



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY
Know the Earth... Show the Way... Understand the World

National System for Geospatial Intelligence: Standards Document

National System for Geospatial Intelligence (NSG) Metadata Foundation (NMF)

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Introduction

The National System for Geospatial-Intelligence (NSG) is a unified community of geospatial intelligence (GEOINT) experts, producers, and users organized around the goal of integrating technology, policies, capabilities, and doctrine to produce GEOINT in a multi-intelligence environment. This includes the Department of Defense (DoD) and non-DoD components of the Intelligence Community (IC), including, where appropriate, civil agency, federal, and coalition partners. Geospatial metadata is used in the NSG to specify the structure for, and to describe the characteristics of, GEOINT data.

The NSG Metadata Foundation (NMF) is a **GEOINT Metadata Standard** applicable across the NSG. The term **GEOINT** stands for Geospatial Intelligence. **Geospatial** refers to either an implicit or explicit reference to a location relative to the earth. **GEOINT** encompasses the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth. GEOINT consists of imagery, imagery intelligence, and geospatial information.

Metadata is information that captures the characteristics of a resource to represent the 'who', 'what', 'when', 'where', 'why', and 'how' of that resource. GEOINT Metadata is used to locate imagery, imagery intelligence, and/or geospatial information and allow the user the ability to determine its usability and suitability for a particular mission or function.

A **GEOINT Standard** is a documented agreement containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics to ensure that materials, products, processes, or services are fit for the analysis and visual representation of physical features and geographically referenced activities.

The meaning and contexts of the preceding terms build upon one another in the order shown. Familiarity with these terms and their contexts are critical to understand what it means for the NMF to be a **GEOINT Metadata Standard** that defines a logical schema for metadata in the NSG. It provides the foundation for understanding and applying the NMF in the many communities that comprise the NSG.

The NMF is intended to be used by several different audiences including (1) Those who write standards and provide configuration management for the collection of standards; (2) Acquisition personnel who will publish Requests for Proposals, and other contract documents; (3) System engineers who will identify and select the proper metadata content for a specific technology solution; (4) System engineers who will confirm that the proper metadata content has been selected; (5) Programmers who will instantiate those elements in the operational code, and (6) Test engineers who will confirm the presence and correctness of those elements.

This version of the NMF reflects changes resulting from revisions to international consensus metadata standards, such as ISO 19115:2003/Corr. 1:2006 revised to become ISO 19115-1:2014; revisions to Intelligence Community (IC) metadata technical specifications, such as IC-Information Security Markings (IC-ISM) Version 8 revised to Version 13; and the consolidation of NSG metadata schema and NSG application schema based on these standards into a unified concept model in the form of the NSG Application Schema (NAS) 8.0. NMF 3.0 is a profile of the NAS 8.0 to address metadata for Identification and Access of NSG dataset and service resources.

All content of NMF – Part 1: Core Version 2.2, NMF – Part 2: Quality Metadata Version 1.1, NMF – Part 4: Electronic Records Management Version 2.0, and NMF – Part 5: Metadata for Services Version 1.0 have been integrated into the NAS to provide a single NSG concept model for content. NMF – Part 3: Metadata for Imagery and Gridded Data Version 1.1 will be integrated with the NAS at a future date. User should consult the NAS for a complete list of metadata elements for use within the NSG. Annex D provides additional information concerning the Governance Process for making changes to this profile.

1 Scope

The NMF is applicable to, and shall be used for:

- Cataloging of resources, including the description of datasets and services
- Describing geographic services, geographic datasets, and dataset series

The NMF defines:

- Mandatory and conditional metadata sections, metadata entities, and metadata elements
- The minimum set of metadata required to identify a resource
- The minimum set of metadata required to provide access control for a resource

The NMF is a profile of the NSG Application Schema (NAS) and the metadata contained therein, based on the following standards:

- ISO 19115-1:2014 Geographic Information – Metadata – Part 1: Fundamentals
- ISO 19157:2013 Geographic information – Data quality
- Intelligence Community Technical Specification, Abstract Data Definition for Electronic Records Management Version 2014-DEC, 22 Dec 2014
- Intelligence Community Technical Specification, Abstract Data Definition Version 2 (IC.ADD.V2) Chapter 3 - Information Security Marking Data Elements, 9 Aug 2011
- Intelligence Community Technical Specification, Information Security Markings (ISM), Version 13, 09 May 2014
- Intelligence Community Technical Specification, Need-To-Know (NTK), Version 10, 6 September 2013
- Intelligence Community Technical Specification, Revision Recall (RevRecall), Version 1, 09 May 2014

2 Relation to Other Standards

2.1 Concept Sources

The NMF defines “what we all must understand” (as a set of metadata concepts) in the NSG regarding geospatial metadata in support of identification and access functions. Its basic metadata concepts exist in, and are defined in, authoritative standards from a broad community of International, National, DoD, and IC standards. These are used in the NAS, and subsequently in the NMF, as the basis for establishing a coherent set of metadata concepts that meet NSG requirements for geospatial metadata.

The ISO 19115-1 and 19157 set of standards serve as the primary source of those metadata concepts. The Dublin Core Metadata Set, DoD Discovery Metadata Specification (DDMS), Geography Markup Language (GML) (as implemented in Time-Space-Position-Information (TSPI) for XML implementations), Geopolitical Entities, Names, and Codes (GENC), and the IC Information Security Marking (ISM), Need To Know (NTK), and Revision Recall (RevRecall) Specifications are then used to identify additional concepts that are required by the NSG. Some required concepts (such as the access rights and handling fields from the IC Specifications) are not present in the International Standard, so those concepts are presented as extensions to the 19115-1 Constraints package.

2.2 International Organization for Standardization

The NMF is a Class 2 profile of the conceptual schema for metadata defined by International Organization for Standardization (ISO) Technical Committee 211 (TC 211) Geographic Information / Geomatics. The originating ISO standards continue to provide the normative definition of all elements not

restricted or extended by the NMF. Information from those standards has been included solely to provide context.

2.3 Definition of Class 1 and Class 2 Profiles

The NMF is a Class 1 profile of the NAS and a collective Class 2 Profile of ISO 19115-1 and 19157 as defined by ISO 19106 – Geographic Information – Profiles. ISO 19106 defines two classes of profiles:

- An ISO 19106 Class 1 profile allows an organization to constrain and/or restrict the base ISO standard. This allows for more severe restrictions on conditionality, cardinality, and content; such as making an optional concept mandatory. It does not allow for the release of existing restrictions in the base standard; such as making mandatory concepts optional.
- An ISO 19106 Class 2 Profile allows both the constraint/restriction of the base standard as well as the extension of that standard, within the context of the base standard, using non-ISO geographic information standards as part of the profile. This allows individual standards organizations such as the NGA to add information that is not covered in the ISO standard it is profiling.

The NAS and the NMF both constrain and extend the base ISO standards by:

- Requiring the use of other classes and attributes that are optional in the originating ISO
- Extending some classes and codelists to provide additional capabilities
- Defining additional NSG-specific classes and codelists

2.4 NMF, NMIS, and NAS

In order to enhance cross-system interoperability, the NSG specifies a number of GEOINT Standards for creating and publishing information products and resources. The NMF profiles the NAS and implementations shall demonstrate data exchange using the NSG Metadata Implementation Specification (NMIS). Together, this set of standards comprises an interdependent set of components that together define a common method for specifying and encoding GEOINT and related geospatial metadata in the NSG. These standards and all GEOINT standards are included in the DoD IT Standards Registry (DISR) and the IC Enterprise Standards Baseline (IC ESB).

The NSG Application Schema (NAS) is a logical data model that specifies an NSG-wide structure for geospatial data that is technology neutral. This Platform Independent Model (PIM) determines the syntactic structure used to represent NSG feature constructs. Unlike the NMF and the NMIS, the scope of the NAS is not confined to, nor is it primarily, metadata. The NMF, as a profile of both the aforementioned ISO standards and the NAS, and through implementation of other community standards, exists as one mechanism through which metadata can be examined, NSG restrictions can be applied, and the results of that process can be used as input for update and maintenance information for the NAS. Thus, the metadata requirements in the NMF, the NMIS, and the NAS are a non-conflicting, cohesive set of metadata requirements for the NSG.

The NMF is a logical data model which allows implementation specifications to be developed to address how the concepts in this model should be realized for a specific technology. The NMIS provides that guidance for XML schema. Additional implementation specifications will be developed and published as standardization documents as requirements for those specifications are identified.

The purposes of the NMF, the NMIS, and, within the scope of metadata, the NAS are to promote:

- Common understanding of Geospatial metadata within and across NSG participants
- Standard foundation for expressing Geospatial metadata
- Standard set of business rules for specifying Geospatial metadata
- Standard logical specification of Geospatial metadata

- Re-use and standardization of Geospatial metadata in the NSG
- Harmonization of Geospatial metadata creation within and across NSG participants, despite varying business requirements and practices
- Standard physical specification(s) of Geospatial metadata for use with multiple Commercial Off-The-Shelf (COTS) technologies, including standards-based exchange
- Standard Geospatial metadata publication using both internally- and externally-defined specifications and mechanisms.

2.5 Intelligence Community Technical Specifications

The Intelligence Community publishes metadata standards to support data exchange among its members. Not all NSG members have a requirement to use Intelligence Community Technical Specifications and sections 5.2.6, 5.2.7, 5.4.1, 5.4.2, 5.4.3, and 5.4.4 do not apply to those Non-IC members. The only elements from IC Technical Specifications within Tables 1 and Tables 2 are Metadata Classification, Metadata Classification System, Resource/Service Classification, and Resource/Service Classification System. Non-IC members should substitute the appropriate ISO 19115-1 MD_SecurityConstraints elements in place of these IC Technical Specification elements.

The NAS reuses the publicly released versions of Intelligence Community (IC) Technical Specifications for Intelligence Community – Information Security Markings (IC-ISM) (to include ISM Notices), Intelligence Community – Need-To-Know (IC-NTK), and Intelligence Community – Revision Recall. Content from NMF – Part 4: Electronic Records Management Version 2.0 is included and will be replaced at a future date when the Intelligence Community – Electronic Records Management (IC-ERM) Technical Specification is approved and publicly released. Applicable metadata from these IC Technical Specifications are included in the NMF for information. Consult the appropriate ICSB mandated versions of these IC Technical Specifications to ensure full conformance with IC Requirements.

The NMF is embedded as Mission Specific Metadata when included with the IC Trusted Data Format (IC-TDF) and can provide the applicable metadata to populate IC Enterprise Data Header (IC EDH) wrappers.

3 Minimum Mandatory Metadata

3.1 Scope of Minimum Mandatory Metadata

There are two minimum mandatory sets of metadata described here. One set is focused on the elements required to enable the identification and access controls of a data resource. The second set is focused on the elements required to enable the identification and access controls of a service resource. Both sets of metadata include the appropriate access and handling elements as mandated by Federal rules and regulations.

3.2 Minimum Mandatory for Data Resources

The minimum mandatory metadata elements for data resource identification and access are listed in the following table.

| Core Metadata Concept | Multiplicity | Definition | Domain Guidance |
|---------------------------|----------------------------------|--|---|
| Metadata Point of Contact | 1..* | <p>The party or parties acting in a role of responsibility for a set of resource metadata.</p> <p>The first instance of this element is to have the role of “creator”.</p> | <p><u>Resource Metadata (Table 7)</u> Metadata Contact – Populate using the Responsibility datatype (Table 46) with RoleCode (Table 3) of ‘pointOfContact’ and identifying the individual or organization responsible for the metadata record.</p> |
| Metadata Date | 1..* | <p>The date(s), and optionally time(s), of an event involving a set of resource metadata.</p> <p>The first instance of this element is to have the role of “creation”.</p> | <p><u>Resource Metadata (Table 7)</u> Resource Metadata Date – Populate using Date datatype (Table 50) with the DateTypeCode (Table 3) such as ‘creation’, ‘publication’, or ‘revision’ for when the metadata record was created, published, or revised.</p> |
| Metadata Standard Title | 1 (Promoted from 0..* in NAS) | <p>The name of the metadata standard which determines the structure and content of this set of resource metadata.</p> | <p><u>Resource Metadata (Table 7)</u> Metadata Standard Citation – Populate using Citation datatype (Table 45) identifying the Cited Resource Title of the standard used for the metadata record.</p> |
| Metadata Standard Edition | 1 (Promoted from 0..* in NAS) | <p>The version of the metadata standard which determines the structure and content of this set of resource metadata.</p> | <p><u>Resource Metadata (Table 7)</u> Metadata Standard Citation – Populate using Resource Identifier (Table 45) identifying the code for the edition of the standard used for the metadata record.</p> |
| Metadata Scope Code | 1 | <p>A brief indicator of the type of resource for which metadata information is reported.</p> | <p><u>Metadata Scope (Table 8)</u> Resource Scope – Populate using ScopeCode codelist (Table 3) to identify the type of resource the metadata applies to such as ‘dataset’, ‘series’, ‘attribute’, or ‘feature’.</p> |
| Metadata Scope Name | 1 (Promoted from 0..1 in NAS) | <p>A word or phrase that describes the type of resource for which information is reported.</p> | <p><u>Metadata Scope (Table 8)</u> Resource Scope – Populate using Resource Scope Name identifying type of resource if Resource Scope is not ‘dataset’.</p> |
| Metadata Classification | 1 | <p>The classification level of the metadata, in accordance with the Intelligence Community (IC) Security Markings Manual.</p> | <p><u>Security Attributes Group (Table 33)</u> Resource Classification – Populate with ResClassificationStrucText datatype (Table 33).</p> |

| Core Metadata Concept | Multiplicity | Definition | Domain Guidance |
|--------------------------------|-------------------------------------|--|---|
| Metadata Classification System | 1 | The classification system of the metadata, in accordance with the Intelligence Community (IC) Security Markings Manual. | <u>Security Attributes Group (Table 33)</u> Resource Owner-Producer – Populate with ResOwnerProducerStrucText datatype (Table 33). |
| Resource Title | 1 | The name by which a cited resource is known. | <u>Resource Identification (Table 9)</u> Resource Citation – Populate with using Cited Resource Title (Table 45). |
| Resource Abstract | 1 | A brief statement or narrative summary of the resource. | <u>Resource Identification (Table 9)</u> Resource Abstract – Populate with free text providing a short description of the resource. |
| Resource Point of Contact | 1..* | The party(ies) acting in a role of responsibility for the resource. The first instance of this element is to have the role of “originator”. | <u>Resource Identification (Table 9)</u> Resource Point of Contact – Populate using the Responsibility datatype (Table 46) with RoleCode (Table 3) of ‘pointOfContact’ and identifying the individual or organization responsible for the metadata record. |
| Resource Date | 1 | A reference date for a cited resource. The first instance of this element is to have the role of “creation”. | <u>Resource Identification (Table 9)</u> Resource Citation – Populate using Cited Resource Date (Table 45) with the date and DateType (Table 3) such as ‘creation’, ‘publication’, or ‘revision’ for when the metadata record was created, published, or revised. |
| Resource Identifier | 1 | A value uniquely identifying the resource within a namespace. | <u>Resource Identification (Table 9)</u> Resource Citation –Populate using Cited Resource Identifier (Table 45) identifying the code for the unique resource identifier. |
| Resource Geographic Location | 1..* (Promoted from 0..* in NAS) | The spatial extent of the resource. The spatial extent is a geographic identifier (for example: a country name), a bounding box (for example: the bounding latitudes and longitudes), or a bounding object (for example: a set of coordinate points). | <u>Resource Identification (Table 9)</u> Resource Extent – Populate using Resource Extent (Table 38) to specify a Geographic Bounding Box, Geographic Description, or Geographic Bounding Object. |

| Core Metadata Concept | Multiplicity | Definition | Domain Guidance |
|--------------------------------|-------------------------------------|---|--|
| Resource Language | 1 | Designation of the locale language. | <u>Data Identification (Table 10)</u> Text Locale – Populate using Locale Language (Table 55) LanguageCode codelist (Table 3) to identify language of resource. |
| Resource Character Set | 1 | Designation of the character set to be used to encode the textual value of the locale. | <u>Data Identification (Table 10)</u> Text Locale – Populate using Locale Character Encoding (Table 55) IANA Charset codelist (Table 3) to identify character set used in resource. |
| Resource Topic Category Code | 1..* (Promoted from 0..* in NAS) | A theme or topic keyword that represents a subject of the resource. | <u>Resource Identification (Table 9)</u> Topic Category – Populate using MD_TopicCategoryCode enumeration (Table 4). |
| Resource Keywords | 1..* | Information about keywords describing this resource. | <u>Keywords (Table 12)</u> Keywords – Populate with Keyword to identify content of the resource. |
| Resource Classification | 1 | The classification level of the resource, in accordance with the Intelligence Community (IC) Security Markings Manual. | <u>Security Attributes Group (Table 33)</u> Resource Classification - Populate with ResClassificationStrucText datatype (Table 33). |
| Resource Classification System | 1 | The classification system of the resource, in accordance with the Intelligence Community (IC) Security Markings Manual. | <u>Security Attributes Group (Table 33)</u> Resource Owner-Producer – Populate with ResOwnerProducerStrucText datatype (Table 33). |
| Resource Category | 1 | The particular category of a data resource within a defined taxonomy. Resources within a category have similar information content and have been produced by similar processing methods. The default is a resource category type of "other". | <u>NMF Data Identification (Table 11)</u> Data Identification – Populate with Resource Category using code from ResourceCategoryCode codeList (Table 3). |
| Metadata Language | 0..1 | Designation of the locale language. | <u>Obligation:</u> Required when not defined by encoding. <u>Data Identification (Table 10)</u> Text Locale – Populate using Locale Language (Table 55) LanguageCode codelist (Table 3) to identify language of resource. |

| Core Metadata Concept | Multiplicity | Definition | Domain Guidance |
|--------------------------------------|---------------------|--|--|
| Metadata Character Set | 0..1 | Designation of the character set to be used to encode the textual value of the locale. | <p><u>Obligation</u>: Required when not defined by encoding.</p> <p><u>Data Identification (Table 10)</u> Text Locale – Populate using Locale Character Encoding (Table 55) IANA Charset codelist (Table 3) to identify character set used in resource.</p> |
| Parent Metadata Citation | 0..1 | A standardized reference to a set of metadata that is in a parent relationship to this set of resource metadata. | <p><u>Obligation</u>: Required if there is an upper scope Level.</p> <p><u>Resource Identification (Table 9)</u> Parent Metadata Citation – Populate using Citation datatype (Table 45) identifying the identifier of parent metadata.</p> |
| Resource Temporal Extent | 0..1 | The time period covered by the resource | <p><u>Obligation</u>: Required when Resource Extent Description, or Geographic Extent, or Vertical Extent not documented.</p> <p><u>Temporal Extent (Table 43)</u> Temporal Extent – Populate using Temporal Geometric Primitive (Table 60), such as Temporal Period or Temporal Instance.</p> |
| Resource Coordinate Reference System | 0..1 | Information about a spatial or temporal reference system used by representations in the resource. | <p><u>Obligation</u>: Required if the resource includes coordinates.</p> <p><u>Reference System Information (Table 37)</u> Reference System Identifier – Populate with Identifier (Table 54) Code identifying the reference system used in the resource.</p> |

Table 1 – Minimum Mandatory Metadata for Data Resources

3.3 Minimum Mandatory for Service Resources

The minimum mandatory metadata elements for service identification and access are listed in the following table.

| Core Metadata Concept | Multiplicity | Definition | Domain Guidance |
|---------------------------|----------------------------------|--|---|
| Metadata Point of Contact | 1..* | <p>The party or parties acting in a role of responsibility for a set of resource metadata.</p> <p>The first instance of this element is to have the role of “creator”.</p> | <p><u>Resource Metadata (Table 7)</u> Metadata Contact – Populate using Responsibility datatype (Table 46) with RoleCode (Table 3) of ‘pointOfContact’ and identifying the individual or organization responsible for the metadata record.</p> |
| Metadata Date | 1..* | <p>The date(s), and optionally time(s), of an event involving a set of resource metadata.</p> <p>The first instance of this element is to have the role of “creation”.</p> | <p><u>Resource Metadata (Table 7)</u> Resource Metadata Date – Populate using Date datatype (Table 50) with the DateTypeCode (Table 3) such as ‘creation’, ‘publication’, or ‘revision’ for when the metadata record was created, published, or revised.</p> |
| Metadata Standard Title | 1 (Promoted from 0..* in NAS) | <p>The name of the metadata standard which determines the structure and content of this set of resource metadata.</p> | <p><u>Resource Metadata (Table 7)</u> Metadata Standard Citation – Populate using Citation datatype (Table 45) identifying the Cited Resource Title of the standard used for the metadata record.</p> |
| Metadata Standard Edition | 1 (Promoted from 0..* in NAS) | <p>The version of the metadata standard which determines the structure and content of this set of resource metadata.</p> | <p><u>Resource Metadata (Table 7)</u> Metadata Standard Citation – Populate using Resource Identifier (Table 45) identifying the code for the edition of the standard used for the metadata record.</p> |
| Metadata Scope Code | 1 | <p>A brief indicator of the type of resource for which metadata information is reported.</p> | <p><u>Metadata Scope (Table 8)</u> Resource Scope – Populate using ScopeCode codelist (Table 3) code ‘service’ to identify the metadata applies to a service.</p> |
| Metadata Scope Name | 1 (Promoted from 0..1 in NAS) | <p>A word or phrase that describes the type of resource for which information is reported.</p> | <p><u>Metadata Scope (Table 8)</u> Resource Scope – Populate using Resource Scope Name identifying type of resource if Resource Scope is not ‘dataset’.</p> |
| Metadata Classification | 1 | <p>The classification level of the metadata, in accordance with the Intelligence Community (IC) Security Markings Manual.</p> | <p><u>Security Attributes Group (Table 33)</u> Resource Classification - Populate with ResClassificationStrucText datatype (Table 33).</p> |

| Core Metadata Concept | Multiplicity | Definition | Domain Guidance |
|--------------------------------|-------------------------------------|--|---|
| Metadata Classification System | 1 | The classification system of the metadata, in accordance with the Intelligence Community (IC) Security Markings Manual. | <u>Security Attributes Group (Table 33)</u> Resource Owner-Producer – Populate with ResOwnerProducerStrucText datatype (Table 33). |
| Service Title | 1 | The name by which a service is known. | <u>Resource Identification (Table 9)</u> Resource Citation – Populate with using Cited Resource Title (Table 45). |
| Service Abstract | 1 | A brief statement or narrative summary of the service. | <u>Resource Identification (Table 9)</u> Resource Abstract – Populate with free text providing a short description of the service. |
| Service Point of Contact | 1..* | The party(ies) acting in a role of responsibility for the service. The first instance of this element is to have the role of “originator”. | <u>Resource Identification (Table 9)</u> Resource Point of Contact – Populate using the Responsibility datatype (Table 46) with RoleCode (Table 3) of ‘pointOfContact’ and identifying the individual or organization responsible for the metadata record. |
| Service Date | 1 | A reference date for a service. The first instance of this element is to have the role of “creation”. | <u>Resource Identification (Table 9)</u> Resource Citation – Populate using Date datatype (Table 50) with the date and DateType (Table 3) such as ‘creation’, ‘publication’, or ‘revision’ for when the metadata record was created, published, or revised. |
| Service Identifier | 1 | A value uniquely identifying the service within a namespace. | <u>Resource Identification (Table 9)</u> Resource Citation – Populate using Cited Resource Identifier (Table 45) identifying the code for the unique resource identifier. |
| Service Geographic Location | 1..* (Promoted from 0..* in NAS) | The spatial extent of the resource. The spatial extent is a geographic identifier (for example: a country name), a bounding box (for example: the bounding latitudes and longitudes), or a bounding object (for example: a set of coordinate points). | <u>Resource Identification (Table 9)</u> Resource Extent – Populate using Resource Extent (Table 38) to specify a Geographic Bounding Box, Geographic Description, or Geographic Bounding Object. |
| Service Topic Category Code | 1..* (Promoted from 0..* in NAS) | A theme or topic keyword that represents a subject of the service. | <u>Resource Identification (Table 9)</u> Topic Category – Populate with Topic Category using MD_TopicCategoryCode enumeration (Table 4). |

| Core Metadata Concept | Multiplicity | Definition | Domain Guidance |
|--|--------------|---|--|
| Service Keywords | 1..* | Information about keywords describing this service. | Keywords (Table 12) Keywords – Populate with Keyword to describe content of the resource. |
| Service Classification | 1 | The classification level of the service, in accordance with the Intelligence Community (IC) Security Markings Manual. | Security Attributes Group (Table 33) Resource Classification - Populate with ResClassificationStrucText datatype (Table 33). |
| Service Classification System | 1 | The classification system of the service, in accordance with the Intelligence Community (IC) Security Markings Manual. | Security Attributes Group (Table 33) Resource Owner-Producer – Populate with ResOwnerProducerStrucText datatype (Table 33). |
| Service Online Location | 1..* | A network location of a service specified using a Uniform Resource Locator (URL) or Uniform Resource Identifier (URI) address, or similar addressing scheme. | Service Operation Metadata (Table 19) Service Operation Connection Point – Populate using Online Linkage (Table 51) with a URL (Table 57). |
| Service Type Name | 1 | The generic name for a type of web service. For example: 'discovery', 'view', 'download', 'transformation', and 'invoke'. | Service Identification (Table 18) Service Type Name – Populate with Generic Name (Table 58) identifying the type of service provided. |
| Service Type Version | 1..* | The version of a web service. Specifying the service type version enables filtered search; for example, a search for providers of version "1.1" OGC Catalogue services. | Service Identification (Table 18) Service Type Version – Populate with version number of the service provided. |
| Service Distributed Computing Platform | 1..* | A distributed computing platform(s) on which a web service operation has been implemented. For example: Hypertext Transfer Protocol (HTTP), Common Object Request Broker Architecture (CORBA), and Extensible Markup Language (XML). | Service Operation Metadata (Table 19) Service Operation Computing Platform – Populate using DCPList codeList (Table 3). |
| Service Operation Name | 1 | The unique name of a web service operation interface. For example: GetCapabilities, DescribeRecord, and GetRecords. | Service Operation Metadata (Table 19) Service Operation Name – Populate with name of the service interface. |

| Core Metadata Concept | Multiplicity | Definition | Domain Guidance |
|-----------------------|--------------|--|--|
| Coupled Resource | 0..* | Citation information for resource(s) on which a web service operates. | <p><u>Obligation</u>: Required when the service is coupled to a resource.</p> <p><u>Coupled Resource (Table 20)</u> Service Coupling Reference – Populate with Cited Resource Identifier (Table 45) to identify resource(s) that are coupled to the service.</p> |
| Couple Resource Type | 0..1 | The type of coupling between a web service operation and a data resource, as a category. | <p><u>Obligation</u>: Required when the service is coupled to a resource.</p> <p><u>Service Identification (Table 18)</u> Service Data-coupling Type – Populate with CouplingType codeList (Table 3).</p> |

Table 2 – Minimum Mandatory Metadata for Service Resources

4 NMF Structure

4.1 Introduction

The NMF defines “*what we all must understand*” (as a set of metadata concepts) in the NSG regarding geospatial metadata in support of identification and access functions.

ISO 19115-1:2014 serves as the primary source of metadata concepts for the NMF. The *ISO 19115-1:2014* standard is defined using Unified Modeling Language (UML) diagrams. As the NMF is a profile of *19115-1:2014*, it is also defined using UML diagrams. For an introduction on UML notation, see Annex G of this document.

The detailed specification of the NMF is organized into multiple sections:

- Section 4.2: **value domains** (data types, code lists, and enumerations) used by the Conceptual Schema Profile
- Section 4.3: **structure of the tables** used to specify the Conceptual Schema data dictionary
- Section 5: **metadata sections**
- Section 5.1: **metadata information** metadata elements
- Section 5.2: **identification** metadata elements
- Section 5.2.1: **resource identification** metadata elements
- Section 5.2.2: **data identification** metadata elements
- Section 5.2.3: **data identification** extension elements
- Section 5.2.4: **keyword** metadata elements
- Section 5.2.5: **format** metadata elements
- Section 5.2.6: **revision recall** metadata elements
- Section 5.2.7: **electronic records management** metadata elements

- Section 5.3: **service identification** metadata elements
- Section 5.4: **constraints** metadata elements
- Section 5.4.1: **resource constraints** metadata elements
- Section 5.4.2: **notice** metadata elements
- Section 5.4.3: **need to know** metadata elements
- Section 5.4.4: **security attributes group** metadata elements
- Section 5.5: **lineage** metadata elements
- Section 5.6: **reference system** metadata elements
- Section 5.7: **datatypes**
- Section 5.7.1: **resource extent** metadata elements
- Section 5.7.2: **geographic extent** metadata elements
- Section 5.7.3: **temporal extent** metadata elements
- Section 5.7.4: **vertical extent** metadata elements
- Section 5.7.5: **citation and responsibility** metadata elements
- Section 5.7.6: **common class** metadata elements
- Section 5.7.7: **other 19103 datatype** metadata elements

4.2 Value Domains

4.2.1 Introduction

The NMF specifies value domains to provide a normalization of metadata values in order to ensure that two or more community members exchanging information “speak the same conceptual encoding language.”

