TECHNICAL REPORT

ISO/IEC TR 20943-1

First edition
2003-08-01

Information technology — Procedures for achieving metadata registry (MDR) content consistency —

Part 1: Data elements

Technologies de l'information — Procédures en vue d'obtenir la cohérence du contenu d'un registre de metadonnées (RM) —

Partie 1: Éléments de données

Reference number
ISO/IEC TR 20943-1:2003(E)

© ISO/IEC 2003

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale
© ISO/IEC 2003 — All rights reserved

Contents

Page

Foreword vii

Introduction viii

1 Scope 1
1.1 Background 1
1.2 Purpose 1
1.3 Scope 1
1.4 Registration approach — data elements and value domains 1

2 Normative references 2

3 Terms and definitions 2

4 Data element abstraction 2
4.1 Abstraction types 3
4.2 Example of specialization/generalization 3
4.2.1 Example of sharing a value domain 4
4.3 Example of concatenation/decomposition 4
4.4 Example of aggregation 5

5 Data element registration 6

6 Bottom-up approach to data element registration 6
6.1 General procedures for registering a data element 7
6.1.1 Understanding the data element 7
6.1.2 Content research 7
6.1.3 Data element definition 8
6.1.4 Permissible values and value domain 8
6.1.5 Representation class 9
6.1.6 Names and identifiers 9
6.1.7 Other metadata attributes 9
6.1.8 Data element concept 10
6.1.9 Classification schemes 11
6.1.10 Registration and administrative status information 11
6.2 Example of International Standard with enumerated domain 12
6.2.1 Understanding the data element 12
6.2.2 Content research 12
6.2.3 Data element definition 13
6.2.4 Permissible values and value domain 13
6.2.5 Representation Class 13
6.2.6 Identification and naming the data element 13
6.2.7 Other metadata attributes 14
6.2.8 Data element concept 15
6.2.9 Classification 15
6.2.10 Registration and administrative status information 16
6.2.11 Other names and codes from ISO 3166 16
6.2.12 Summary of metadata attributes 16
6.3 Application system data element development examples 19
6.3.1 Understanding the data element 19
6.3.2 Content research 19
6.3.3 Data element definition 19
6.3.4 Permissible values and value domain 20
6.3.5 Representation Class 20
6.3.6 Identify and name the data element 20
6.3.7 Other metadata attributes 21

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.3.8 Data element concept 22
6.3.9 Classification 22
6.3.10 Registration and administrative status information 22
6.3.11 Related data elements 23
6.3.12 Summary of metadata attributes 23
6.4 Example of International Standard with non-enumerated domain 25
6.4.1 Understanding the data element 25
6.4.2 Content research 26
6.4.3 Data element definition 26
6.4.4 Permissible values and value domain 26
6.4.5 Representation Class 27
6.4.6 Identifying and naming the data element 27
6.4.7 Other metadata attributes 28
6.4.8 Data element concept 28
6.4.9 Classification 29
6.4.10 Registration and administrative status informaiton 30
6.4.11 Other data elements in ISO 6709 30
6.4.12 Summary of metadata attributes 30
6.5 Example of a standard data element that uses a standard non-enumerated domain 33
6.5.1 Understanding the data element 33
6.5.2 Content research 33
6.5.3 Data element definition 33
6.5.4 Permissible values and value domain 33
6.5.5 Representation Class 34
6.5.6 Identifying and naming the data element 34
6.5.7 Other metadata attributes 35
6.5.8 Data element concept 36
6.5.9 Classification 36
6.5.10 Registration and administrative status information 37
6.5.11 Related data elements 37
6.5.12 Summary of attributes 37
6.6 Classification of data elements 40
6.6.1 General procedures for registering a classification of data elements 40
6.6.2 Data elements in a document 41
6.6.3 Data elements in a standard 42
6.7 Linking of data elements 43

7 Example of top-down approach to data element registration 44
7.1 Classification and Context 45
7.2 Objects and properties of data element concepts 46
7.3 Professional organization identifier example 47
7.3.1 Data element concept, conceptual domain and value meanings 47
7.3.2 Define and identify data elements 47
7.3.3 Specify value domain and permissible values 48
7.3.4 Other data element attributes 48
7.3.5 Classify the data element 49
7.3.6 Registration and administrative status information 49
7.3.7 Summary of attributes 49
7.4 Language expert identifier example 49
7.4.1 Data element concept, conceptual domain and value meanings 49
7.4.2 Define and identify data elements 49
7.4.3 Specify value domain and permissible values 50
7.4.4 Other data element attributes 50
7.4.5 Classify the data element 51
7.4.6 Registration and administrative status information 51
7.4.7 Summary of attributes 51
7.5 Language skill type identifier example 51
7.5.1 Data element concept, conceptual domain and value meanings 51
7.5.2 Define and identify data elements 52
7.5.3 Specify value domain and permissible values 52

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.5.4 Other data element attributes 53
7.5.5 Classify the data element 53
7.5.6 Registration and administrative status information 53
7.5.7 Summary of attributes 53
7.6 Natural language identifier example 53
7.6.1 Data element concept, conceptual domain and value meanings 54
7.6.2 Define and identify data elements 54
7.6.3 Specify value domain and permissible values 54
7.6.4 Other data element attributes 55
7.6.5 Classify the data element 55
7.6.6 Registration and administrative status information 55
7.6.7 Summary of attributes 56
7.7 Skill level discriminator example 56
7.7.1 Data element concept, conceptual domain and value meanings 56
7.7.2 Define and identify data elements 56
7.7.3 Specify value domain and permissible values 57
7.7.4 Other data element attributes 57
7.7.5 Classify the data element 58
7.7.6 Registration and administrative status information 58
7.7.7 Summary of attributes 58
7.8 Example summary table of attributes 58

8 Example of complex data 58
8.1 Examples 58

Annex A (informative) Tables of data element attributes for examples 65

Annex B (informative) Application of ISO/IEC 11179-2, -4, -5 and -6 75
B.1 Data element definition 75
B.1.1 Rules for definitions 75
B.1.2 Guidelines for definitions 77
B.1.3 Data element definition syntax 80
B.1.4 Terms commonly used in definitions 81
B.2 Representational attributes 81
B.2.1 Permissible values 81
B.2.2 Value domain 82
B.2.3 Representation class 83
B.2.4 Data Element Example 84
B.3 Identifying and naming a data element 85
B.3.1 Name context 85
B.3.2 Establish a naming convention 86
B.3.3 Example of a naming convention 87
B.3.4 Formulating a data element name 87
B.4 Identification 88
B.4.1 Data element identifier 88
B.4.2 Versioning 89
B.5 Conceptual relationships 90
B.5.1 Data element concept 90
B.5.2 Conceptual domain 91
B.5.3 Value meanings 91
B.6 Classification 92
B.7 Quality review 93
B.7.1 Registration status 93
B.7.2 Administrative status 93

Annex C (informative) Crosswalk of names in Technical Report to ISO/IEC 11179-3 metamodel 95

Annex D (informative) Example of complete associated metadata item descriptions using top-down approach to data element registration 98
D.1 Example data model 98
D.2 Presentation of Information 99
D.2.1 Format of Item identifier 99

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.3 Context 100
D.4 Object classes and properties 101
D.5 Data element concepts and conceptual domains 105
D.6 Value Meanings 112
D.7 Value Domains and Representation Classes 114
D.8 Permissible Values 118
D.9 Data elements 121

Bibliography 125

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 20943-1:2003, which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 32, *Data management and interchange*.

ISO/IEC 20943 consists of the following parts, under the general title *Information technology — Procedures for achieving metadata registry (MDR) content consistency*:

Note: Parts 2 and 3 are currently under development.

— *Part 1: Data elements*

— *Part 2: XML structured data*

— *Part 3: Value domains*

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Introduction

The exchange of metadata between metadata registries based on International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) 11179 *Information technology — metadata registries (MDR)*, depends not only on registry software that conforms to the standard, but also on metadata contents that are comparable between registries. While the standard has provisions for data specification and registration, there are pragmatic issues pertaining to populating the registries with content. Based on the experiences of organizations that are implementing the standard, a Technical Report to explore content issues will help current and future users.

Metadata registries can be used to register data elements, value domains, and associated attributes for many kinds of organizational data resource collections. Metadata registries can store information on data elements used on forms, represented in enterprise data models, contained in EDI message sets, and described in documents and standards, as well as those data elements that are part of computer system applications. Some organizations use the registry to record essential facts about how data elements are used in existing applications, while other organizations use the registry as a repository of standard data elements to be used as models for data elements in application development. ISO/IEC 11179-6 specifically addresses the development and population of metadata registries.

ISO/IEC 11179-3 models a data element and its associated data element concept. Conceptualization and articulation of rules and relationships are needed in the creation of data element concepts, data elements, and value domains. Explication of the various possible levels of data elements and data element concepts and their relationships would greatly assist in the creation of shareable, well-formed data. Relationship and inheritance from the most generalized data element to the most specialized application data element need to be specified. Reuse of data value domains should be enabled and regularized.

While metadata registries can be used for storing information about a variety of metadata entities, this report addresses only data elements and associated metadata items. The goal of this paper is to ensure that there is a common understanding of the content of the data element attributes so that metadata can be shared between registries, despite their differences.

This Technical Report is based ISO/IEC 11179-3 of the six-part ISO/IEC standard that describes the organization of a registry for managing the semantics of data. The standard specifies the structure of a registry in the form of a conceptual model. The conceptual model is not intended to be a logical or physical data model for a computer system.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Information technology — Procedures for achieving metadata registry (MDR) content consistency —

Part 1: Data elements

1 Scope

1.1 Background

An ISO/IEC 11179-based metadata registry (MDR) (hereafter referred to as a "registry") is a tool for the management of shareable data; a comprehensive, authoritative source of reference information about data. It supports the standardization and harmonization processes by recording and disseminating data standards, which facilitates data sharing among organizations and users. It provides links to documents that refer to data elements and to information systems where data elements are used. When used in conjunction with an information database, the registry enables users to better understand the information obtained.

A registry does not contain data itself. It contains the metadata that is necessary to clearly describe, inventory, analyse, and classify data. It provides an understanding of the meaning, representation, and identification of units of data. The standard identifies the information elements that need to be available for determining the meaning of a data element (DE) to be shared between systems.

1.2 Purpose

The purpose of ISO/IEC TR 20943-1:2003 is to describe a set of procedures for the consistent registration of data elements and their attributes in a registry. ISO/IEC TR 20943-1:2003 is not a data entry manual, but a user's guide for conceptualizing a data element and its associated metadata items for the purpose of consistently establishing good quality data elements. An organization may adapt and/or add to these procedures as necessary.

