



U.S. Department
of Transportation

**Federal Aviation
Administration**

**U.S. Department of Transportation
Federal Aviation Administration**

Standard Practice

Documenting & Registering Taxonomies

FOREWORD

This standard is approved for use by all Departments of the Federal Aviation Administration (FAA).

This standard defines FAA's requirements for developing, documenting, and registering [taxonomies](#). This standard has been prepared in accordance with FAA-STD-068, Department of Transportation Federal Aviation Administration, *Preparation of Standards* [3].

Comments, suggestions, or questions on this document shall be addressed to:

Federal Aviation Administration
Air Traffic Systems Operation
800 Independence Avenue, SW
Washington, DC 20591

Table of Contents

1	SCOPE	1
1.1	BACKGROUND	1
1.2	INTENDED AUDIENCE	1
2	APPLICABLE DOCUMENTS	1
2.1	GOVERNMENT DOCUMENTS.....	1
2.2	NON-GOVERNMENT DOCUMENTS.....	2
2.3	ORDER OF PRECEDENCE	2
3	DEFINITIONS	3
3.1	KEY WORDS.....	3
3.2	TERMS AND DEFINITIONS.....	3
3.3	ACRONYMS AND ABBREVIATIONS	5
4	GENERAL REQUIREMENTS.....	6
5	DETAILED REQUIREMENTS.....	6
5.1	TAXONOMY CONTENT	6
5.2	DOCUMENTING A TAXONOMY.....	8
5.3	REGISTERING A TAXONOMY	8
6	NOTES	9
6.1	MANAGEMENT OF TAXONOMIES	9
APPENDIX A	A-1
APPENDIX B	B-1

List of Figures

FIGURE 1 TYPICAL TREE STRUCTURE.....	6
--------------------------------------	---

List of Tables

TABLE I. TAXONOMY NODE ATTRIBUTES	7
TABLE II. TAXONOMY NODE OPTIONAL ATTRIBUTES	7

1 SCOPE

This standard provides a set of requirements for documenting and registering taxonomies that are used by the FAA to support data and information management, content and records management, information discovery, and semantic interoperability by categorizing and describing data and information.[1] This standard does not dictate the technology used for the implementation of these taxonomies; however, it does specify that they will be registered and centrally located for reuse.

1.1 Background

“The word *taxonomy* means the science of classifying things. It has become a popular term now for any hierarchical classification or [categorization](#) system. Thus, we no longer speak of ‘taxonomy’ as a science but rather ‘a taxonomy’ (plural: taxonomies) as a collection of terms organized into a hierarchical structure (broader term/narrower terms).” [11] Within the context of this document, the term "taxonomy" denotes a hierarchical classification system in the traditional sense, i.e., one in which each child node is a subclass (or sub-type) of its parent, as represented by an "is-a" relationship.

Published in February 2010, FAA Standard Practice for Web Service Taxonomies, FAA-STD-066 [2] was developed to specify the minimum set of taxonomies for categorizing FAA Web services and their artifacts. Business needs have changed since then, and a new standard is called for to support the documentation and registration of taxonomies for broader use, see section 2.3 for precedence between FAA-STD-066 and this standard.

There are many ways to use taxonomies, from classifying data to discovering information and services. Taxonomies support [semantic interoperability](#), [knowledge management](#), and [information management](#). Taxonomies may vary in size from a few simple categories to a large and complex hierarchy. Taxonomies can classify virtually any type of physical or conceptual entities (products, processes, knowledge fields, human groups, etc.) at any level of granularity.

This standard recognizes the importance of taxonomies as shareable FAA resources, and it prescribes the documentation and registration of taxonomies so they may be understood and reused throughout the agency.

1.2 Intended Audience

The intended audience for this standard includes architects, data and information stewards, developers, and subject matter experts.

2 APPLICABLE DOCUMENTS

2.1 Government Documents

- [1] FAA Order 1375.1E, Information/Data Management, 16 November 2011.
(http://www.faa.gov/regulations_policies/orders_notices)
- [2] FAA-STD-066, Web Service Taxonomies, 26 February 2010.
(www.tc.faa.gov/its/worldpac/standards/faa-std-066.pdf)
- [3] FAA-STD-068, Preparation of Standards, 4 December 2009.

