provided in MD_Constraints

Related Classes

- **MD_Constraints** the Superclass to MD_LegalConstraints. MD_LegalConstraints implements all the properties of MD_Constraints. Full guidance of the associated elements are discussed there.

- **MD_SecurityConstraints** A sibling to MD_LegalConstraints and an extension to MD_Constraints for constraints applied for security purposes.

UML diagrams

Recommended elements highlighted in yellow

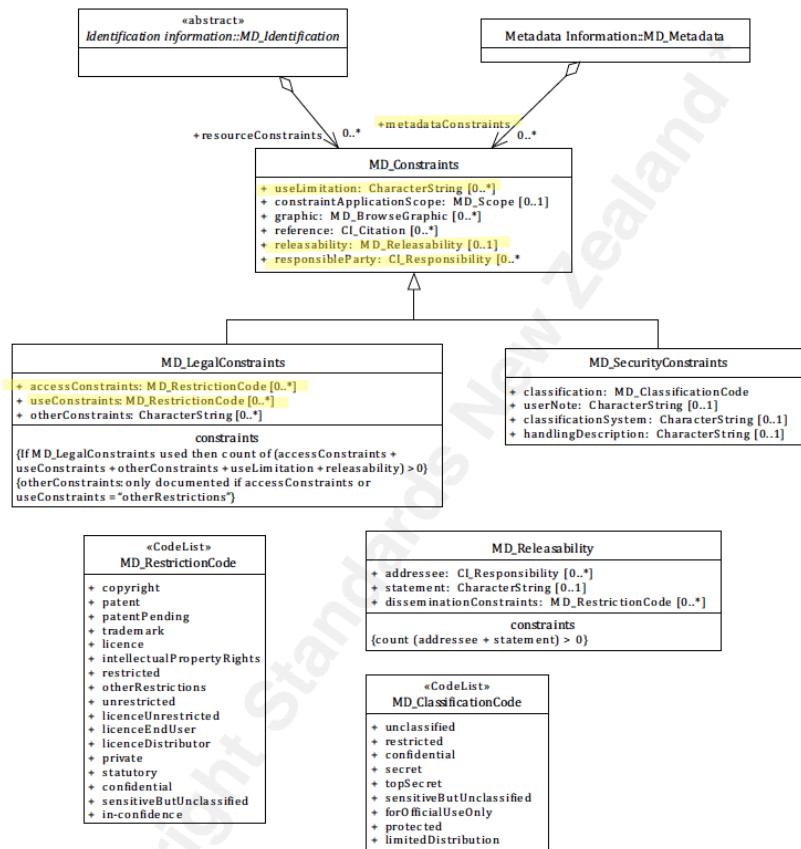


Figure 52: MD_Constraints

Class MD_Scope

*The capture of information about the physical extents of the resource is needed under many packages of information about a cited resource. A standardised way of this scope is useful. This function is provided by the class **MD_Scope**.*

- **Governance - ISO**
- **Metadata type - structural**
- **ICSM Level of Agreement - ****

Definition

the target resource and physical extent for which information is reported.

ISO Associations (May be found in)

- MD_Constraints.constraintApplicationScope
- LI_Lineage.scope
- LI_ProcessStep.scope
- LI_Source.scope
- MD_MaintenanceInformation.maintenanceScope

Attributes -

- **level - (codelist - MD_ScopeCode) [1..1]** Mandatory when using MD_Scope - target resource covered
- **extent - (class - EX_Extent) [0..*]** Information about the horizontal, vertical and temporal extent of the resource specified by the scope
- **levelDescription - (codelist - MD_ScopeDescription) [0..*]** detailed description/listing of the items specified by the level

Associated Classes, Codelists and Unions

MD_ScopeCode - codelist Class of information to which the referencing entity applies

- *attribute* - information applies to the attribute value
- *attributeType* - information applies to the characteristic of a feature
- *collectionHardware* - information applies to the collection hardware class
- *collectionSession* - information applies to the collection session
- *dataset* - information applies to the dataset
- *series* - information applies to the series

- *nonGeographicDataset* - information applies to non-geographic data
- *dimensionGroup* - information applies to a dimension group
- *feature* - information applies to a feature
- *featureType* - information applies to a feature type
- *propertyType* - information applies to a property type
- *fieldSession* - information applies to a field session
- *software* - information applies to a computer program or routine
- *service* - information applies to a capability which a service provider entity makes available to a service user entity through a set of interfaces that define a behaviour, such as a use case
- *model* - information applies to a copy or imitation of an existing or hypothetical object
- *tile* - information applies to a tile, a spatial subset of geographic data
- *metadata* - information applies to metadata
- *initiative* - information applies to an initiative
- *sample* - information applies to a sample
- *document* - information applies to a document
- *repository* - information applies to a repository
- *aggregate* - information applies to an aggregate resource
- *product* - metadata describing an ISO 19131 data product specification
- *collection* - information applies to an unstructured set
- *coverage* - information applies to a coverage
- *application* - information resource hosted on a specific set of hardware and accessible over a network