1.3 Scope

The scope of ISO/IEC TR 20943-1:2003 is limited to the associated items of a data element: the data element identifier, names and definitions in particular contexts, and examples; data element concept; conceptual domain with its value meanings; and value domain with its permissible values.

1.4 Registration approach — data elements and value domains

There is a choice when registering code sets and other value domains in an ISO/IEC 11179 metadata registry. Some Registration Authorities treat these sets as value domains, and others treat them as data elements. For the purposes of ISO/IEC TR 20943-1:2003, the choice will always be to treat the sets as data elements unless explicitly stated. This choice is made to help illustrate the way to register many different kinds of data elements, including examples for registering standard code sets as data elements.

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

2 Normative references

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

ISO/IEC 11179-1:—[1)], *Information technology — Metadata registries (MDR) — Part 1: Framework for the specification and standardization of data elements*

ISO/IEC 11179-2:—[1)], *Information technology — Metadata registries (MDR) — Part 2: Classification for data elements*

ISO/IEC 11179-3:2003, *Information technology — Metadata registries (MDR) — Part 3: Registry metamodel and basic attributes*

ISO/IEC 11179-4:—[1)], *Information technology — Metadata registries (MDR) — Part 4: Rules and guidelines for the formulation of data definitions*

ISO/IEC 11179-5:—[1)], *Information technology — Metadata registries (MDR) — Part 5: Naming and identification principles for data elements*

ISO/IEC 11179-6:—[1)], *Information technology — Metadata registries (MDR) — Part 6: Registration of data elements*

ISO/IEC TR 15452:2000, *Information technology — Specification of data value domains*

Standards from which examples have been drawn to be used in this document are listed in the Bibliography.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 11179 and ISO/IEC TR 15452 apply.

4 Data element abstraction

This clause presents a conceptual framework for structuring data elements and data element contents in a registry. Data elements are ideally the result of a process of development, involving several types of abstraction, producing a series of "layers" related to each other by the method of abstraction used to produce one from the other. Layers may progress from the more general to the more specific.

Depending on the type of abstraction, relationships among the members of each layer and between layers are meaningful in terms of defining the structure of the registry contents. This provides a means of comparison of the contents of different registries and of searching within a registry. In addition to the data element definition and other attributes, comparing the type and level of abstraction by which the data element was derived can ensure that content can be shared among registries.

One could use layers to structure development of a system, for instance, with the highest layers of definition contained in a business view, and development progressing to the implemented system layer. The number and granularity of layers are driven by user requirements. This clause will describe two ways to derive layers, neither of which are intended to be mandatory for any particular implementation, and will present examples of the types of abstraction most useful to registry implementations.

1) To be published.

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

4.1 Abstraction types

Abstraction is a well-developed tool for analysis and conceptualization. It is used as a way of focusing on parts of the model of interest to a particular process or function. The term "abstraction" is used to refer both to the process and the results of the process. Abstraction can be applied to the registry environment as a way to articulate the development of data elements and their relationships to each other.

Several methods can be used to achieve the decomposition of layers from the most abstract to the more concrete. Starting with the most general conceptual notions and progressing to the data elements in applications, these layers can be labeled by the type or types of abstraction used to produce them from another layer. Although this description of the process of abstraction development implies that it always proceeds in one direction (from the general to the concrete), there may certainly be cases where the reverse is true. Also, after the structures are in place, there is no implication that the relationships are all in single directions. Indeed, the names of the abstraction types deliberately include two levels in a effort to avoid that assumption.

The three types of abstraction of most interest to data element development are *specialization/generalization, concatenation/decomposition* and *aggregation.*

- **Specialization/generalization** is a relationship between two classes, where all items in one (subclass) are also in the other (superclass).

- **Concatenation (**or **composition)** involves the development of composite values by concatenation of character sequences from source values. **Decomposition** involves the separation out of the component portions of value sequences into their source character values.

- **Aggregation** involves the derivation of values by means of mathematical operations on source values. It is not usually possible to reverse the operation (called **derivation**) to recover the component parts.

All three types are commonly found in registries.

4.2 Example of specialization/generalization

The mechanism of specialization/generalization can be used to express a hierarchical structural relationship among data elements.

The United States Postal Service (USPS) establishes postal codes for the United States. The data element State USPS Code (figure 1) forms part of an address group. It might be used to map to application data elements directly, but it could also be the highest layer of a hierarchy of data elements, each displaying a greater degree of specialization according to its position in the structure.

The next layer down contains the elements Geographic Address State Code and Mailing Address State Code. The two State Code elements are now members of two differing address groups. The conceptual domains of the two elements are still identical, however, as the set of potentially valid values of geographic addresses and mailing addresses are the same.

Further specialization takes place at the next layer. Mailing Address State Code is partitioned into Facility Mailing Address State Code and Customer Mailing Address State Code. As before, the address groups of these elements differ, and in addition the data value domains do not necessarily contain the same sets of valid values. The domain of Customer Mailing Address State Code might remain the same as Mailing Address State Code, but the domain of Facility Mailing Address State Code might now be restricted to the subset of states in which facilities are located.

In this example, application data elements are mapped to the registry elements at this layer. Subclause 6.7 describes linking data elements that occur in different databases, under different names, to one registry data element. These relationships encourage data interchange by assuring semantic equivalency among disparately appearing data elements.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

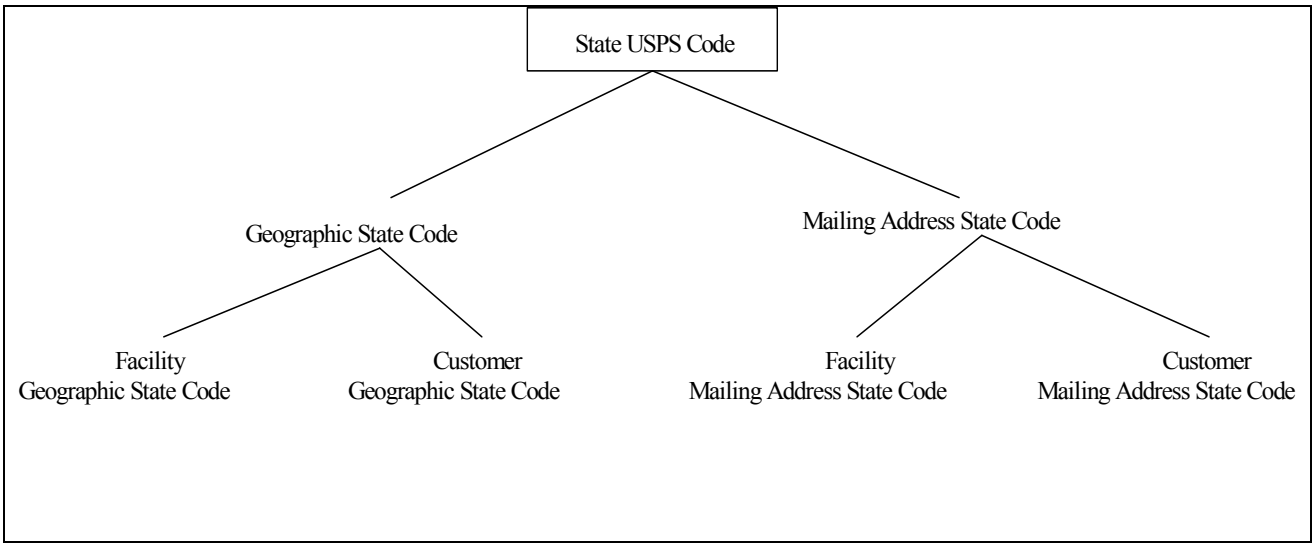

Figure 1 — Specialization/generalization hierarchy

Clauses 6, 7 and Annex A show a way to track the layers of specialization by assigning Layer of Abstraction Type as a value of Classification_Scheme_Item.csi_type_name and values such as specialization, generalization, aggregation, and concatenation to the attribute Classification_Scheme_Item.csi_value in the data element description. These attributes show the type of abstraction of the data element in the abstraction structure. In the example above, the attribute value for data element State USPS Code's Classification_Scheme_Item.csi_value is designated as Generalization. This designation indicates that this data element is at the top of the specialization/generalization structure for data elements in this registry. The data elements in the next layer, Geographic State Code and Mailing Address State Code, are assigned the attribute value Specialization. The data elements in the third layer, namely Facility Geographic State Code, Customer Geographic State Code, Facility Mailing Address State Code, and Customer Mailing Address State Code, are also assigned Specialization.

There may be other structures in the registry in which data elements are placed relative to other registry entries, such as data element concepts. In that case, other attributes may be needed to locate the example data elements in those structures.

4.2.1 Example of sharing a value domain

Figure 1 shows a specialization/generalization hierarchy where State USPS Code is viewed as a data element that is specialized as Geographic State Code and Mailing Address State Code. If the ranges of permissible values for Geographic State Code and Mailing Address State Code are identical, then an alternative representation of this scenario is to consider State USPS Code as a data value domain that is shared by the data elements Geographic State Code and Mailing Address State Code.

4.3 Example of concatenation/decomposition

Use concatenation/decomposition to express a relationship among data elements in which the higher layer describes a whole sequence, and the lower layers are component parts of that sequence. They may or may not be discrete; that is, some of the lower layer components may overlap in their descriptions or domains.

An example of this type of abstraction is the dividing of mailing address sequences into their subcomponents (figure 2). These divisions are based on ISO 11180, Postal Addressing. The figure shows some of the subdivisions for the data element group Mailing Address Group.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

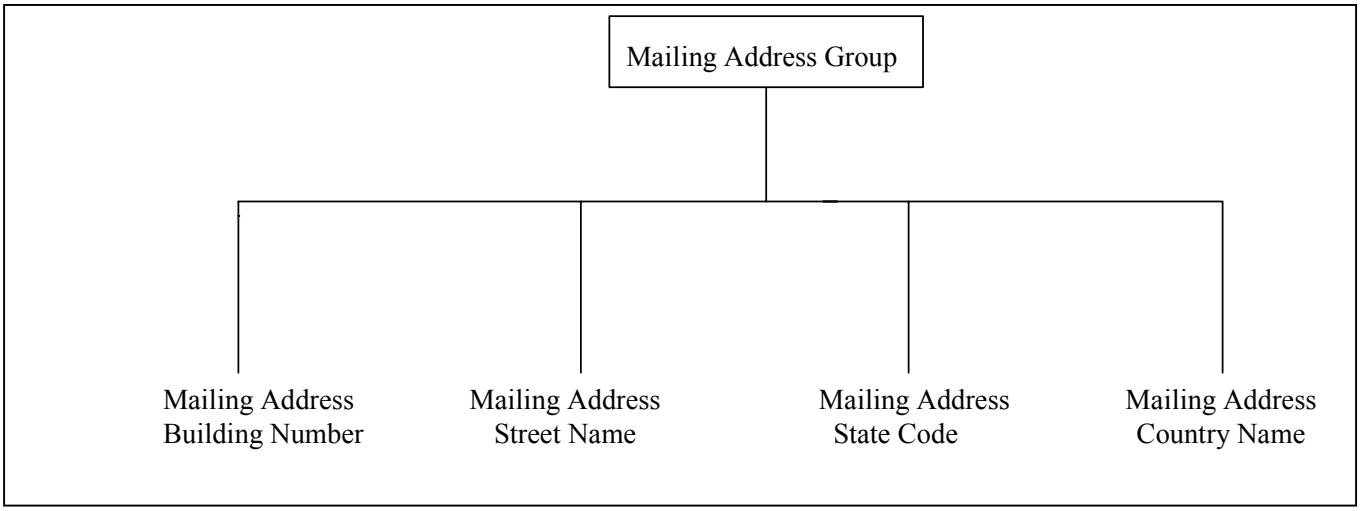

Figure 2 — Concatenation/decomposition example

4.4 Example of aggregation

Use aggregation to express a relationship among data elements in which the higher layer describes a characteristic of a whole and the lower layers are factors affecting that characteristic. They may or may not be discrete; that is, some of the lower layer components may overlap in their descriptions or domains.