<http://www.tc.faa.gov/its/worldpac/standards/faa-std-068.pdf>)

- [4] FAA-STD-063, XML Namespaces, 1 May 2009
(<http://www.tc.faa.gov/its/worldpac/standards/faa-std-063.pdf>)

2.2 Non-Government Documents

- [5] DCMI Glossary, Dublin Core Metadata Initiative, User Guide Committee, 7 November 2005.
(<http://dublincore.org/documents/usageguide/glossary.shtml>)
- [6] ISO/IEC 6523-1:1998 Information Technology - Structure for the identification of organizations and organization – part1: Identification of organization identification schemes, 17 June 2010.
(http://www.iso.org/iso/catalogue_detail?csnumber=25773)
- [7] ISO/IEC 11179, Information Technology – Metadata Registries (MDR), Parts 1 – 6 (<http://metadata-standards.org/11179/>)
- [8] ISO/IEC 20944-1 Information technology - Metadata Registries Interoperability and Bindings (MDRIB) - Part 1: Framework, common vocabulary, and common provisions for conformance, 8 January 2013.
(<http://metadata-stds.org/20944/index.html>)
- [9] RFC 2119, Internet Engineering Task Force Key words for use in RFCs to Indicate Requirement Levels, March 1997. (<http://www.ietf.org/rfc/rfc2119.txt>)
- [10] RFC 3986, Internet Engineering Task Force Uniform Resource Identifier (URI): Generic Syntax: Network Working Group, January 2005. (<http://www.rfc-editor.org/rfc/rfc3986.txt>)
- [11] Taxonomies, Thesauri, and Controlled Vocabularies – Hedden Information Management
(<http://www.hedden-information.com/taxonomies.htm>)
- [12] Duhon, Bryant (1998), It's All in our Heads. Inform, September 2012
- [13] ANSI/NISO Z39.19 - Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabularies, 13 May 2010.
(http://www.niso.org/kst/reports/standards?step=2&gid=None&project_key=7cc9b583cb5a62e8c15d3099e0bb46bbae9cf38a)
- [14] SKOS Simple Knowledge Organization system Primer, W3C, August 2009 (<http://www.w3.org/TR/skos-primer/>)

2.3 Order of Precedence

In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

Special mention of FAA-STD-066 [2] is warranted here. FAA-STD-066 specifies twelve required Web service taxonomies, as follows¹:

Services for Citizens Taxonomy

North American Industry Classification System (NAICS) Taxonomy

United Nations Standard Products and Services Code (UNSPSC) Taxonomy

¹ The listed taxonomies with the exception of NAICS and UNSPSC are located in FAA Data Registry (<https://fdr.gov>)

FAA Office Taxonomy
FAA Service Category Taxonomy
Legislative Compliance Taxonomy
Lifecycle Stage Taxonomy
Service Criticality Taxonomy
Delivery Channel Taxonomy
Service Transport Taxonomy
Message Exchange Pattern Taxonomy
Service Visibility Taxonomy

FAA-STD-072 will take precedence for documenting all taxonomies except these twelve taxonomies mentioned above which will remain required for use until FAA-STD-066 is retired.

3 DEFINITIONS

3.1 Key Words

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this standard are to be interpreted as described in RFC 2119 [9]. These key words are capitalized when used to unambiguously specify requirements. When these words are not capitalized, they are meant in their natural-language sense.

3.2 Terms and Definitions

<i>Categorization</i>	The process of classifying or assigning items into categories or groups based on characteristics which the items have in common.
<i>Creator</i>	The person or organization primarily responsible for developing the content of the taxonomy. Adapted from [5]
<i>FAA Data Registry (FDR)</i>	The official source of the FAA's data standards. The FDR (https://fdr.gov) is a web-enabled system that provides ready access to the agency's standards and is compliant with the International Organization for Standardization/International Electrotechnical Commission. [7]
<i>Format</i>	The physical or digital manifestation of the taxonomy . Typically, Format may include the media-type or dimensions of the taxonomy. Examples of dimensions include size and duration. Adapted from [5]
<i>Hierarchical Model</i>	A data model whose pattern of structure is based on a tree structure; that is, a data structure that arranges entities or attributes as nodes , with at most one parent node for each node, and with only one root node . [8]