MD_ScopeDescription - union (Union - class describing a selection of one of the specified types)

Description of the class of information covered by the information

- **attributes** - (*Set - charStr*) instances of attribute types to which the information applies
- **features** - (*Set - charStr*) instances of feature types to which the information applies
- **featureInstances** - (*Set - charStr*) feature instances to which the information applies
- **attributeInstances** - (*Set - charStr*) attribute instances to which the information applies
- **dataset** - (*charStr*) dataset to which the information applies
- **other** - (*charStr*) class of information that does not fall into the other categories to which the information applies

Discussion

Information about scope of a citation of an aspect of a resource or its maintenance is of high importance to document as this information strongly impacts on the understandability of the resource metadata to the user.

The MD_Scope is used to describe the breadth and or type of the resource that a metadata record or class describes. It includes a MD_ScopeCode as a brief indicator of the scope which can be useful in search and presentation applications and a MD_ScopeDescription in order to provide more detail. The values in the MD_ScopeCode list are intentionally general and details of their application are left to the data provider. In order to foster interoperability, the usage of the scope codes should be carefully documented in any community of practice. Clause E.5 outlines possible applications of codes from the MD_ScopeCode codelist and related codes included in ISO/TS 19139 as part of the MX_ScopeCode list. These examples are meant to provide reasonable starting points and are certainly not exhaustive.

Recommendations

Crosswalk considerations

ISO19139 HierarchyLevel attributes were replaced by an MD_Scope class to improve the description of the scope of the metadata;

- MD_Constraints.constraintApplicationScope (New Element)
 - This new element was added in order to allow description of constraints on a resource that vary in space and/or time and/or level
- DQ_DataQuality.scope (replaced by LI_Lineage.scope)
 - This element allows the description of the type and/or extent of the lineage information. DQ_Data-Quality scope was moved to ISO 19157
- LI_Lineage.sourceExtent (replaced by LI_Source.scope)
 - This new element was added in order to allow description of more details of the scope of a lineage section. This was required, in part, to replace the DQ_Scope from the DQ_DataQuality class that was moved from 19115 to the new data quality standard (ISO 19157).
- LI_ProcessStep.scope (New Element)
 - This new element was added in order to allow description of the scope of a process step independently from the scope of the entire lineage section. This was required, in part, to replace the DQ_Scope from the DQ_DataQuality class that was moved from 19115 to the new data quality standard (ISO

19157).

- MD_MaintenanceInformation.updateScope and MD_MaintenanceInformation.updateScopeDescription
(Replaced by) MD_MaintenanceInformation.maintenanceScope
 - These two roles were combined into maintenance-Scope: MD_Scope [0..*]
in order to allow specifying a scope that includes a spatial and temporal extent

Related Links

- ESIP MD_Scope

UML diagrams

Recommended elements highlighted in yellow

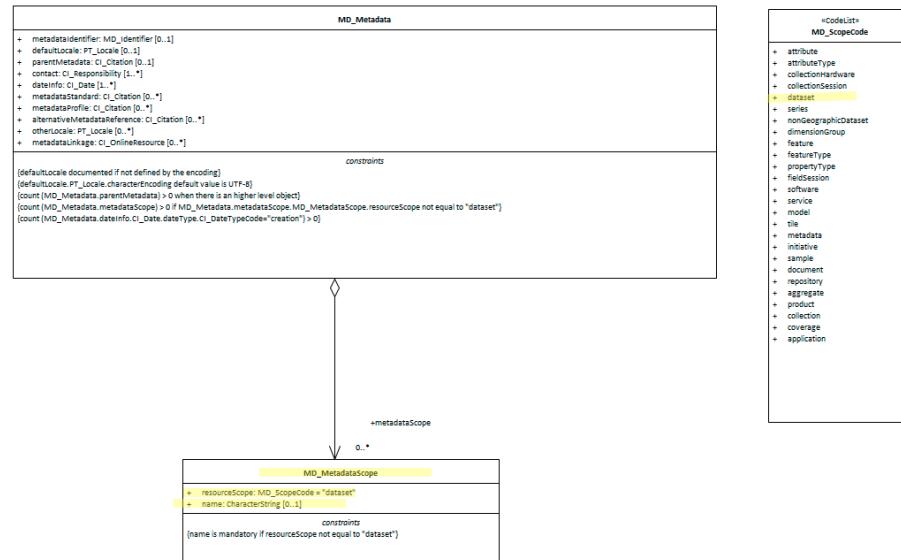


Figure 53: MD_Scope

Class - MD_SecurityConstraints

When constraints information (*MD_Constraints*) concern security issues they should be captured using the class *MD_SecurityConstraints*.