Examples of this type of abstraction include:

- the derivation of a period of operation by subtraction of the commencement time, and any temporary stoppage periods, from the finishing time.

- the derivation of an average and standard deviation from a population of values and the count of those values.

It should be noted that it is not usually possible to reverse the aggregation operation (which is called derivation). This is because the derivation process produces a different type of information to the original data instances. In a strict analysis of derivation, information is usually lost in the process.

Clauses 6, 7 and Annex A show a way to track the layers of concatenation by assigning Layer of Abstraction Type as a value of Classification_Scheme_Item.csi_type_name and values such as specialization, generalization, aggregation, and concatenation to the attribute Classification_Scheme_Item.csi_value in the data element description. These attributes show the type of abstraction of the data element in the abstraction structure. In the example above, the attribute value for data element Mailing Address Group's Classification_Scheme_Item.csi_value is designated as Concatenation. This designation indicates that this data element group is at the top of the concatenation/decomposition structure for data elements in this registry. The data elements in the next layer of decomposition are assigned the attribute value Decomposition.

Throughout Clauses 6 and 7, reference will be made to the layer of abstraction for each example data element. The relationship of elements in any particular layer to those above and below it will help the user to choose which data element contains the appropriate information for a particular use.

There may be other structures in the registry in which data elements are placed relative to other registry entries, such as data element concepts. In that case, other attributes may be needed to locate the example data elements in those structures.

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

5 Data element registration

Registration of a data element in a registry requires that certain characteristics of the data element be recorded to clearly describe and define it. These characteristics are stored as attributes of the data element. A registry can be used to record information about a range of data elements, from those found in carefully crafted data standards to those found in applications. The amount and quality of metadata information available can vary from good, complete information to poor, incomplete information. This Technical Report is intended to describe the population of a registry with data elements for which good quality, consistent metadata can be created. ISO/IEC 11179-3 specifies attributes for recording information about a data element in a registry. This Technical Report gives examples that demonstrate the population of a registry. It includes attributes that are mandatory and fully defined by the metamodel, as well as those where the Registration Authority must establish its own profile of required attributes.

There are often problems associated with poorly-formed data elements. For instance, values with definitions other than those defined in the formal definition attribute may be mixed into a value domain along with those which are properly defined. Two data elements may contain overlapping values. This document does not address these kinds of problems.

The metamodel provides for the recording of administrative data about many metadata items of the registry. These are considered to be Administration records. Administration records must contain an identifier, the date the item was created, and the registration and administrative status of the item. Administration records must have a name and a definition in context. An administration record may also contain dates when data about the item were changed, an effective date, and an end date. Explanatory notes and the origin of the item, as well as administrative notes, change description, and unresolved issues may also be recorded. The exact process for determining registration status of administration records other than data element itself, has not been established in the current ISO/IEC 11179-6, where registration is described. For the purpose of this Technical Report, the characteristics of completeness and data quality that are to be used to determine registration status for all items is considered to be the same as for data elements themselves.

Two approaches to data element registration are included in this report: a bottom-up approach, where limited information about the data element is available prior to registration, and a top-down approach, where conceptual information has previously been identified.

- The bottom-up registration procedure provides for the basic metadata attributes about the data element (e.g., definition, name, and permissible values) to be completed prior to defining the conceptual information about the data element. This approach is described in Clause 6 of the Technical Report.

- A top-down approach is useful in many circumstances. Although it requires more "up front" effort, top-down registration has the potential to produce more stable and uniform metadata. An example of a top-down registration, where registration begins with identification of data element concepts, is provided in Clause 7.

It should be noted that the same rules and guidelines apply to the associated metadata items and attributes of a data element, regardless of the approach. The bottom-up and top-down procedures differ only in the order that the practitioner analyzes the data element and formulates its associated items and attributes. The complete registration process is described in context in Clause 6. Except for the order described, the same processes are applicable in Clause 7.

6 Bottom-up approach to data element registration

In many cases where a data element is submitted for registration, only a limited amount of information (e.g., a name, definition, and a set of permissible values) is provided by the submitter. Other attributes must be determined based on an understanding of the underlying data values and concepts that are implied by those facts. Registry practitioners, working from existing systems, may find that working from data elements to data element concepts is appropriate. This approach is referred to as bottom-up in this Technical Report. A bottom-up approach might also be used where the registry is intended to serve as a distribution mechanism for metadata that describes the data in data products such as public data sets, query results, etc.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

The examples provided in this clause describe how to formulate attributes about a data element, based on a bottom-up procedure. The registration procedures are presented in a logical order for analysing and formulating attributes for a data element. First a general procedure for registering data elements is described, followed by examples of registration of four types of data elements, including data elements from:

- an International Standard with an enumerated domain;
- an information system, where the application data element uses that standard enumerated domain;
- an International Standard with a non-enumerated domain;
- another standard, where the application data element uses that standard non-enumerated domain.

This Technical Report is intended to be used to help registry practitioners to formulate the attributes that describe and define a data element. Subclause 6.1 presents an example of an overall approach to bottom-up data element registration. Subclauses 6.2, 6.3, 6.4, and 6.5 should be consulted for more specific examples of registering the kinds of data elements described in International Standards, national standards, and in information systems. Annex A contains a table that concisely summarizes the information registered for each data element in the examples that follow in Clause 6. Annex B, which is based on ISO/IEC 11179-2, -4, -5 and -6, contains more detailed information and examples to assist the practitioner who is registering data elements. Annex C provides a crosswalk from the example attributes named in this Technical Report to the ISO/IEC 11179-3 metamodel.

6.1 General procedures for registering a data element

Often only a limited amount of information is available about a data element that has been submitted for registration, e.g., the name and definition contained in a document or provided by the submitting organization and a set of permissible values, where appropriate. The general procedures that follow are intended to result in the registration of a complete, well-defined data element that meets the requirements of a particular registration authority.

It should be noted that the metadata for some data elements in a registry will never be complete. This is true of application data elements that are obtained from computer software, where very little information is known except the representational attributes (e.g., field length and datatype). For these data elements, only the most basic attributes will be entered, and the data element's registration status will remain incomplete.

6.1.1 Understanding the data element

When examining existing computer systems, the practitioner should not automatically assume that there will be a one-to-one correspondence between a field in a record and a data element in the registry. Often as systems evolve, fields become used for multiple purposes under various conditions. When such a situation is detected, it may be desirable to establish more than one data element, corresponding to a single field. The reverse situation where multiple fields correspond to a single data element is also possible, though less likely.

The first step in the registration procedure is to gain an understanding of the data element. What kind of data will be stored in this data element? Is there a definition or description of the data values? Were permissible values or examples of the data provided? Will the data values be determined by an arithmetic or statistical procedure? What will the data values look like; e.g., are they names or descriptions of things, numerals to be calculated, strings of characters and numbers that are identifiers? Where documentation is inadequate to fully understand the data element, the practitioner must consult those who represent the source of the data element to obtain the necessary information.

The result of this first step is an understanding of the semantic content of the data element.

6.1.2 Content research

Prior to formulating attributes toward registration of a new data element, the registrar should perform content research to determine the following:

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Is the data element described in an existing International, National, or organizational standard?

- Does a data element exist in the registry, or a federation of registries, that has the potential for being reused?

It is necessary to recognize that the registration practitioner must make value decisions when recording metadata into the registry. The practitioner will determine if a data element might be adapted to meet new requirements, or if some attributes of an existing data element (e.g., value domain, data element concept, or conceptual domain) might be reused with the new data element. Content research should include a search of conceptual domains, data element concepts, and value domains, as well as data elements, to identify attributes that might be relevant to the data element to be registered. If a standard data element exists that can be used as a model to meet the particular specifications for a new purpose, some of its associated metadata items may be reused for registration of the new data element.

The result of this step is confirmation that a new data element is needed, or a decision to modify or reuse an existing data element or some of its attributes.

6.1.3 Data element definition

The essential semantic content of a data element must be captured in a data element definition. ISO/IEC 11179-4 describes rules and guidelines for formulating definitions. Examples are provided in Annex B for formulating definitions, based on the rules and guidelines set forth in ISO/IEC 11179-4. Definitions and names are entered in context (i.e., a designation of the discipline in which a name and definition are applied or from which it originates). For many of the examples used in this report, the context is recorded as “Registry.” “Registry” in this example indicates that the name and definition have been formulated according to the rules and guidelines established by the registration authority for this particular registry. In addition to designating context, the language represented by a name and definition can also be designated as a Language identifier. For this report, all examples have been provided in English.

6.1.4 Permissible values and value domain

ISO/IEC 11179-3 identifies the attributes that describe the domain of permissible values. The permissible values for a data element are the value domain for the data element. Annex B also contains detailed information about the attributes in value domains and examples of how those attributes are used for both enumerated domains (i.e., established through a list) and non-enumerated domains (e.g., specified through a formula, rule, procedure, or reference). Datatypes must be associated with the name of the schema or source where the datatype name originated. Annex B provides examples of datatype sources. Format is used to indicate the position of punctuation symbols, or other editing requirements for the data item value (e.g., YYYYMMDD is a format for date).

Different attributes are used depending upon whether the permissible values are enumerated or non-enumerated. Each enumerated permissible value is associated with a valid value meaning that provides meaning to the permissible value, as described in Subclause 6.1.8.

Each enumerated permissible value is also entered in the registry with its begin date (i.e., the date when that permissible value became valid for a value meaning in that registry). End dates will also be entered, when the permissible value for a value meaning becomes invalid.