Identifier (ID)	A sequence of characters, capable of uniquely identifying that with which it is associated, within a specified context. [7]
Information Management	The leading, planning, organizing, structuring, describing, and controlling of the collection of information (developed from one or more data sources) and monitoring that information throughout its life-cycle; including the distribution of information to one or more audiences, and reviewing users' needs to incorporate future best practices. [1]
Knowledge Management	A discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise's information assets. These assets may include databases, documents, policies, procedures, and previously un-captured expertise and experience in individual workers. [12]
Metadata	Data that defines or describes other data. [7]
Node	A point from which subordinate items originate within a taxonomy. [8]
Organization	A unique framework of authority within which a person or persons act, or are designated to act, towards some purpose. [6]
Parent Node	A node to which at least one other node is directly subordinate. [8]
Rights	Information about Intellectual Property Rights (IPR), Copyrights, and various Property Rights held in and over the taxonomy. Adapted from [5]
Root Node	A node that has no parent node . [8]
Semantic Interoperability	The ability to exchange information and automatically interpret it meaningfully and accurately.
Steward	A person or organization delegated the responsibility for managing a specific set of data and or information resource. [1]
Taxonomy	A collection of terms organized into a hierarchical structure. Each term (" node ") in a taxonomy is in one or more parent-child (broader/narrower) relationships to other terms in the taxonomy. Adapted from [13]
Title	The name given to the taxonomy by which the taxonomy is known. Adapted from [5]

Uniform Resource Identifier (URI)	A compact string of characters for identifying an abstract or physical resource. [10]
Uniform Resource Locator (URL)	A type of URI that identifies a resource via a representation of its primary access mechanism (e.g., its network "location"), rather than by some other attributes it may have. [10]
User	A person or organization that makes use of a taxonomy.

3.3 Acronyms and Abbreviations

ANSI	American National Standards Institute
DCMI	Dublin Core Metadata Initiative
FAA	Federal Aviation Administration
FDR	FAA Data Registry
ID	Identifier
IPR	Intellectual Property Rights
ISO/IEC	International Organization for Standardization/International Electrotechnical Commission
MDR	Metadata Repository
MDRIB	Metadata Registries Interoperability and Bindings
NAICS	North American Industry Classifications System
NISO	National Information Standards Organization
OWL	Ontology Web Language
RDF	Resource Description Framework
RFC	Request for Comment
UNSPSC	United Nations Standard Products and Services Code
URI	Universal Resource Identifier
URL	Universal Resource Locator
XML	eXtensible Mark-up Language

4 GENERAL REQUIREMENTS

This section contains general requirements for establishing and documenting taxonomies.

- a. All [taxonomies](#) SHALL be specified as described in section 5.1, Taxonomy Content.
- b. All taxonomies SHALL be documented through a common set of [metadata](#) as described in section 5.2, Documenting a Taxonomy.
- c. All taxonomies SHALL be registered in the [FAA Data Registry](#) (FDR).
- d. All taxonomies SHALL conform to a [hierarchical model](#) (i.e., the taxonomy forms a tree structure with at most one [parent node](#) for each [node](#), and with only one [root node](#)).
- e. All taxonomies SHALL be based on only one differentiating notion, such as aircraft types, security levels, or FAA service categories. (For example, “fixed wing” and “top secret” should not be part of the same taxonomy, whereas “fixed wing” and “rotorcraft” may very well be.)

Figure 1 depicts the structure of a taxonomy.