Each value domain is specified using one of the following methods:

- **CodeLists** expressing a resource-managed value in a *CharacterString* – these are specified in Table 3
- **Enumerations** expressing fixed values in a *CharacterString* – these are specified in Table 4
- **Complex datatypes** consisting of multiple elements whose value domains are either abstract types, datatypes, CodeList, or Enumeration values

4.2.2 Codelists

4.2.2.1 Data Agility

The uses the CodeList type (literally, a “list of codes”) to specify the value domains for many metadata elements. The use of CodeLists instead of “free text” or a fixed enumeration has three principal advantages:

- Ensure that the lexical content of a metadata element is encoded in a consistent manner for a given concept. Even though the code may be a human-readable word or phrase, code lists eliminate variations in spelling, character case, spacing, and other presentation factors to reduce the concept to a single unambiguous representation.

- Remain independent of the conceptual schema and the metadata content. This allows CodeLists to be profiled to meet evolving user needs without requiring changes to the conceptual schema.
- Provide a mechanism for encoding data for use in a multilingual environment. Because the codes provide a consistent representation for a given concept, supporting dictionaries containing definitions and human-readable labels in one or more languages can be developed for presentation of CodeList information in multiple languages.

Within a metadata instance document, the content of a metadata element that is specified as a CodeList requires two pieces of information. The code list value is an unambiguous identifier of a concept within a set of related concepts (e.g., country codes or geometry types). A code list value may be designated through the use of a URL, allowing for the identification of the code list value to be tied to a resource where the semantic of the value may be maintained. In addition to the value itself, identification of the code list namespace (value domain) is required in order for consumers of the metadata to interpret the value. One means to identify a value domain is publication and access of the values through a named register on common-access registry such as the NSG Information Resource (IR) Registry.

The CodeLists used to specify value domains in the NMF Conceptual Schema shall be specified in the NSG Information Resource (IR) Registry; accordingly their domains are not specified in this document, although example values are provided.

For each CodeList the following rules apply:

- A domain value is represented as a *CharacterString* with two distinguishable components separated by a forward-slash (“/”) character.
- The first component is a RestrictedURI expressing an authoritative namespace within which the CodeList value is designated; this first component may be treated as optional if its value can be determined from the context of use.
- The second component is an unambiguous identifier of a value in the authoritative CodeList namespace; it follows the XML schema pattern "[^:\n\r\t]+" – which ensures that the CodeList value excludes specific characters and is at least one character in length.
- Using the fully-qualified *CharacterString* as a URL it shall be possible to unambiguously identify and access (e.g., via a catalog or register) the full specification of the CodeList value being referenced.

4.2.2.2 Code Lists

The CodeLists used by the NMF are specified in Table 3. The examples provided in Table 3 are not all-inclusive. Full sets reside in the NSG Standards Information Resources registry (see: <http://nsgreg.nga.mil/ir/registers.jsp>). The Information Resources registry enables access to its content via both a browse interface for analyst use and a REST (Representational State Transfer) interface for machine-to-machine use (see: <https://nsgreg.nga.mil/ir/irResources.jsp>).

| Name/Definition | Example(s) (not all-inclusive) |
|--|--|
| <p><u>ClassificationCode</u> level of classification applicable to a resource, or portion of a resource. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> • ISO 19115-1:2014: https://api.nsgreg.nga.mil/codelist/ClassificationCode <p>Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=100014</p> | <p>“confidential” or “restricted” or “secret” or “topSecret” or “unclassified”</p> |

| Name/Definition | Example(s) <i>(not all-inclusive)</i> |
|--|---|
| <p><u>CouplingType</u> denotes the type of coupling between a web service operation and a data resource. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> NSG Standards Registry: http://api.nsgreg.nga.mil/codelist/CouplingType Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=121318 | <p>“loose” or “tight” or “mixed”</p> |
| <p><u>DateTypeCode</u> context with respect to which a date is specified. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> ISO 19115-1:2014: http://api.nsgreg.nga.mil/codelist/DateTypeCode Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=100015 | <p>“creation” or “publication” or “revision” or “validTill” or “receivedOn”</p> |
| <p><u>DCPList</u> A codelist, each domain member of which denotes a distributed computing platform on which an operation has been implemented.</p> <ul style="list-style-type: none"> ISO 19115-1:2014: http://api.nsgreg.nga.mil/codelist/DCPList Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=121317 | <p>“XML” or “CORBA” or “JAVA” or “COM” or “SQL” or “SOAP” or “Z3950” or “HTTP” or “WebServices”</p> |
| <p><u>IANA Charset</u> set of charsets recognized through the Internet Assigned Numbers Authority (IANA) registration procedure established by RFC 2978 (IANA Charset Registration Procedures); a charset (referred to as a "character set" in the past) is a method of converting a sequence of octets into a sequence of characters, optionally producing additional control information such as directionality indicators.</p> <ul style="list-style-type: none"> NSG Standards Registry: http://api.nsgreg.nga.mil/codelist/IANACharset Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=100011 | <p>“Adobe-Standard-Encoding” or “ISO-8859-10” or “UTF-8” or “Windows-1252”</p> |

| Name/Definition | Example(s) <i>(not all-inclusive)</i> |
|--|---|
| <p><u>LanguageCode</u> 3-letter language code as specified by ISO 639-2:1998. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> ISO 639-2 Trigraph Language Codes:: http://api.nsgreg.nga.mil/codelist/ISO639-2 Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=100010 | <p>“fre” or “eng”</p> |
| <p><u>NoticeTypeCode</u> Indicator that the element contains a security-related notice and is used to categorize which of the required notices is specified in the ISM_Notices entity. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> NSG Standards Registry:: http://api.nsgreg.nga.mil/codelist/NoticeTypeCode Its allowed values are specified at: http://nsgreg.nga.mil/ir/view?i=121695 | <p>“RD” or “IMC” or “FRD” or “FISA”</p> |
| <p><u>RecordsHoldTypeCode</u> category of hold NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> NSG Standards Registry:: https://api.nsgreg.nga.mil/codelist/RecordsHoldTypeCode Its allowed values are specified at: http://nsgreg.nga.mil/ir/view?i=121319 | <p>“congressionalInquiry” or “financial” or “litigation”</p> |
| <p><u>ReferenceSystemTypeCode</u> A set of spatio-temporal reference system types individually indicating a category of reference system based on its mathematical and parametric structure. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> NSG Standards Registry:: https://api.nsgreg.nga.mil/codelist/ReferenceSystemTypeCode Its allowed values are specified at: http://nsgreg.nga.mil/ir/view?i=121692 | <p>“Geodetic Geocentric” or “Geodetic Geographic 2D” or “Geodetic Geographic 3D” or “Geographic Identifier” or “Temporal” or “Vertical”</p> |
| <p><u>ResourceCategoryCode</u> Identifies a category of a resource within a taxonomy of resource categories. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> NSG Standards Registry: http://api.nsgreg.nga.mil/codelist/ResourceCategoryCode Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=110558 | <p>“aeronauticalServices” or “elevation” or “maritimeServices” or “topographicFeatures”</p> |
| <p><u>RestrictionCode</u> limitation place upon the access to, or use of, a resource. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> ISO 19115-1:2014: http://api.nsgreg.nga.mil/codelist/RestrictionCode Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=100032 | <p>“copyright” or “usPrivacyAct”</p> |

| Name/Definition | Example(s) <i>(not all-inclusive)</i> |
|---|---|
| <p><u>RevisionActionCodeList</u> denotes the type of action to be taken on receipt of notification of withdrawal or modification. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> NSG Standards Registry: http://api.nsgreg.nga.mil/codelist/RevisionActionCode <p>Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=121696</p> | <p>"purge" <i>or</i> "manual instruction"</p> |
| <p><u>RevisionTypeCode</u> describes the type of revision to the resource. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> NSG Standards Registry: http://api.nsgreg.nga.mil/codelist/RevisionTypeCode <p>Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=110568</p> | <p>"adminRecall" <i>or</i> "adminRevision" <i>or</i> "substantiveRecall" <i>or</i> "substantiveRevision"</p> |
| <p><u>RoleCode</u> function performed by a responsible party for a resource. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> ISO 19115-1:2014: http://api.nsgreg.nga.mil/codelist/RoleCode <p>Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=100033</p> | <p>"custodian" <i>or</i> "distributor" <i>or</i> "pointOfcontact" <i>or</i> "publisher"</p> |
| <p><u>ScopeCode</u> class of applicable information within a resource to which the referencing entity applies. NOTE: The allowed authoritative namespace is:</p> <ul style="list-style-type: none"> ISO 19115-1:2014: http://api.nsgreg.nga.mil/codelist/ScopeCode <p>Its allowed values are specified at: https://nsgreg.nga.mil/ir/view?i=100035</p> | <p>"dataset" <i>or</i> "series" <i>or</i> "feature" <i>or</i> "featureType" <i>or</i> "attribute" <i>or</i> "attributeType"</p> |

Table 3 – NMF Conceptual Schema Code Lists

4.2.3 Enumerations

An Enumeration value is an unambiguous identifier of a concept within a fixed, finite set of related concepts. Unlike a CodeList this set may not be extended without a schema modification. The following subsections specify the Enumerations used in the NMF.

4.2.3.1 TopicCategory

The Enumeration TopicCategory is defined as follows:

| |
|--|
| <p>TopicCategory</p> <p>A high-level geographic data thematic classification that assists in the grouping and search of available geospatial data sets.</p> <p>NOTE1 May be used to group keywords as well. The listed example topic members are not exhaustive.</p> <p>NOTE2 It is understood there are overlaps between general categories and the user is encouraged to select the one most appropriate.</p> |
|--|

Its domain members (enumerants) are specified in Table 4. The following information is specified for each enumerant:

- domain **Code** – a 3-digit numeric code that may be used where compactness in denotation is desirable;
- concept **Topic** – a human-interpretable designation for the topic;
- concept **Definition**; and
- **Example Topic Members** – concepts that fall within the scope of the topic category.

| Code | Topic | Definition | Example Topic Members |
|------|---|--|--|
| 001 | farming | The rearing of animals and/or the cultivation of plants. | Agriculture, irrigation, aquaculture, plantations, herding, pests and diseases affecting crops and livestock. |
| 002 | biota | Flora and/or fauna in the natural environment. | Wildlife, vegetation, biological sciences, ecology, wilderness, sea life, wetlands, and habitat. |
| 003 | boundaries | Legal land descriptions. | Political and administrative boundaries. |
| 004 | climatologyMeteorology Atmosphere ¹ | Processes and phenomena of the atmosphere. | Cloud cover, weather, climate, atmospheric conditions, climate change, and precipitation. |
| 005 | economy | Economic activities, conditions, and employment. | Production, labor, revenue, commerce, industry, tourism and ecotourism, forestry, fisheries, commercial or subsistence hunting, exploration and exploitation of resources such as minerals, oil ,and gas. |
| 006 | elevation | Height above or below sea level. | Altitude, bathymetry, digital elevation models, slope, and derived products. |
| 007 | environment | environmental resources, protection, and conservation | Environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, and landscapes. |
| 008 | geoscientificInformation | Information pertaining to earth sciences. | 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, and erosion. |
| 009 | health | Health, health services, human ecology, and safety. | Disease and illness, factors affecting health, hygiene, substance abuse, mental and physical health, and health services. |
| 010 | imageryBaseMaps EarthCover ¹ | Base maps. | Land cover, topographic maps, imagery, unclassified images, and annotations. |
| 011 | intelligenceMilitary | Military bases, structures, and activities. | Barracks, training grounds, military transportation, and information collection. |
| 012 | inlandWaters | Inland water features, drainage systems and their characteristics. | Rivers and glaciers, salt lakes, water utilization plans, dams, currents, floods, water quality, and hydrographic charts. |
| 013 | location | Positional information and services. | Addresses, geodetic networks, control points, postal zones and services, and place names. |
| 014 | oceans | Features and characteristics of salt water bodies (excluding inland waters). | Tides, tidal waves, coastal information, and reefs. |
| 015 | planningCadastre | Information used for appropriate actions for future use of the land. | Land use maps, zoning maps, cadastral surveys, and land ownership. |

¹ Although split over two lines for presentation purposes this is a single string with no breaks.

| Code | Topic | Definition | Example Topic Members |
|------|------------------------|--|---|
| 016 | society | Characteristics of society and cultures. | Settlements, anthropology, archaeology, education, traditional beliefs, manners and customs, demographic data, recreational areas and activities, social impact assessments, crime and justice, and census information. |
| 017 | structure | Man-made constructions. | Buildings, museums, churches, factories, housing, monuments, shops, and towers. |
| 018 | transportation | Means and aids for conveying persons and/or goods. | Roads, airports/airstrips, shipping routes, tunnels, nautical charts, vehicle or vessel location, aeronautical charts, and railways. |
| 019 | utilitiesCommunication | Energy, water and waste systems, and communications infrastructure and services. | Hydroelectricity, geothermal, solar and nuclear sources of energy, water purification and distribution, sewage collection and disposal, electricity and gas distribution, data communication, telecommunication, radio, and communication networks. |

Table 4 – Enumeration MD_TopicCategory Domain Value

4.2.3.2 NTK Access Criteria Type

The type of criteria that must be satisfied to determine whether access to a resource can be granted, as determined by IC DES.NTK.XML

| NAS AlphaCode | Name | Definition |
|---------------|------------|--|
| group | Group | Access to a resource can be granted to all of the members of a defined group of individuals (for example: a person or a service). |
| individual | Individual | Access to a resource can be granted to an individual (for example: a person or a service). |
| profile | Profile | Access to a resource can be granted to an individual (for example: a person or a service) based on a characteristic(s) of a profile. |

Table 5 – Enumeration NTKAccessCriteriaType Domain Value

4.3 Element Table Structure

4.3.1 Introduction

Each subsection in Section 5 contains a UML diagram and data dictionary tables. The data dictionary tables provide definitions and explanations to go along with the UML diagram in order to fully define the metadata. The dictionary is specified in a hierarchy to establish relationships and organize the information.

The UML diagrams contained in Section 5 are profiled versions of the UML diagrams contained in *ISO 19115-1:2014*. Classes, attributes, and associations that have not been included in this NMF profile have been hidden. Likewise, classes, attributes, and associations which extend the base standard have been added. For the original diagrams - consult *19115-1:2014*.

For the data dictionary tables in Section 5 each UML model class equates to a data dictionary entity. Each UML model class attribute equates to a data dictionary element. The shaded rows define entities. The entities and elements within the data dictionary are defined by five attributes (those attributes are listed below). The term “dataset” when used as part of a definition is synonymous with all types of geographic data resources (aggregations of datasets, individual features, and the various classes that compose a feature).

4.3.2 NSG AlphaCode

A unique alphanumeric value that may be used to designate this concept for the purposes of data interchange within the NSG.

4.3.3 Name

A label assigned to a metadata entity or to a metadata element. Metadata entity names start with an upper case letter. Spaces do not appear in a metadata entity name. Instead, multiple words are concatenated, with each new subword starting with a capital letter (example: XnnnYmmm). Metadata element names use the same naming conventions as entity names with the exception that they start with a lower case letter.

Metadata entity names are unique within the entire data dictionary of this document. Metadata element names are unique within a metadata entity, not the entire data dictionary of this document. Metadata element names are made unique, within an application, by the combination of the metadata entity and metadata element names (example: MD_Metadata.characterSet). Role names are used to identify metadata abstract model associations and are preceded by "Role name:" to distinguish them from other metadata elements.

4.3.4 Definition

A precise statement of the nature, properties, scope, or essential qualities of the concept.

4.3.5 Multiplicity

Specifies the maximum number of instances the metadata entity or the metadata element may have. Single occurrences are shown by "1"; repeating occurrences are represented by "N". Fixed number occurrences other than one are allowed, and will be represented by the corresponding number (e.g., "2", "3" ... etc.).

Multiplicity should always be understood to apply to the specified metadata element "as a whole" – regardless of the nature (complex) of its value domain. Conversely, multiplicity should always be understood to be only applicable (meaningful) within the scope of the table within which the element is specified.

- For example, while a point of contact shall have exactly one postal address, that postal address may have multiple delivery point element values (e.g., a street address as well as a suite number).

The types of possible multiplicity statements are listed in Table 6.

| Multiplicity | Definition | Implied Obligation |
|--------------------------------------|---|--------------------|
| Exactly one <i>Example: 1</i> | Exactly one value occurrence is permitted. | Minimum |
| At least one <i>Example: 1..*</i> | At least one value occurrence is required, and multiple value occurrences are permitted. | Minimum |
| Exact number <i>Example: 3</i> | Exactly the specified number of value occurrences must be present. | Minimum |
| Exact range <i>Example: 2..4</i> | At least the number of value occurrences specified in the lower range limit must be present; no more value occurrences than the specified upper range limit may be present. | Minimum |
| Zero or one <i>Example: 0..1</i> | Possibly one; zero or one value occurrence is permitted. | Additional |
| Zero or more <i>Example: 0..*</i> | A possibly empty range; zero or more value occurrences are permitted. | Additional |

| Multiplicity | Definition | Implied Obligation |
|--|--|--------------------|
| Exact range (possibly empty) <i>Example: 0..3</i> | No occurrences are permitted; no more occurrences than the specified upper range limit may be present. | Additional |

Table 6 – Multiplicity and Implied Obligation

4.3.6 Type

Specifies a set of distinct values for representing the metadata elements; for example, integer, real, string, DateTime, and Boolean. The data type attribute is also used to define metadata entities, stereotypes, and metadata associations.

The domain specifies the values allowed or the use of free text. “Free text” indicates that no restrictions are placed on the content of the field. Integer-based codes shall be used to represent values for domains containing CodeLists.

In cases where the value domain is complex, a reference is provided to the section that specifies its complex content requirement.

5 Metadata Sections

5.1 Metadata Information

Metadata Information provides metadata about the metadata for the resource, that is it provides information on who created the metadata, when the metadata was created, what standard was used to create the metadata, and the scope covered by the metadata. This information is typically used for the management of the metadata about the resource. This Metadata Information is applicable to both Data and Service Resources.

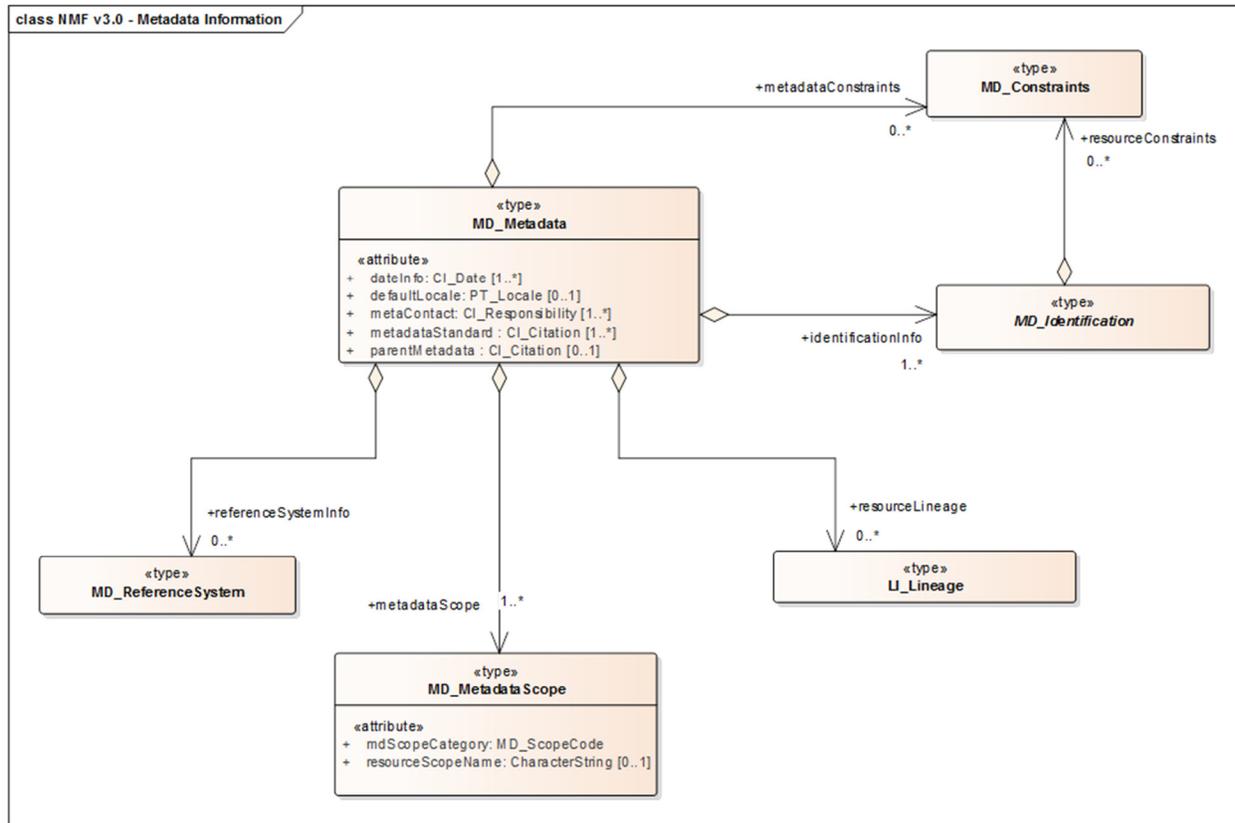


Figure 1 – Metadata Information

5.1.1 Resource Metadata

The metadata description defined by Resource Metadata must identify, at a minimum:

- A **Metadata Point of Contact** or responsible party for the metadata
- A **Metadata Date** applicable to the metadata (such as the date it was created)
- A **Metadata Standard Title** and **Metadata Standard Edition** used in the creation of the metadata
- A **Metadata Classification** and **Metadata Classification System** that outline the security classification and control markings of the metadata. This is discussed later in this document, in the section titled Security Attributes Group.

In addition to the minimum mandatory concepts, Resource Metadata has a set of constraints, or business rules, that apply to the information it holds:

- If the **Metadata Language** is not defined by the encoding it becomes mandatory and is populated using Text Locale
- If the **Metadata Character Set** is not defined by the encoding it also becomes mandatory in the metadata and is also populated using Text Locale
- If there is a higher-level metadata object then **Parent Metadata Citation** becomes mandatory

At least one of the dates provided must be a creation date. In this structure that means that the `dateInfo` must have a `dateType` of 'creation'.

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Metadata Information::MD_Metadata

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------------|-------------------------------------|---|-----------------------------|---------------------------------|
| MD_Metadata | Resource Metadata | Information that is about a resource. Resource metadata is information about the identification, application schema, portrayal catalogue, content, reference system, maintenance, scope, legal constraints, security constraints, quality, spatial and/or temporal schema, spatial reference, and/or distributor(s) of the resource. | | |
| dateInfo | Resource Metadata Date | The date(s), and optionally time(s), of an event involving a set of resource metadata. Examples of events include: creation, release, distribution, and revision. | 1..* {unordered, unique} | CI_Date (Table 50) |
| defaultLocale | Text Locale | The cultural and linguistic setting applicable to the interpretation of a character string. Specified by a combination of language, potentially a country, and a character encoding (character set). | 0..1 | PT_Locale (Table 55) |
| metaContact | Metadata Contact | The party or parties acting in a role of responsibility for a set of resource metadata. Resource metadata is information about the identification, application schema, portrayal catalogue, content, reference system, maintenance, scope, legal constraints, security constraints, quality, spatial and/or temporal schema, spatial reference, and/or distributor(s) of the resource. | 1..* {unordered, unique} | CI_Responsibility (Table 46) |
| metadataStandard | Metadata Standard Citation | Standardized reference for a standard which determines the structure and content of a set of resource metadata. Resource metadata is information about the identification, application schema, portrayal catalogue, content, reference system, maintenance, scope, legal constraints, security constraints, quality, spatial and/or temporal schema, spatial reference, and/or distributor(s) of the resource. | Mandatory | CI_Citation (Table 45) |
| parentMetadata | Parent Metadata Citation | A standardized reference to a set of metadata that is in a parent relationship to this set of resource metadata. If a metadata record owns or contains other metadata records (example: metadata about a resource series), it is said to be in a parent relationship. | 0..1 | CI_Citation (Table 45) |
| Role: identificationInfo | Resource Identification Information | Basic information required to uniquely identify the resource. | 1..* {unordered, unique} | MD_Identification (Table 9) |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|------------------------------|------------------------------|---|-----------------------------|----------------------------------|
| Role: metadataConstraints | Metadata Constraints | Information about the security and legal restrictions on the access to and/or use of this resource metadata. | 0..* {unordered, unique} | MD_Constraints (Table 21) |
| Role: metadataScope | Resource Metadata Scope | Information about the type of resource for which metadata is provided, and a description of that resource type. The type of a resource may be determined from a variety of perspectives; for example, based on its content (for example: a specific feature or property type), its structure (for example: consisting of a data series or an aggregate of other resources), or its purpose (for example: related to an initiative or a field session, or serving as a repository). This was formally known as "hierarchy level" in ISO 19115:2003. | 0..* {unordered, unique} | MD_MetadataScope (Table 8) |
| Role: referenceSystemInfo | Reference System Information | Information about the spatial or temporal reference system(s) used in the resource. | 0..* {unordered, unique} | MD_ReferenceSystem (Table 37) |
| Role: resourceLineage | Resource Lineage | Information about the provenance, source(s), and/or the production process(es) applied to the resource. | 0..* {unordered, unique} | LI_Lineage (Table 34) |

Table 7 – Resource Metadata

5.1.2 Metadata Scope

The Metadata Scope attribute provides the scope/type of the resource for which metadata is provided. While the default for this attribute is 'dataset', it may hold any of the values included in the MD_ScopeCode Codelist.

The metadata description defined by Metadata Scope must identify, at a minimum:

- A **Metadata Scope Code** identifying the scope of the metadata and populated with Resource Scope
- A **Metadata Scope Name** providing additional description of the scope of the metadata and populated with Resource Scope Name

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Metadata Information::MD_MetadataScope

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|------------------|----------------|---|--------------|------|
| MD_MetadataScope | Metadata Scope | Applicability of the resource metadata to a specified resource type. Resource type, or scope, may be determined from a variety of perspectives; for example, based on its subject matter (for example: a specific feature or property type), its structure (for example: consisting of a data series or an aggregate of other resources), or its purpose (for example: related to an initiative or a field session, or serving as a repository). | | |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------|---------------------|---|--------------|--|
| mdScopeCategory | Resource Scope | <p>A brief indicator of the type of resource for which metadata information is reported.</p> <p>For example, a resource scope may be information that is reported only for feature types.</p> | Mandatory | MD_ScopeCode <<CodeList>> (Table 3) (ScopeCode) |
| resourceScopeName | Resource Scope Name | <p>A word or phrase that describes the type of resource for which information is reported.</p> <p>Resource scope name can be more descriptive or specific about the particular type of resource being described than the resource scope code indicates. For example, in the case where information is reported only for feature types whose instances participate in transportation networks, the resource scope name may be "Transportation Networks".</p> | Mandatory | CharacterString / Free text |

Table 8 – Metadata Scope

5.2 Identification Information

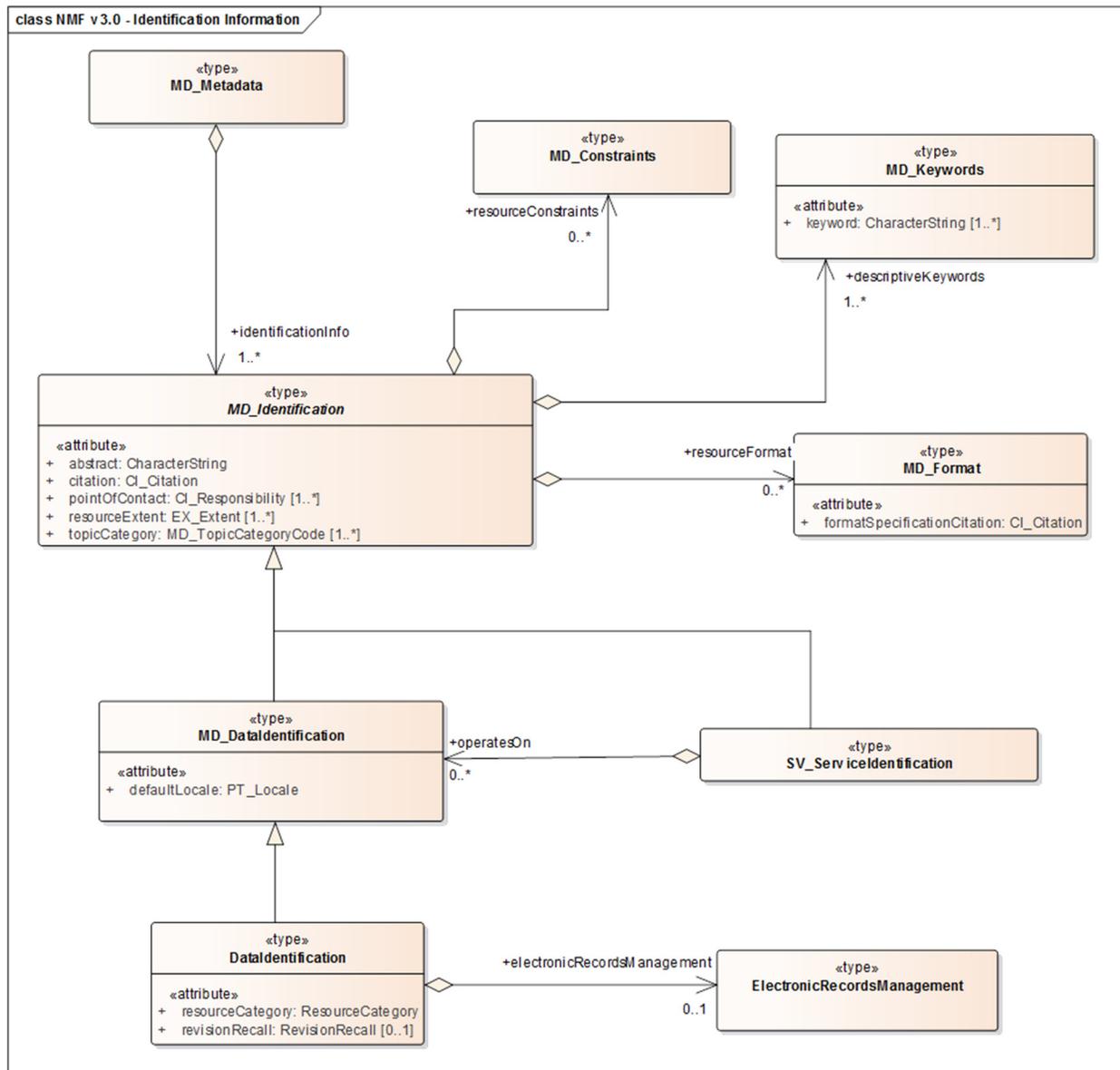


Figure 2 – Identification Information

5.2.1 Resource Identification

The Resource Identification class provides a citation identifying the content of the data or service resource. Resource Identification is an abstract class, meaning that the attributes associated with this class are inherited by the Data Identification (Table 11) and Service Identification (Table 19) entities.