Value domains for non-enumerated domains must include a description of the values that are valid for the data element. This report contains specific examples of registering data elements with enumerated domains (Subclauses 6.2 and 6.3) and with a non-enumerated domains (Subclause 6.4 and 6.5).

The value domain is an administration record, requiring that administrative data be recorded for the value domain, including name and definition in context, the origin of the domain, and any explanatory comments, as well as the administrative and registration status of the value domain.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.1.5 Representation class

At this time in the registration process, it is appropriate to enter the representation class that describes how the data element is represented. Representation class is an optional attribute in an ISO 11179 registry. Where representation class is used, it is an administration record. An identifier, name, definition, and context are required for each representation class, as well as the other attributes: registration status, administrative status, and creation date. Optional attributes (e.g., explanatory comments, origin) may also be included with representation class.

When registering a data element, a representation class is selected from the administered representation classes and recorded for the data element. A representation class qualifier can also be recorded where appropriate. For a description of the usage of representation class and examples of representation classes, see Subclause B.2.3.

6.1.6 Names and identifiers

ISO/IEC 11179-5 gives principles for naming and identification of data elements. Most people prefer to use names when talking about a data element. At least one name must be assigned to a data element, associated with the context in which the name is used. A name can be developed for a scientific discipline, an organization, a particular computer language, a database management system, or other purpose. Each name is developed according to the naming convention for a particular name context. The naming convention can vary from "whatever you want to call it" to a highly structured name. The description of the naming convention should be stored in the metadata registry as a reference document. ISO/IEC 11179-5 does not specify a mandatory naming convention, but does explain how to document one. Annex B also expands on ISO/IEC 11179-5 by providing examples of the use of names and name contexts.

Each data element registered within a Registration Authority (RA) is unambiguously identified with a unique identifier. Although the standard does not specify the format or content of the data element identifier (DI), the identifier should carry no useful information about the data element, e.g., it might be a number assigned sequentially by an automated system. If the attributes of a data element change, a new version of the data element is created and registered with a version identifier (VI).

Since each registration authority establishes its own identification scheme, the same identifier might be used to identify a different data element in another registry or even in the same registry for a different registration authority. Therefore, a Registration Authority Identifier (RAI) must be established and used with the data identifier and version identifier for unique identification of a data element. Data elements registered under the provisions of ISO/IEC 11179 are assigned an international registration data identifier (IRDI), which is a composite of the RAI, the DI, and the VI. ISO/IEC 11179-6 describes the requirements for an RA and the construction of an RAI. The RAI is composed of an International Code Designator (ICD), an Organization Identifier (OI), an Organization Part Identifier (OPI), and an OPI Source (SRC). The IRDI is discussed further in ISO/IEC 11179-6. For this Technical Report, the example RAI is designated to be {RAI}.

All administration records within an ISO/IEC 11179 registry are assigned identifiers, established by the same process as described above for data elements.

6.1.7 Other metadata attributes

Other mandatory and optional data element attributes are described in ISO/IEC 11179-3. In addition to the definitional attributes described in Subclause 6.1.3 and the identifying attributes described in Subclause 6.1.6, there are administrative, relational, classifying, and other miscellaneous attributes that serve to define and describe a data element. The standard for an ISO/IEC 11179 metadata registry requires that a data element be documented with an administration record.

In addition to the mandatory attributes specified by ISO/IEC 11179-3, a registration authority might establish a profile for a particular registry. The profile specifies such requirements as:

- where attributes described as optional in the standard are mandatory for that registry;
- optional attributes in the standard are not included in the registry;

© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- attributes not included in the standard might be identified and added to the registry.

The attributes that relate data elements through data element concepts (Subclause 6.1.8) and those that classify data elements (Subclause 6.1.9) are described in subsequent clauses of this report. Many information sources do not provide concept or classification information about the data element. Some administrative information is related to registration and administrative status, and is described in Subclause 6.1.10. Annex B includes detailed information about these metadata attributes.

For the bottom-up registration procedure described in this report, some administrative and miscellaneous attributes are recorded at this time, including the following.

- Submitting Organization: The submitting organization is the name of the organization that has submitted the data element for addition to the registry. The submission contact for the submitting organization is also recorded in the registry.

- Stewardship Contact: The organization that has been delegated the responsibility for managing a set of data resources is the stewardship contact. The stewardship contact may be a position within the organization, or even a hot line answering service. Additional information about the contact, including telephone number, email address, and mail code can be entered at this time.

- DE Explanatory Comment: A data element may have an explanatory comment that can be used to provide remarks about the data element, including usage, procedure, and other explanatory information that is not appropriate to include in the data element definition attribute.

- DE Origin. A data element can be associated with any type of source, including a document, standard, system, group, form, or message set. Only one source is associated with a data element to indicate the origin of information about the data element. Additional information can be entered about the source at this time, including abstract and bibliographic information.

The System Date is generally captured by the application software for the administrative attributes Creation Date and Last Change Date. Other administrative data may be entered manually.

6.1.8 Data element concept

At this stage in registering a data element, it is possible to specify conceptual information about the data element through the data element concept. The data element concept may relate several data elements that record data about that concept with different representations, e.g., both names and codes that represent provinces of Canada and share the same concept, which in this example is "Canadian Province Identifier."

Data element concepts may be identified with object class, property, and qualifiers. A data element concept is singular (only one concept is represented). It can be associated with many data elements, including other names and codes, and it does not include a representation class term in its name or definition. The data element concept is associated with only one conceptual domain, as described in the following paragraph.

Data element concepts are specified through a conceptual domain, i.e., a set of possible valid value meanings of an administered data item concept, whose representation in a registry shall be independent of (and shall not constrain) their representation in any corresponding value domain. The conceptual domain, "Canadian Provinces", would include valid value meanings such as "The Canadian province of (Alberta, ... Yukon Territory)," where each value meaning would identify one Canadian province. Each value meaning is entered in the registry, associated with its conceptual domain, its begin date (i.e., the date when that value meaning became effective in the conceptual domain for that registry) and end date (i.e., the date when the value meaning became invalid). Permissible values are associated with value meanings, according to the representation defined by the value domain. For example, the permissible value “CA”, the 2-character alphabetic code for Canada, would be associated with the value meaning “The primary geopolitical entity known as Canada” in a Conceptual Domain entitled, "Countries of the World."

Data element concepts and conceptual domains are always administration records and must be specified with administrative data, as is the data element itself. Therefore, at least one name and definition must be recorded in context for the data element concept and for the conceptual domain. The dates when they are entered into

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

the registry and both registration status and administrative status are required for both. Comment, origin, and other administrative attributes might also be stored about a data element concept and a conceptual domain.

Derivation of data element concepts and conceptual domains, including value meanings are described in detail in Annex B.

6.1.9 Classification schemes

The classification scheme attributes are recorded, where appropriate, at this time. Classification helps to add information to data elements that is not easily included in definitions, helps to organize the contents of a registry, and helps to provide access by supporting more meaningful queries. ISO/IEC 11179-2 describes general categories of classification.

Each registration authority should determine the types of classification to be included in a registry. The classification scheme type name is always recorded. The registration authority might choose to classify data elements as groups, such as the following.

- Data elements used in a mailing address.
- Data elements used to identify facilities.
- Data elements that locate a point on the surface of the earth.
- Data elements that are listed in a data standard.
- Data elements included in an application system.
- Data elements identified on a data collection form.

Examples of other types of classification that the registration authority might choose, are to classify data elements with one or more keywords, e.g., altitude, date, facility, industrial, and organization, and by object class. Classification schemes always contain administrative data, and are related to such items as organization, reference document, registration authority, and contact information. In this Technical Report, only examples of classification scheme types and examples of classification values for those types are provided.

6.1.10 Registration and administrative status information

Initially, only some of the attributes will be recorded for a newly registered data element. Such a data element will be assigned the registration status of "incomplete." When all of the mandatory attributes for a data element have been entered into the registry but the quality of the metadata has not been verified, the registration status will be "recorded." Through the quality review process, some data elements will be assigned the status of "certified" and some might become "standard." The "standard" data element is the preferred data element to be used for data sharing, to ensure consistent representation and understanding of the data being communicated.

ISO/IEC 11179-6 describes the registration process and the registration status assigned to a data element as the metadata are reviewed and quality is improved. Many data elements might be entered into a registry, but only a relatively small number of them might be assigned a "standard" registration status. Annex B describes the assignment of registration and administrative status throughout the life cycle of a registered data element. ISO/IEC 11179-6 specifies the layers of registration status; the administrative statuses, however, are established by each registration authority. Although ISO/IEC 11179-6 does not provide for the registration of metadata items other than data element, this Technical Report has followed the same process for all administration records as has been established for data element.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.2 Example of International Standard with enumerated domain

This clause provides a specific example of the registration of a data element from an International Standard, where the possible valid values are itemized. The International Organization for Standardization (ISO) 3166-1:1997(E/F), *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*, is used as the source for this example. ISO 3166:1997 is a complete revision of ISO 3166, which was first published in 1974.

ISO 3166 includes the following value domains: short country name in English, full (official) country name in English (not provided for all countries), 2-character alphabetic code, 3-character alphabetic code, 3-character numeric code, short country name in French, and full country name in French.

The following paragraphs are presented in the logical order for formulating attributes for a standard enumerated data element, using the English-language short country name as the example. The table in Subclause 6.2.12 contains all of the metadata attributes recorded for this example of an enumerated data element from an International Standard.

6.2.1 Understanding the data element

The data element to be registered is taken from an International Standard, and it includes an authoritative conceptual domain of country identifiers for all of the countries of the world. The English-language short name was selected for standardization because it has the most utility for information systems used by United States (U.S.) federal agencies as well as the private sector. The short form of the English-language name is used by the U.S. Postal Service (USPS) for all outgoing international mail, in preference to any of the codes or full names that are included in the standard. The name is also preferred by the USPS to any names that are used locally by a country to identify itself. For example, "Japan" is recognized by the USPS in preference to "Nihon," which is the country name commonly used by that country itself. The short form of the name in English has been used in the development of ISO 3166 as the basis for assigning codes in preference to the full name, to avoid, wherever possible, any reflection of a country's political status (e.g., "People's Republic of …" or "Kingdom of…").

Some registration authorities might choose to register short English-language names as a value domain, rather than as a data element. (Note: See Subclause 1.4). ISO 3166 contains names and codes for territories that are not always considered to be countries. A data element based on ISO 3166 might use a subset of the value domain that represents only countries and not territories.

The English language short name in the standard varies in length from four alphabetic characters (e.g., Peru) to 44 alphabetic characters (i.e., South Georgia and the South Sandwich Islands).