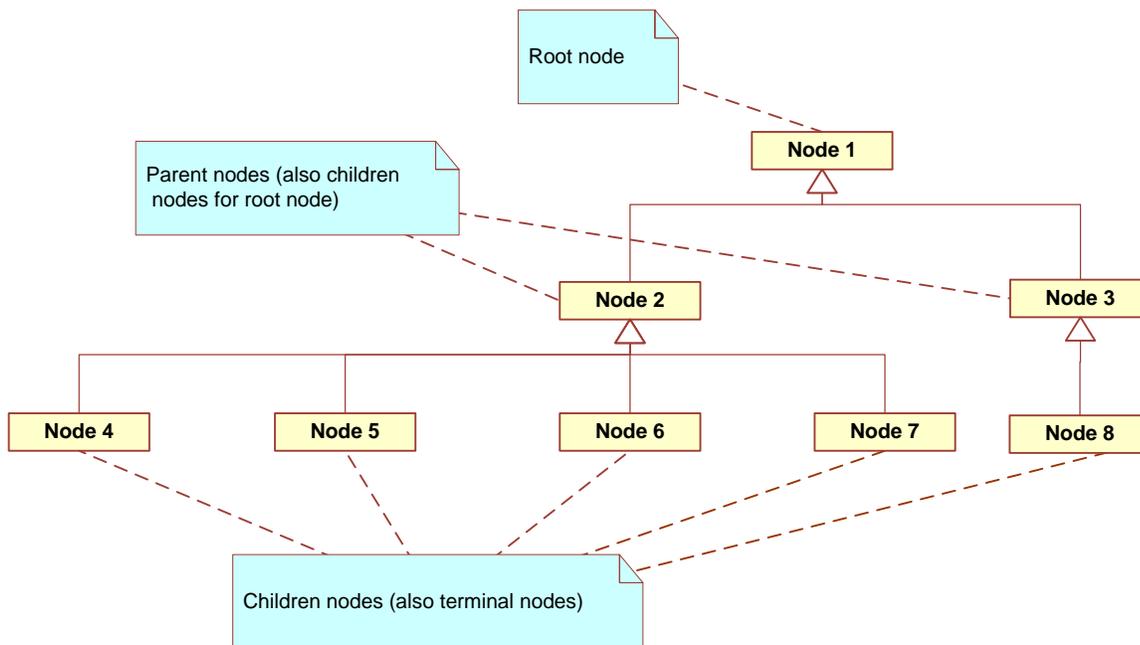


FIGURE 1. Typical hierarchical structure

5 DETAILED REQUIREMENTS

This section presents detailed requirements for documenting the structure and content of [taxonomies](#).

Note: This standard does not prescribe a specific [format](#) or method for defining, transporting, or using taxonomies.

5.1 Taxonomy Content

This section presents requirements pertaining to taxonomy nodes and associated node attributes. Mandatory attributes are specified below.

- a. Every node in a taxonomy SHALL have an ID that uniquely identifies the node within that taxonomy.
- b. Every node except the root node SHALL have a parent ID. (The root node of a taxonomy does not have a parent node and thus cannot have a parent ID.) See Table I.
- c. Every node SHALL have a name.
- d. Every node SHALL have a plain language definition. For guidance on how to write good definitions, see Appendix B, Writing Good Definitions.
- e. Every node SHALL have a “usage note” attribute to clarify the usage of the node. See Table I.

TABLE I. Taxonomy node mandatory attributes

<i>ID</i>	A sequence of characters uniquely identifying the node within the taxonomy.
<i>Parent ID</i>	The ID of the parent node to which the node is directly subordinate; included to support information about the taxonomy structure.
<i>Name</i>	A designation of the node by a linguistic expression intended to be used by humans.
<i>Definition</i>	Supplies a complete plain language explanation of the intended meaning of the node.
<i>Usage note</i>	Supplies information about the intended meaning of the node, especially as an indication of how the use of the node is limited in indexing practice.

The following attributes are optional however should be specified when available

- f. Every node MAY have a source from which its definition was taken or derived.
- g. Every node MAY have an editorial note (s). See Table II.
- h. Every node MAY have a history note. See Table II.
- i. Every node MAY have a change note. See Table II.
- j. Every node MAY have an example(s) of usage. See Table II.

TABLE II. Taxonomy node optional attributes

<i>Source of Definition</i>	A related source from which the node definition is derived.
<i>Editorial Note</i>	Supplies information that is an aid to administrative housekeeping, such as reminder of editorial work still to be done, or warning in the event that future editorial changes might be made. (Adapted from [14])

History Note	Describes a significant change to the meaning or the form of a node. (Adapted from [14])
Change Note	Documents fine-grained changes to a node, for the purposes of administration and maintenance. (Adapted from [14])
Example	Supplies an example use of a node. (Adapted from [14])

5.2 Documenting a Taxonomy

This section presents the information required to document a [taxonomy](#) as an FAA resource.

- a. The information SHALL include a [uniform resource identifier](#) (URI)².
- b. The information SHALL include a taxonomy [title](#).
- c. The information SHALL include the name and organization of the [creator](#) of the taxonomy.
- d. The information SHALL include the name and [organization](#) of the [steward](#) of the taxonomy.
- e. The information SHALL include a brief description of the taxonomy.
- f. The information SHALL include version number.
- g. The information SHALL include detailed description of the nodes.
- h. The description SHOULD include at least one example of the use of taxonomical nodes.
- i. The information SHOULD include a brief overview of the structure of the taxonomy , either as a plain language description or as a diagram of the hierarchical relationships among the taxonomy’s nodes.
- j. The information SHOULD include a brief description of the purpose of the taxonomy, and where and how it can be applied.
- k. If the taxonomy was derived in whole or in part from an existing source, the information SHALL include the name of the source; network location ([URL](#)) of the source or, if the source is not available online, the address of a supplier from whom a copy can be obtained.
- l. The information SHOULD include any special circumstances when use of the taxonomy is not recommended.
- m. The information SHALL include a statement regarding Intellectual property [rights](#) (including copyright) affecting use of the taxonomy, including licensing requirements, etc.
- n. The information SHALL include a condition of use, such as any requirement for registration, payment, or a legal agreement before access to any of the resources.