- **Governance** - ISO, Common, Agency
- **Metadata type** - structural
- **ICSM Level of Agreement** - **

Definition

Handling restrictions imposed on the resource or metadata for national security or similar security concerns.

ISO Associations

The class, *MD_SecurityConstraints* is an specialisation of *MD_Constraints*. Follow the guidance provided for that class plus the following additional guidance.

Attributes -

MD_SecurityConstraints has all the attributes of *MD_Constraints* plus the following:

- **classification** - (codelist - *MD_RestrictionCode*) [0..*] Mandatory when using *MD_SecurityConstraints* - the name of the handling restrictions on the resource or metadata
- **userNote** - (type - *charStr*) [0..1] explanation of the application of the legal constraints or other restrictions and legal prerequisites for obtaining and using the resource or metadata
- **classificationSystem** - (type - *charStr*) [0..1] name of the classification system
- **handlingDescription** - (type - *charStr*) [0..1] additional information about the restrictions on handling the resource or metadata

Discussion

Information about constraints on the access and use of a resource or its metadata is of high importance to document as this information strongly impacts on the usability of the resource to the user. Constraints may be security (*MD_SecurityConstraints*), legal (*MD_LegalConstraints*) or other (*MD_Constraints*).

A restriction may be applicable to a particular aspect of the resource. In this case capture this scope in *constraintApplicationScope* using a value from *MD_Scope*

Many of the resources and even its metadata may carry some security restrictions regarding their access and use. The reasons may be for national security, financial or commercial sensitivity, or privacy concerns as is common with census data. These security restrictions need be documented for users and resource managers along with the identity of the applier of these constraints. Each agency needs to develop consistent guidance on the use of such statement and share clear understanding of their meaning. This is often done by reference to an external body that manages the definitions of the security constraints applied.

Outstanding Issues

Good Practice examples lacking There is a need to gain greater consensus as to the general use of MD_SecurityConstraints across its instances by the MDWG.

Australia Protective Security Policy Framework A best practice method of using the new Australia Protective Security Policy Framework in ISO 19115-1 must be created by the MDWG. While classificationSystem allows use to declare the security framework we are using, it does not do so as a citation which limits our ability to document our reference properly. Also, how to include the values in the framework is not clear. Extending MD_RestrictionCode seems the most obvious, but is changing an ISO codelist the best approach given we want our recommendations not to change the underlying ISO 19115-1.

Recommendations

Therefore - it is important to capture all security constraints that apply to a resource, including its metadata. If there be none then it may be useful to state this fact through the use of the unclassified value of MD_RestrictionCode, particularly if your organisation does regularly handle sensitive resources. Agencies should develop consistent guidance on the use of security classifications and share clear understanding of their meaning with users.

At a minimum the Name (primary and alternate) and version by which this security restriction on the access and use of this cited resource is known should be captured along with the classification value selected from the codelist - MD_ClassificationCode.

Crosswalk considerations

ISO19139 See guidance provided in MD_Constraints

Related Classes

- **MD_Constraints** the Superclass to MD_LegalConstraints. MD_LegalConstraints implements all the properties of MD_Constraints. Full guidance of the associated elements are discussed there.
- **MD_LegalConstraints** A sibling to MD_SecurityConstraints and an extension to MD_Constraints for constraints applied for legal purposes.