6.2.2 Content research

Other standards that contain conceptual domains for country identification include the U.S. Federal Information Processing Standards (FIPS), published by the U.S. Department of Commerce, Technology Administration, National Institute of Standards and Technology (NIST). FIPS 10-4 was developed for use by the U.S. Department of State and was maintained by the Office of the Geographer and Global Issues, U.S. Department of State. FIPS 10-4, published in April 1995, reflects changes through May 6, 1993. FIPS 104-1 implements an American National Standards Institute standard ANSI Z39.27-1984, and adopts entities, names, and codes prescribed by ISO 3166, with some qualifications. For example, FIPS 104-1 does not identify freely associated territories and possessions of the United States as countries, as they are in ISO 3166. FIPS 104-1 was last updated on May 12, 1986. The maintenance organization for FIPS 104-1 has been the National Bureau of Standards (now NIST) in coordination with the U.S. Department of State, the U.S. Board of Geographic Names, and the maintenance organization for ISO 3166. There are no known plans to update either of the FIPS standards, and neither of these standards is recognized internationally.

A standard for data elements that identify countries must be an authoritative international source of value domains with ongoing maintenance. Therefore, the ISO 3166:1997 is used as the origin of the data element for country name.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.2.3 Data element definition

Formulate the definition using the mandatory rules and guidelines established in ISO/IEC 11179-4. The rules and guidelines from ISO/IEC 11179-4 are described with examples in Annex B. The definition is singular, since any instance of the data element contains only one value. Understanding that the essential meaning of this data element is to identify countries by the use of a short name in the English-language, the data element definition can be formulated as "The short, ISO-recognized name of a country, represented in the English language."

6.2.4 Permissible values and value domain

The permissible values for the data element are the short names in English, listed in ISO 3166 (e.g., Afghanistan, Albania, ... Zimbabwe). Each permissible value is entered into a registry with the date when that permissible value was valid for that value meaning in that particular registry. In this example the "begin date" is arbitrarily listed as January 10, 1997, the date when the standard became effective. There is no "end date" to enter at this time.

The scope of the permissible values for this data element includes the short English-language name for all countries. A value domain is defined as a set of permissible values. It can be labeled with a name and a definition, in context. For this example, the context is considered to be “Registry”; the name of the value domain is “Short English-language Country Names”; and the definition is "All short, ISO-recognized English-language names of all countries." Value domains must also have an identifier and a version number, which can be assigned through application software. Refer to Annex B.2.2, Value Domain, and record the other value domain attributes for this example at this time, including the following.

- Datatype: The datatype for country name is "CHARACTER VARYING" and the datatype source is "ANSI ISO SQL."
- Maximum characters: Based on prior research (Subclause 6.2.1), the known maximum length for this value domain is 44.
- Format: There is no required format for this character string.
- VD Origin: The standard from which the permissible values are obtained is ISO 3166-1:1997, Codes for the representation of names of countries and their subdivisions — Part 1: Country codes.
- Identifier: {RAI} 5678:1.

6.2.5 Representation Class

The representation class "Name" is selected from previously registered values for representation class (each of which has its own administration record). For this example, the representation qualifier of "Short" should also be recorded to distinguish the name from the long English-language name in ISO 3166.

6.2.6 Identification and naming the data element

Names do not identify a data element. ISO/IEC 11179-5 requires that data elements be identified with a unique identifier and designated with one or more names, recorded in context.

6.2.6.1 Identification

Assign a unique identifier to the data element for short English-language country name, as described in Annex B for the identification of data elements. In the registry for this example, a unique date element identifier and version identifier (DI:VI = 20903:1) are assigned at the time of registry. The identifier is preceded by the identifier for registration authority, as described in Annex B of this document. For this example, the registration authority identifier is represented as {RAI}. An automated process usually assigns identification numbers when a record is created, including the RAI for which it has been recorded. The IRDI for this example data element is designated as {RAI} 20903 :1.

© ISO/IEC 2003 - All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.2.6.2 Name context and naming convention

ISO/IEC 11179-5 describes the naming of data elements. Annex B gives examples of name contexts and naming conventions. For this International Standard data element, the name is derived from the naming convention that determines the name context "Registry." It is derived based on the example naming convention provided in Annex B and summarized as follows.

- Scope: The scope of this example naming convention is Registry Name.
- Authority: The authority for this example is the Environmental Data Registry.
- Semantic Rules: Names shall include an object and a property, where appropriate. Qualifiers shall be used to differentiate between names that would otherwise be the same. The representation class term shall be included as the last term in the name.
- Lexical Rules: A data element name shall have a maximum of 100 alphanumeric characters. The language of the registry shall be English.
- Name Uniqueness: Names shall be unique within this context for a particular registration authority.

6.2.6.3 Name the data element

Using the above naming convention, the name for this data element is entered with the context of "Registry." The convention specifies that the name should include the object "Country", to indicate the data values to be stored in the data element. The name, according to this registry's naming convention, should also include the representation for the concept, in this example "Name." For this particular example, it is necessary to qualify the name, since there are four value domains of country names in the ISO 3166 standard. The property "English-language" and qualifier "short" are appropriate to this example. The name that has been formulated for this data element, therefore, is "ISO English-Language Country Short Name."

6.2.7 Other metadata attributes

Examples of other metadata attributes that can be recorded at this time are described in the following paragraphs.

- Select the example for this data element. The example must be one of the permissible values in the value domain.

  Data Element Example: China

- Identify the origin for this data element as the standard from which the permissible values are obtained. For this example, the origin of the data element is the same as the origin of the value domain.

  Data Element Origin: ISO 3166-1:1997, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

- Record any explanatory comments not included in the definition that might provide additional information about the data element.

  Data Element Explanatory Comment: This data element is included in the mailing address standard.

- Enter the name of the submitting organization, which is the organization that submitted the data element for registration.

  Submitting Organization: Office of Information Collection

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Record the name or title of the organization or other contact assigned the responsibility for monitoring and maintaining the data element as the stewardship contact.

  Stewardship Contact: Geopolitical Data Administrator

Administrative metadata, such as Creation Date is recorded or captured automatically by the system where applicable. Other administrative data may be entered manually.

6.2.8 Data element concept

Identification of the data element concept, as described in Subclause 6.1.8 is based on the data element name and definition, without the representation. The concept represented in the data element "Short English-Language Country Name" is "Country Identifier," defined as "An identifier for a primary geopolitical entity of the world." This concept can be represented by all seven of the names and codes included in ISO 3166. The name and definition of a data element concept are recorded in context, in the same manner as the name and definition of a data element. The context of the data element concept name and definition in this example is “Registry.”

The object class and property of the data element concept can be entered at this time, with qualifiers if appropriate. For Country Identifier, the object class is recorded as "Country" and the property as "Identifier." Data element concept is an administration record, as are object class and property. Administrative data are required for each of these items, including name and definition, as described above, and the dates when the items were created in the registry. The creation date is generally assigned by application software, captured from the system date.

The conceptual domain is a set of possible valid value meanings of an administered data item concept, whose representation in a registry shall be independent of (and shall not constrain) their representation in any corresponding value domain. The conceptual domain that contains value meanings related to the identity of countries of the world is named "Countries of the World." It is defined as "The primary geopolitical entities of the world." The value meanings associated with this conceptual domain are defined as "The primary geopolitical entity of the world known as <*country name*>," where <*country name*> is one of the country names listed in ISO 3166. Each value meaning is identified by its own value meaning identifier (VMID) and each is entered into the registry with the date when that value meaning became valid for the conceptual domain in its particular registry. In this example the date for each value meaning is set arbitrarily to January 10, 1997, the date when the standard became official. End dates will also be entered, whenever a value meaning becomes invalid within the registry (e.g., when a registry is updated to reflect a change to the usage of that value meaning description).

6.2.9 Classification

The following paragraphs provide examples of types of classification by which this example data element might be classified.

- Identify one or more keywords, where the keyword is a name or subject matter descriptor that will facilitate grouping like data elements for retrieval.

  Keyword: Country

- Group ISO English-Language Country Short Name with similar data elements according to concept for translation or by general subject matter.

  Concept group: Country Identifiers, where other data elements in the group might include the other six representations for "country identifiers."

  Subject group: Geopolitical Entities, where other data elements in the group might include such data elements as state or province name, county name, and city name.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- One or more real world objects that identify this data element can be recorded at this time.

  Object Class: Country

- Identify the abstraction layer of this data element:

  Layer of Abstraction Type: Generalization

6.2.10 Registration and administrative status information

When all of the mandatory metadata attributes have been entered for this data element, it is assigned the registration status of "Recorded" and the administrative status of "In Quality Review." Refer to Annex B for descriptions of registration and administrative statuses. Because the data element was identified by an International Standard, and it is expected to be the preferred data element for representing country name within the example registry, the registration status will be updated to "Standard" with administrative status of "Final", after the necessary quality review has been completed.

The ISO/IEC 11179-3 metamodel requires that both registration status and administrative status be recorded for all administration records. When all of the mandatory metadata attributes have been entered for these administration records, it is assigned the registration status of "Recorded" and the administrative status of "In Quality Review." The descriptions of registration and administrative statuses in Annex B apply to all administration records. Because the data element concept in this example was identified by an International Standard, the registration statuses will be updated to "Standard" with administrative statuses to "Final", after the necessary quality reviews have been completed.

6.2.11 Other names and codes from ISO 3166

Other names, i.e., full English names, and French names (both short and full), and all codes from ISO 3166 can also be registered with their individual value domains, representation, data element definitions, and data element names and definitions. All of the data elements associated with ISO 3166 share the same data element concept (i.e., Country Identifier, defined as "An identifier for a primary geopolitical entity of the world.") and the same conceptual domain (i.e., Countries of the World, defined as "The primary geopolitical entities of the world."). All of the ISO 3166 data elements share the same value meanings. They do, however, have different sets of permissible values associated with the value meanings, depending upon the data element, its representation, and its value domain.

6.2.12 Summary of metadata attributes

The metadata attributes that have been assigned to this data element, i.e., the English-language country short name identified by the ISO 3166:1997 standard, are summarized in the following table and in the first metadata column of Table 1 of Annex A. A crosswalk of metadata attribute names used in this Technical Report to the actual ISO/IEC 11179-3 metamodel is provided in Annex C.