For Data Resources the metadata description defined by Resource Identification must identify, at a minimum:

A **Resource Title** identifying the name by which a cited resource is known and populated with Citation (Table 46)

- A **Resource Abstract** providing a brief statement or narrative summary of the resource
- A **Resource Point of Contact** or responsible party for the resource populated with Responsibility (Table 46)

- A **Resource Date** applicable to the resource (such as the date it was created or revised) populated with Date (Table 50)
- A **Resource Identifier** uniquely identifying the resource within a namespace and populated with Citation (Table 46)
- A **Resource Geographic Location** providing the horizontal, vertical, and/or temporal coverage of the content of a resource populated with Extent (Table 39)
- A **Resource Topic Category Code** identifying a theme or topic keyword that represents a subject of the data content populated with a code from the MD_TopicCategoryCode enumeration (Table 5)

Data Identification is further documented in Section 5.2.2.

For Service Resources the metadata description defined by Resource Identification must identify, at a minimum:

- A **Service Title** identifying the name by which a cited resource is known and populated with Citation (Table 38)
- A **Service Abstract** providing a brief statement or narrative summary of the resource
- A **Service Point of Contact** or responsible party for the resource populated with Responsibility (Table 39)
- A **Service Date** applicable to the resource (such as the date it was created or revised) populated with Date (Table 41)
- A **Service Identifier** uniquely identifying the resource within a namespace and populated with Citation (Table 38)
- A **Service Geographic Location** providing the horizontal, vertical, and/or temporal coverage of the content of a resource populated with Extent (Table 35)
- A **Service Topic Category Code** identifying a theme or topic keyword that represents a subject of the service populated with a code from the MD_TopicCategoryCode enumeration (Table 5)

Service Identification is further documented in Section 5.3.1.

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Identification Information::MD_Identification

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------|---------------------------|---|-----------------------------|------------------------------|
| MD_Identification | Resource Identification | Distinguishing information that uniquely identifies resource. Facts about a resource include citation, unique identification, usage, maintenance, format, constraints, and keywords information. | | {abstract} |
| abstract | Resource Abstract | A brief statement or narrative summary of the resource. | Mandatory | CharacterString / Free text |
| citation | Resource Citation | A standardized reference for a resource. | Mandatory | CI_Citation (Table 45) |
| pointOfContact | Resource Point of Contact | The party(ies) acting in a role of responsibility for the resource. | 1..* {unordered, unique} | CI_Responsibility (Table 46) |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------------|----------------------------------|---|-------------------------------------|--|
| resourceExtent | Resource Extent | The horizontal, vertical, and/or temporal coverage of the content of a resource. | 1..* (Promoted from 0..* in NAS) | EX_Extent (Table 38) |
| topicCategory | Topic Category | A theme or topic keyword that represents a subject of the resource. For example: "biota", "elevation", and "militaryIntellegence". | 1..* (Promoted from 0..* in NAS) | MD_TopicCategoryCode <<Enumeration>> (Table 4) |
| Role: descriptiveKeywords | Descriptive Keywords | Information about keywords describing this resource. | 1..* {unordered, unique} | MD_Keywords (Table 12) |
| Role: resourceConstraints | Resource Constraints Information | Information about restrictions on the access to and/or use of this resource. | 0..* {unordered, unique} | MD_Constraints (Table 21) |
| Role: resourceFormat | Resource Format | Information about the digital form of a resource. | 0..* {unordered, unique} | MD_Format (Table 13) |

Table 9 – Resource Identification

5.2.2 Data Identification

Data identification information is specific to Data Resources. It inherits the attributes identified above for Resource Identification and adds support for Language, Localization, and Character Set Information. This class has also been extended with NSG specific requirements for Resource Category and Revision Recall.

For Data Resources the metadata description defined by Data Identification must identify, at a minimum:

- A **Resource Language** identifying the locale language using PT_Locale (Language Locale) (Table 56)
- A **Resource Character Set** designating the character set to be used to encode the textual value of the locale using PT_Locale (Locale Character Encoding) (Table 56)

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Identification Information::MD_DataIdentification

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------------|---------------------|---|--------------|--------------------------------------|
| MD_DataIdentification | Data Identification | Information that uniquely identifies a data resource. | | subclass of {abstract} MD_Identifier |
| defaultLocale | Text Locale | The cultural and linguistic setting applicable to the interpretation of a character string. Specified by a combination of language, potentially a country, and a character encoding (character set). | Mandatory | PT_Locale (Table 55) |

Table 10 – Data Identification

5.2.3 Data Identification Extension

This DataIdentification class is specific to Data Resources and extends the ISO 19115-1 MD_DataIdentification class to address NSG specific requirements. For Data Resources the metadata description defined by DataIdentification must identify, at a minimum:

- A **Resource Category** identifying the category of the data resource within the defined taxonomy specified by ResourceCategoryCode (Table 4)

In addition to the minimum mandatory concepts, DataIdentification has a set of constraints, or business rules, that apply to the information it holds:

- **Revision Recall** is mandatory when required by Executive Order (EO) 13526, *Classified National Security Information* and is populated using the Revision Recall datatype (Table 15)

NAS UML Model Reference – NMF Profile::Foundation::Resource Metadata::DataIdentification

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------|---------------------|--|--------------|--|
| DataIdentification | Data Identification | Information, not defined in the base standard that uniquely identifies a data resource. | | subclass of MD_DataIdentification |
| resourceCategory | Resource Category | The particular category of a data resource within a defined taxonomy. Resources within a category have similar information content and have been produced by similar processing methods. The default is a resource category type of "other". | Mandatory | ResourceCategory <<CodeList>> (Table 3) (ResourceCategoryCode) |
| revisionRecall | Revision Recall | Information about action(s) to be taken regarding modifications to the data resource (revision) or withdrawal of the data resource (recall). Revision or recall information allows recipients to be aware of modifications and withdrawal and to take mandatory actions in regards to previous versions (for example: immediately destroy all copies of the product). | 0..1 | RevisionRecall (Table 14) |

Table 11 –Data Identification Extension

5.2.4 Keywords

Keywords can be used to describe many things in metadata such as subject matter, content type, area or community of interest, format, geographic area, source and many others. Many communities have created lists of keywords that apply to data sets within their scope. The Keywords class provides information about keywords describing this data or service resource. When the resource described is a service, one instance of Keyword should refer to the service taxonomy defined in ISO 19119.

The metadata description defined by Keywords must identify, at a minimum:

- A **Keyword** providing information describing this data or service resource

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Identification Information::MD_Keywords

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|----------|---|--------------------------------|-------------------------------|
| MD_Keywords | Keywords | A list of words or phrases describing a resource, and their context. | | |
| keyword | Keyword | A common-use or formalised word or phrase that indicates the content of a resource. | 1..* {unordered, unique} | CharacterString / FreeText |

Table 12 –Keywords

5.2.5 Resource Format

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Distribution Information::MD_Format

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------------------|------------------------------|--|--------------|---------------------------|
| MD_Format | Data Format | A description of the computer language construct that specifies the representation of data objects in a record, file, message, storage device or transmission channel. | | |
| formatSpecification Citation | Data Format Specification | Citation information for a subset, profile, or product specification of the data transfer format in which the resource is available. | Mandatory | CI_Citation (Table 45) |

Table 13 – Resource Format

5.2.6 Revision Recall

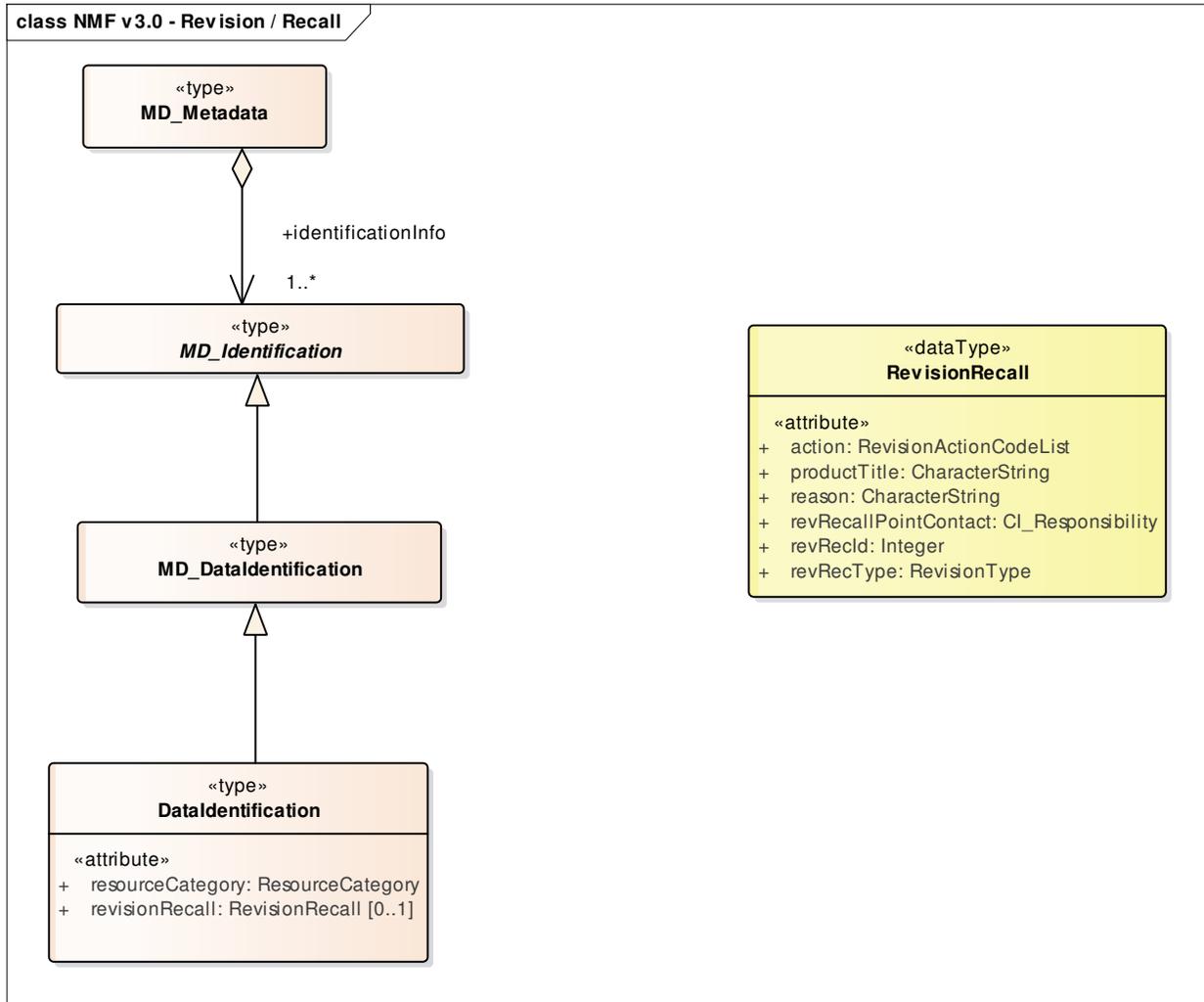


Figure 3 – Revision Recall

Revision Recall is an extension of the Resource Data Identification class. The memorandum, *Intelligence Community Standards and Procedures for Revised or Recalled Intelligence Products*, signed by DNI Negroponte on 5 August 2005, specifies how to indicate, in a textual form, the revision or recall of a previously released document. The data dictionary table presented in this section defines metadata which specifies methods for conveying revision and recall indicators. This includes declaring the title or subject of the intelligence product being revised or recalled, type of revision or recall, the date the revision or recall was issued, the reason for its issuance, and any required actions to be taken as a result of its issuance. This metadata supports Executive Order (EO) 13526, *Classified National Security Information* which "prescribes a uniform system for classifying, safeguarding, and declassifying national security information," across national security disciplines, networks, services, and data.

The metadata description defined by Revision Recall is conditional and mandatory when required by EO 13526.

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Revision Recall::RevisionRecall

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------------|----------------------------------|---|--------------|---|
| RevisionRecall | Revision Recall | Information regarding notification of withdrawal or modification of a data resource. Revision or recall information allows recipients to be aware of modifications and withdrawals and to take necessary actions in regards to previous versions. | | |
| action | Revision Recall Action | An indication of the activity to be performed on the data resource upon receipt of a notification of withdrawal or modification. For example, "purge" and "manual instruction". | Mandatory | RevisionActionCodeList <<CodeList>> (Table 3) (RevisionTypeCode) |
| productTitle | Revision Recall Product Title | The name of the data resource that has been withdrawn or modified. | Mandatory | CharacterString / FreeText |
| reason | Revision Recall Reason | The explanation or justification for the withdrawal or modification of the data resource. For example, "Product ABC has been revised to version 2.0." | Mandatory | CharacterString / FreeText |
| revRecallPointContact | Revision Recall Point Of Contact | The party acting in a role of responsibility for the notification of withdrawal or modification of the data resource. The point of contact is the person the recipient of a revision recall notice would contact to learn more information about the revision or recall. | Mandatory | CI_Responsibility (Table 45) |
| revRecId | Revision Identifier | A sequential integer allowing the unique identification of a notification of modification. Higher numbers refer to more recent revisions and take precedence over lower numbers. Thus, lower numbered revisions should be disregarded in favor of higher numbered revisions. | Mandatory | Integer |
| revRecType | Revision Recall Type | The type of withdrawal or modification. For example, a type of revision or recall may be an administrative revision or a substantive recall. | Mandatory | RevisionType <<CodeList>> (Table 3) (RevisionTypeCode) |

Table 14 – Revision Recall

5.2.7 Electronic Records Management

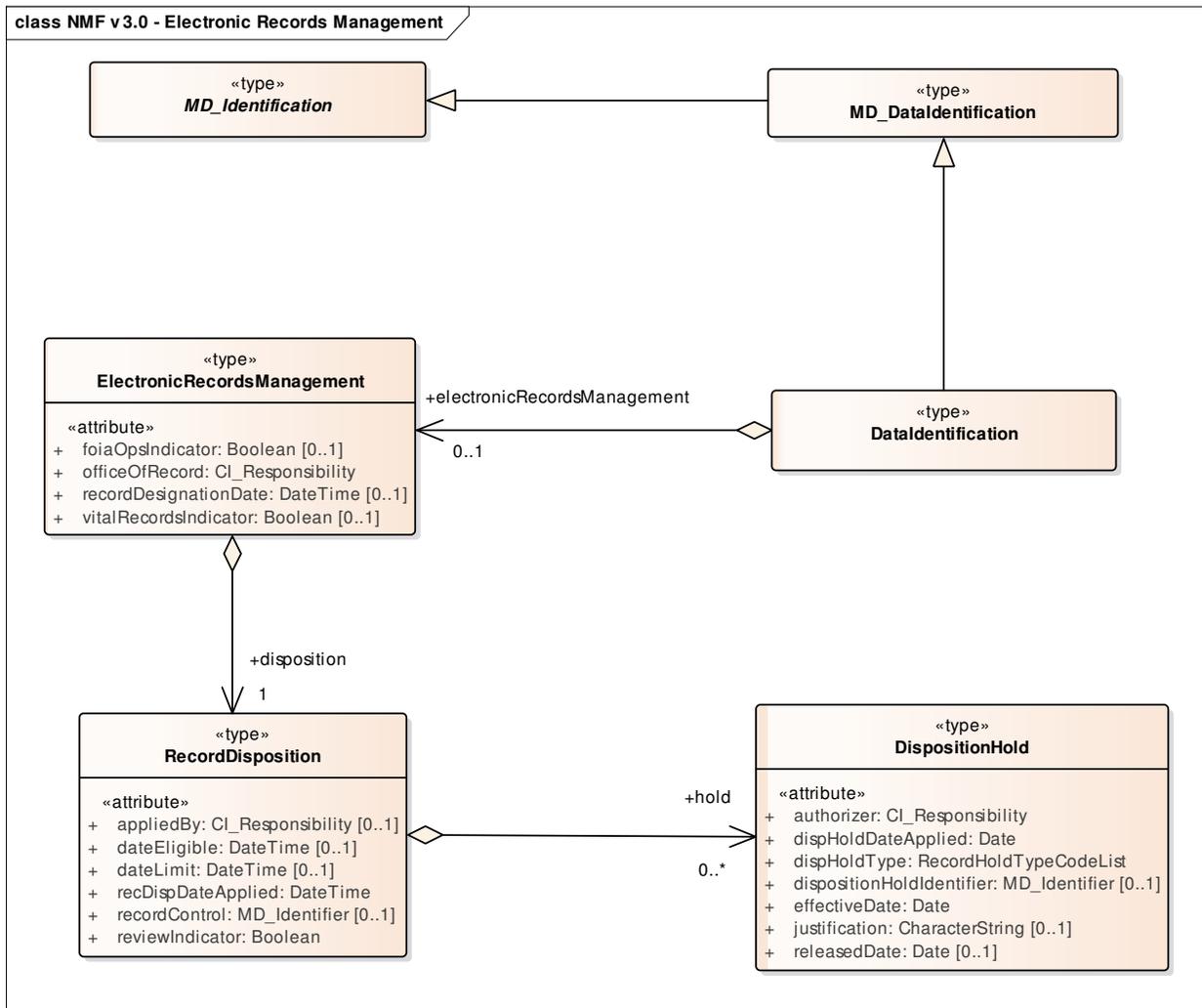


Figure 4 – Electronic Records Management

5.2.7.1 Electronic Records Management Information

NAS UML Model Reference – NMF Profile::Information::Entity Metadata::ElectronicRecordsManagement

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------------------|---|--|--------------|------|
| ElectronicRecordsManagement | Electronic Records Management Information | Information used by a records management system to manage a resource. A records management system systematically controls the creation, distribution, use, maintenance, and disposition of recorded information maintained as evidence of business activities and transactions. | | |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------------|--------------------------------|---|--------------|------------------------------|
| foiaOpsIndicator | FOIA Operations Indicator | <p>An indication that a managed record is exempted from U.S. Freedom of Information Act (FOIA) search and publication.</p> <p>For example, the U.S. Central Intelligence Agency (CIA) may have secured an operations-exemption. Each records management authority has specific exemptions they request and maintain.</p> | 0..1 | Boolean |
| officeOfRecord | Office of Record | <p>The party acting in a role of responsibility for making decisions related to a managed record</p> <p>The specification of the party identifies the specific organisation (for example: an intelligence agency) and organisational element that is responsible for the official copy of the record.</p> | Mandatory | CI_Responsibility (Table 46) |
| recordDesignationDate | Record Designation Date | <p>The date and, optionally, time that a managed record is declared final and starts the retention period which will be used to calculate the disposition date based on the retention schedule.</p> <p>Examples of dates for records being declared final: cutoff date, publication date, creation date.</p> | 0..1 | DateTime (Table 65) |
| vitalRecordsIndicator | Vital Record Indicator | <p>An indication that a managed record is considered essential to continuity of operation during and after emergencies or disaster conditions.</p> <p>Also known as an Essential Record (as specified in the U.S. Federal Continuity Directive 1 (FCD 1) 2012).</p> | 0..1 | Boolean |
| Role: disposition | Record Disposition Information | <p>Information about the disposition of a managed record.</p> <p>Disposition is the final action that puts into effect the results of an appraisal decision for a series of records. Possible dispositions include: transfer to an archival institution (for example: the U.S. National Archives and Records Administration (NARA)), transfer to a records center, and destruction.</p> | Mandatory | RecordDisposition (Table 16) |

Table 15 – Electronic Records Management Information

5.2.7.2 Record Disposition

NAS UML Model Reference – NMF Profile::Information::Entity Metadata::RecordDisposition

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------|-------------------------------------|--|--------------------------|------------------------------|
| RecordDisposition | Record Disposition | <p>An action taken with regard to U.S. federal records that are no longer needed for current government business as determined by their appraisal pursuant to legislation, regulation, or administrative procedure.</p> <p>Disposition is the final action that puts into effect the results of an appraisal decision for a series of records. There are two possible dispositions: transfer to the U.S. National Archives and Records Administration (NARA) and destruction. A record is a resource that has been recognized as a unit for the purposes of record management.</p> | | |
| appliedBy | Record Disposition Applied By | The party acting in a role of responsibility for performing the disposition of a managed record. | 0..1 | CI_Responsibility (Table 46) |
| dateEligible | Record Disposition Date Eligible | The date, and optionally, time that a managed record becomes eligible for disposition. | 0..1 | DateTime (Table 65) |
| dateLimit | Record Disposition Date Limit | The date, and optionally, time by which a disposition action must be taken regarding a managed record. | 0..1 | DateTime (Table 65) |
| recDispDateApplied | Record Disposition Date Applied | The date, and optionally, time that a disposition action was taken for a managed record. | Mandatory | DateTime (Table 65) |
| recordControl | Record Disposition Record Control | <p>A unique identifier of a record control system disposition policy.</p> <p>The identifier is determined in accordance with U.S. National Archives and Records Administration (NARA) policy.</p> | 0..1 | MD_Identifier (Table 54) |
| reviewIndicator | Record Disposition Review Indicator | An indication that a record has been reviewed to determine the appropriate Records Control Schedule, if applicable. | Mandatory | Boolean |
| Role: hold | Record Disposition Hold | Information about a suspension of disposition of a managed record. | 0..* {unordered, unique} | DispositionHold (Table 17) |

Table 16 – Record Disposition

5.2.7.3 Disposition Hold

NAS UML Model Reference – NMF Profile::Information::Entity Metadata::DispositionHold

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------|------------------|--|--------------|------|
| DispositionHold | Disposition Hold | <p>A suspension of disposition of a set of one or more records in the records management process of the cognizant organization or institution.</p> <p>Disposition is the final action that puts into effect the results of an appraisal decision for a series of records. There are two possible dispositions: transfer to the U.S. National Archives and Records Administration (NARA) and destruction.</p> | | |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------------|---------------------------------|--|--------------|--|
| authorizer | Disposition Hold Authorizer | The party acting in a role of responsibility for establishing a suspension of disposition on a managed record. A hold is defined as a suspension of disposition. | Mandatory | CI_Responsibility (Table 46) |
| dispHoldDateApplied | Disposition Hold Date Applied | The date that a suspension of disposition order was applied to a managed record. A hold is defined as a suspension of disposition. | Mandatory | Date (Table 64) |
| dispHoldType | Disposition Hold Type | The type of a suspension of disposition on a managed record. For example: financial, litigation, or mission critical. A hold is defined as a suspension of disposition. | Mandatory | RecordHoldTypeCodeList <<CodeList>> (Table 3) (RecordHoldTypeCode) |
| dispositionHoldIdentifier | Disposition Hold Identifier | A unique identifier of a suspension of disposition for a managed record. The identifier is unique among all hold types and electronic records management authorities. A hold is defined as a suspension of disposition. | 0..1 | MD_Identifier (Table 54) |
| effectiveDate | Disposition Hold Effective Date | The date that a suspension of disposition order became effective for a managed record. A hold is defined as a suspension of disposition. | Mandatory | Date (Table 64) |
| justification | Disposition Hold Justification | A legal, policy or mission driver for a suspension of disposition order on a managed record. A hold is defined as a suspension of disposition. | 0..1 | CharacterString/FreeText |
| releasedDate | Disposition Hold Released Date | The date that a suspension of disposition order on a managed record was released. A hold is defined as a suspension of disposition. | 0..1 | Date (Table 64) |

Table 17 – Disposition Hold

5.3 Service Identification Information

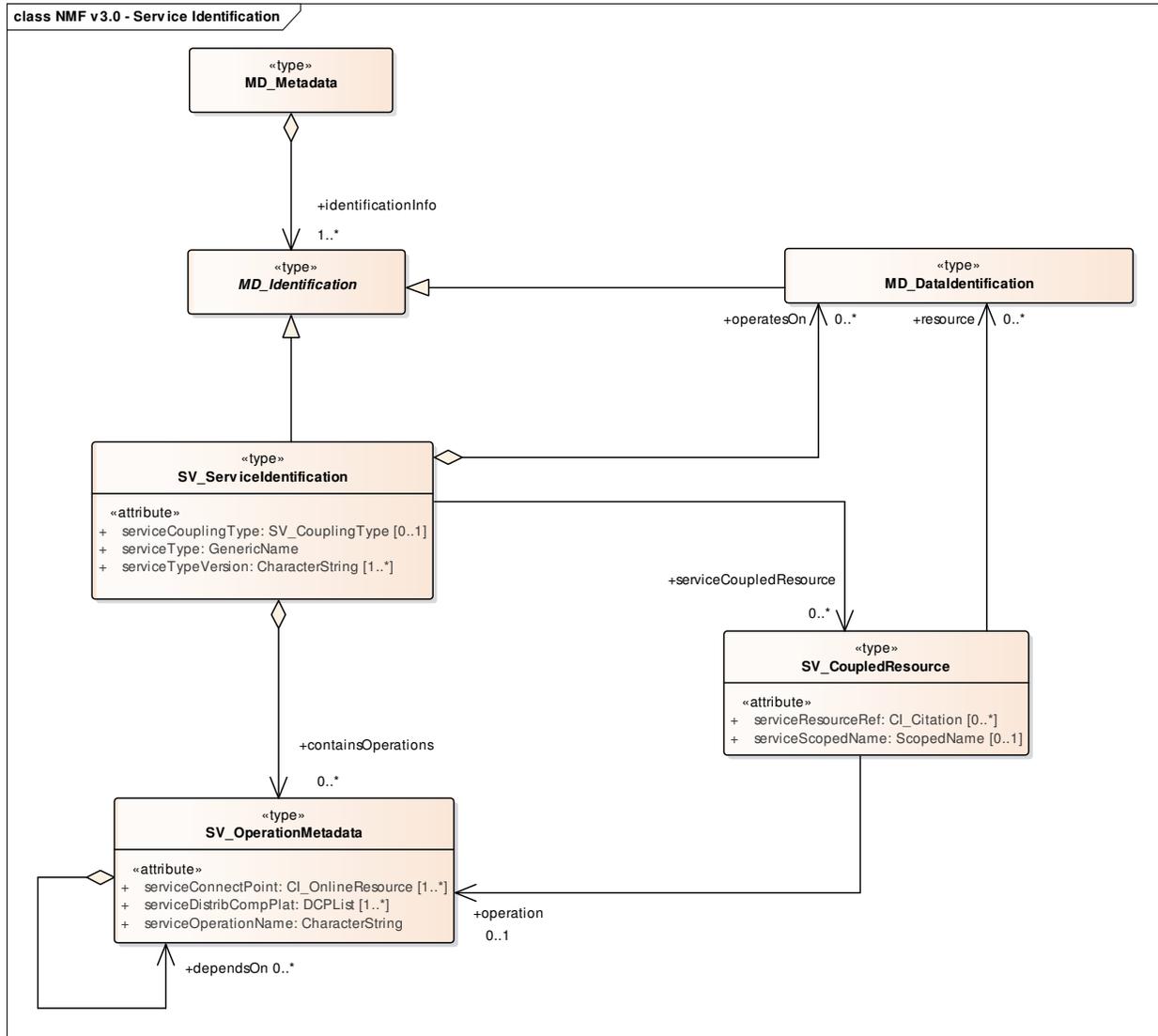


Figure 5 – Service Identification Information

5.3.1 Service Identification

Service identification is specific to Service Resources. It inherits the attributes identified above for Resource Identification and adds support for identifying Service Type Name, Service Type Version, and the Service Data-coupling Type.