5.3 Registering a Taxonomy

This section presents requirements for registering FAA taxonomies in the FAA Data Registry (FDR). This standard specifies human-readable text to describe taxonomies to facilitate registration, even though many [users](#) will utilize taxonomies represented as XML artifacts (e.g., Web service registries, RDF/OWL Ontology). See Appendix A for an example of a completed registration form.

² FAA standard for Universal Resource Identifier (URN) is Universal Resource Name (URN) defined in FAA-STD-063

- a. All taxonomies SHALL use the FAA Taxonomy Registration Form located at <https://fdr.gov>.
- b. The completed form and any accompanying electronic files or documents SHALL be submitted to FAA Data Registrar as identified in FDR Contacts at <https://fdr.gov>.

6 NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Management of Taxonomies

The decision to update, retire, supersede a registered taxonomy is made by submitting a change request to FAA Data Registrar. FDR is capable of maintaining multiple versions of a taxonomy at the same time.

Version number has a major and minor component (e.g. 1.2 where 1 represents the major component and .2 represents the minor component). Minor version component are used to represent changes such as typographical corrections, spellings, creator, and steward information. All other changes to the taxonomy, its structure, and nodes are considered major.

Appendix A Example of A Taxonomy



Form FAA-STD-072 (06/2013)

FAA Taxonomy Registration Form (EXAMPLE) *(Note the entire taxonomy is not included here)*

Please e-mail completed form to the FDR registrar (see <https://fdr.gov> contacts).

Part I - Administrative Details (Refer to Form instructions)	
1. Taxonomy Unique Identifier	urn:us:gov:dot:faa:taxonomies:security-category
2. Taxonomy Title	Security Category
3. Taxonomy Version Number	1.01
4. Taxonomy Creator	Mojdeh Supola
5. Taxonomy Description	Categories used to label data ^[1] and information ^[2] according to its security level. [1] Data: A representation of fact, concept, or instruction represented in a formalized form suitable for communication, interpretation or processing either by human and/or by automated systems. This is the lowest level of abstraction, compared to information and knowledge. [2] Information Data in context. The meaning given to data or the interpretation of data based on its context. The finished product as a result of the interpretation of data. Data processed in such a way that it can increase the knowledge of the person who receives it. Data that possesses one or more of the following characteristics: (1) has been verified to be accurate and timely, (2) is specific and organized for a purpose, (3) is presented within a context that gives it meaning and relevance, and which (4) leads to increase in understanding and decrease in uncertainty. The value of information lies solely in its ability to affect a behavior, decision, or outcome.
6. Overview of Structure	This is a simple four tiered taxonomy. The root node is "Security Category" under which the next tier of subcategories falls. Second Tier categories such as "Classified National Security" and "Controlled Unclassified Information" are located. Third tier (and any lower) tiers are typically used to operationally categorize the security levels of data and information. These include categories such as "Secret", "Confidential" etc.
7. Purpose	To enable the exchange of data/information based on its level of security/sensitivity.
8. Source Name	FAA Order 1600.2E , Safeguarding Classified National Security Information and FAA Order 1600.75, Protecting Sensitive Unclassified Information (SUI) National Archives Registry and Executive Order 13556. FAA Data and Information Management Order 1375.1E
9. Source URL	FAA Order 1600.2E at https://employees.faa.gov/tools_resources/orders_notices/index.cfm/go/document.information/documentID/14606 and FAA Order 1600.75 at https://employees.faa.gov/tools_resources/orders_notices/index.cfm/go/document.information/documentID/14210 and FAA Data and Information Management Order 1375.1E at https://employees.faa.gov/tools_resources/orders_notices/index.cfm/go/document.information/documentID/1019640
10. Instructions for Source Taxonomy	Must have FAA web mail account to access https://employees.faa.gov then follow supplied URLs to download source files.
11. Special Circumstances	This taxonomy is used for categorizing data, information, web services, and content and it is not recommended for categorizing systems and applications.
12. Intellectual Property Rights	The taxonomy is in the public domain and may therefore be reproduced without any limitations.
13. Conditions of use	None
14. Steward Name	Mojdeh Supola
15. Steward Organization	Air Traffic Organization, System Operations