Metadata Attribute Name		ISO 3166, Enumerated
1	**Data Element Definition**	
	Data Element (DE) Definition Context	Registry
	DE Definition	The short, ISO-recognized name of a country, represented in the English language.
2	**Permissible Values and Value Domain**	
	Permissible Values (each PV)	All English-language short country names from ISO 3166, matched with value meanings. (recorded as: Afghanistan, Albania,...., Zimbabwe)
	PV Begin Date (each PV)	19970110
	PV End Date (each PV)	(Not applicable)

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Metadata Attribute Name		ISO 3166, Enumerated
	Value Domain (VD) Context	Registry
	VD Name	ISO English-Language Country Short Names
	VD Definition	All short, ISO-recognized English-language names of all countries.
	VD Description	(Not applicable)
	VD Item Identifier	{RAI} 5678:1
	Datatype	CHARACTER VARYING
	Datatype Schema/Source	ANSI ISO SQL
	Maximum Characters	44
	Format	(Not applicable)
	Unit of Measure	(Not applicable)
	Precision	(Not applicable)
	VD Origin	ISO 3166-1:1997
	VD Explanatory Comment	The value domain includes only the subset of ISO 3166 names that designate countries; it does not include names of territories.
3	**Representation Class Item**	
	Representation Class	Name
	Representation Class Qualifier	Short
4	**Data Element Name and Identifier**	
	DE Name Context	Registry
	DE Name	ISO English-Language Country Short Name
	DE Identifier	{RAI} 209033:1
5	**Other Data Element Attributes**	
	DE Example	China
	DE Origin	ISO 3166-1:1997, Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes
	DE Explanatory Comment	This data element is included in the mailing address standard.
	Submitting organization	Office of Information Collection
	Stewardship Contact	Geopolitical Data Administrator
6	**Data Element Concept and Conceptual Domain**	
	Data Element Concept (DEC) Context	Registry
	DEC Name	Country Identifier
	DEC Definition	An identifier for a primary geopolitical entity of the world.
	Object Class	Country
	Object Class Qualifier	(Not applicable)

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Metadata Attribute Name		ISO 3166, Enumerated
	Property	Identifier
	Property Qualifier	(Not applicable)
	DEC Item Identifier	{RAI}12345:1
	Conceptual Domain (CD) Context	Registry
	CD Name	Countries of the World
	CD Definition	The primary geopolitical entities of the world.
	CD Item Identifier	{RAI} 2468:1
	CD Origin	ISO 3166:1
	Value Meaning (for each VM)	The primary geopolitical entity known as <China>
	VM Begin Date (for each VM)	19970110
	VM End date (for each VM)	(Not applicable)
	VM Identifier (for each VM)	<Assigned by system as 1001…1230: one to each VM>
7	**Classification Type Examples**	Classification Values for Classification Type
	Keyword	Country
	Group	Geopolitical Entities, Country Identifiers
	Object	Country
	Layer of Abstraction Type	Generalization
8	**Registration and Administrative Status**	
	DE Registration Status	Standard
	DE Administrative Status	Final
	VD Registration Status	Standard
	VD Administrative Status	Final
	DEC Registration Status	Standard
	DEC Administrative Status	Final
	CD Registration Status	Standard
	CD Administrative Status	Final

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.3 Application system data element development examples

Application data elements are data elements that are used for a particular application. For this report, an application data element, such as is found in a computer system application, has been identified as an example for data registration. Data elements used in computer systems are associated with an entity (e.g., table) and might be identified with a qualifier. The country name attribute in the mailing address entity has been selected from an information management system that contains data about facilities (i.e., the Facility Data System). This data element was selected to illustrate the relationship between an application data element and a standard data element with the same data values. It also illustrates how a well-defined data element might differ from one that is identified from a computer application system. The methodology is the same as that described in Subclause 6.1. It should be noted that many computer application systems contain metadata that is incomplete. Often, only the data element name, the data type and the field length are known about a data element. Where the data element can reuse domain and conceptual information based on a standard data element, as in this example, the data element can be registered as Recorded. Many data elements, however, must be registered as Incomplete, and all metadata attributes identified in the model as Mandatory, might never be complete.

The table in Subclause 6.3.12 contains a summary of all the metadata for the application data element described in this report.

6.3.1 Understanding the data element

The application data element for country code, used in a mailing address, must be capable of being used on a mail piece for delivery of mail to any country throughout the world. The country must be represented in such a way that it is easily read and conforms to a known identifier for that country. Therefore, authoritative names of all countries must be included in the value domain. The name must be of a length that will fit on one line of the address block.

6.3.2 Content research

The United States Postal Service mailing address standard requires that the country name be included as the last line of a mail piece. Before a data element for the mailing address country name is registered, the registry for the registration authority is examined to determine if there is a data element, value domain or permissible values, or data element concept and conceptual domain that might be reused in attributing this data element.

A search of the registry will find that a standard data element has been registered, based on the International Standard ISO 3166. The standard data element is not specific enough to describe the application of the data element to a mailing address entity. The appropriate value domain for country name to be used in a mailing address, however, should be the short name from the ISO 3166 standard. All value domain information for this application data element (i.e., country name used in a mailing address) is the same as for the ISO standard Short English-Language Country Name, described in Subclause 6.2, and the conceptual domain for this data element is the same. Therefore, the data element will be registered, reusing the conceptual domain and permissible values from the standard data element.

6.3.3 Data element definition

The definition for the country name attribute in the mailing address entity is formulated according to the rules and guidelines listed in ISO/IEC 11179-4. The rules and guidelines are provided in Annex B of this Technical Report, with additional examples that will provide assistance in formulating the definition. Because this data element has been submitted through a computer application system (i.e., the Facility Data System), the definition provided by the application system is retained, identified by its context. In this instance, the context is the system name, according to the naming convention for that system. Name Context for this application data element is described in Subclause 6.3.6.2. Definitions may be entered into the registry in conjunction with the context used for the data element name. The definition with the context for the Facility Data System is "The name of a country where the addressee is located." The Registry name context definition includes the concepts for country identifier, mailing address, and representation. The rules and guidelines specified in ISO/IEC 11179-4 are used to formulate the data element definition as "The name of the country where a mail piece is delivered."

--`,,`-`-`,,`,,`,`,,`-`---

© ISO/IEC 2003 - All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.3.4 Permissible values and value domain

The permissible values for a data element are determined by the value domain. The application data element for mailing address country name uses the same permissible values as the standard data element for English-language short country names listed in the ISO 3166 standard (e.g., Afghanistan, Albania, ..., Zimbabwe). The scope of the permissible values for this data element includes the short English-language name for all countries. The registration authority has determined that this data element is represented by the same value domain as exists for the data element {RAI} 209033:1, ISO English-Language Country Short Name. It is not necessary to record additional permissible values or other value domain information for this data element, since value domain {RAI} 5678:1 is being reused.

6.3.5 Representation Class

The representation class "Name" is selected from the representation class administration record. For this example, the representation qualifier of "Short" should also be recorded to distinguish the name from the long English-language name in ISO 3166.

6.3.6 Identify and name the data element

Names do not identify a data element. ISO/IEC 11179-5 requires that data elements be identified with a unique identifier and designated with one or more names, recorded in context.

6.3.6.1 Identification

For this example, the data element for the country name used in a mailing address is assigned a unique data identifier (DI) and version identifier (VI) (5394:1) by the computer application software when it is entered into the registry. The Registration Authority for this data element in this example is represented as {RAI}.

6.3.6.2 Name context and naming convention

In this example, the data element is assigned two names, each with its own context. First is the system name context, since this data element was identified as being part of an application system, and retention of the name used by the system is valuable for documenting the system. The naming convention that has been established for the system name context, i.e., the "Facility Data System" context, is as follows.

- Scope: The scope of this example naming convention is application data elements in the Facility Data System.
- Authority: The authority for this example is the Environmental Data Registry
- Semantic Rules: Names shall be the same as those used by the application software, using the convention of Entity Name.Attribute Name (i.e., table name.column name).
- Lexical Rules: A data element name shall have a maximum of 200 alphanumeric characters. The language of the registry shall be English.
- Name Uniqueness: Names shall be unique within a registration authority for the entity/attribute relationship.

The second name to be assigned to this data element has the context "Registry." It follows the naming convention for registry name context, as described in Annex B.

- Scope: The scope of this example naming convention is Registry Name.
- Authority: The authority for this example is the Environmental Data Registry.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Semantic Rules: Names shall include an object and a property, where appropriate. Qualifiers shall be used to differentiate between names that would otherwise be the same. The representation class term shall always be included as the last term in the name.

- Lexical Rules: A data element name shall have a maximum of 100 alphanumeric characters. The language of the registry shall be English. There are no controlled word lists for naming application data elements.

- Name Uniqueness: Names shall be unique within a name context for a particular registration authority.

6.3.6.3 Name the data element

When documenting an application system, it is important to know the name of the system and the entity in which the data element exists as an attribute. This data element is assigned a name for the context "Facility Data System." It is also valuable to know the name of the attribute in that system. For this example, the system name is Facility Data System, which is documented in the registry as a system. The name of the attribute in the system is Country_Name, and the entity name is Mailing_Address. Therefore, the data element name for the context Facility Data System is Mailing_Address.Country_Name.

The data element name with Registry as its context should identify the data values to be contained in the value domain (i.e., country) and the entity (i.e., address) associated with the data element. It should also include the representation term. The representation is the same as for the ISO standard data element. For the application data element (e.g., country name in a mailing address entity) the entity is "address" qualified by "mailing." The qualifier is appropriate, since the registry might also have an application data element that designates the country name in a geographic (i.e., physical location) address entity. The qualifier is needed to discriminate between the country name in mailing and geographic addresses. The guidelines described in Subclause 6.1.6 should be followed. The Registry name of this data element, based on ISO/IEC 11179-5 guidelines is "Mailing Address Country Name."

6.3.7 Other metadata attributes

Other metadata attributes that can be recorded at this time are the following.

- Select the example for this data element; it must be one of the permissible values in the value domain.

  Data Element Example: Denmark

- Identify the origin for this data element as the standard from which the permissible values are obtained.

  Data Element Origin: Facility Data System

- Record any notes or comments that might provide additional information about the data element that is not included in the definition.

  Data Element Explanatory Comment: The country name is always located as the last line of a mail piece for international mailings.

- Enter the name of the submitting organization, which is the Office that submitted the data element for registration.

  Submitting Organization: Office of Enforcement and Compliance Assurance

- Record the name of the individual or organization assigned the responsibility for monitoring and maintaining the data element as the stewardship contact.

  Stewardship Contact: Facility Data Systems Hot Line

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Other administrative metadata, such as Creation Date are recorded or captured automatically by the system where applicable. Other administrative data may be entered manually.

6.3.8 Data element concept

The data element concept for this data element includes the object class (entity) of address, as well as the property of being a country identifier. It does not include the qualifier for "mailing." This data element concept is not the same as the concept for the standard Country Short Name data element, which is limited to the concept of country identifier. The name of this data element concept, following the guidelines described in Subclause 6.1.8, is "Address Country Identifier" and the data element concept definition is "An identifier for an address of a primary geopolitical entity of the world." This data element concept could be reused for other address country identifiers, such as a geographic address country name, a geographic country code, or other representations and data element qualifiers. This is a new data element concept, and it requires that administrative data be recorded for this item.