UML diagrams

Recommended elements highlighted in yellow

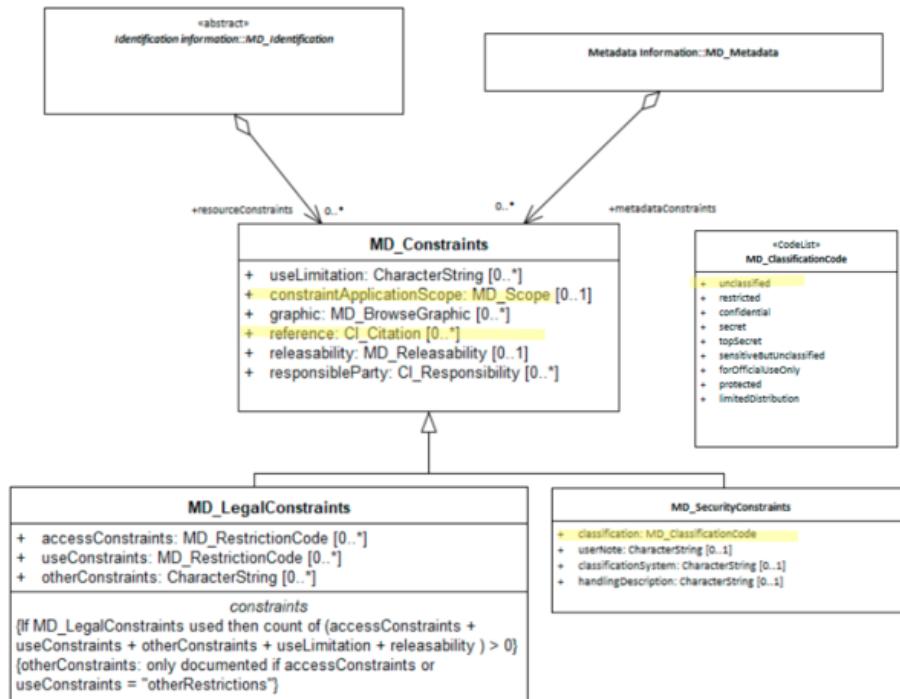


Figure 54: MD_Constraints

class - PT_Locale

To clearly identify, for humans and machines, the language in which metadata and its associated resources are captured we need a standised way to store such information. The class PT_Locale provides us such a structure.

- **Governance - ISO**
- **Metadata type - administrative**
- *ICSM Level of Agreement - ****

Definition

Contains the description of a locale

ISO Associations -

- MD_Metadata.defaultLocale
- MD_Metadata.otherLocale
- MD_DataIdentification.defaultLocale
- MD_DataIdentification.otherLocale
- MD_FeatureCatalogueDescription.locale

ICSM Recommended Sub Element for class CI_OnlineResource

- **language** - (*codelist - LanguageCode*) [1..1] Madatory. Designation of the locale language in ISO 639-2, 3-alphabetic digits code
- **country** - (*codelist - CountryCode*) [0..1] Optional. Designation of the specific country of the locale language
- **characterEncoding** - (*codelist - MD_CharacterSetCode*) [1..1] Madatory. Use UTF8

Discussion

A locale (identified as PT_Locale) is a combination of language, potentially a country, and a character encoding (i.e., character set) in which localised character strings are expressed. Because of our location and culture, the defualt language for jusidictions under the guidance of ICSM will most usually be to use

Outstanding Issues

DCAT Guidance states: “Resources defined by the Library of Congress (1, 2) SHOULD be used. If a ISO 639-1 (two-letter) code is defined for language,

then its corresponding IRI SHOULD be used; if no ISO 639-1 code is defined, then IRI corresponding to the ISO 639-2 (three-letter) code SHOULD be used.” This may present a problem of translation from ISO 19115-1 use of ISO 639-2, 3-alphabetic digits code

Recommendations

Therefore - given the location and area of influence of ICSM, for language, the three letter code chosen from the ISO 639-2 LanguageCode CodeList should default to “eng” for most instances of PT_Locale in a metadata record. Use UTF8 as the characterEncoding for consistency across catalogues.

UML diagrams

Recommended elements highlighted in yellow

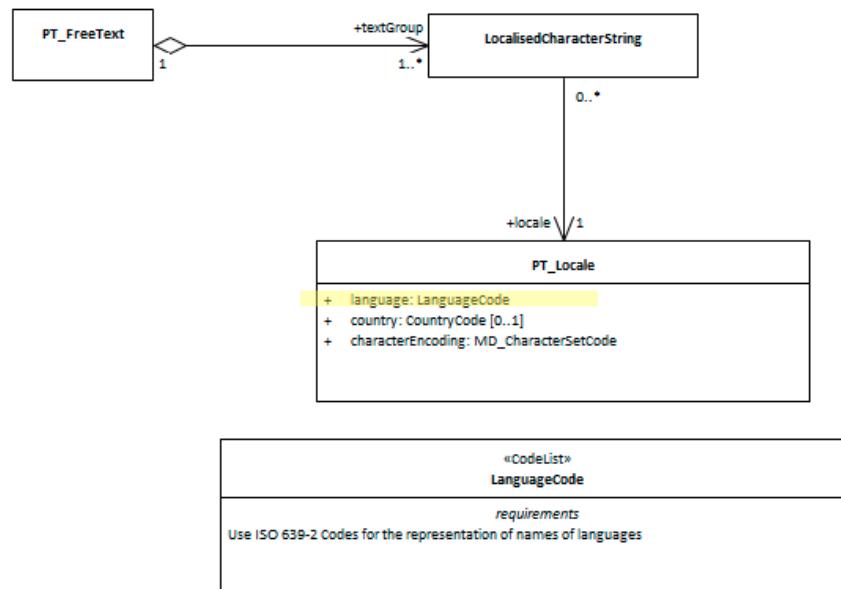


Figure 55: PT_Locale