For Service Resources the metadata description defined by Service Identification must identify, at a minimum:

- A **Service Type Name** identifying the name for a type of web service using a code from the CouplingType codeList (Table 4)
- A **Service Type Version** identifying the version of a web service

In addition to the minimum mandatory concepts, Service Identification has a set of constraints, or business rules, that apply to the information it holds:

- A **Couple Resource Type** identifying the type of coupling between a web service operation and a data resource using a code from the CouplingType codeList (Table 4) when the service is coupled to a Data Resource

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Service Metadata Information::SV_ServiceIdentification

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------------|-----------------------------|---|--|--|
| SV_ServiceIdentification | Service Identification | Information that identifies the capabilities which a web service provider makes available to a user of the service through a set of interfaces that define a behaviour. | | subclass of {abstract} MD_Identification |
| serviceCouplingType | Service Data-coupling Type | The type of coupling between a web service operation and a data resource, as a category. Not all web services will be coupled to the resource. | 0..1 Condition / coupled resource exists? | CouplingType <<CodeList>> (Table 3) (CouplingType) |
| serviceType | Service Type Name | The generic name for a type of web service. For example: 'discovery', 'view', 'download', 'transformation', and 'invoke'. | Mandatory | GenericName (Table 58) |
| serviceTypeVersion | Service Type Version | The version of a web service. Specifying the service type version enables filtered search; for example, a search for providers of version "1.1" OGC Catalogue services | 1..* {unordered, unique} | CharacterString / FreeText |
| Role: containsOperations | Service-contained Operation | Information about individual service operation(s) that comprise the web service. | 0..* {unordered, unique} | SV_OperationMetadata (Table 19) |

Table 18 – Service Identification

5.3.2 Service Operation Metadata

Service Operation Metadata describes the information required to invoke a web service, including its web address, platform information, and interface name.

For Service Resources the metadata description defined by Service Operation Metadata must identify, at a minimum:

- A **Service Online Location** identifying the Service Operation Connection Point using Online Linkage (Table 52)
- A **Service Distributed Computing Platform** identifying the Service Operation Computing Platform using a code from the DCPList codeList (Table 4)
- A **Service Operation Name** identifying the name of a web service operation interface

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Service Metadata Information::SV_OperationMetadata

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------------------|--------------------------------------|---|-----------------------------|---|
| SV_OperationMetadata | Service Operation Metadata | Information that describes the signature of a method provided by a web service. The described signature is limited to exactly one method. | | |
| serviceConnectPoint | Service Operation Connection Point | Information about accessing the web interface for this web service operation. | 1..* {unordered, unique} | CI_OnlineResource (Table 51) |
| serviceDistribCompPlat | Service Operation Computing Platform | A distributed computing platform(s) on which a web service operation has been implemented. For example: Hypertext Transfer Protocol (HTTP), Common Object Request Broker Architecture (CORBA), and Extensible Markup Language (XML). | 1..* {unordered, unique} | DCPList <<CodeList>> (Table 3) (DCPList) |
| serviceOperationName | Service Operation Name | The unique name of a web service operation interface. For example: GetCapabilities, DescribeRecord, and GetRecords. | Mandatory | CharacterString / FreeText |
| Role: serviceCoupledResource | Service Data-coupled Resource | In the case of a tightly-coupled web service operation, information establishing a relationship between that operation and a data resource. | 0..* {unordered, unique} | SV_CoupledResource (Table 20) |

Table 19 – Service Operation Metadata

5.3.3 Coupled Resource Information

Coupled Resource Information identifies data resource(s) coupled to a web service. The Service Data-coupling Type whether the coupling is loose, tight or mixed is identified in Table 19 above.

For Service Resources the metadata description defined by Coupled Resource Information has a set of constraints, or business rules, that apply to the information it holds:

- A **Coupled Resource** identifying the Service Coupling Reference and Service Coupling Name for resource(s) on which a web service operates is required when the service is coupled to a resource, using Citation (Table 46) and Scoped Name (Table 60)

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Service Metadata Information::SV_CoupledResource

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------|--------------------------|--|--------------|------|
| SV_CoupledResource | Service Coupled Resource | Information establishing a relationship between a web service operation and a resource. Describes a named binding between a web service operation and coupled datasets. Explicit bindings are specified for an operation and dataset if one or more datasets are accessible only through a subset of service operations, or if one dataset is accessed with different scoped names. For example, feature type name in a Web Feature Service (WFS) or layer name in a Web Map Service (WMS). | | |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------|----------------------------|---|-----------------------------|-------------------------------------|
| serviceResourceRef | Service Coupling Reference | Citation information for a resource that is coupled to a web service operation. | 0..* {unordered, unique} | CI_Citation (Table 45) |
| serviceScopedName | Service Coupling Name | The name of a resource as determined by a web service operation. For example, the name of a data layer or feature type as referenced and used by a particular Web Mapping Service operation. | 0..1 | ScopedName (Table 59) |
| Role: operation | Service Coupling Operation | Information about the web service operation to which data resource(s) are coupled. | 0..1 | SV_OperationMetadata (Table 19) |
| Role: resource | Service Coupling Resource | Resource(s) that are tightly coupled to a web service operation. | 0..* {unordered, unique} | MD_DataIdentification (Table 10) |

Table 20 – Coupled Resource Information

5.4 Constraint Information

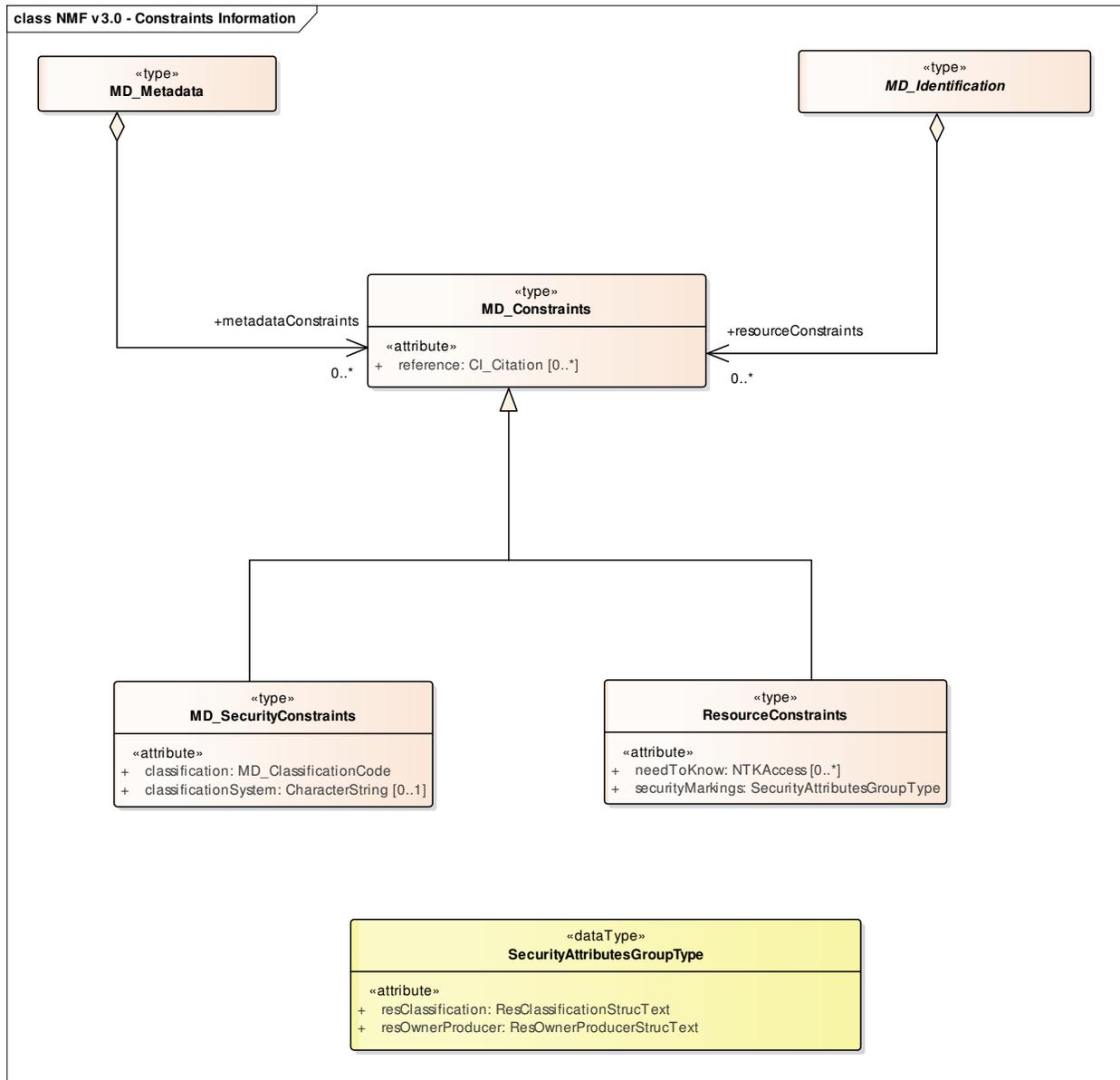


Figure 6 – Constraints Information

5.4.1 Resource Constraints

The Resource Constraints in this section provide information on mandatory restrictions to the access and use of a resource or a set of resource metadata based on ISO 19115-1:2014. The NSG follows DoD/IC directives for the use of IC.ADD.V2 (Chapter 3, Information Security Marking) and extends these elements as defined in Table 18 below using the Security Markings entity. This section is provided as information for those users/systems that require interoperability with ISO 19115-1:2014 based systems.

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Constraint Information::MD_Constraints

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|----------------|-------------------------------|---|-----------------------------|------------------------|
| MD_Constraints | Resource Constraints | Restrictions on the access to and/or use of a resource or a set of resource metadata. A resource may consist of either a collection of data or the metadata that describes some collection of data. | | |
| reference | Resource Constraint Reference | Citation information for detailed information about the constraint. For example, a citation of a copyright statement or licence agreement. A resource constraint is a restriction on the access to and/or use of a resource or a set of resource metadata. | 0..* {unordered, unique} | CI_Citation (Table 45) |

Table 21 – Resource Constraints

5.4.1.1 Security Constraints

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Constraint Information::MD_SecurityConstraints

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|------------------------|---|--|--------------|--|
| MD_SecurityConstraints | Security Constraints | A specification of the handling restrictions imposed on either a resource or resource metadata because of national security and/or other security concerns. | | subclass of MD_Constraints |
| classification | Resource Security Classification | The security classification marking of a resource or a set of resource metadata. A security marking usually implies handling restrictions | Mandatory | MD_ClassificationCode <<CodeList>> (Table 3) (ClassificationCode) |
| classificationSystem | Resource Security Classification System | The name of the classification system of the security classification marking of a resource or a set of resource metadata. A resource may consist of either a collection of data or the metadata that describes some collection of data. | 0..1 | CharacterString / FreeText |

Table 22 – Security Constraints

5.4.1.2 Resource Constraints Extension

ISO 19115-1:2014 contains a bare minimum of security-related metadata elements. That bare minimum is not sufficient for use in the NSG. The MD_Constraints class has been extended to accommodate the additional security requirements of the NSG. The NSG follows DoD/IC directives for the use of IC.ADD.V2 (Chapter 3, Information Security Marking) and extends these elements as defined below.

The XML Data Encoding specification for Need-To-Know Metadata, version 10 (NTK.XML.V10) is an ODNI standard for encoding metadata necessary to facilitate automated systems making a “need-to-know” determination in order to allow access to a resource.

It is mandatory for all users of the NMF to document security metadata using the ResourceConstraints class.

NAS UML Model Reference – NMF Profile::Foundation::Resource Metadata::ResourceConstraints

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------|----------------------|--|-----------------------------|--|
| ResourceConstraints | Resource Constraints | Restrictions on the access to and/or use of a resource or a set of resource metadata information. Restrictions may take the form of handling restrictions imposed on a resource or metadata associated with a resource because of national security and/or other security concerns. | | subclass of MD_Constraints |
| needToKnow | Need-To-Know Access | Information used to facilitate automated access determination for a resource, based on system-specific properties assigned to the resource. A resource may have multiple occurrences in order to specify information from multiple, different access systems. | 0..* {unordered, unique} | NTKAccess (Table 26) |
| securityMarkings | Security Markings | Control markings that indicate the classification level, and other security-based access restrictions, of the resource in accordance with Office of the Director of National Intelligence (ODNI)/Controlled Access Program Coordination Office (CAPCO) guidance. The control markings included are (for example) classification level, dissemination information, and Sensitive Compartmented Information (SCI) controls. | Mandatory | SecurityAttributesGroupType (Table 33) |

Table 23 – Resource Constraints Extension

5.4.2 Notice

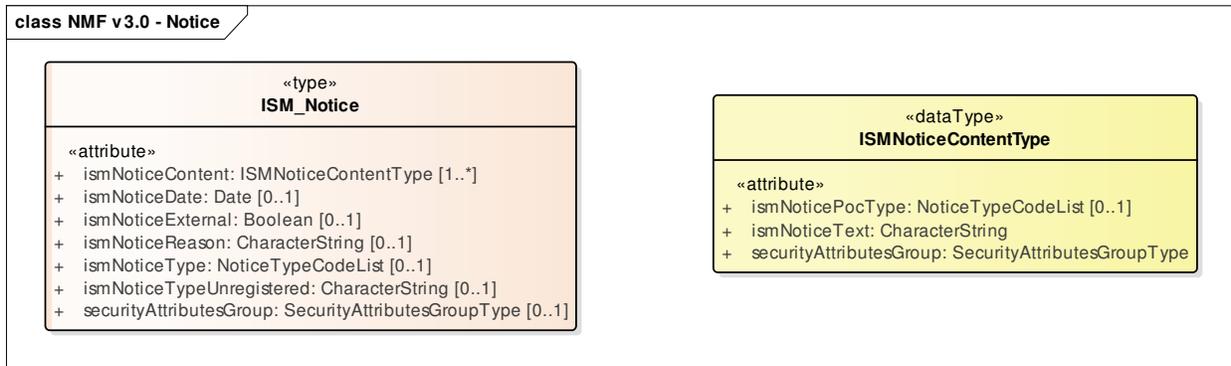


Figure 7 – Notice

5.4.2.1 ISM Notice

In some cases restrictions on the distribution and use of a resource cannot be adequately captured in the security markings. Notices provide that additional security related information in a textual format. Most notices are standardized through registration in the IC registry. Registered notices can be identified by their notice type.

The data dictionary table presented in this section is not found in ISO 19115-1:2014. This metadata represents the Notices metadata required by the U.S Intelligence Community (IC).

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Information Security Marking::ISM_Notice

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------------|---------------------------|--|-----------------------------|---|
| ISM_Notice | ISM_Notice | Information concerning security notice(s). | | |
| ismNoticeContent | ismNoticeContent | The textual content of a security-related notice, including point-of-contact information. For example: "This document contains RESTRICTED DATA as defined in the Atomic Energy Act of 1954. Unauthorized disclosure subject to administrative and criminal sanctions." | 1..* {unordered, unique} | ISMNoticeContent Type (Table 25) |
| ismNoticeDate | ismNoticeDate | A date associated with a notice. For example, a DoD Distribution notice date. | 0..1 | Date (Table 64) |
| ismNoticeExternal | ismNoticeExternal | An indication that the information requiring the security-related notice is not present in the resource. This indicator allows for a security-related notice to exist through association with a resource, but without the data that would normally require the notice. A citation may be accompanied by a notice applicable to the cited content, but not the citation itself. | 0..1 | Boolean |
| ismNoticeReason | ismNoticeReason | A justification for controlling the release of information. The text of the reason should be less than 2048 characters. An example includes the reason for a Department of Defense Distribution restriction. | 0..1 | CharacterString / FreeText |
| ismNoticeType | ismNoticeType | The category of a security-related notice based on the nature of the restriction or warning to which it relates. Examples may include: the North Atlantic Treaty Organization (NATO), Restricted Data (RD), Formerly Restricted Data (FRD), and Foreign Intelligence Surveillance Act (FISA). | 0..1 | NoticeTypeCodeList <<CodeList>> (Table 3) NoticeTypeCode |
| ismNoticeTypeUnregistered | ismNoticeTypeUnregistered | The category of a security-related notice based on the nature of the restriction or warning to which it relates, where that category is not included in the Intelligence Community (IC) XML Data Encoding Specification (DES) for Information Security Marking (ISM) Metadata standard (IC DES.ISM.XML). The text of the Notice Type must be less than 2048 characters. | 0..1 | CharacterString / FreeText |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------------|-------------------------|---|--------------|--|
| securityAttributesGroup | securityAttributesGroup | <p>A security classification and control marking in accordance with the (US) Controlled Access Program Coordination Office (CAPCO) guidance.</p> <p>The Intelligence Community (IC) Information Security Marking (ISM) XML Schema specifies a common set of XML attributes for implementing security-based metadata throughout the IC. The IC ISM XML Schema provides markup for the tokens that are used to format the CAPCO markings.</p> | 0..1 | SecurityAttributesGroupType (Table 33) |

Table 24 – ISM Notice

5.4.2.2 ISM Notice Content Type

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Information Security Marking::ISMNoticeContentType

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|----------------------|------------------------------|--|--------------|--|
| ISMNoticeContentType | Notice Content Type | <p>The text of a security notice as determined by the Intelligence Community (IC) XML Data Encoding Specification (DES) for Information Security Marking (ISM) Metadata standard (IC DES.ISM.XML).</p> <p>A security notice may contain point-of-contact information for a party responsible for the content of the notice.</p> | | |
| ismNoticeText | Notice Text | <p>The textual content of a security-related notice.</p> <p>For example: "This document contains RESTRICTED DATA as defined in the Atomic Energy Act of 1954. Unauthorized disclosure subject to administrative and criminal sanctions." Also, point-of-contact information may be included.</p> | Mandatory | CharacterString / FreeText |
| ismNoticePocType | Notice Point Of Contact Type | <p>A reason for a party who is responsible for a security-related notice.</p> <p>Certain points-of-contact (POCs) are required for different reasons, such as Intelligence Community Directive (ICD)-710, "Classification Management and Control Markings System" compliance or Department of Defense (DoD) Distribution statements. An external source of valid values for Notice Point Of Contact Type is the XML Schema named CVEnumISMPocType.xsd.</p> | 0..1 | NoticeTypeCodeList <<CodeList>> (Table 3) NoticeTypeCode |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------------|---------------------------|--|--------------|--|
| securityAttributesGroup | Security Attributes Group | <p>A security classification and control marking in accordance with the Intelligence Community (IC) XML Data Encoding Specification (DES) for Information Security Marking (ISM) Metadata standard (IC DES.ISM.XML).</p> <p>The Intelligence Community (IC) Information Security Marking (ISM) XML Schema specifies a common set of XML attributes for implementing security-based metadata throughout the IC.</p> | Mandatory | SecurityAttributesGroupType (Table 33) |

Table 25 – ISM Notice Content Type

5.4.3 Need-to-Know

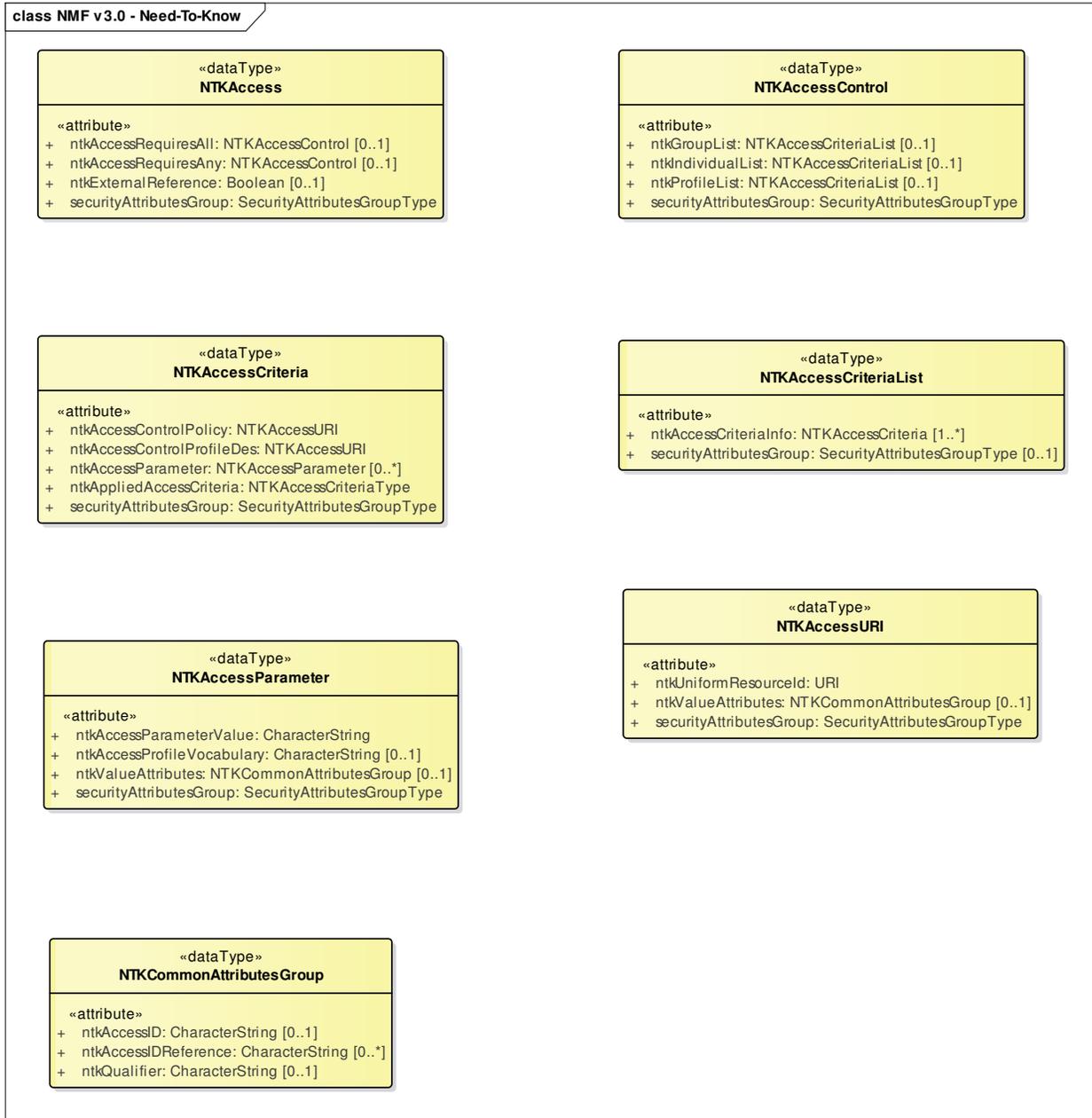


Figure 8 – Need-to-Know

Information sharing within the U.S. national intelligence enterprise frequently relies on being able to determine an individual’s need-to-know as one component in determining whether to allow access to data, referred to as access control. This need to know metadata are used to represent the system-specific properties assigned to an information resource that will be used, in conjunction with information about the user, and possibly other information, to determine the user’s access to the data.

The data dictionary table presented in this section is not found in ISO 19115-1:2014. This metadata represents the Need to Know metadata required by the U.S Intelligence Community (IC) and falls into the data attributes leg of the IC access control framework.

5.4.3.1 Need-to-Know Access

The Need-to-Know Access (NTKAccess) entity is required for resources stored in IC systems and identifies a metadata record as requiring access control. It helps the receiving system understand access requirements for the resource. The associated attributes in this entity identify whether the receiving system must understand all of the access requirements listed within this structure or only must understand at least one of the access requirements. The Security Attributes Group allows security markings to be associated with the metadata.

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Need-To-Know Metadata::NTKAccess

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------------|--|--|--------------|-----------------------------|
| NTKAccess | Need-to-Know Access | <p>A specification of metadata that enables the determination of whether a requester (for example: a person or a service) can be granted access to an information resource.</p> <p>The Need-to-Know (NTK) framework supports the design of tailored and extensible access control mechanisms. It provides the means by which a data producer can specify NTK metadata that identifies individuals, groups, and/or profile characteristics and valid combinations of these that an access control system needs in order to determine how to grant access.</p> | | |
| ntkAccessRequires All | Need-to-Know Access Requires All | A specification of the criteria for controlling access to a resource, where all of the criteria must be satisfied to grant a requester (for example: a person or a service) access to a resource. | 0..1 | NTKAccessControl (Table 27) |
| ntkAccessRequires Any | Need-to-Know Access Requires Any | A specification of the criteria for controlling access to a resource, where at least one of the criteria must be satisfied to grant a requester (for example: a person or a service) access to a resource. | 0..1 | NTKAccessControl (Table 27) |
| ntkExternalReference | Need-to-Know Access External Reference | <p>An indication of whether the source of data for use by an application implementing Need-to-Know (NTK) access is an external or internal source.</p> <p>A value of 'true' indicates that the source of data is external to the application and a value of 'false' indicates the source of data is internal to the application.</p> | 0..1 | Boolean |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------------|---------------------------|---|--------------|--|
| securityAttributesGroup | Security Attributes Group | <p>A security classification and control marking in accordance with the Intelligence Community (IC) XML Data Encoding Specification (DES) for Information Security Marking (ISM) Metadata standard (IC DES.ISM.XML).</p> <p>The Intelligence Community (IC) Information Security Marking (ISM) XML Schema specifies a common set of XML attributes for implementing security-based metadata throughout the IC. The IC ISM XML Schema provides markup for the tokens that are used to format the IC Marking System Register and Manual markings.</p> | Mandatory | SecurityAttributesGroupType (Table 33) |

Table 26 – Need-to-Know Access

5.4.3.2 NTK Access Control

The Need-to-Know Access Control (NTKAccessControl) entity provides the structure to specify the criteria for controlling access based on using one or more of an individual, a group, or a predetermined profile based on an access policy.

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Need-To-Know Metadata::NTKAccessControl

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------------|------------------------------|---|--------------|--|
| NTKAccessControl | Need-to-Know Access Control | A specification of the criteria for controlling access to a resource, where all of or at least one of the criteria must be satisfied to grant a requester (for example: a person or a service) access to a resource. | | |
| ntkIndividualList | Need-to-Know Individual List | A set of criteria that must be satisfied to determine whether access to a resource can be granted to an individual (for example: a person or a service). | 0..1 | NTKAccessCriteriaList (Table 28) |
| ntkGroupList | Need-to-Know Group List | A set of criteria that must be satisfied to determine whether access to a resource can be granted to all of the members of a defined group of individuals (for example: a person or a service). | 0..1 | NTKAccessCriteriaList (Table 28) |
| ntkProfileList | Need-to-Know Profile List | A set of criteria that must be satisfied to determine whether access to a resource can be granted to an individual (for example: a person or a service) based on the characteristics of a profile. | 0..1 | NTKAccessCriteriaList (Table 28) |
| securityAttributesGroup | Security Attributes Group | <p>A security classification and control marking in accordance with the Intelligence Community (IC) XML Data Encoding Specification (DES) for Information Security Marking (ISM) Metadata standard (IC DES.ISM.XML).</p> <p>The Intelligence Community (IC) Information Security Marking (ISM) XML Schema specifies a common set of XML attributes for implementing security-based metadata throughout the IC. The IC ISM XML Schema provides markup for the tokens that are used to format the IC Marking System Register and Manual markings.</p> | Mandatory | SecurityAttributesGroupType (Table 33) |

Table 27 – NTK Access Control**5.4.3.3 NTK Access Criteria List**

The Need-to-Know Access Criteria List (NTKAccessCriteriaList) entity provides the constraints used to control access to a resource as a list of criteria.