The conceptual domain for this application data element is the conceptual domain for all the countries of the world. It uses the same value meanings and the same permissible values as the standard data element for country name. Therefore it reuses the conceptual domain (CD ID 2468:1) and the value domain (5678:1) that were established for the standard data element, ISO English-Language Short Name ({RAI} 209033:1), described in Subclause 6.2.

6.3.9 Classification

This data element might be classified by source or according to one or more of the following classification schemes.

- Identify one or more keywords, where the keyword is a name or subject matter descriptor that will facilitate grouping similar data elements for retrieval.

  Keyword: Country, Mailing Address

- Group the mailing address country name with similar data elements according to concept for translation or by general subject matter.

  Subject group: Mailing Address, which might include such data elements as street address name, city name, and postal code.

- One or more real world objects that identify this data element can be identified at this time.

  Object Class: Country, Mailing Address

- Identify the abstraction layer(s) of this data element:

  Layer of Abstraction Type: Specification; Decomposition

6.3.10 Registration and administrative status information

When all of the mandatory metadata attributes have been entered for this data element, it is assigned the registration status of "Recorded" and the administrative status of "In Quality Review." This data element was identified by an application, and so it often would not be completely attributed. This particular application data element, however, has been completed by reusing the value domain, permissible values, and conceptual domain of a standard data element, and so can be entered with a registration status of Recorded. The reused value domain and conceptual domain have been assigned the registration statuses of "Standard" and administrative statuses of "Final," as described in Subclause 6.2.10.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.3.11 Related data elements

Data elements related to this application data element for Country Name are other data elements that are used in the mailing address entity. This includes such data elements as street name or other delivery point, city or other jurisdictional name, state or province name or code, and ZIP+4 code or other international postal code. None of these share the same value domains, conceptual domains, or permissible values. The data elements, however, can be classified as a group that make up the Mailing Address entity.

6.3.12 Summary of metadata attributes

The following table contains a summary of the values assigned to the metadata attributes in the preceding paragraphs of Subclause 6.3. Annex A also contains this metadata in the second metadata column in Table 1. A crosswalk of metadata attribute names used in this Technical Report to the actual ISO/IEC 11179-3 metamodel is provided in Annex C.

Metadata Attribute Name		Application System	
1	**Data Element Definition**		
	Data Element (DE) Definition Context	Registry	Facility Data System
	DE Definition	The name of the country where a mail piece is delivered.	The name of a country where the addressee is located.
2	**Permissible Values and Value Domain**		
	Permissible Values (each PV)	All English-language short country names from ISO 3166, matched with value meanings. (recorded as: Afghanistan, Albania,....., Zimbabwe)	
	PV Begin Date (each PV)	19970110	
	PV End Date (each PV)	(Not applicable)	
	Value Domain (VD) Context	Registry	
	VD Name	ISO English-Language Country Short Names	
	VD Definition	All short, ISO-recognized English-language names of all countries.	
	VD Description	(Not applicable)	
	VD Item Identifier	{RAI} 5678:1	
	Datatype	CHARACTER VARYING	
	Datatype Schema/Source	ANSI ISO SQL	
	Maximum Characters	44	
	Format	(Not applicable)	
	Unit of Measure	(Not applicable)	
	Precision	(Not applicable)	
	VD Origin	ISO 3166-1:1997	
	VD Explanatory Comment	The value domain includes only the subset of names that designate countries; it does not include names of territories.	
3	**Representation Class Item**		
	Representation Class	Name	

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Metadata Attribute Name		Application System	
	Representation Class Qualifier	Short	
4	**Data Element Name and Identifier**		
	DE Name Context	Registry	Facility Data System
	DE Name	Mailing Address Country Name	Mailing_Address.Country_Name
	DE Identifier	{RAI} 5394:1	
5	**Other Data Element Attributes**		
	DE Example	Denmark	
	DE Origin	Application system	
	DE Explanatory Comment	This data element is required for delivery of mail outside the country of origin.	
	Submitting organization	Office of Enforcement and Compliance Assurance	
	Stewardship Contact	Facility Data Systems Administrator	
6	**Data Element Concept and Conceptual Domain**		
	Data Element Concept (DEC) Context	Registry	
	DEC Name	Address Country Identifier	
	DEC Definition	An identifier for a primary geopolitical entity of the world that indicates a mailing address.	
	Object Class	Address	
	Object Class Qualifier	(Not applicable)	
	Property	Identifier	
	Property Qualifier	Country	
	DEC Item Identifier	{RAI}12468:1	
	Conceptual Domain (CD) Context	Registry	
	CD Name	Countries of the World	
	CD Definition	The primary geopolitical entities of the world.	
	CD Item Identifier	{RAI} 2468:1	
	CD Origin	ISO 3166:1	
	Value Meaning (for each VM)	The primary geopolitical entity known as <China>	
	VM Begin Date (for each VM)	19970110	
	VM End Date (for each VM)	(Not applicable)	
	VM Identifier (for each VM)	<Assigned by system as 1001…1230: one to each VM>	
7	**Classification Type Examples**	Classification Values for Classification Type	

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Metadata Attribute Name		Application System
	Keyword	Country, Address., Mailing
	Group	Mailing Address
	Object	Address, Country
	Layer of Abstraction Type	Specialization
8	**Registration and Administrative Status**	
	DE Registration Status	Recorded
	DE Administrative Status	In Quality Review
	VD Registration Status	Standard
	VD Administrative Status	Final
	DEC Registration Status	Recorded
	DEC Administrative Status	In Quality Review
	CD Registration Status	Standard
	CD Administrative Status	Final

6.4 Example of International Standard with non-enumerated domain

This clause provides a specific example of the registration of a data element from an International Standard, where the possible valid values are not enumerated, but must be determined by a procedure. The International Organization for Standardization (ISO) 6709:1983 (E), *Standard representation of latitude, longitude and altitude for geographic point locations*, is used as the source for this example.

The table in Subclause 6.4.12 contains all of the metadata attributes recorded for the non-enumerated data element from an International Standard.

6.4.1 Understanding the data element

Latitude is a measure of the angular distance on a meridian north or south of the equator. The standard provides for a variable format and more than one representation for recording the latitude measure: degrees and decimal degrees, and sexagesimal (i.e., degrees, minutes, and seconds). The standard also includes more than one representation and format for longitude, and a flexible format for altitude. In addition, a standard format for data transfer is included in the standard.

Although new technology and new tools (e.g. Global Positioning System [GPS]) and analytical and mapping software have caused some geographic information specialists to prefer the measurement of locational coordinates in degrees and decimal degrees, many organizations continue to measure latitude and longitude in degrees, minutes, and seconds. Therefore, the registration authority of the registry in this example, has determined a need to register a data element for latitude measured in degrees, minutes, and seconds. According to the standard, the placement of the decimal point indicates the transition from degrees to sexagesimal measures. Examples of data in the standard include sexagesimal latitudes that are measured to a range of one or two decimal places for seconds. The standard, however, does not limit the precision, but requires only that the number of decimal places indicate the precision of the measurement. The registration authority for this example requires that latitude be recorded up to 5 decimal positions, where it can be measured to that level of precision.

Latitude values are measured in a range of 0 (on the equator) to 90 degrees. Minutes and seconds each are measured in a range of 60 degrees (0 to 59). Latitude values on or North of the equator are recorded as

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

positive numbers; those South of the equator are negative. Where latitude degrees are measured in single digit, they must be recorded with a preceding zero. For data transfer, latitude measures must be preceded by the directional symbol (+ or -), and they must include decimal point, where the measurement includes decimal seconds. In data transfer, latitude always precedes longitude, which precedes altitude. The latitude and longitude must be expressed in the same format style and to the same precision (indicated by the number of decimal positions). There are no separators between the latitude, longitude, and altitude; the directional symbol serves as a separator for the data element values.

6.4.2 Content research

ISO 19111, Spatial referencing by coordinates, describes the data required to define 1-, 2-, and 3-dimensional coordinate reference systems. The coordinate reference system must be fully defined for a position to be unambiguous. Knowledge of the reference system is necessary to determine if coordinate points are comparable. The standard does not, however, provide information about representation of the coordinates. ISO/TC 211/ WG 3, the workgroup that is currently revising ISO 15046, has expressed an interest in revising (ISO) 6709:1983 (E), *Standard representation of latitude, longitude and altitude for geographic point locations*. Because of TC211's interest in ISO 6709, and their current work on the closely related standard, ISO 15046, it seems likely that ISO 6709 will soon be reviewed and updated if needed. Therefore, ISO 6709 seems appropriate to be identified as a standard data element for latitude measure where latitude is measured as sexagesimal (i.e., in degrees, minutes, and seconds).

A search of the registry in our example reveals about 40 data elements related to latitude measure. One, an interim standard in the example registry for latitude, measured in degrees and decimal degrees, is compliant with the ISO 6709 data element for degrees. None of the other data elements has the potential for compliance with ISO 6709 for sexagesimal measure of latitude. The other latitude data elements in the registry have been assigned the registration status of incomplete, and many data elements are qualified (e.g., latitude where a facility is located, latitude of a smokestack). For the purpose of this example, none have the potential for being modified to meet the requirements of the ISO 6709 standard for latitude, measured in degrees, minutes, and seconds.

Therefore, in this example, the ISO 6709 latitude, sexagesimal measure, is selected for registration as a new data element.

6.4.3 Data element definition

The data element definition is formulated according to the rules and guidelines described in Annex B, based on ISO/IEC 11179-4. The rules require that a data element definition be unique within a registration authority, so the unit of measure has been included in the definition as "The sexagesimal measure of the angular distance on a meridian north or south of the equator." Including the unit of measure in the definition distinguishes the data element from the existing standard for latitude in the example registry. That standard data element is defined simply as "The measure of the angular distance on a meridian north or south of the equator." The definition is singular, because it refers to only one instance of the data value. Note that ISO 6709 does not include a definition for latitude.

6.4.4 Permissible values and value domain

ISO 6709 is an International Standard that does not list specific values that are valid for the data element; the measure of latitude is a non-enumerated domain. There are no stored permissible values in a registry for non-enumerated domains. A description of the data values for a non-enumerated domain is required. The values that are permissible for the ISO 6709 sexagesimal latitude data element are those values that conform to the description of the value domain and the attributes for datatype, unit of measure, and precision. The value domain name for sexagesimal latitude is "Sexagesimal Measures of Latitude," and the value domain definitions is "All sexagesimal measures of the distance of an angle north or south of the equator." This non-enumerated domain can be described as " Latitude measure on or north of the equator is positive; latitude measure south of the equator is negative. The range limit for degrees is 0-90, for minutes is 0-59, and for seconds is 0-59." By including the unit of measure in the definition, the value domain is distinguished from the value domain definition for latitude measured in degrees. The definition is plural, because it includes all possible measurements of latitude determined by this type of measurement.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Value domain information is recorded for this non-enumerated value domain. The ISO/IEC 11179-3 metamodel provides for the collection of administrative data for value domains.