Note: Steward Name and Organization must be registered in the FAA Data Registry

FAA Taxonomy Registration Form (EXAMPLE)

PART II
For each node in the taxonomy complete a row of the following:
(Refer to Form instructions)

A. NODE_ID	B. PARENT_NODE_ID	C. NODE_NAME	D. NODE_DEFINITION	E. USAGE_NOTE	F. SOURCE_OF_DEFINITION	G. EDITORIAL_NOTE	H. HISTORY_NOTE	I. CHANGE_NOTE	J. EXAMPLE
SC		Security Category	The categories used to designate, mark, or label information according to its security level.	This node is not intended for use (not allowed) and it is only used as a grouping within this taxonomy.	FAA Orders 1600.2E and 1600.75.				
classified	SC	Classified National Security	A designation for information that has been determined by Executive Order 12958 or any predecessor order to require protection against unauthorized disclosure and is marked to indicate its classified status when in documentary form. NOTE: The terms "classified national security information" and "classified information" are interchangeable.	This node is not intended for use (not allowed) and it is only used as a grouping within this taxonomy.	FAA Order 1600.2E				
TS	classified	Top Secret	A designation for information whose unauthorized disclosure reasonably could be expected to cause <i>exceptionally grave</i> damage to the national security.	This is an allowable node (allowed) for classifying data/information.	FAA Order 1600.2E				TS//GAMMA//FGI CAN//RSEN//COMSEC/X1
S	classified	Secret	A designation for information whose unauthorized disclosure reasonably could be expected to cause <i>serious damage</i> to the national security.	This is an allowable node (allowed) for classifying data/information.	FAA Order 1600.2E				
C	classified	Confidential	A designation for information whose unauthorized disclosure reasonably could be expected to cause <i>damage</i> to the national security.	This is an allowable node (allowed) for classifying data/information.	FAA Order 1600.2E				"(C) Unauthorized disclosure of the following location would cause damage to the national security...."
CUI	SC	Controlled Unclassified Information	A designation for unclassified information that requires safeguarding or dissemination controls, pursuant to and consistent with applicable law, regulations, and government-wide policies (Executive Order 13556). CUI may include information that may qualify for withholding from the public under the Freedom of Information Act (FOIA).	This node is not intended for use (not allowed) and it is only used as a grouping within this taxonomy.	FAA Order 1600.75	This item's subnodes have not been added yet to the taxonomy	This node was added in 2013 to address NARA efforts on dealing with Sensitive but unclassified data.	Changed SUI to CUI on 11/23/2012	
			Insert additional rows as needed above here.						

Appendix B

Writing Good Definitions

The purpose of a definition is to define a concept with words or phrases that describe, explain, or make definite and clear its meaning. Precise and unambiguous definitions are one of the most critical aspects of ensuring data shareability. When two or more parties exchange data, it is essential that all be in explicit agreement on the meaning of that data.

ISO/IEC 11179 [7] Part 4 provides a guide for writing good data definitions. The requirements and recommendations described in this section are adapted from ISO/IEC 11179 Part 4, Sections 4 and 5. (Note the difference between requirements and recommendations: compliance with the requirements can be objectively tested, whereas compliance with the recommendations can only be evaluated subjectively.) Although ISO/IEC 11179-4 requirements and recommendations pertain to data elements and other administered items, they can also be applied when writing definitions or descriptions for any concepts. The requirements and recommendations are as follows. Note: these are not normative.

Requirements – A definition shall:

- Be stated in the singular
- State what the concept is, not only what it is not
- Be stated as a descriptive phrase or sentence(s)
- Contain only commonly understood abbreviations
- Be expressed without embedding definitions of other data or underlying concepts

Recommendations – A definition should:

- State the essential meaning of the concept
- Be precise and unambiguous
- Be concise
- Be able to stand alone
- Be expressed without embedding rationale, functional usage, or procedural information
- Avoid circular reasoning
- Use the same terminology and consistent logical structure for related definitions