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Need-To-Know Metadata::NTKAccessCriteriaList

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------------|--|---|-----------------------------|--|
| NTKAccessCriteriaList | Need-to-Know Access Criteria List | A list of criteria for a specific category of resource access control. | | |
| ntkAccessCriteriaInfo | Need-to-Know Access Criteria Information | A set of constraints used to control access to a resource, expressed as an access control policy and a Data Encoding Specification (DES), accompanied by either an individual name(s), a group name, or a profile characteristic name. | 1..* {unordered, unique} | NTKAccessCriteria (Table 29) |
| securityAttributesGroup | Security Attributes Group | <p>A security classification and control marking in accordance with the Intelligence Community (IC) XML Data Encoding Specification (DES) for Information Security Marking (ISM) Metadata standard (IC DES.ISM.XML).</p> <p>The Intelligence Community (IC) Information Security Marking (ISM) XML Schema specifies a common set of XML attributes for implementing security-based metadata throughout the IC. The IC ISM XML Schema provides markup for the tokens that are used to format the IC Marking System Register and Manual markings.</p> | 0..1 | SecurityAttributesGroupType (Table 33) |

Table 28 – NTK Access Criteria List**5.4.3.4 NTK Access Criteria**

The Need-to-Know Access Criteria (NTKAccessCriteria) entity provides the constraints to control access as an access control policy and a Data Encoding Specification (DES).

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Need-To-Know Metadata::NTKAccessCriteria

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------|------------------------------|---|--------------|------|
| NTKAccessCriteria | Need-to-Know Access Criteria | The specification of constraints used to control access to a resource, expressed as an access control policy and a Data Encoding Specification (DES), accompanied by an individual name(s), a group name(s), or profile characteristic name(s). | | |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|----------------------------|---|---|-----------------------------|--|
| ntkAccessControlPolicy | Need-to-Know Access Control Policy | <p>The Uniform Resource Identifier (URI) for an Access Control Encoding Specification (ACES) that defines the combinational logic used to grant a requester (for example: a person or a service) access to a resource.</p> <p>For example, the Access Control Encoding Specification (ACES) for Originator Controlled (ORCON) Need-to-Know is an access control policy.</p> | Mandatory | NTKAccessURI (Table 31) |
| ntkAccessControlProfileDes | Need-to-Know Access Control Profile Data Encoding Specification | <p>The Uniform Resource Identifier (URI) for the Data Encoding Specification (DES) of a Need-to-Know (NTK) access control profile.</p> <p>An example of a Uniform Resource Identifier (URI) for a Data Encoding Specification (DES) of an access control profile is "guide://2020/oc-ntk.des.v1".</p> | Mandatory | NTKAccessURI (Table 31) |
| ntkAccessParameter | Need-to-Know Access Parameter | <p>The name(s) of an individual(s) (for example: a person or a service) or a group(s), or a characteristic(s) of a profile, used by an access control policy that defines the logic used to determine whether to grant the requester access to a resource.</p> <p>Depending on whether the NTK access criteria apply to an individual, group, or profile, the XML name for the access parameter is AccessIndividualValue, AccessGroupValue, or AccessProfileValue, respectively.</p> | 0..* {unordered, unique} | NTKAccessParameter (Table 30) |
| ntkAppliedAccessCriteria | Need-to-Know Applied Access Criteria | <p>The applied criteria that must be satisfied to determine whether access to a resource can be granted.</p> <p>Requirements for need-to-know access control decisions vary according to whether they apply to an individual (person or service), group, or profile.</p> | Mandatory | NTKAccessCriteriaType <<Enumeration>> > (Table 5) |
| securityAttributesGroup | Security Attributes Group | <p>A security classification and control marking in accordance with the Intelligence Community (IC) XML Data Encoding Specification (DES) for Information Security Marking (ISM) Metadata standard (IC DES.ISM.XML).</p> <p>The Intelligence Community (IC) Information Security Marking (ISM) XML Schema specifies a common set of XML attributes for implementing security-based metadata throughout the IC. The IC ISM XML Schema provides markup for the tokens that are used to format the IC Marking System Register and Manual markings.</p> | Mandatory | SecurityAttributesGroupType (Table 33) |

Table 29 – NTK Access Criteria

5.4.3.5 NTK Access Parameter

The Need-to-Know Access Parameter (NTKAccessParameter) entity provides the name of an individual, group, or profile used by a NTK access control policy.

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Need-To-Know Metadata::NTKAccessParameter

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|----------------------------|--|--|--------------|--|
| NTKAccessParameter | Need-to-Know Access Parameter | The name of an individual (for example: a person or a service) or the name of a group, or the name of a characteristic of a profile, used by a Need-to-Know (NTK) access control policy. | | |
| ntkAccessParameterValue | Need-to-Know Access Control Policy Parameter | The name of an individual (for example: a person or a service), the name of a group, or the value of a characteristic of a profile used in a Need-to-Know (NTK) access determination. | Mandatory | CharacterString / FreeText |
| ntkAccessProfileVocabulary | Need-to-Know Access Criteria Vocabulary | The name of a characteristic (for example: a parameter) of a profile defined by an access control policy used in a Need-to-Know (NTK) access determination. The value is one item of a defined, shared vocabulary that is access control policy specific. This attribute applies to Need-to-Know Profile Lists only | 0..1 | CharacterString / FreeText |
| ntkValueAttributes | Need-to-Know Common Attributes Group | An attributes group used by the Need-to-Know (NTK) access control mechanism to reference specific parts of an Extensible Mark-up Language (XML) encoded document. | 0..1 | NTKCommonAttributesGroup (Table 32) |
| securityAttributesGroup | Security Attributes Group | A security classification and control marking in accordance with the Intelligence Community (IC) XML Data Encoding Specification (DES) for Information Security Marking (ISM) Metadata standard (IC DES.ISM.XML). The Intelligence Community (IC) Information Security Marking (ISM) XML Schema specifies a common set of XML attributes for implementing security-based metadata throughout the IC. The IC ISM XML Schema provides markup for the tokens that are used to format the IC Marking System Register and Manual markings. | Mandatory | SecurityAttributesGroupType (Table 33) |

Table 30 – NTK Access Parameter

5.4.3.6 NTK Access URI

The Need-to-Know Access Uniform Resource Identifier (NTKAccessURI) entity provides the online resource reference used to access a resource and associated security markings.

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Need-To-Know Metadata::NTKAccessURI

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------------|---|---|--------------|--|
| NTKAccessURI | Need-to-Know Access Uniform Resource Identifier | The unique name used to access a resource on the Internet or an intranet, accompanied by a security attributes group and a Need-to-Know (NTK) parameter attributes group. | | |
| ntkUniformResourceId | Need-to-Know Uniform Resource Identifier (URI) | The unique address of an information resource on the Internet or an intranet used by the Need-to-Know (NTK) access control mechanism to reference resources containing access control policy details. | Mandatory | URI (Table 56) |
| ntkValueAttributes | Need-to-Know Common Attributes Group | A group of attributes that are used by the Need-to-Know (NTK) access control mechanism to reference specific parts of an Extensible Markup Language (XML) encoded document. | 0..1 | NTKCommonAttributesGroup (Table 32) |
| securityAttributesGroup | Security Attributes Group | <p>A security classification and control marking in accordance with the Intelligence Community (IC) XML Data Encoding Specification (DES) for Information Security Marking (ISM) Metadata standard (IC DES.ISM.XML).</p> <p>The Intelligence Community (IC) Information Security Marking (ISM) XML Schema specifies a common set of XML attributes for implementing security-based metadata throughout the IC. The IC ISM XML Schema provides markup for the tokens that are used to format the IC Marking System Register and Manual markings.</p> | Mandatory | SecurityAttributesGroupType (Table 33) |

Table 31 – NTK Access URI

5.4.3.7 NTK Common Attributes Group

The Need-to-Know Common Attributes Group (NTKCommonAttributesGroup) datatype provides a group of attributes that are used by the Need-to-Know (NTK) access control mechanism to reference specific parts of an Extensible Mark-up Language (XML) encoded document.

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Need-To-Know Metadata::NTKCommonAttributesGroup

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------------|--------------------------------------|--|--------------|------|
| NTKCommonAttributesGroup | Need-to-Know Common Attributes Group | A group of attributes that are used by the Need-to-Know (NTK) access control mechanism to reference specific parts of an Extensible Mark-up Language (XML) encoded document. | | |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|----------------------|--|--|-----------------------------|----------------------------|
| ntkAccessID | Need-to-Know Access Identifier | <p>A resource-unique identifier for an Extensible Mark-up Language (XML) encoded document element that can be used to support Need-to-Know (NTK) portion marking of a part of a document (for example: a paragraph).</p> <p>The valid content of a Need-to-Know Access Identifier must conform to the XML Schema specification for a non-colonized XML Name (NCName). An NCName is a character string that must start with a letter or underscore ("_") and may contain only letters, digits, periods, hyphens, and underscores.</p> | 0..1 | CharacterString / FreeText |
| ntkAccessIDReference | Need-to-Know Access Identifier Reference | <p>Information in an Extensible Mark-up Language (XML) encoded document element that provides a reference to another XML element that can be used to support Need-to-Know (NTK) portion marking of a part of a document (for example: a paragraph).</p> <p>The content of a reference to a defined identifier (ID) is restricted to the same lexical domain as the ID. When there is more than one Need-to-Know Access Identifier Reference attributes, their content should be combined into one XML IDREFS attribute with spaces separating each ID.</p> | 0..* {unordered, unique} | CharacterString / FreeText |
| ntkQualifier | Need-to-Know Qualifier | <p>User-defined property within an element for general purpose processing used with block objects to provide supplemental information over and above that conveyed by the element name.</p> <p>This attribute is analogous to the "class" attribute of the Hypertext Markup Language (HTML).</p> | 0..1 | CharacterString / FreeText |

Table 32 – NTK Common Attributes Group

5.4.4 Security Attributes Group

The IC Security Markings Manual and Registry is responsible for establishing the uniform list of security control markings (and the authorized abbreviated forms of such markings) authorized for dissemination of classified information by components of the U.S. Intelligence Community.

The authoritative list of security marking concepts is documented in IC.ADD.V2 (Chapter 3, Information Security Marking).

The data dictionary table presented in this section is not found in ISO 19115-1:2014. This metadata includes the security marking metadata required by the U.S Intelligence Community (IC) in accordance with the IC.ADD.V2. Only mandatory metadata is included in this data dictionary.

In an XML-based encoding, attribute group 'SecurityAttributesGroup' should be referenced in the attribute definition list of any element that requires security metadata.

The metadata description defined by Security Attributes Group must identify, at a minimum:

- A **Metadata Classification** identifying the highest level of classification applicable to the resource, or a portion of the Data or Service Resource
- A **Metadata Classification System** identifying the national government or international organization owner(s) and/or producer(s) of the Data or Service Resource
- A **Resource Classification** identifying the highest level of classification applicable to the resource, or a portion of the Data Resource
- A **Resource Classification System** identifying the national government or international organization owner(s) and/or producer(s) of the Data Resource
- A **Service Classification** identifying the national government or international organization owner(s) and/or producer(s) of the Service Resource
- A **Service Classification System** identifying the national government or international organization owner(s) and/or producer(s) of the Service Resource

NAS UML Model Reference – DoD/IC::Intelligence Community Metadata::IC - Information Security Marking::SecurityAttributesGroupType

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------------------|---|---|--------------|--|
| SecurityAttributesGroupType | Security Attributes Group | <p>A security classification and control marking in accordance with the (US) IC Markings System Register and Manual.</p> <p>The Intelligence Community (IC) Information Security Marking (ISM) XML Schema specifies a common set of XML attributes for implementing security-based metadata throughout the IC. The security-based metadata includes portion marks, security banners, the classification authority block, and other security control markings.</p> | | |
| resClassification | Resource Classification | The highest level of classification applicable to the resource, or a portion of the resource, within the domain of classified national security information. | Mandatory | ResClassificationStrucText |
| resOwnerProducer | Resource Owner-Producer | The national government or international organization owner(s) and/or producer(s) of the resource. | Mandatory | ResOwnerProducerStrucText |
| ResClassificationStrucText | Resource Classification Structured Text | <p>A structured text consisting of a single value that is drawn from a codelist, each domain member of which denotes a security classification that is applicable to a resource.</p> <p>Specified listed values may be limited to those marked (U). Additional listed values with other, more restrictive, release markings may exist and be documented elsewhere.</p> | | Populated with CVEnumISMClassificationAll (IC Technical Specification) |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------------------|--|---|--------------|--|
| ResOwnerProducer StrucText | Resource Owner- Producer Structured Text | A structured text consisting of a sequence of values that are individually drawn from a codelist, each domain member of which denotes an owner-producer that is applicable to a resource. Specified listed values may be limited to those marked (U). Additional listed values with other, more restrictive, release markings may exist and be documented elsewhere. | | Populated with ismcat:ownerproducer (IC Technical Specification) |

Table 33 – Security Attributes Group

5.5 Lineage Information

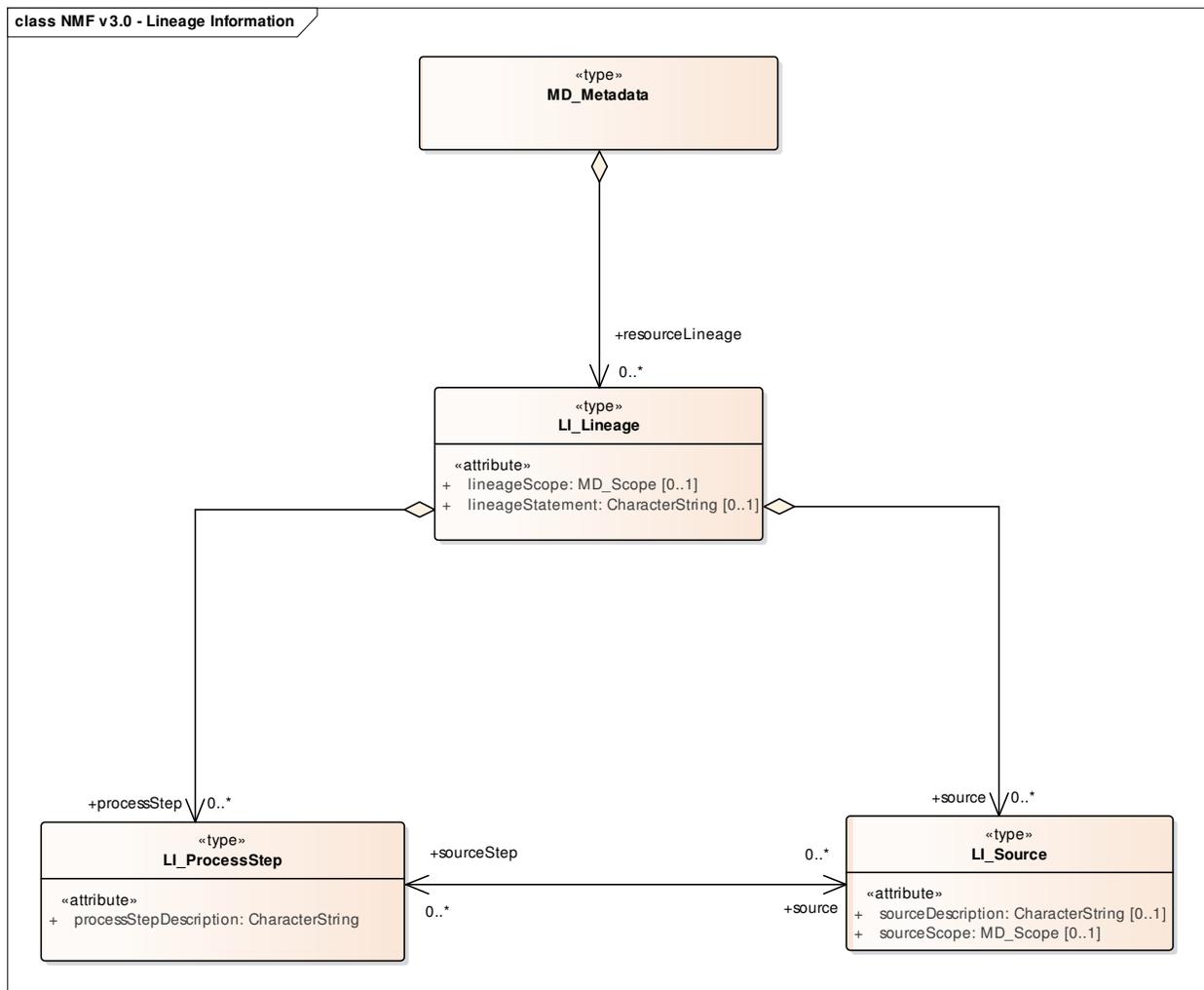


Figure 9 – Lineage Information

5.5.1 Resource Lineage

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Lineage Information::LI_Lineage

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------|-------------------|---|--|----------------------------|
| LI_Lineage | Resource Lineage | Information about the sources and/or production processes used in creating the resource. | | |
| lineageScope | Lineage Scope | <p>The content type restriction and/or spatio-temporal extent limitation within the resource to which lineage information applies.</p> <p>The lineage scope identifies the portion of the resource to which the lineage information applies or the timeframe for which the lineage information is valid. For example, "lineage information applies only to elevation data collected prior to 20160121."</p> | 0..1 | MD_Scope (Table 53) |
| lineageStatement | Lineage Statement | <p>A general explanation of the knowledge of the resource provider regarding the lineage of the resource.</p> <p>For example, "this feature was collected by photogrammetric extraction using XYZ imagery taken 20160121."</p> | 0..1 Conditional / (DQ_DataQuality.dataQualityScope.DQ_Scope.mdScopeCategory='dataset' or 'series')? | CharacterString / FreeText |
| Role: processStep | Process Step | Information about event(s) and/or transformation(s) in the life of the resource. | 0..* {unordered, unique} Conditional / LI_Lineage.lineageStatement and source role not documented? | LI_ProcessStep (Table 35) |
| Role: source | Lineage Statement | Information about resource(s) that were used in creating the resource. | 0..* {unordered, unique} Conditional / LI_Lineage.lineageStatement and processStep role are documented? | LI_Source (Table 36) |

Table 34 – Resource Lineage

5.5.2 Process Step Information

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Lineage Information::LI_ProcessStep

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|------------------------|--------------------------|--|-----------------------------|----------------------------|
| LI_ProcessStep | Resource Process Step | <p>Information about an event or transformation in the life of a resource, including the process(es) used to maintain the resource.</p> <p>A process step event is an action that occurs at an instance in time that does not change the content of the resource but may change the format of the resource; for example, importing data into a database or application that may reformat the content into an application specific format. A process step transformation is an action that modifies the content of the resource to create new content; for example, applying an algorithm to the resource in order to obtain a set of new values or combining existing content to create new content.</p> | | |
| processStepDescription | Process Step Description | <p>A narrative or other textual description of a process step, including related processing parameters and/or tolerances.</p> <p>Steps in a process are ordered actions taken with a resource that may preserve or modify its contents. For example, importing data into a database and/or application that may reformat the content into an application specific format or new content may be created by applying an algorithm to the resource and/or combining existing content to create new content.</p> | Mandatory | CharacterString / FreeText |
| Role: source | Process Step Source | Information about a resource that this process step used to derive another resource. | 0..* {unordered, unique} | LI_Source (Table 36) |

Table 35 – Process Step Information

5.5.3 Source Information

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Lineage Information::LI_Source

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------|--------------------|---|---|----------------------------|
| LI_Source | Resource Source | Information about a resource that was used to derive another resource. | | |
| sourceDescription | Source Description | <p>A description of the data set that was used to define the digital representation of the feature or data set.</p> <p>No restriction is placed on the length of the description.</p> | 0..1 Conditional / sourceScope not provided? | CharacterString / FreeText |
| sourceScope | Source Scope | The content type restriction and/or spatio-temporal extent limitation of the resource that was used to derive another resource. | 0..1 Conditional / sourceDescription not provided? | MD_Scope (Table 53) |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------|-------------|--|--------------------------------|------------------------------|
| Role: sourceStep | Source Step | Information about a process step in which this source was used. A process step is an event or transformation in the life of a resource. | 0..* {unordered, unique} | LI_ProcessStep (Table 35) |

Table 36 – Source Information

5.6 Reference System Information

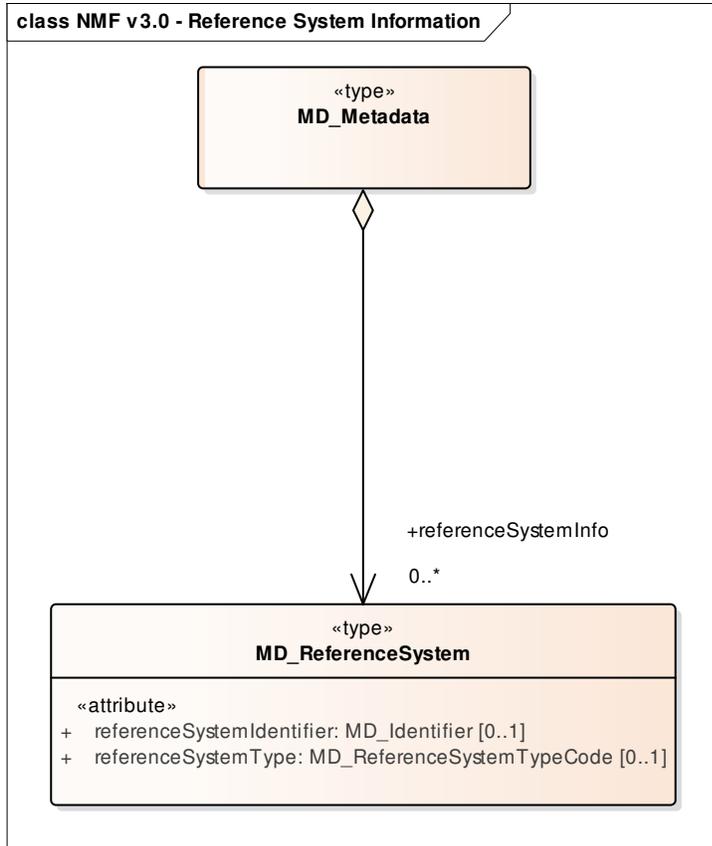


Figure 10 – Reference System Information

For Data Resources the metadata description defined by Reference System Information has a set of constraints, or business rules, that apply to the information it holds:

- A **Resource Coordinate Reference System** stating the Reference System Identifier is required when if the resource includes coordinates and is populated with Identifier (Table 55) Code identifying the reference system used in the resource

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Reference System Information::MD_ReferenceSystem

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|------|------------|--------------|------|
|---------------|------|------------|--------------|------|

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------------|--------------------------------|---|--------------|---|
| MD_ReferenceSystem | Reference System Specification | Information about a spatial or temporal reference system used by representations in the resource. Refer to SC_CRS in ISO 19111 when coordinate reference system information is not given through a reference system identifier. | | |
| referenceSystemIdentifier | Reference System Identifier | An unambiguous identifier of a spatial and/or temporal reference system. Refer to International Organization of Standardization (ISO) 19111 and ISO 19111-2 when coordinate reference system information is not given through reference system identifier (for example: "EPSG::4326"). | 0..1 | MD_Identifier (Table 54) |
| referenceSystemType | Reference System Type | The type of a spatio-temporal reference system. For example, a compound geographic 2-dimensional parametric type of spatio-temporal reference system. | 0..1 | MD_ReferenceSystemTypeCode <<codeList>> (Table 3) ReferenceSystemTypeCode |

Table 37 – Reference System Information

5.7 Datatypes

Datatypes provide a structured pattern used to populate a large number of the metadata elements listed in tables 1 and 2. These datatype may be reused by multiple metadata elements and ensure data content is expressed in a consistent manner between concepts.

5.7.1 Resource Extent

Extent information documents the spatio-temporal location for the content of the resource expressed within a geographic, temporal, or vertical frame of reference.

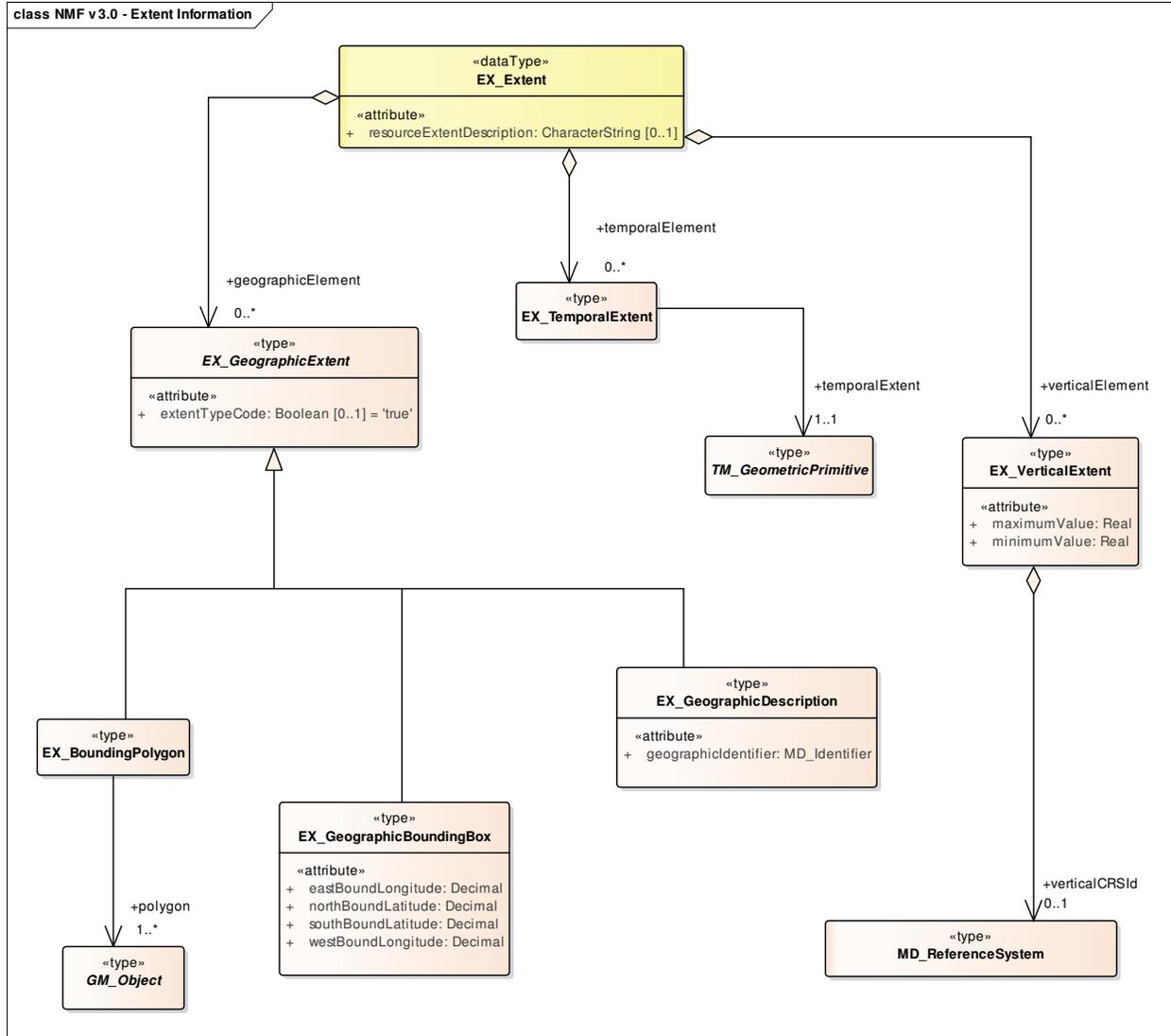


Figure 11 – Resource Extent

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Extent Information::EX_Extent

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|-----------------|---|--------------|------|
| EX_Extent | Resource Extent | <p>Information about the spatial, vertical, and/or temporal coverage of a resource.</p> <p>A spatial extent is an area(s), such as a point(s), line(s), and/or polygon(s). A vertical extent is a height or depth, or a range of them. A temporal extent is one or more periods in time. Granularity and precision are variable. The extents characterize the time(s) and location(s) of the content of the resource.</p> | | |

| NSG AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------------|-----------------------------|---|---|--------------------------------|
| resourceExtentDescription | Resource Extent Description | A textual description of the spatial, temporal, and/or vertical coverage of a resource. | 0..1 Conditional / geographicElement and temporalElement and verticalElement not documented? | CharacterString / FreeText |
| Role: geographicElement | Spatial Extent | A spatial component of the extent(s) of a resource. The geographic extent is a geographic identifier (for example: a country name), a bounding box (for example: the bounding latitudes and longitudes), or a bounding object (for example: a set of coordinate points). | 0..* {unordered, unique} | EX_GeographicExtent (Table 39) |
| Role: temporalElement | Temporal Extent | A temporal component of the extent(s) of a resource. The temporal extent is the time period covered by a resource. | 0..* {unordered, unique} | EX_TemporalExtent (Table 43) |
| Role: verticalElement | Vertical Extent | A vertical component of the extent(s) of a resource. The vertical extent is the minimum and maximum vertical limits present in the vertical domain of the resource. | 0..* {unordered, unique} | EX_VerticalExtent (Table 44) |

Table 38 – Resource Extent

5.7.2 Geographic Extent

The Geographic Extent Datatype describes the spatial extent of the Data or Service Resource and is used to populate **Resource Geographic Location** (Table 10) and/or **Service Geographic Location** (Table 10). This datatype can be used to specify a Geographic Bounding Box, Geographic Description, or Geographic Bounding Object.

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Extent Information::EX_GeographicExtent

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------------|-------------------|---|--------------|------|
| EX_GeographicExtent | Geographic Extent | A spatial extent of the resource. The geographic extent is a geographic identifier (for example: a country name), a bounding box (for example: the bounding latitudes and longitudes), or a bounding object (for example: a set of coordinate points). | | |

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|----------------|-------------|---|------------------------------|---------|
| extentTypeCode | Extent Type | <p>An indication of whether the specified geographic extent encompasses an area covered by the data ('true') or an area where data is not present ('false').</p> <p>When encoded numerically, 0 = exclusion (or 'False') and 1 = inclusion (or 'True').</p> <p>When this attribute is either missing or unpopulated it is understood that the implied value of the Extent Type is 'true' and thus that the specified geographic extent encompasses an area covered by the data.</p> | 0..1 Initial Value='true' | Boolean |

Table 39 – Geographic Extent

5.7.2.1 Geographic Bounding Box

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Extent Information::EX_GeographicBoundingBox

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------------|----------------------------|--|--------------|---|
| EX_GeographicBoundingBox | Geographic Bounding Box | <p>A geographic extent of the resource.</p> <p>A geographic bounding box is an approximate reference. Therefore, the bounding box may be provided with a precision of up to two decimal places, and a specification of the coordinate reference system is unnecessary.</p> | | subclass of {abstract} EX_Geographic Extent |
| eastBoundLongitude | Eastern Bounding Longitude | The eastern-most coordinate of the limit of a resource extent, expressed in longitude in decimal degrees (positive east). | Mandatory | Decimal |
| northBoundLatitude | Northern Bounding Latitude | The northern-most coordinate of the limit of a resource extent, expressed in latitude in decimal degrees (positive north). | Mandatory | Decimal |
| southBoundLatitude | Southern Bounding Latitude | The southern-most coordinate of the limit of a resource extent, expressed in latitude in decimal degrees (positive north). | Mandatory | Decimal |
| westBoundLongitude | Western Bounding Longitude | The western-most coordinate of the limit of a resource extent, expressed in longitude in decimal degrees (positive east). | Mandatory | Decimal |

Table 40 –Geographic Bounding Box

5.7.2.2 Geographic Description

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Extent Information::EX_GeographicDescription

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------------|------------------------|--|--------------|---|
| EX_GeographicDescription | Geographic Description | A description of the geographic area which is denoted by geographic identifiers. | | subclass of {abstract} EX_Geographic Extent |
| geographicIdentifier | Geographic Identifier | A unique identifier used to denote a geographic area. The geographic identifier should be formulated in accordance with ISO 19112 Geographic information - Spatial referencing by geographic identifiers. | Mandatory | MD_Identifier (Table 54) |

Table 41 – Geographic Description

5.7.2.3 Bounding Polygon

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Extent Information::EX_BoundingPolygon

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------|----------------------------|---|-----------------------------|---|
| EX_BoundingPolygon | Geographic Bounding Object | An enclosing geometric object which locates the resource. The boundary of the geometric object is expressed as a set of (x,y) coordinate(s). | | subclass of {abstract} EX_Geographic Extent |
| Role: polygon | Bounding Geometric Object | The geometric object(s) whose boundaries define the extent of the resource. Examples of a bounding object are a point and a polygon. | 1..* {unordered, unique} | GM_Object |

Table 42 – Bounding Polygon

5.7.3 Temporal Extent

For Data Resources the metadata description defined by Temporal Extent has a set of constraints, or business rules, that apply to the information it holds:

- o A **Resource Temporal Extent** stating the Temporal Extent is required when Resource Extent Description, or Geographic Extent, or Vertical Extent not documented and is populated using Temporal Geometric Primitive (Table 48), such as Temporal Period or Temporal Instance

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Extent Information::EX_TemporalExtent

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|----------------------|-----------------|--|--------------|----------------------------------|
| EX_TemporalExtent | Temporal Extent | The time period covered by the resource. | | |
| Role: temporalExtent | Temporal Extent | The temporal limit of the resource, expressed as an instantaneous point in time or a period of time. | Mandatory | TM_GeometricPrimitive (Table 60) |

Table 43 – Temporal Extent

5.7.4 Vertical Extent

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Extent Information::EX_VerticalExtent

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|------------------------|--------------------------------------|---|--------------|----------------------------------|
| EX_VerticalExtent | Vertical Extent | <p>The vertical extent of the resource.</p> <p>The vertical extent is the minimum and maximum vertical limits present in the vertical domain of the resource.</p> | | |
| maximumValue | Vertical Extent Maximum Value | The highest vertical limit of a geospatial extent. | Mandatory | Real |
| minimumValue | Vertical Extent Minimum Value | The lowest vertical limit of a geospatial extent. | Mandatory | Real |
| Role: verticalCRSId | Vertical Coordinate Reference System | <p>Identification of the vertical Coordinate Reference System (CRS) used for the minimum and maximum values of the vertical extent.</p> <p>A vertical coordinate reference system is a one-dimensional Coordinate Reference System (CRS) used for recording heights or depths. Vertical CRSs make use of the direction of gravity to define the concept of height or depth, but the relationship with gravity may not be straightforward.</p> | 0..1 | MD_ReferenceSystem (Table 37) |

Table 44 – Vertical Extent

5.7.5 Citation and Party Information

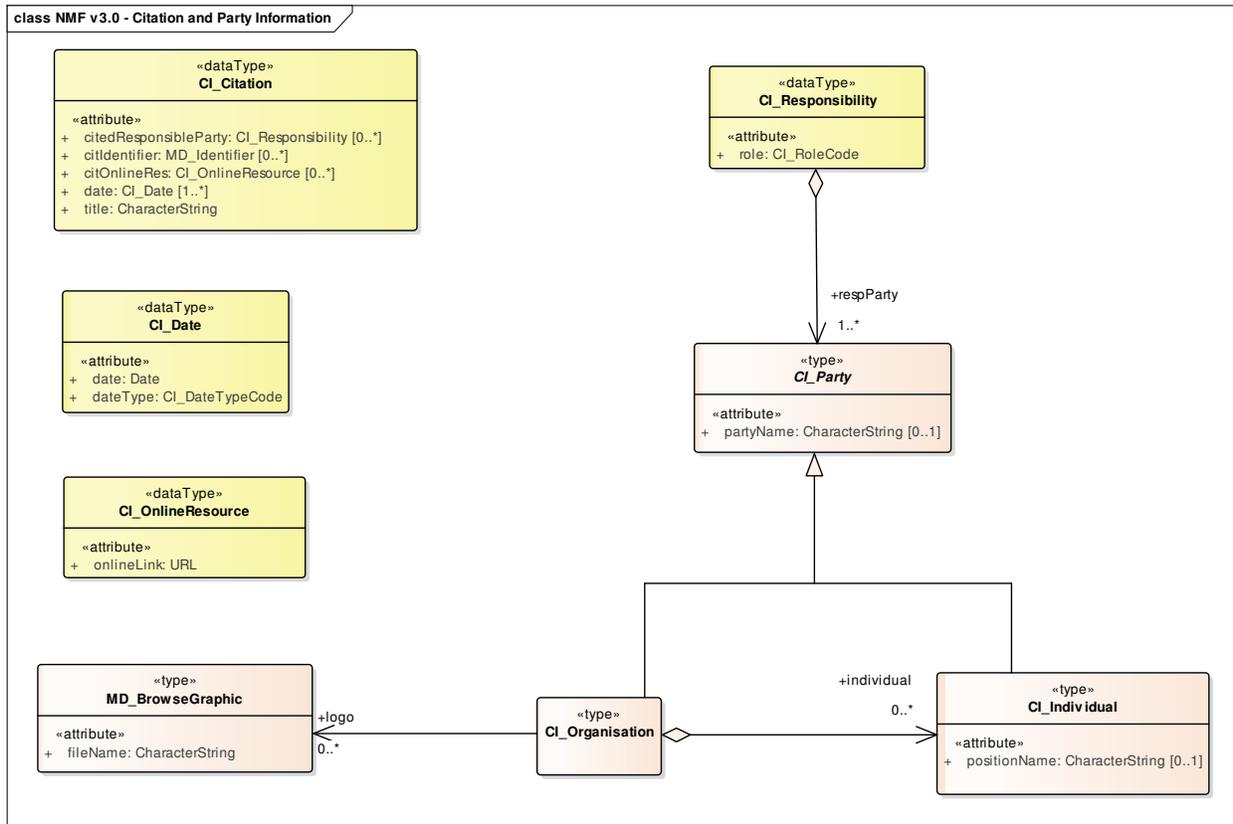


Figure 12 – Citation and Party Information

5.7.5.1 Citation

The Citation Datatype describes a cited resource of the Data or Service Resource and is used to populate **Metadata Standard Title** (Table 8), **Resource Title** (Table 10), **Parent Metadata Citation** (Table 11), and **Coupled Resource** (Table 21). This datatype can be used as the basis to specify a Cited Resource Responsible Party, Cited Resource Date, Cited Resource Identifier, Cited Resource Online Reference, or Cited Resource Title.

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Citation and Responsible Party Information::CI_Citation

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------------|----------------------------------|--|-----------------------------|------------------------------|
| CI_Citation | Citation | A specification of a cited resource. | | |
| citedResponsibleParty | Cited Resource Responsible Party | Name and/or position information for person(s) and/or organisation(s) responsible for the resource. This includes the role(s), name(s), contact(s), and position(s) information about the party(ies). | 0..* {unordered, unique} | CI_Responsibility (Table 46) |
| citIdentifier | Cited Resource Identifier | A value uniquely identifying the resource within a namespace. | 0..* {unordered, unique} | MD_Identifier (Table 54) |

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|------------------------------------|---|--------------------------------|---------------------------------|
| citOnlineRes | Cited Resource Online Reference | Information about network sources from which the cited resource can be obtained. Information regarding a resource may include, for example, its content (a dataset), a specification of its structure or content, or a specification of a community metadata profile regarding its structure or content. | 0..* {unordered, unique} | CI_OnlineResource (Table 51) |
| date | Cited Resource Date | A reference date for a cited resource. At least one reference date must be specified. | 1..* {unordered, unique} | CI_Date (Table 50) |
| title | Cited Resource Title | The name by which a cited resource is known. The resource title must be specified. | Mandatory | CharacterString / FreeText |

Table 45 – Citation

5.7.5.2 Responsibility

The Responsibility Datatype provides information about a role of responsibility with respect to a resource and the party(ies) that serve in that capacity for the Data or Service Resource and is used to populate **Metadata Point of Contact** (Table 8), **Resource Point of Contact** (Table 10), and **Service Point of Contact** (Table 10). This datatype can be used as the basis to specify a Responsibility Role and a Party Name or Position Name.

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Citation and Responsible Party Information::CI_Responsibility

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|--------------------|----------------------|--|--------------------------------|--|
| CI_Responsibility | Responsibility | Information about a role of responsibility with respect to a resource and the party(ies) that serve in that capacity. A party is an individual and/or organisation who serves in a role of responsibility with respect to a resource. | | |
| role | Responsibility Role | The function performed by a responsible party with respect to a resource. | Mandatory | CI_RoleCode <<CodeList>> (Table 3) (RoleCode) |
| Role: respParty | Responsibility Party | Information about party(ies) who are serving in a role of responsibility with respect to a resource. | 1..* {unordered, unique} | CI_Party (Table 47) |

Table 46 – Responsibility

5.7.5.3 Party Information

One of Party: Party Name, Party Individual: Position Name or Party Organisation: Organisation Logo must be documented.

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Citation and Responsible Party Information::CI_Party

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|----------------|--|--------------|----------------------------|
| CI_Party | Resource Party | Information about an individual or an organisation associated with a resource. | | {abstract} |
| partyName | Party Name | The name of an individual or organisation associated with a resource. | 0..1 | CharacterString / FreeText |

Table 47 – Party Information**5.7.5.4 Individual**

One of Party: Party Name, Party Individual: Position Name or Party Organisation: Organisation Logo must be documented.

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Citation and Responsible Party Information::CI_Individual

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|---------------------------|---|--------------|---------------------------------|
| CI_Individual | Resource Party Individual | Information about an individual, including the individual's name and position. | | subclass of {abstract} CI_Party |
| positionName | Position Name | The title of an individual in an organization. For example, Chief Engineer or Midwest Sales Manager. | 0..1 | CharacterString / FreeText |

Table 48 – Individual**5.7.5.5 Organisation**

One of Party: Party Name, Party Individual: Position Name or Party Organisation: Organisation Logo must be documented.

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Citation and Responsible Party Information::CI_Organisation

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|------------------|-----------------------------|--|-----------------------------|---------------------------------|
| CI_Organisation | Resource Party Organisation | Information about an organisation, including its logo and members of the organisation. | | subclass of {abstract} CI_Party |
| Role: individual | Organisation Individual | A member of the organisation. | 0..* {unordered, unique} | CI_Individual (Table 48) |
| Role: logo | Organisation Logo | A graphic image that identifies an organisation. This graphic is usually a representation or symbol of an organisation's name or trademark, and is often designed for recognition and branding. | 0..* {unordered, unique} | MD_BrowseGraphic (Table 52) |

Table 49 – Organisation**5.7.5.6 Date and Date Type**

The Date and Date Type Datatype describes a reference date and type of date for the resource of the Data or Service Resource and is used to populate **Metadata Date** (Table 8), **Resource Date** (Table 10), and **Service Date** (Table 10).

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Citation and Responsible Party Information::CI_Date

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|---------------|--|--------------|--|
| CI_Date | Date and Type | A reference date and an event type used to describe it. | | |
| date | Date | A reference date for a resource. The reference date must be specified, and formatted in accordance with ISO 8601. | Mandatory | Date (Table 64) |
| dateType | Date Type | The type of event to which a date is referenced. The reference date type must be specified. | Mandatory | CI_DateTypeCode <<CodeList>> (Table 3) (DateTypeCode) |

Table 50 – Date and Date Type

5.7.5.7 Online Resource

The Online Resource Datatype identifies an online source for the Service Resource and is used to populate **Service Online Location** (Table 19).

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Citation and Responsible Party Information::CI_OnlineResource

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------|-----------------|---|--------------|-------------------|
| CI_OnlineResource | Online Resource | Information about online sources from which the dataset, specification, or community profile name and extended metadata elements can be obtained. | | |
| onlineLink | Online Linkage | A network location of a resource specified using a Uniform Resource Locator (URL) or Uniform Resource Identifier (URI) address, or similar addressing scheme. For example: http://www.statkart.no/isotc211 . The linkage must be specified. | Mandatory | URL (Table 56) |

Table 51 – Online Resource

5.7.5.8 Browse Graphic

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Commonly Used Classes::MD_BrowseGraphic

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|------------------|-------------------|--|--------------|----------------------------|
| MD_BrowseGraphic | Browse Graphic | A graphic image that illustrates some aspect of the resource. For example, a graphic could portray a legend, a security marking, or a data provider logo. | | |
| fileName | Graphic File Name | The name of a file that contains a graphic that provides an illustration of an aspect of a resource. | Mandatory | CharacterString / FreeText |

Table 52 – Browse Graphic

5.7.6 Common Classes

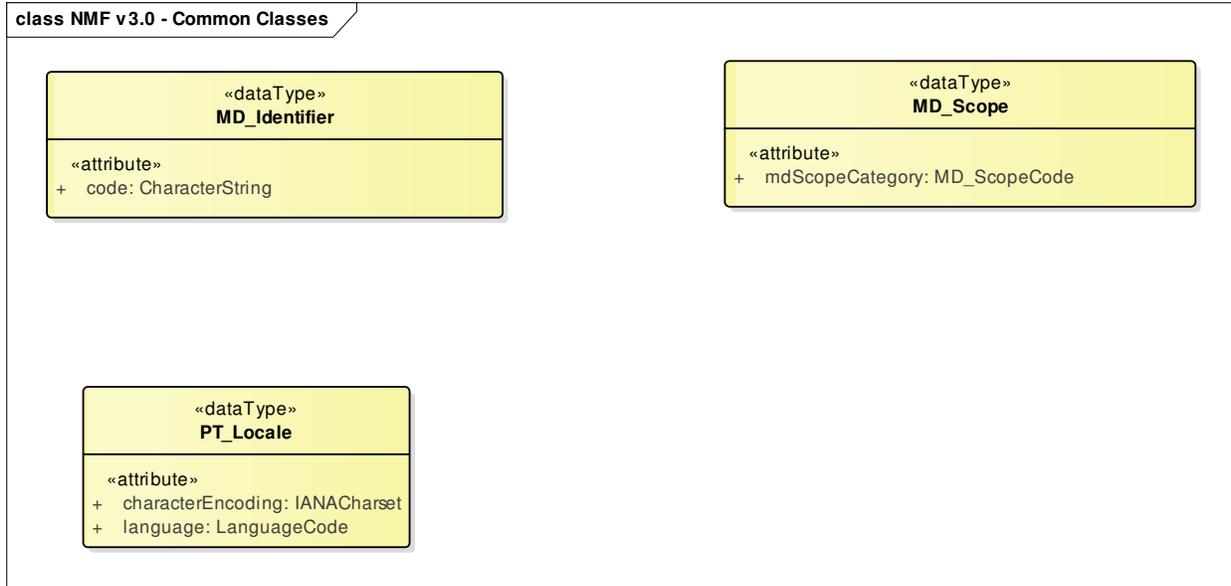


Figure 13 – Common Classes

5.7.6.1 Scope

The Scope Datatype defines the extent of the area or subject matter that the Data and Service Resource deals with or to which it is relevant and is used to populate the **Metadata Scope Code** defined by Resource Scope (Table 9).

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Commonly Used Classes::MD_Scope

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------|----------------|---|--------------|--|
| MD_Scope | Scope | The content restrictions and the horizontal, vertical, and/or temporal limits of a resource. For example, a limit on a resource can result in information being reported only for feature types or within a specified geographic region. | | |
| mdScopeCategory | Scope Category | A denotation, according to content-type, of a subset of a resource. For example: a subset restricted to all feature instances, a subset restricted to documents, or a subset consisting of data represented as coverages | Mandatory | MD_ScopeCode <<CodeList>> (Table 3) (ScopeCode) |

Table 53 – Scope

5.7.6.2 Identifier

The Identifier Datatype describes a unique reference that identifies the Data or Service Resource and is used to populate **Metadata Standard Edition** (Table 8), **Resource Identifier** (Table 10), **Service Identifier** (Table 10), and **Resource Coordinate Reference System** (Table 37).

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Commonly Used Classes::MD_Identifier

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|------------|---|--------------|----------------------------|
| MD_Identifier | Identifier | A value uniquely identifying an object within a namespace. | | |
| code | Code | An alphanumeric value (a 'code') identifying an instance in the namespace. For example, for the codespace of 'EPSG' the code value '4326'. Avoid characters that are not legal in URLs. | Mandatory | CharacterString / FreeText |

Table 54 – Identifier

5.7.6.3 Text Locale

The Text Identifier Datatype describes localization information to support use of foreign languages in the Data Resource and is used to populate **Metadata Language** (Table 11), **Metadata Character Set** (Table 11), **Resource Language** (Table 11), and **Resource Character Set** (Table 11).

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Language-character set Localisation Information::PT_Locale

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|-------------------|---------------------------|---|--------------|---|
| PT_Locale | Text Locale | The locale with respect to which a localized character string is expressed. Specified by a combination of language, potentially a country, and a character encoding (character set). | | |
| characterEncoding | Locale Character Encoding | Designation of the character set to be used to encode the textual value of the locale. | Mandatory | IANACharset <<CodeList>> (Table 3) (IANA Charset) |
| language | Locale Language | Designation of the locale language. | Mandatory | LanguageCode <<CodeList>> (Table 3) (LanguageCode) |

Table 55 – Text Locale

5.7.7 Other ISO 19103 Datatypes

Other standard datatypes originating in ISO 19103 are included within the NAS which are used by this profile. Examples include Uniform Resource Identifier (URI), Uniform Resource Location (URL), names, and the component building blocks used to express a date and time.

5.7.7.1 URI

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Language-character set Localisation Information:: URI

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|------|--|--------------|-----------------------------|
| URI | URI | The unique name used to access a resource on the Internet. It is not necessarily a specific file location (for example: it may be a call to an application or a database). URI is an acronym for 'Uniform Resource Identifier'. | | subclass of CharacterString |

Table 56 – URI

5.7.7.2 URL

NAS UML Model Reference – ISO 19100::ISO 19115-1 Metadata - Fundamentals::Metadata - Language-characteriset Localisation Information::URL

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|------|---|--------------|-----------------|
| URL | URL | The address of a resource on the Internet. May not have persistent significance. URL is an acronym for 'Uniform Resource Locator'. | | subclass of URI |

Table 57 – URL

5.7.7.3 Generic Name

NAS UML Model Reference – ISO 19100::ISO 19103 Conceptual schema language::Basic Types - Implementation - Names::GenericName

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|--------------|--|--------------|----------------------------|
| GenericName | Generic Name | A generic scoped and local name structure for a type or attribute name in the context of a namespace.. | | |
| nameString | Name String | A name that exists within a namespace. | Mandatory | CharacterString / FreeText |

Table 58 – Generic Name

5.7.7.4 Scoped Name

NAS UML Model Reference – ISO 19100::ISO 19103 Conceptual schema language::Basic Types - Implementation - Names::ScopedName

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|-------------|--|--------------|-------------------------|
| ScopedName | Scoped Name | A composite of a local name for locating another namespace and a generic name valid in that namespace. A scoped name contains a local name as head and a generic name, which might be a local name or a scoped name, as tail. | | subclass of GenericName |

Table 59 – Scoped Name

5.7.7.5 Temporal Geometric Primitive

NAS UML Model Reference – ISO 19100::ISO 19108 Temporal schema::Temporal Objects::TM_GeometricPrimitive

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|-----------------------|------------------------------|--|--------------|------|
| TM_GeometricPrimitive | Temporal Geometric Primitive | An abstract class that provides information about a temporal position. | | |

Table 60 – Temporal Geometric Primitive**5.7.7.6 Temporal Period**

NAS UML Model Reference – ISO 19100::ISO 19108 Temporal schema::Temporal Objects::TM_Period

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|-----------------|--|--------------|-----------------------------------|
| TM_Period | Temporal Period | A one-dimensional temporal geometry primitive that represents an extent in time. The period is equivalent to a curve in space. Like a curve, it is an open interval bounded by beginning and end points (instants), and has length (duration). Its location in time is described by the temporal positions. | | subclass of TM_GeometricPrimitive |
| Role: begunBy | Begun-by | The TM_Instant that starts this TM_Period. The position of the TM_Instant designated by the value of 'begin' may be indeterminate. | Mandatory | TM_Instant (Table 62) |
| Role: endedBy | Ended-by | The TM_Instant that ends this TM_Period. The position of the TM_Instant designated by the value of 'end' may be indeterminate. | Mandatory | TM_Instant (Table 62) |

Table 61 – Temporal Period**5.7.7.7 Temporal Instant**

NAS UML Model Reference – ISO 19100::ISO 19108 Temporal schema::Temporal Objects::TM_Instant

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|-------------------|--|--------------|-----------------------------------|
| TM_Instant | Temporal Instant | A zero-dimensional temporal geometry primitive that represents a position in time. It is equivalent to a point in space. In practice, an instant is an interval whose duration is less than the resolution of the time scale. | | subclass of TM_GeometricPrimitive |
| position | Temporal Position | The temporal position of this Temporal Instant. | Mandatory | TM_Position (Table 63) |

Table 62 – Temporal Instant**5.7.7.8 Temporal Position**

NAS UML Model Reference – ISO 19100::ISO 19108 Temporal schema::Temporal Reference System::TM_Position

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|-------------------------|---|--------------|------------------------|
| TM_Position | Temporal Position | A location relative to a temporal reference system. A union class that consists of one of the data types listed as its attributes, including Date, Time, and DateTime, and support for non-Gregorian temporal reference systems. | | |
| date8601 | Gregorian Date | An ISO 8601 encoding of a Gregorian date. ISO 19103 defines data types for expressing dates as character strings that comply with ISO 8601. | | Date (Table 65) |
| time8601 | Gregorian Time | An ISO 8601 encoding of a UTC time. ISO 19103 defines data types for expressing times as character strings that comply with ISO 8601. | | Time (Table 65) |
| dateTime8601 | Gregorian Date and Time | An ISO 8601 encoding of a Gregorian date and UTC time. ISO 19103 defines data types for expressing dates and times as character strings that comply with ISO 8601. | | DateTime (Table 66) |

Table 63 – Temporal Position

5.7.7.9 Date

NAS UML Model Reference – ISO 19100::ISO 19103 Conceptual schema language::Basic Types - Primitive - Date and Time::Date

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|------|--|--------------|------|
| Date | Date | A complex datatype giving values for century, (optionally) year, (optionally) month and (optionally) day. The character encoding of a date is a string which shall follow the format specified by ISO 8601. | | |

Table 64 – Date

5.7.7.10 Date and Time

NAS UML Model Reference – ISO 19100::ISO 19103 Conceptual schema language::Basic Types - Primitive - Date and Time::DateTime

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|---------------|--|--------------|------|
| DateTime | Date and Time | A complex datatype giving values for century, (optionally) year, (optionally) month and (optionally) day, hour, (optionally) minute, (optionally) second and (optionally) time zone. The character encoding of a date and time is a string which shall follow the format specified by ISO 8601. | | |

Table 65 – Date and Time

5.7.7.11 Time

NAS UML Model Reference – ISO 19100::ISO 19103 Conceptual schema language::Basic Types - Primitive - Date and Time::Time

| NAS AlphaCode | Name | Definition | Multiplicity | Type |
|---------------|------|---|--------------|------|
| Time | Time | <p>A complex datatype giving values for hour, (optionally) minute, (optionally) second and (optionally) time zone.</p> <p>The character encoding of a time is a string which shall follow the format specified by ISO 8601.</p> | | |

Table 66 – Time

Annex A– Conformance

(Normative)

A.1 Introduction

Conformance with the NSG Metadata Foundation shall be determined based on the methods specified in this Annex and the Abstract Test Suite specified in Annex B. The NSG Metadata Foundation makes use of the NSG Metadata Implementation Specification – Part 2 to conduct conformance tests. These tests are accomplished through the use of a validating XML processor and a Schematron validator. In general, these tests are used to determine if an XML instance document is both well-formed (meets syntactic requirements) and valid (meets logical requirements) with respect to the requirements of the NMF, and in the case of an NMF-conformant application whether it correctly writes and/or reads NMF-conformant instance documents.

A.2 Validating XML Processor

XML Schema 1.0 (Second Edition) describes a class of data objects called “XML documents” and partially describes the behavior of computer programs which process them.

XML documents are made up of storage units called “entities”, which contain either parsed or unparsed data. Parsed data is made up of characters, some of which form character data, and some of which form markup. Markup encodes a description of the document’s storage layout and logical structure. XML provides a mechanism to impose constraints on the storage layout and logical structure.

An XML schema is used to describe the structure of an XML document by specifying the valid elements that can occur in a document, the order in which they can occur, and expressing constraints on certain aspects of these elements. These constraints may be as simple as “The Name in an element’s end-tag MUST match the element type in the start-tag.” and “An element type MUST NOT be declared more than once.”, however many are more complex.

An XML schema is intended as a machine-readable mechanism to describe what constitutes a valid XML document according to a particular XML vocabulary. A schema defines what constraints an XML document producer commits to meeting and what expectations an XML document consumer must meet in order to ensure that the transmission of that document from producer to consumer results in a complete and faithful data exchange. Typically, the consumer ensures that the XML document being received from the producer conforms to that producer commitment by validating the received document against its specified XML Schema document (XSD).

Usually a general-purpose XML processor is used to read XML documents, providing access to their content and structure; this is typically accomplished on behalf of a specialized application. XML Schema 1.0 (Second Edition) describes the required behavior of that XML processor in terms of how it must read XML data and the information that it must provide to that specialized application. Usually a “validating” XML processor is employed – which is required to examine every component of the XML document and report all well-formedness and validity violations.

A.3 Schematron Validator

ISO/IEC 19757-3:2006 defines the Schematron Document Schema Definition Language (DSDL) that may be used to specify one or more validation processes to be performed against XML instance documents. Schematron is a rule-based validation language for making assertions about the presence or absence of patterns in XML trees. It is a simple and powerful structural schema language expressed in XML using a small number of elements and XPath (a query language for selecting nodes from an XML document). It may be employed as an adjunct to the structural validation capabilities of XSD – testing for co-occurrence constraints, non-regular constraints, and inter-document constraints.

Schematron is a language system for specifying and declaring assertions about arbitrary patterns in XML documents, based on the presence or absence, names and values of elements and attributes along paths. It uses the languages of XML Path Language (XPath) Version 1.0 and XSL Transformations (XSLT) Version 1.0.

Considered as a document type, a Schematron schema (.sch file) contains natural-language assertions concerning a set of XML documents, marked up with various elements and attributes for testing these natural-language assertions, and for simplifying and grouping assertions.

Considered theoretically, a Schematron schema reduces to a non-chaining rule system whose terms are Boolean functions invoking an external query language on the instance and other visible XML documents, with syntactic features to reduce specification size and to allow efficient implementation.

Considered analytically, Schematron has two characteristic high-level abstractions: the pattern and the phase. These allow the representation of non-regular, non-sequential constraints that ISO/IEC 19757-2:2003 (Document Schema Definition Languages (DSDL) – Part 2: Regular grammar-based validation – RELAX NG) cannot specify, and various dynamic or contingent constraints.

A general Schematron validator is a function returning an indication that an XML document is "valid", "invalid" or "error". The function notionally performs two steps: transforming the specified Schematron schema into a minimal syntax², and then testing the XML document against the minimal syntax. It is common to implement Schematron validators directly using XSLT.

ISO/IEC 19757-3:2006, Annex C Default Query Language Binding specifies that:

A Schematron schema with no language binding or a `queryBinding` attribute with the value `xslt`, in any mix of upper and lower case letters, shall use the following binding:

- *The query language used is the extended version of XPath specified in XSLT. Consequently, the data model used is the data model of those specifications.*
- The rule context is interpreted according to the Production 1 of XSLT. The rule context may be the root node, elements, attributes, comments and processing instructions.
- The assertion test is interpreted according to Production 14 of XPath, as returning a Boolean value.
- The name query is interpreted according to Production 14 of XPath, as returning a string value. Typically, the `select` attribute contains an expression returning an element node: the name query takes the local or prefixed name of the node, not its value.
- The value-of query is interpreted according to Production 14 of XPath, as returning a string value.
- The let value is interpreted according to Production 14 of XPath, as returning a string value.
- The notation for signifying the use of parameter of an abstract pattern is to prefix the name token with the '\$' character. This is a character not found as a delimiter in URLs or XPath. The '\$' character not followed by the name of an in-scope parameter shall not be treated as a parameter name delimiter. Such a character may subsequently be used as a delimiter for a variable name or as a literal character.
- A Schematron let expression is treated as an XSLT variable. The XSLT '\$' delimiter signifies the use of a variable in a context expression, assertion test, name query, value-of query or let expression. The '\$' character not followed by the name of an in-scope variable shall be treated as a literal character.

The XSLT `key` element may be used, in the XSLT namespace, before the pattern elements.

The attributes `id`, `name` and `prefix` should follow the rules for non-colonized names for the version of XML used by the document.

While the ISO/IEC 19757-3:2006 Default Query Language Binding uses XSLT 1.0, other Query Language Bindings may be employed.

Schematron validators used in testing NMF conformance shall use the default Query Language Binding of XSLT 1.0.

In the future it may be the case that *XSL Transformations (XSLT) Version 2.0* (<http://www.w3.org/TR/xslt20/>) may be allowed for use in testing NMF conformance, based on the publication of ISO/IEC 19757-3 Second Edition.

A.4 Conformance

A.4.1 Introduction

NMF Conformance is based on use of the NSG Metadata Implementation Specification - Part 2 to carry out the tests specified in Annex B, Abstract Test Suite. NMF conformance of an XML instance document requires that the following set of conditions be met; in general these tests will be applied in the sequence specified.

1. The XML instance document, when evaluated against *nmis.xsd* and the specified NSG Registry-based imported schema resources using a validating XML processor, shall be determined to be **well-formed** in accordance with the XML Schema 1.0 (Second Edition) standard.

² This process: resolves all inclusions by replacing the `include` element by the resource to which it links; resolves all abstract patterns by replacing parameter references with actual parameter values in all enclosed attributes that contain queries; resolves all abstract rules in the schema by replacing the `extends` elements with the contents of the abstract rule identified; negates all `report` elements into `assert` elements; and, removes elements used for diagnostics and documentation.

2. The XML instance document, when evaluated against ***nmis.xsd*** and the specified DSE-based imported schema resources using a validating XML processor, shall be determined to be **valid** in accordance with the XML Schema 1.0 (Second Edition) standard. This test ensures that the document meets the conformance requirements of ISO/TS 19115-3 and 19157-2.
3. The XML instance document, when evaluated against ***nmisGmd.sch*** using a Schematron validator conforming to the requirements of ISO/IEC 19757-3:2016, shall be determined to be **valid**. This test ensures that the document satisfies all constraints specified by ISO/TS 19115-3 and 19157-2 that cannot be enforced using XSD.
4. The XML instance document, when evaluated against ***nmisGmdProfileExclude.sch*** using a Schematron validator conforming to the requirements of ISO/IEC 19757-3:2016, shall be determined to be **valid**. This test ensures that the document does not use elements from ISO/TS 19115-3 and 19157-2 that are excluded from the NMF.
5. The XML instance document, when evaluated against ***nmisGmdProfileRestrict.sch*** using a Schematron validator conforming to the requirements of ISO/IEC 19757-3:2016, shall be determined to be **valid**. This test ensures that when the document uses elements from ISO/TS 19115-3 and 19157-2 their use is restricted in accordance with the requirements of the NMF.
6. The XML instance document, when evaluated against ***nmisGmi.sch*** using a Schematron validator conforming to the requirements of ISO/IEC 19757-3:2006, shall be determined to be **valid**. This test ensures that the document satisfies all constraints specified by ISO/TS 19139-2 that cannot be enforced using XSD, the document does not use elements from ISO/TS 19139-2 that are excluded from the NMF, and when the document uses elements from ISO/TS 19139-2 their use is restricted in accordance with the requirements of the NMF.
7. The XML instance document, when evaluated against ***nmis.sch*** using a Schematron validator conforming to the requirements of ISO/IEC 19757-3:2006, shall be determined to be **valid**. This test ensures that when the document uses ISO/TS 19115-2, 19139-2 and 19157-2-extension elements, their use is restricted in accordance with the requirements of the NMF.

The files *nmisGmdProfile.xsd* and *nmisGmiProfile.xsd* shall not be used for the purposes of validation.

A.4.2 Metadata Document Generation

All XML instance documents generated by the system under test that are intended to be NMF-conformant shall satisfy the set of conditions specified in Annex A.4.1.

A sampling approach is often used to demonstrate confidence that all NMF instance documents generated by the system under test are (and will be) NMF conforming. The implementing system has operational, functional, and design-specific requirements for populating the mandatory, conditional and optional elements of metadata. There may be differing requirements specific to each variety of data or service to be described by the system generated metadata. Based on analysis of the system's metadata generation requirements and design, test cases are formulated to exercise the variety of combinations and permutations of the required metadata characteristics. Metadata instance documents generated by the system for each test case shall satisfy the NMF conformance requirements.

A.4.3 Metadata Document Consumption

The system under test shall demonstrate that it successfully and “meaningfully” extracts all component values of any XML instance document that has been demonstrated to be NMF-conformant, as determined by the set of conditions specified in Annex A.4.1.

A sampling approach is often used to demonstrate confidence that the system under test can successfully and meaningfully consume (extract component values from) any NMF-conforming instance document. A set of NMF-conforming instance documents that collectively exercise the extent and variety of mandatory, conditional and optional elements of metadata permitted by the NMF standard is presented for consumption by the system under test. The capability to “meaningfully” extract all component values is evaluated within the context of the operational, functional, and performance requirements of the system under test.

A.4.4 Implementation Conformance Statement (ICS) Pro Forma

The following ICS pro forma may be used by the supplier or sponsor of an implementation as a framework to document the standards conforming capabilities of the implementation of this standard.

| NMF 3.0 - Implementation Conformance Statement (ICS) | | | | | |
|---|---|------------|----------------------------|---|-----|
| B=Baseline NMF P=Profile Obligation I=Implemented P/F=Pass/Fail M=Mandatory O=Optional C=Conditional | | | | | |
| Implementation Under Test: | | | Profile Identifier: | | |
| Test Point: | | | Test Sponsor: | | |
| Date of Initial ICS Completion: | | | Test Organization: | | |
| Date of Test Completion: | | | | | |
| Characteristic | Parameter | Obligation | | | |
| | | B | P | I | P/F |
| <p><u>General Capabilities.</u> The NMF specifies metadata for the cataloging of resources, including the minimal description of datasets and services, and describing geographic services, geographic datasets, and dataset series</p> <p>Those parameters shown on the right as 'implemented' provide an indication of the capabilities enabled by NMF documents produced by the implementation under test.</p> <p>These parameters are informational only; the concept of pass/fail is not applicable for this characteristic.</p> | Metadata Point of Contact role code identifies a "creator" to support IC-EDH, | M | | | |
| | Metadata Point of Contact uses NSGReg RoleCode value | M | | | |
| | Metadata Date DateType includes a value of "creation" | M | | | |
| | Metadata Date uses NSGReg DateTypeCode value | M | | | |
| | Metadata Standard Title included as a mandatory element. | M | | | |
| | Metadata Standard Edition included as a mandatory element. | M | | | |
| | Metadata Standard Edition uses '8.0' to reflect profiled NAS Version | M | | | |
| | Metadata Scope Code uses NSGReg ScopeCode value | M | | | |
| | Metadata for a Dataset Resource uses a ScopeCode value of 'dataset', 'series', or 'service' | M | | | |
| | Metadata Scope Name included as a mandatory element | M | | | |
| | Metadata Classification uses IC-ISM | M | | | |
| | Metadata Classification System uses IC-ISM | M | | | |
| | Resource/Service Point of Contact role code identifies a "originator" | M | | | |
| | Resource/Service Point of Contact uses NSGReg RoleCode value | M | | | |
| | Resource/Service Date includes a value of "creation" | M | | | |
| | Resource/Service Date uses NSGReg DateTypeCode value | M | | | |
| | Resource/Service Geographic Location included as a mandatory element | M | | | |

| NMF 3.0 - Implementation Conformance Statement (ICS) | | | | | |
|---|--|------------|----------------------------|---|-----|
| B=Baseline NMF P=Profile Obligation I=Implemented P/F=Pass/Fail M=Mandatory O=Optional C=Conditional | | | | | |
| Implementation Under Test: | | | Profile Identifier: | | |
| Test Point: | | | Test Sponsor: | | |
| Date of Initial ICS Completion: | | | Test Organization: | | |
| Date of Test Completion: | | | | | |
| Characteristic | Parameter | Obligation | | | |
| | | B | P | I | P/F |
| | Resource Language uses NSGReg ISO639-2 code value if resource is a 'dataset' | C | | | |
| | Resource Character Set uses NSGReg IANCharSet value if resource is a 'dataset' | C | | | |
| | Resource/Service Topic Category Code included as a mandatory element | M | | | |
| | Resource/Service Classification uses IC-ISM | M | | | |
| | Resource/Service Classification System uses IC-ISM | M | | | |
| | Resource Category included as a mandatory element if resource is a 'dataset' | C | | | |
| | Resource Coordinate Reference System included as a mandatory element if resource is a 'dataset' and coordinates are included | C | | | |
| | Service Distributed Computing Platform Set uses NSGReg DCPListt value if resource is a 'service' | C | | | |
| | Coupled Resource has 'Operates On' elements if Coupling Type is 'mixed' or 'tight' | C | | | |
| | Coupled Resource Type has 'Coupling Type' when 'Operates On' is included | C | | | |
| | | | | | |
| <u>Conformance Level.</u> The Abstract Test Suite (ATS) for NMF 3.0 is a compendium of abstract test cases that provide a basis for verifying the content of NMF 3.0 metadata. The only conformance level defined; is that any minimum metadata profile derived from the NAS is compliant. The NSG Metadata Implementation Specification (NMIS) - Part 2: XML Exchange Schema provides additional conformance test capabilities for metadata encoded using XML. | Any metadata meeting the requirements of the NMF is compliant. | M | | X | |
| | | | | | |

| NMF 3.0 - Implementation Conformance Statement (ICS) | | | | | |
|--|--|----------------------------|---|---|-----|
| B=Baseline NMF P=Profile Obligation I=Implemented P/F=Pass/Fail M=Mandatory O=Optional C=Conditional | | | | | |
| Implementation Under Test: | | | | | |
| Test Point: | | Profile Identifier: | | | |
| Date of Initial ICS Completion: | | Test Sponsor: | | | |
| Date of Test Completion: | | Test Organization: | | | |
| Characteristic | Parameter | Obligation | | | |
| | | B | P | I | P/F |
| <u>Extensions to NMF Profile of the NAS.</u> The content of NMF documents can optionally be extended to the extent permitted by the NAS. When opting to extend the NMF, the parameters to the right apply. | All additional 'optional' metadata elements included are NAS Conformant. | M | | | |
| | | | | | |

Annex B– Abstract Test Suite (ATS)

B.1 Introduction

Metadata provided as specified in this profile of the NAS shall meet the requirements specified in this abstract test suite. This abstract test suite applies to any minimum metadata profile derived from the NAS. The NSG Metadata Foundation makes use of the NSG Metadata Implementation Specification – Part 2 to conduct conformance tests.

B.2 Metadata test suite

B.2.1 Test case identifier: XML well-formed and valid

- a) Test Purpose: Verify that the minimal XML metadata instance document is well formed and valid.
- b) Test Method: Use an XML validation tool to determine if XML instance is valid using the NMIS XML schema.
- c) Reference: Section 5.
- d) Test Type: Validation.

B.2.2 Test case identifier: Completeness test

- a) Test Purpose: to determine conformance by the inclusion of all metadata packages, metadata classes, and metadata elements that are specified with an obligation of “mandatory” or mandatory under the conditions specified.

NOTE 1 Many elements designated as mandatory are contained within optional classes. These elements become mandatory only when their containing class is used.

- b) Test Method: a comparison between this part of NMF Profile of the NAS and a subject metadata set to be tested shall be performed to determine if all metadata defined as mandatory in Sections 3 and 5 are present. A comparison test shall also be performed to determine if all metadata elements defined as conditional in Sections 3 and 5 are present if the conditions set out in this NMF Profile of the NAS apply.
- c) Reference: Tables 1 and 2; Sections 5.1.1, 5.1.2, 5.2.1, 5.2.2, 5.2.3, 5.2.4, 5.3.1, 5.3.2, 5.3.3, 5.4.4, 5.7.3 and 5.6.
- d) Test Type: Conformance.

NOTE 2 The test cases in B.2.2 to B.2.7 apply at all levels of obligation – mandatory, conditional, and optional.

B.2.3 Test case identifier: Maximum occurrence test

- a) Test Purpose: to ensure each metadata element occurs no more than the number of times specified in this NMF Profile of the NAS.
- b) Test Method: examine a subject metadata set for the number of occurrences of each metadata package, metadata class, and metadata element provided. The number of occurrences for each shall be compared with its “Maximum Occurrences” attribute specified in Section 5.
- c) Reference: Section 5.
- d) Test Type: Conformance.

B.2.4 Test case identifier: Data type test

- a) Test Purpose: to determine if each metadata element within a subject metadata set uses the specified data type.
- b) Test Method: the value of each provided metadata element is tested to ensure its data type adheres to the data type specified.
- c) Reference: Section 5.

- d) Test Type: Conformance.

B.2.5 Test case identifier: Domain test

- a) Test Purpose: to determine if each provided metadata element within a subject metadata set falls within the specified domain.
- b) Test Method: the values of each metadata element are tested to ensure they fall within the specified domain.
- c) Reference: Section 5.
- d) Test Type: Conformance.

B.2.6 Test case identifier: Schema test

- a) Test Purpose: to determine if a subject metadata set follows the schema specified in this NMF Profile of the NAS.
- b) Test Method: test each metadata element and ensure it is contained within the specified metadata class.
- c) Reference: Section 5.
- d) Test Type: Conformance.

B.2.7 Test Case identifier: Content Conformance

- a) Test Purpose: verify that property values have consistent content as specified in this NMF Profile of the NAS.
- b) Test Method: verify that document validates with the NMIS Schematron rule set.
- c) Reference: Section 5.
- d) Test Type: Conformance.

Annex C– References

C.1 Normative References

| Standard or Specification |
|--|
| NAS – Part 1: Platform Independent Model – Database, Version 8.0, 11 July 2016: (http://nsgreg.nga.mil/doc/view?i=81112) |
| ISO 19107:2003, Geographic information – Spatial schema (http://www.iso.org/iso/catalogue_detail.htm?csnumber=26012) |
| ISO 19108:2002, Geographic information – Temporal schema (http://www.iso.org/iso/catalogue_detail.htm?csnumber=26013) |
| ISO 19115-1:2014, Geographic information – Metadata – Part 1: Fundamentals (http://www.iso.org/iso/catalogue_detail.htm?csnumber=53798) |
| ISO 19157:2013, Geographic information – Data quality (http://www.iso.org/iso/catalogue_detail.htm?csnumber=32575) |
| ISO 8601:2004, Data elements and interchange formats – Information interchange – Representation of dates and times (http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=40874) |
| Intelligence Community Technical Specification, Information Security Markings (ISM), Version 13, 09 May 2014 (https://www.dni.gov/index.php/about/organization/chief-information-officer/information-security-marking-metadata) |
| Intelligence Community Technical Specification, Need-To-Know (NTK), Version 10, 6 September 2013 (https://www.dni.gov/index.php/about/organization/chief-information-officer/need-to-know-metadata) |
| Intelligence Community Technical Specification, Revision Recall (RevRecall), Version 1, 09 May 2014 (https://www.dni.gov/index.php/about/organization/chief-information-officer/revision-recall) |
| Intelligence Community Technical Specification, Abstract Data Definition for Electronic Records Management Version 2014-DEC, 22 Dec 2014 |
| Intelligence Community Technical Specification, Abstract Data Definition Version 2 (IC.ADD.V2) Chapter 3 - Information Security Marking Data Elements, 9 Aug 2011 (https://www.dni.gov/index.php/about/organization/chief-information-officer/abstract-data-definition) |

Table 67 – Normative References

C.2 Informative References

| Standard or Specification |
|--|
| ISO 19105:2000, Geographic information – Conformance and testing |
| ISO 19106:2004, Geographic information – Profiles |

| Standard or Specification |
|--|
| ISO 19111:2007, Geographic information – Spatial referencing by coordinates |
| ISO 80000-3:2006, Quantities and units - Part 3: Space and time |
| ISO 80000-4:2006, Quantities and units - Part 4: Mechanics |
| IEC 80000-6:2008, Quantities and units - Part 6: Electromagnetism |
| ISO 80000-7:2008, Quantities and units - Part 7: Light |
| NIST Special Publication 811, Ed. 2008, Guide for the Use of the International System of Units (SI) http://physics.nist.gov/cuu/pdf/sp811.pdf |

Table 68 – Informative References

Annex D– Governance

D.1 Governance Overview

The National Geospatial-Intelligence Agency (NGA), as the Functional Manager for the NSG, provides strategic thinking, guidance, and direction to the NSG concerning all aspects of GEOINT, from its acquisition to its utilization. That guidance and direction includes the development of standards to support the discovery and provisioning of timely, relevant, and accurate GEOINT in support of U.S. national defense and response to natural disasters. Those standards are developed through the Geospatial-Intelligence Standards Working Group (GWG).

The GWG is an NSG forum that serves the Director, National Geospatial-Intelligence Agency in executing the functional management responsibilities authorized in NSG Directive (NSGD) 1100, 02 August 2014. The GWG provides the forum for the coordination of GEOINT standards activities. The GWG is led and chaired by the NGA's National Center for Geospatial Intelligence Standards (NCGIS).

In addition to its designation as an NSG Functional Management forum, the GWG is a Joint Technical Working Group that participates in the DoD and IC Joint Enterprise Standards Committee (JESC) standards governance processes. Approved GEOINT standards are then cited in the DoD Information Technology (IT) Standards Registry (DISR).

Within the GWG, metadata issues are addressed by the GWG Metadata Focus Group (MFG). The MFG is one of several chartered focus groups made up of Subject Matter Experts (SMEs) that address topical issues related to GEOINT standards. The NMF was developed under the charter and standard operating procedures of the MFG and approved through GWG, DoD, and IC standards approval processes.

The NMF is a profile of the NAS and is subject to the NAS Governance Process. The GEOINT Content Standards Board (GCSB) is the community forum responsible for providing governance and configuration management for the NAS and accompanying content maintained in the NAS Registry.

The GCSB operates under the auspices of the National Geospatial-Intelligence Committee (GEOCOM) that serves the Director of NGA in executing the functional management responsibilities authorized in NSG Directive NSGD 1100, 2 August 2014, specifically as a forum for the coordination of GEOINT standard activities. Refer to the GCSB Terms of Reference (TOR) for information on the structure and operation of the GCSB.

D.2 Configuration Management Roles

D.2.1 Owner

The NAS Owner shall be the NGA, whose Director is the functional manager for Geospatial Intelligence (GEOINT). The NAS Owner shall be responsible for approving, publishing, and promulgating the NAS Standard and its accompanying NAS Registry for use by the Department of Defense (DoD), Intelligence Community (IC), and U.S. civil federal agencies.

The approval authority for the content of the accompanying NAS Registry is the GCSB.

D.2.2 Configuration Manager

The NAS Configuration Manager shall be the pertinent Subject Matter Expert (SME) provided by the NGA.

The NAS Configuration Manager shall maintain the NAS Standard and its accompanying content in the NAS Registry, including updates to the content of the NAS Standard according to Change Notifications and approved Change Requests received from the GCSB Secretariat.

The NAS Configuration Manager shall provide technical support to the GCSB Secretariat (see Section D.2.3.1), upon request.

The NAS Configuration Manager shall monitor base standard maintenance authority activities, review all Change Requests in a timely manner, and submit applicable Change Notifications (in regards to either the NAS Standard or its accompanying content in the NAS Registry) to the GCSB Secretariat (see Section D.2.3.1).

The NAS Configuration Manager shall ensure that citations of the NAS Standard in the DoD IT Standards Registry (DISR) and the IC Enterprise Standards Baseline (IC ESB) are complete, correct, and current.

D.2.3 Configuration Control Body

The "Voting Members" of the GCSB shall fulfill the role of the Configuration Control Body (CCB) for the NAS Standard and its accompanying content in the NAS Registry.

The GCSB organization, as detailed in the GCSB TOR, consists of three co-chairpersons, a secretariat, voting members, and general members. The chairs are provided by NGA/A, NGA/S, and NGA/T. Change Requests are submitted to the GCSB Secretariat at geointcontentccb@nga.mil.

D.2.4 Secretariat

The NCGIS shall serve as the GCSB Secretariat. The Secretariat shall provide, or otherwise arrange for an alternate organization to provide, organizational, logistic, and administrative support for the GCSB. The Secretariat shall be responsible for the receipt, review, and management of Change Notifications and Change Requests to the NAS Standard and its accompanying content in the NAS Registry. The Secretariat may seek technical assistance from the NAS Configuration Manager (see Section D.2.2) in the review of Change Requests.

D.2.4.1 Voting Members

Voting membership shall consist of designated representatives from the DoD (including individual military services and commands), IC (individual agencies to include DIA, NGA, NRO, and NSA), and U.S. civil federal agencies, with each designated organization having one vote. The voting options for voting members are: Approve, Not Approve, and No Business Interest. Actions of the voting members shall be determined by a 60 percent majority vote, where 60 percent of the voting members have chosen to cast a vote of either Approve or No Business Interest. A vote of No Business Interest is considered a neutral vote and shall not negatively impact the voting majority percentage. A non-response by a voting member shall be considered and registered as No Business Interest.

Note Upon occasion it may become necessary to process a Change Request involving classified or For Official Use Only (FOUO) content. Only voting members holding the requisite security clearances may participate in the coordination of classified Change Requests, and the thresholds for establishing a quorum and establishing approval shall be based on the number of designated voting members holding the requisite security clearance. In the case of For Official Use Only (FOUO) requests, the Change Request will be coordinated only with those authorized to receive FOUO information, and voting and quorum thresholds are adjusted accordingly.

The list of voting members and their point-of-contact information shall be published by the GCSB Secretariat to the GCSB general membership in order to facilitate the process of preparing and submitting Change Requests (see Section D.3.2). The GCSB Secretariat shall also maintain distribution lists for classified and FOUO audiences.

D.2.4.2 General Members

General membership shall include all interested U.S. federal agencies, international partners, commercial industry, not-for-profit organizations, and academia. The CCWG Secretariat shall maintain an electronic mail distribution list whose members receive all CCWG communications and may participate in CCWG meetings. Members of the CCWG electronic mail distribution list do not necessarily represent official DoD, IC, or U.S. civil federal agency positions – which are reserved to the CCWG voting membership. The GCSB shall meet physically only when necessary, instead fulfilling its CCB role using electronic communications (e.g., electronic mail and teleconferencing).

The GCSB Chair or any GCSB member (either voting or general) may request a physical or electronic meeting of the GCSB; however, the GCSB meets only at the discretion of the GCSB Chair. There is no minimum quorum participation requirement in order to hold a GCSB meeting.

GCSB meetings, whether conducted physically or electronically, shall follow a published agenda prepared and distributed by the GCSB Secretariat.

D.2.5 Submitting Organization

Organizations that are authorized to request changes to the NAS Standard shall be those that, for the purposes of the GCSB, represent the highest level overseeing a common mission. A submitting organization may be below a department or agency level if the organization has a unique mission. In general, all GCSB voting members represent authorized submitting organizations. The NAS Configuration Manager (see Section D.2.2) shall also be an authorized submitting organization. An organization that is not an authorized submitting organization may submit its Change Request directly to the GCSB Secretariat. The list of authorized Submitting Organizations and their point-of-contact information shall be published by the GCSB Secretariat (see Section D.2.3.1) to the GCSB general membership in order to facilitate the process of preparing and submitting Change Requests (see Section D.3.1).

D.3 Configuration Management Procedures

D.3.1 Origination of Change Requests

Changes to the NAS Standard and/or its accompanying content in the NAS Registry are accomplished through the process of creating, coordinating, and adjudicating Change Requests. Change Requests are initiated by requests from U.S. organizations to address a U.S. organizational requirement. Change Requests are used to evaluate and reach a GCSB agreement, and voted on by the GCSB Voting Members.

D.3.2 Submission of Change Requests

Submitting GCSB member organizations (see Section D.2.4) shall submit Change Requests for the NAS Standard content in the NAS Registry to the GCSB Secretariat in accordance with the GCSB TOR (see Section D.2.3.1).

Annex E– Terms, Definitions, and Acronyms (Informative)

E.1 Terms and Definitions

| Term | Definition |
|------------------------------------|---|
| abstract test case | generalized test for a particular requirement [ISO 19105] NOTE An abstract test case is a formal basis for deriving executable test cases. One or more test purposes are encapsulated in the abstract test case. An abstract test case is independent of both the implementation and the values. It should be complete in the sense that it is sufficient to enable a test verdict to be assigned unambiguously to each potentially observable test outcome (i.e., sequence of test events). |
| abstract test module | set of related abstract test cases [ISO 19105] NOTE Abstract test modules may be nested in a hierarchical way. |
| abstract test suite | abstract test module specifying all the requirements to be satisfied for conformance [ISO 19105] |
| application schema | conceptual schema for data required by one or more applications [ISO 19101] |
| base standard | ISO geographic information standard or other information technology standard that is used as a source from which a profile may be constructed [ISO 19106] |
| citation | information object containing information that directs a reader's or user's attention from one <i>resource</i> to another [ISO 24619:2011] |
| class | description of a set of objects that share the same attributes, operations, methods, relationships, and semantics [adapted from ISO/IEC 19501] |
| compliance | state of a specific software product which implements a standard and has passed compliance testing against that standard. [Adapted from Open Geospatial Consortium (OGC) 08-134r6] |
| conformance | fulfillment of specified requirements [ISO 19105] |
| content metadata | schema that defines data (including metadata) structures, including the types of elements, sub-elements, and values they can contain [Getty Library - Introduction to Metadata] |
| coordinate reference system | coordinate system that is related to an object by a datum [ISO 19111] NOTE 1 A coordinate system is a set of mathematical rules for specifying how coordinates are to be assigned to points. [ISO 19111] NOTE 2 A datum is a parameter or set of parameters that define the position of the origin, the scale, and the orientation of a coordinate system. [ISO 19111] NOTE 3 A coordinate is one of a sequence of n numbers designating the position of a point in n-dimensional space. [ISO 19111] |
| coverage | feature that acts as a function to return values from its range for any direct position within its spatiotemporal domain [ISO 19123] |
| dataset | identifiable collection of data [ISO 19115-1] NOTE A dataset can be a smaller grouping of data which, though limited by some constraint such as spatial extent or feature type, is located physically within a larger dataset. Theoretically, a dataset can be as small as a single <i>feature</i> (4.5) or feature attribute contained within a larger dataset. A hardcopy map or chart can be considered a dataset. |
| dataset series | collection of datasets sharing common characteristics |

| | |
|---|--|
| data type | specification of a value domain with operations allowed on values in this domain [ISO 19103] EXAMPLES An Integer, a Real, a Boolean, a CharacterString, and a Date. NOTE Data types include primitive predefined types and user-definable types. |
| feature | abstraction of real world phenomena [ISO 19101] |
| feature attribute | characteristic of a feature [ISO 19101] |
| geospatial | refers to either an implicit or explicit reference to a location relative to the earth |
| geospatial information | information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth, including statistical data; information derived from, among other things, remote sensing, mapping, and surveying technologies; and mapping, charting, and geodetic data, including “geodetic products” [Title 10 US Code §467] |
| geospatial intelligence | the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth [Title 10 U.S. Code §467] NOTE Consists of imagery, imagery intelligence, and geospatial information. |
| geospatial intelligence standard | documented agreement containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics to ensure that materials, products, processes, or services are fit for the analysis and visual representation of physical features and geographically referenced activities |
| geospatial metadata | information which captures the basic characteristics of a data resource; represents the who, what, when, where, why, and how of the resource |
| implementation conformance statement pro forma | information about an implementation to a specification, by presenting in a uniform manner the implemented capabilities (e.g., functions, features) and options as well as limitations of the implementation. An ICS pro forma typically takes the form of a blank questionnaire or checklist for an implementation. [W3C/TR/qaframe-spec] |
| information | knowledge concerning objects, such as facts, events, things, processes, or ideas, including concepts, that within a certain context has a particular meaning [ISO 19118] |
| lineage | provenance, source(s) and production process(es) used in producing a resource [ISO 19115-1] |
| metadata | information about a resource [ISO 19115-1] |
| metadata element | discrete unit of metadata [ISO 19115-1] NOTE 1 Metadata elements are unique within a metadata entity. NOTE 2 Equivalent to an attribute in UML terminology. |
| metadata entity | set of metadata elements describing the same aspect of data [ISO 19115-1] NOTE 1 May contain one or more metadata entities. NOTE 2 Equivalent to a class in UML terminology |
| metadata section | subset of metadata which consists of a collection of related metadata entities and metadata elements [ISO 19115-1] NOTE Equivalent to a package in UML terminology. |
| national system for geospatial intelligence | the combination of technology, policies, capabilities, doctrine, activities, people, data, and communities necessary to produce geospatial intelligence in an integrated multi-intelligence, multi-security domain environment |
| normative | those aspects of a standard that must be implemented in order for a particular system to be compliant to the standard |
| provenance | organization or individual that created, accumulated, maintained and used records [ISO 5127:2001] |

| | |
|----------------------|---|
| resource | identifiable asset or means that fulfils a requirement [ISO 19115-1] |
| service | distinct part of the functionality that is provided by an entity through interfaces [ISO 19119] |
| specification | declarative description of what something is or does [adapted from ISO/IEC 19501] |
| value domain | set of accepted values [ISO/IEC 19103] EXAMPLE The range 3-28, all integers, any ASCII character, enumeration of all accepted values (green, blue, white). |

Table 69 – Terms and Definitions**E.2 Acronyms**

| Term | Definition |
|-------------|--|
| ADD | Abstract Data Definition |
| ASCII | American Standard Code for Information Interchange |
| ATS | Abstract Test Suite |
| CCB | Configuration Control Body |
| COTS | Commercial Off-The-Shelf |
| CRS | Coordinate Reference System |
| DDMS | DoD Discovery Metadata Standard |
| DISR | DoD Information Technology (IT) Standards Registry |
| DNI | Director of National Intelligence |
| DoD | Department of Defense |
| GCSB | GEOINT Content Standards Board |
| GEOCOM | National Geospatial-Intelligence Committee |
| GEOINT | Geospatial Intelligence |
| GML | Geography Markup Language |
| GWG | GEOINT Standards Working Group |
| IC ESB | IC Enterprise Standards Baseline |
| IC | Intelligence Community |
| IC/DoD | Intelligence Community/Department of Defense |
| ICS | Implementation Conformance Statement |
| IEC | International Electrotechnical Commission |
| IETF | Internet Engineering Task Force |
| ISM | Information Security Marking |
| ISO TC | International Organization for Standardization Technical Committee |
| ISO | International Organization for Standardization |
| ISO/IEC | International Organization for Standardization/International Electrotechnical Commission |
| ISO/TC | International Organization for Standardization/Technical Committee |
| ISO/TS | International Organization for Standardization/Technical Specification |
| JESC | Joint Enterprise Standards Committee |
| MFG | Metadata Focus Group |

| Term | Definition |
|------|---|
| NGA | National Geospatial-Intelligence Agency |
| NMF | NSG Metadata Foundation |
| NMIS | NSG Metadata Implementation Specification |
| NSG | National System for Geospatial Intelligence |
| NSGD | National System for Geospatial Intelligence Directive |
| NTK | Need to Know |
| ODNI | Office of the Director of National Intelligence |
| OGC | Open Geospatial Consortium |
| PIM | Platform Independent Model |
| RFC | Request for Comments (IETF) |
| SCI | Sensitive Compartmented Information |
| SME | Subject Matter Expert |
| TC | Technical Committee |
| TSPI | Time-Space-Position-Information |
| UML | Unified Modeling Language |
| URI | Uniform Resource Identifier |
| URL | Uniform Resource Locator |
| URN | Uniform Resource Name |
| UUID | Universally Unique Identifier |
| XML | eXtensible Markup Language |

Table 70 – Acronyms

Annex F – Revision History

| Change | Rationale |
|--|--|
| Version 3.0 | |
| Combine NMF Parts into single document | All NSG metadata is now integrated into the NAS as the single source for NSG metadata |
| Change Scope to address only Identification and Access (I&A) metadata | Scope narrowed to address need to identify NSG base metadata requirements |
| Update ISO 19115:2003/Cor.1:2006 to ISO 19115-1:2014 | ISO published updated standard to replace 19115 and resultant changes are incorporated in this profile |
| Add ISO 19157:2013 as source for Data Quality metadata | ISO published updated standard to replace 19114/19138 and resultant changes are incorporated in this profile |
| Add IC-ISM V13 as a profiled standard | IC-CIO updated DES and latest version approved for public release profiled |
| Add IC-NTK V10 as a profiled standard | IC-CIO updated DES and latest version approved for public release profiled |
| Add IC-RevRecall V1 as a profiled standard | IC-CIO updated DES and latest version approved for public release profiled |
| Add IC-ERM as a profiled standard | IC-CIO preparing to publish DES and a NSG version included until approved for public release |
| References, Definitions, and Acronyms (Sections 2, 3, and 4) expanded and consolidated in Annex C | References, Definitions, and Acronyms updated to most current versions and moved to an annex allowing main body to focus on metadata elements |
| Conformance and Compliance (Section 5) moved to Annex A | Conformance and Compliance expanded and moved to an annex allowing main body to focus on metadata elements |
| Relation to Other Standards Section added | Section added to explain how NMF relates to other NSG, IC, and ISO standards |
| Metadata Concept tables replaced by Minimum Mandatory for Dataset Resources and Service Resources tables | Tables reflect a more narrow focus on what Identification and Access metadata needs to be provided for Dataset Resources and Service Resources |
| Metadata entity set section renamed metadata information | Section name changed to reflect referenced standard |
| Service Identification section added | Section added to referenced standard |
| Data quality section replaced by lineage section | Data quality moved to new standard, lineage broken out to provide provenance in referenced standard |
| Maintenance section removed | Not included in this profile |
| Spatial representation system section removed | Not included in this profile |
| Identifier section moved to Common classes section | Adding to a datatype class more accurately reflects how element is used |
| Content information section removed | Not included in this profile |
| Distribution section removed | Not included in this profile |
| Application schema removed | Not included in this profile |

| | |
|---|---|
| RS_Identifier changed to MD_Identifier | ISO 19115-1 standard revised |
| CI_ResponsibleParty changed to CI_Responsibility | ISO 19115-1 standard revised |
| Version 2.2 | |
| Change date type code “validityExpires” to “validTill” (Table 4 and Figure 14) | “validTill” is found in NSGReg codelist https://nsgreg.nga.mil/ir/view?i=100015 |
| Remove date type code “released” from figure 14 | “released” is not found in NSGREG codelist https://nsgreg.nga.mil/ir/view?i=100015 |
| Change “source” amplification code to “scope” amplification code (Table 65) | Correct value is “ScopeAmplificationCode” https://nsgreg.nga.mil/ir/view?i=100034 |
| Change code from “author” to “resourceProvider” (Table 75) | “author” is not found in the GSIP codelist https://nsgreg.nga.mil/ir/view?i=100033 |
| Provide definition for “applicationSchemaInfo” (Table 7) | Definition from section B.2.2, ISO 19115, Identification Information data dictionary, “provides information about the conceptual schema of a dataset” |
| Change cardinality of Need To Know from “1..1” to “0..1” (Figure 4 and Table 16) | Inconsistent with IC NTK specification. And the change is from 1..1 to 0..*, as NTK is optional and multiple occurring. |
| Change classificationSystem: CharacterString to Mandatory (remove 0..1) (Figure 4) | Inconsistent with ISO 19115:2003/Cor 1:2006 |
| Remove comments (Business Rule) that says codespace is mandatory (Table 29) | Business rule is incorrect. The element was not made mandatory. |
| Change “MD_ApplicationSchemaInformation” to an aggregated class. (Table 36) | Brings the table into line with the Application Schema UML diagram |
| Add “US CAPCO” to classificationSystem (Table 51) | Provides complete example |
| Add levelDescription to Table 53 | Provides complete example |
| Version 2.1 | |
| Restructured to better comply with ISO/IEC TR 10000-1:1998, and ISO 19106:2003 | The NMF is a profile of ISO 19115. It must conform to the profiling rules. These changes strengthened that conformance |
| Documented in scope section that the NMF uses the ISO multi-part specification strategy. | Addresses ambiguity in version 2.0 as to how NMF “extensions” were to be applied vs. community extensions. |
| Re-wrote conformance section to address conformance and compliance | Version 2.0 did not address compliance, just conformance |
| Revised the resource model | Additional resources were added in version 2.1. |
| Added “parentIdentifier” to MD_Metadata | Enhanced support for data services |
| Added “dataSetURI” to MD_Metadata | Enhances support for data services |
| Added “spatialRepresentationInfo” to MD_Metadata. Added MD_SpatialRepresentation class. Added “TopologyLevelCode” code lists. | Feature Foundation Data (FFD) Safety of Navigation (SON) requirement |
| Added “contentInfo” to MD_Metadata. Added MD_ContentInformation class. | Feature Foundation Data (FFD) Safety of Navigation (SON) requirement |

| | |
|---|--|
| <p>Added "metadataMaintenance" to MD_Metadata. Added "resourceMaintenance" to MD_Identification. Added MD_MaintainanceInformation class. Added "MaintenanceFrequencyCode" to code lists.</p> | <p>Provides an ISO 19115 conformant mount point for the Records Management Extension</p> |
| <p>Added "distributionInfo" to MD_Metadata Added MD_Distribution class.</p> | <p>More direct association between CRC and metadata per SON request.</p> |
| <p>Added "resourceCategory" to NMF_DataIdentification Added "ResourceCategoryCode" code lists.</p> | <p>NGA requirement</p> |
| <p>Added "revisionRecall" to NMF_DataIdentification. Added NMF_RevisionRecall class. Added "RevisionTypeCode" to code lists.</p> | <p>Required by DNI Memorandum "Intelligence Community Standards and Procedures for Revised or Recalled Intelligence Products" August 5, 2005.</p> |
| <p>Added "needToKnow" to NMF_SecurityConstraints. Added NTK_Access class</p> | <p>Mandated by IC standard NTK.XML 5</p> |
| <p>Added "notices" to NMF_SecurityConstraints. Added ISM_Notices class. Added "NoticeTypeCode" to code lists.</p> | <p>Mandated by IC standard ISM.XML 7</p> |
| <p>Updated contents of ISM_SecurityAttributesGroup to ISM.XML 7 and IC.ADD.V2 Identified IC.ADD.V2 as the authoritative source instead of the IC.ISM</p> | <p>GSIP recommendation</p> |
| <p>Added amplifying information to MD_Identifier specifying encodings when used with specific NMF Part 1 elements.</p> | <p>Identifiers are the preferred way to reference a resource in the NSG. Detailed specifications on how identifiers are formatted are required to assure interoperability.</p> |
| <p>Added NMF_DigitalTransferOptions as a subclass of MD_DigitalTransferOptions.</p> | <p>Required to support additional transfer options beyond those provided by ISO</p> |
| <p>Added "crc" to NMF_DigitalTransferOptions. Added NMF_CRCValue class.</p> | <p>Feature Foundation Data (FFD) Safety of Navigation (SON) requirement</p> |
| <p>Added "alternateTitle" to CI_Citation.</p> | <p>Part of the ISO 19115 definition. May be needed to fully describe identifiers.</p> |
| <p>Updated DDMS mappings and DDMS profile to DDMS version 4</p> | <p>GSIP recommendation</p> |
| | |

Table 71 – Revision History

Annex G– UML Primer

(Informative)

G.1 UML Notations

The diagrams that appear in this document are presented using the Unified Modeling Language (UML) static structure diagram with the ISO Interface Definition Language basic type definitions and the UML Object Constraint Language (OCL) as the conceptual schema language. The UML notations used in this Standard are described in Figure 14.

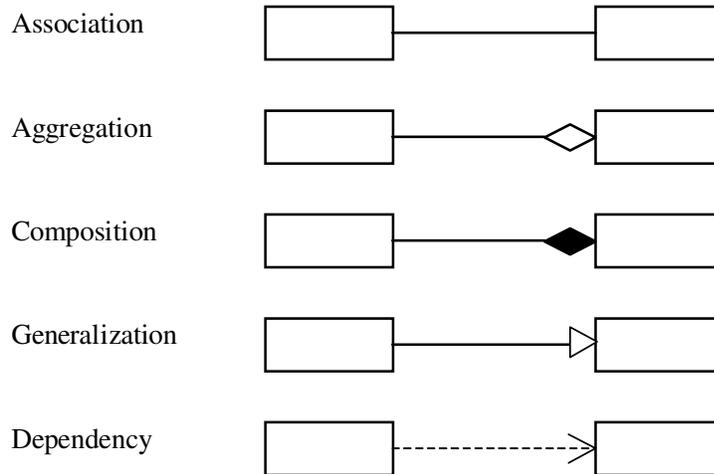


Figure 14 – UML Notation

G.2 UML Model Relationships

G.2.1 Associations

An association is used to describe a relationship between two or more classes. UML defines three different types of relationships, called association, aggregation and composition. The three types have different semantics. An ordinary association shall be used to represent a general relationship between two classes. The aggregation and composition associations shall be used to create part-whole relationships between two classes.

An aggregation association is a relationship between two classes in which one of the classes plays the role of container and the other plays the role of a containee.

A composition association is a strong aggregation. In a composition association, if a container object is deleted, then all of its containee objects are deleted as well. The composition association shall be used when the objects representing the parts of a container object cannot exist without the container object.

G.2.2 Navigation

Associations may be navigable in only one direction. If the direction is not specified, it is assumed to be a two-way association. If one-way associations are intended, the direction of the association can be marked by an arrow at the end of the line. Navigability means that instances participating in links at runtime (instances of an association) can be accessed efficiently from instances participating in links at the other end of the association. The precise mechanism by which such access is achieved is implementation specific. If an end is not navigable, access from the other ends may or may not be possible, and if it is, it might not be efficient.

G.2.3 Generalization

A generalization is a relationship between a superclass and the subclasses that may be substituted for it. The superclass is the generalized class, while the subclasses are specified classes.

G.2.4 Instantiation / Dependency

A dependency relationship shows that the client class depends on the supplier class/interface to provide certain services, such as:

- Client class accesses a value (constant or variable) defined in the supplier class/interface;
- Operations of the client class invoke operations of the supplier class/interface;
- Operations of the client class have signatures whose return class or arguments are instances of the supplier class/interface.

An instantiated relationship represents the act of substituting actual values for the parameters of a parameterized class or parameterized class utility to create a specialized version of the more general item.

G.2.5 Roles

If an association is navigable in a particular direction, the model shall supply a “role name” that is appropriate for the role of the target object in relation to the source object. Thus in a two-way association, two role names will be supplied. Figure 15 represents how role names and cardinalities are expressed in UML diagrams.

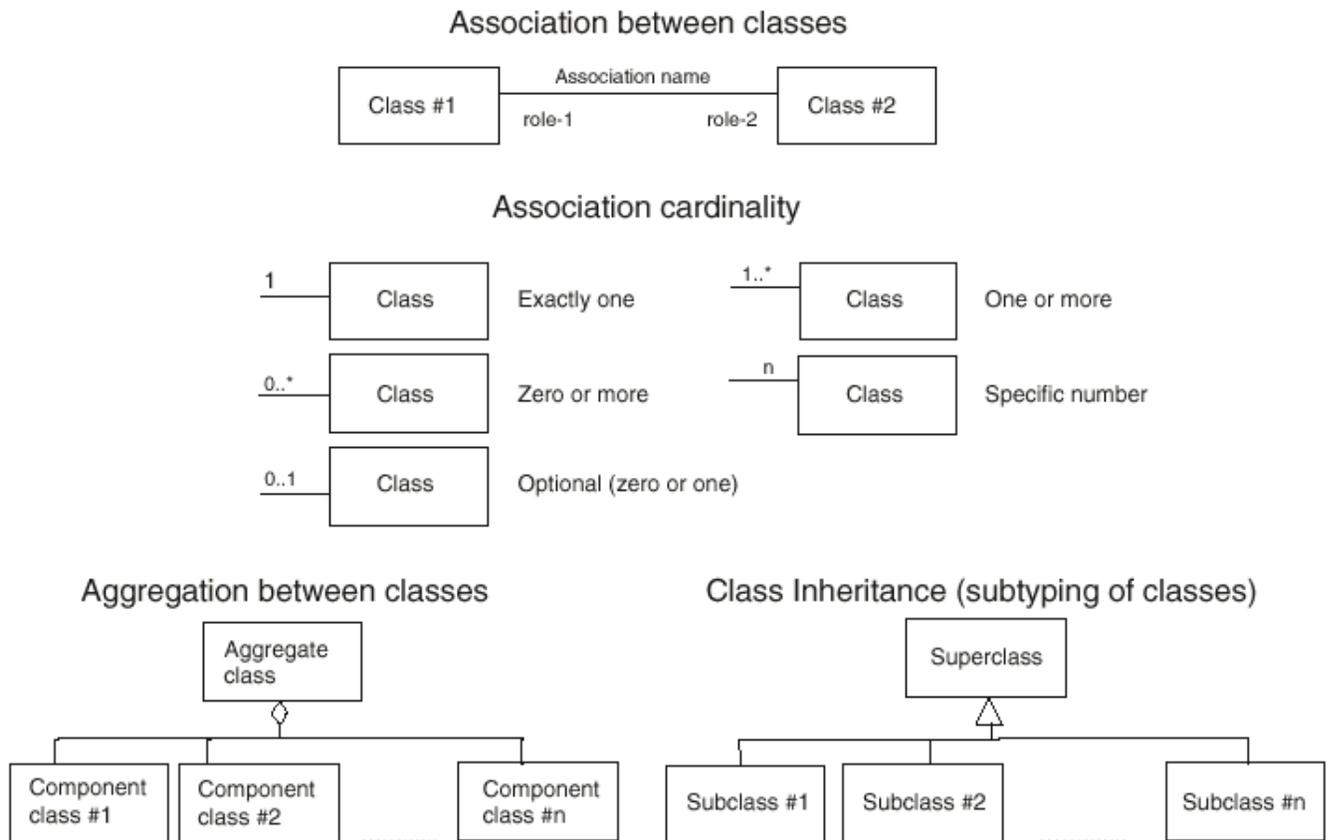


Figure 15 – UML Roles

G.3 UML Model Stereotypes

A UML stereotype is an extension mechanism for existing UML concepts. It is a model element that is used to classify (or mark) other UML elements so that they in some respect behave as if they were instances of new virtual or pseudo metamodel classes whose form is based on existing base metamodel classes. Stereotypes augment the

classification mechanisms on the basis of the built-in UML metamodel class hierarchy. Below are brief descriptions of the stereotypes used in this document.

In this document the following stereotypes are used:

- a. <<type>> class used for specification of a domain of instances (objects), together with the operations applicable to the objects. A type may have attributes and associations.
- b. <<enumeration>> data type whose instances form a list of named literal values. Both the enumeration name and its literal values are declared. Enumeration means a short list of well-understood potential values within a class.
- c. <<dataType>> a descriptor of a set of values that lack identity and whose operations do not have side effects. Datatypes include primitive pre-defined types and user-definable types. Pre-defined types include numbers, string, and time. User-definable types include enumerations.
- d. <<codeList>> used to describe a more open enumeration. <<codeList>> is a flexible enumeration. Code lists are useful for expressing a long list of potential values. If the elements of the list are completely known, an enumeration should be used; if the only likely values of the elements are known, a code list should be used.
- e. <<union>> describes a selection of one of the specified types. This is useful to specify a set of alternative classes/types that can be used, without the need to create a common super-type/class.
- f. <<leaf>> package that contains definitions, without any sub-packages.

Annex H– Example NMF Conceptual Schema Profile Instance Document (Informative)

H.1 Introduction

This Annex presents a stylized example of a resource metadata instance document that is conformant to the NMF Conceptual Profile.

This example describes a 2-dimensional vector dataset using the WGS84 coordinate reference system encoded using ESRI Shapefiles. The dataset covers an area of southern New Jersey, USA and contains a sample of Mission Specific Data (MSD). The dataset was created by NGA on August 30, 2007, and is available on-line through the NGA Example Features Server (EFS) [a fictional web service]. The data in the dataset is current as of January 1, 2007, (temporal extent). Descriptive metadata provides thematic keywords for the dataset, place names, geopolitical regions (i.e., countries and their subdivisions), and facilities. The dataset contains a limited number of feature types that are defined in the NSG Entity Catalogue v2.0. The dataset features were produced from Topographic Line Map (TLM) (1:50,000 scale) and then updated using TLM and Controlled Imagery Base (CIB) (5 meter) sources. The dataset conforms to the NSG Application Schema v8.0 and both the dataset and metadata are unclassified.

H.2 Presentation Format

The example is presented in tabular form. The left side of the table (**Metadata Section / Element**) corresponds to the metadata section or elements, as appropriate. Indentation is used to denote the hierarchical organization of the elements as described in the conceptual schema in Section **Error! Reference source not found.** The **Content** column uses shading to distinguish the metadata structural elements from content elements. This column contains the example data for the leaf or content metadata elements. Metadata elements which form the structure of the metadata (and contain complex content) have a gray box for the content and no content; their name is in bold gray.

In this example, code list values are specified as URLs such as:

<http://api.nsgreg.nga.mil/codelist/ISO639-2/eng>

This URL denotes the language “English” in accordance with ISO 639 – Part 2.

The code list value is composed of two parts separated by the forward slash (“/”): the resource (code list) location and the local name (code list value). The resource location in this example (preceding the forward slash (“/”)) is:

<http://api.nsgreg.nga.mil/codelist/ISO639-2>

This identifies the code list in which the value is defined. The local name in this example (following the forward slash (“/”)) is:

“eng”

The code value is a unique identifier for the code list entry within the code list resource. The code list resource source is the NSG Standards registry (see: <http://nsgreg.nga.mil/ir/registers.jsp>)

In this example both the code list and an exemplar code list value are presented together as a single URL.

H.3 Example

| Metadata Section / Element | Content |
|--|---|
| MD_Metadata | |
| metaContact : CI_Responsibility | |
| organisationName | U.S. National Geospatial-Intelligence Agency |
| role : CI_RoleCode | http://api.nsgreg.nga.mil/codelist/RoleCode/creator |
| dateInfo | 2016-05-30T09:30:47Z |
| defaultLocale : PT_Locale | |
| characterEncoding : IANACharset | http://api.nsgreg.nga.mil/codelist/IANACharSet/utf8 |
| language : LanguageCode | http://api.nsgreg.nga.mil/codelist/iso639-2/eng |
| metadataScope:MD_MetadataScope | |
| mdScopeCategory: MD_ScopeCode | http://api.nsgreg.nga.mil/codelist/ScopeCode/dataset |
| resourceScopeName | cell |
| parentMetadata:CI_Citation | |
| title | LTDS_39N078W_A-P |
| metadataStandardName | National System for Geospatial Intelligence (NSG) Application Schema (NAS) |
| metadataStandardVersion | 8.0 |
| identificationInfo : MD_Identification | <i>See Table 73</i> |
| metadataConstraints : MD_Constraints | <i>See Table 74</i> |
| referenceSystem : MD_ReferenceSystem | <i>See Table 75</i> |
| dataQualityInfo : DQ_DataQuality | <i>See Error! Reference source not found.</i> |
| distributionInfo : MD_Distribution | <i>See Error! Reference source not found.</i> |

Table 72 – MD_Metadata Example

| Metadata Section / Element | Content |
|------------------------------------|---|
| MD_DataIdentification | |
| abstract | A small-footprint sample of NAS-conformant data located in the southern region of New Jersey, USA. It contains a variety of urban, terrain, shoreline, and littoral vector-based feature data, some of which are vertical obstructions to aircraft. |
| citation : CI_Citation | |
| pointOfContact : CI_Responsibility | |
| Party: CI_organisation | U.S. National Geospatial-Intelligence Agency |
| role : CI_RoleCode | http://api.nsgreg.nga.mil/codelist/RoleCode/originator |
| date : CI_Date | |
| date | 2016-05-30T09:30:47Z |
| dateType : CI_DateTypeCode | http://api.nsgreg.nga.mil/codelist/DateTypeCode/creation |
| title | Local Topographic Data Store (LTDS) data sample for cell 39N078WA |
| characterSet : MD_CharacterSetCode | http://api.nsgreg.nga.mil/codelist/CharacterSetCode/utf8 |
| extent : EX_Extent | |
| geographicElement : | |
| EX_GeographicExtent : | |
| EX_GeographicBoundingBox | |

| Metadata Section / Element | Content |
|--|---|
| eastBoundLongitude | -74.66142 |
| northBoundLatitude | 39.19414 |
| southBoundLatitude | 39.10306 |
| westBoundLongitude | -74.92269 |
| geographicElement : EX_GeographicExtent : EX_GeographicDescription | |
| geographicIdentifier : MD_Identifier | |
| authority : CI_Citation | |
| date : CI_Date | |
| date | 2007-06-01 |
| dateType : CI_DateTypeCode | http://api.nsgreg.nga.mil/codelist/DateTypeCode/revision |
| title | What's What in New Jersey |
| code | Southern New Jersey |
| language | http://api.nsgreg.nga.mil/codelist/iso639-2/eng |
| topicCategory : MD_TopicCategoryCode | boundaries |
| topicCategory : MD_TopicCategoryCode | intelligenceMilitary |
| topicCategory : MD_TopicCategoryCode | inlandWaters |
| topicCategory : MD_TopicCategoryCode | location |
| topicCategory : MD_TopicCategoryCode | oceans |
| topicCategory : MD_TopicCategoryCode | structure |
| topicCategory : MD_TopicCategoryCode | transportation |
| topicCategory : MD_TopicCategoryCode | utilitiesCommunication |
| resourceCategory | http://api.nsgreg.nga.mil/codelist/ResourceCategoryCode/topographicFeatures |
| descriptiveKeywords : MD_Keywords | |
| keyword | Boundaries and Lines |
| keyword | General Structures |
| keyword | Woeful Weeping Willow |
| keyword | Conspicuously Cheerful Charthouse |
| keyword | Gotham City |
| keyword | All Souls Cathedral |
| keyword | Lake Louise |
| keyword | Roaring River |
| keyword | Happy Hills |
| keyword | Pete's Pier |
| keyword | Sam's Shipyard |
| keyword | Mighty Manufacturing |
| resourceConstraints : ResourceConstraints | |
| classification : MD_ClassificationCode | http://api.nsgreg.nga.mil/codelist/ClassificationCode/unclassified |
| classificationSystem | USA |

Table 73 – Dataset Resource Identification Metadata Example

| Metadata Section / Element | Content |
|----------------------------|---|
| MD_Constraints | |
| MD_SecurityConstraints | |
| classification | http://api.nsgreg.nga.mil/codelist/ClassificationCode/unclassified |
| classificationSystem | IC ISM |

Table 74 – Metadata Constraints Metadata Example

| Metadata Section / Element | Content |
|---|---|
| MD_ReferenceSystem | |
| referenceSystemIdentifier : MD_Identifier | |
| code | WGS84E_2D |
| codeSpace | http://api.nsgreg.nga.mil/coord-ref-system/WGS84E_2D |

Table 75 – Reference System Metadata Example