Other value domain attributes for this example include the following.

- Item Identifier: A system generated identifier for the value domain and its version identifier.
- Name: Sexagesimal Measures of Latitude.
- Definition: All sexagesimal measures of the distance of an angle north or south of the equator.
- Description: Latitude measure on or north of the equator is positive; latitude measure south of the equator is negative. The range limit for degrees is 0-90, for minutes is 0-59, and for seconds is 0-59.
- Datatype: The datatype for latitude measure is "alphanumeric" to explicitly include the directional symbol and decimal point, where appropriate.
- Datatype schema/source: ANSI ISO SQL
- Maximum characters: The maximum field length for sexagesimal latitude is 13 (+/- DDMMSS.sssss), to accommodate up to five decimal places for seconds.
- Format: +/-DDMMSS to +/-DDMMSS.SSSSS.
- Unit of Measure: Latitude for this example is measured in sexagesimal units.
- Precision: The number of decimal places recorded indicates the precision of the measure.

6.4.5 Representation Class

The representation class "Measure" is selected for this data element from the administration record for representation class. The representation class qualifier "Sexagesimal" is assigned to this data element to distinguish the data element from one where the representation is "Degree."

6.4.6 Identifying and naming the data element

ISO/IEC 11179-5 requires that data elements be identified with a unique identifier and designated with one or more names, recorded in context.

6.4.6.1 Identifiers

A unique identifier is required for the latitude data element. For the registration authority in this example, the data element identifier and version identifier (DI:VI = 312345:1) are assigned automatically by the registry software. The IRDI for this example data element is {RAI} 312345 :1.

6.4.6.2 Name context and naming convention

For this ISO standard data element, the name is assigned with the context of "Registry," using the naming convention described in the example in Annex B, summarized as follows.

- Scope: The scope of this example naming convention is Registry Name.
- Authority: The authority for this example is the Environmental Data Registry.
- Semantic Rules: Names shall include an object class and a property, where appropriate. Qualifiers shall be used to differentiate between names that would otherwise be the same. The representation class term shall be included as the last term in the name.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Lexical Rules: A data element name shall have a maximum of 100 alphanumeric characters. The language of the registry shall be English.

- Name Uniqueness: Names shall be unique within a context for a particular registration authority.

6.4.6.3 Name the data element

Using the above naming convention, the name is entered with the context of "Registry." The convention specifies that the name should include the object "Latitude", to indicate the data values to be stored in the data element. Include the representation for the concept in the name; in this example "Measure." There is no requirement in ISO/IEC 11179-5 that data element names be unique in a registry. However, the naming convention used in this example specifies that names must be unique within a context for a particular registration authority. It is advisable to use a qualifier in the data element name to differentiate between data elements that might otherwise have the same name. The name includes the object (latitude) and the representation (measure). For this example, the name of the latitude data element will carry the qualifier "sexagesimal" as a discriminator. The name that has been derived for the latitude data element is "Latitude Sexagesimal Measure."

6.4.7 Other metadata attributes

Other metadata attributes that can be recorded at this time are the following.

- Provide an example of the data value that conforms to the description in the value domain, and to the datatype and other value domain attributes for this data element.

  Data Element Example: +674532 and +674531.85435

- Record the origin of this data element as the standard where the data element was identified.

  Data Element Origin: ISO 6709:1983 (E), *Standard representation of latitude, longitude and altitude for geographic point locations*.

- Record explanatory comments that contain additional information about the data element that is not appropriate for the definition.

  Data Element Explanatory Comment: Latitude sexagesimal converts to latitude degrees by the following formula: seconds/60 = minutes, decimal minutes/60 = decimal degrees.

- List the organization that submitted the data element for registration as the submitting organization.

  Submitting Organization: Office of Information Collection

- The organization or individual that has responsibility for maintaining and updating the data element is recorded as the stewardship contact for that data element.

  Stewardship Contact: Geographic Information Systems Administrator

Administrative metadata, such as Creation Date are recorded or captured automatically by the system where applicable. Other administrative data may be entered manually.

6.4.8 Data element concept

The methodology to be used for deriving a data element concept is described in Subclause 6.1.8 and Annex B of this Technical Report. Latitude is a distance measure, where measure is its representation. The data element concept for latitude measure is "Latitude Distance" with the definition, "A measure of the angular distance of a point on the surface of the earth north or south of the equator." Note that this concept definition incorporates the term "measure," which is a representation term. The concept of latitude, however, is the

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

measure of a distance. Therefore, it is appropriate in this instance to use the term measure when defining the concept. A data element concept is the data element without representation.

Administrative information must be collected about a data element concept. Therefore, both name and definition are recorded in context, which for this example is the context of the Registry (i.e., the rules that have been established by the registration authority for this example registry).

Both object classes and properties may be stored for data element concepts. For this example, Latitude is recorded as the object class and Distance as its property. No qualifiers are recorded.

A conceptual domain is a set of possible value meanings for a data element concept. The value meanings for this conceptual domain, however, are not enumerated. For non-enumerated domains, such as latitude distance measure, the value meanings are not explicitly identified. The conceptual domain for the Latitude Distance data element concept is the implied repository of all latitudes that mark positions on the earth with relation to the equator. The value meanings could be defined as "The distance measure of a point north or south of the equator that is <value>." No explicit value meanings are stored in the registry for latitude coordinates.

Recording of administrative information about conceptual domains is required according to the metamodel. An administered conceptual domain has the advantage of being maintained, with identification of the source of the information. This is especially appropriate where there is a possiblity that the domain will be reused. Names and definitions have been assigned to the conceptual domain, and the conceptual domain is treated as an administration record. The name of the conceptual domain is "Measures of Latitude" and the definition of the conceptual domain is "All latitude measures of points north or south of the equator."

6.4.9 Classification

This data element might be classified according to a source or by one or more of the following classification schemes.

- Identify one or more keywords, where the keyword is a name or subject matter descriptor that will facilitate grouping like data elements for retrieval.

  Keyword: Latitude, Horizontal Coordinate, Spatial

- Group Latitiude Sexagesimal Measure with similar data elements for translation or by general subject matter.

  Subject group: Geographic Point Location.

- One or more real world objects that identify this data element can be identified at this time.

  Object Class: Latitude

- Identify the abstraction layer of this data element:

  Layer of Abstraction Type: Generalization

© ISO/IEC 2003 - All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.4.10 Registration and administrative status informaiton

When all of the mandatory metadata attributes have been entered for this data element, it is assigned the registration status of "Recorded" and the administrative status of "In Quality Review." This data element was identified in an International Standard, and so would soon be updated to reflect a higher status of the data element. The data element, however, would not be expected to be assigned the status of "Standard." The data element is not expected to become the preferred representation for latitude measure, since geographic information specialists prefer that latitude and longitude be recorded in degrees. Therefore, after quality review has been completed, the data element will be assigned the registration status of "Certified" with an administrative status of "No further action."

The metamodel requires that both registration status and administrative status also be recorded for data element concept. The descriptions of registration and administrative statuses in Annex B also apply to data element concepts. When all of the mandatory metadata attributes have been entered for this data element concept, it is assigned the registration status of "Recorded" and the administrative status of "In Quality Review." Because the data element concept and its associated conceptual domain in this example were identified by an International Standard, the registration status will be updated to "Standard" with administrative status to "Final" for both, after the necessary quality reviews have been completed. The value domain for sexagesimal measure is based on the ISO 6709 standard, and is expected to become the standard value domain for sexagesimal latitude. Therefore, the registration status is assigned the value of "Standard" and the administrative status of "Final."

6.4.11 Other data elements in ISO 6709

ISO 6709 identifies five data elements: sexagesimal latitude, degrees latitude, sexagesimal longitude, degrees longitude, and altitude. The different formats represented by the units of measure for latitude (i.e., degrees and sexagesimal) express representation (i.e., unit of measure). The two latitude data elements from ISO 6709 are translatable at the concept level, based on their unit of measure representations. They share the same conceptual domain, because their implied value meanings are the same. Likewise, the longitude data elements share a longitude data element concept and conceptual domain, and longitude data can be translated based on unit of measure conversions.

Whereas the multiple data elements identified in ISO 3166 share the same data element concept and the same conceptual domain, the data elements identified in ISO 6709 do not share data element concepts and conceptual domains. All three concepts: latitude, longitude, and altitude, are distance measures. Latitude, however, is a north/south measure with respect to the equator; longitude is an east/west measure with respect to the prime meridian; and altitude is a vertical measure with respect to a point of reference such as sea level. Each has its own data element concept and its own conceptual domain.

These data elements do share classification. All can be classified as the group "Geographic Point Location."

6.4.12 Summary of metadata attributes

The following table summarizes the metadata attributes assigned to latitude sexagesimal measure in the preceding paragraphs in Subclause 6.4. The first column in Table 2 in Annex A also contains this metadata. A crosswalk of metadata attribute names used in this Technical Report to the actual ISO/IEC 11179-3 metamodel is provided in Annex C.

	Metadata Attribute Name	ISO 6709, Non-enumerated
1	**Data Element Definition**	
	Data Element (DE) Definition Context	Registry
	DE Definition	The sexagesimal measure of the angular distance of a position on the earth on a meridian north or south of the equator.
2	**Permissible Values and Value Domain**	

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Metadata Attribute Name		ISO 6709, Non-enumerated
	Permissible Values (each PV)	Measures of latitude in degrees, minutes, and seconds. (Informational only; not recorded for non-enumerated domains)
	PV Begin Date (each PV)	(Not applicable for non-enumerated domains)
	PV End Date (each PV)	(Not applicable for non-enumerated domains)
	Value Domain (VD) Context	Registry
	VD Name	Sexagesimal Measures of Latitude
	VD Definition	All sexagesimal measures of the distance of an angle north or south of the equator.
	VD Description	Latitude measure on or north of the equator is positive; latitude measure south of the equator is negative. The range limit for degrees is 0-90, for minutes is 0-59, and for seconds is 0-59.
	VD Item Identifier	{RAI} 9876:1
	Datatype	CHARACTER VARYING
	Datatype Schema/Source	ANSI ISO SQL
	Maximum Characters	13
	Format	+/-DDMMSS to +/-DDMMSS.SSSSS
	Unit of Measure	Sexagesimal
	Precision	Number of decimal places recorded.
	VD Origin	ISO 6709
	VD Explanatory Comment	(not applicable)
3	**Representation Class**	
	Representation Class	Measure
	Representation Class Qualifier	Sexagesimal
4	**Data Element Name and Identifier**	
	DE Name Context	Registry
	DE Name	Latitude Sexagesimal Measure
	DE Identifier	{RAI} 312345:1
5	**Other Data Element Attributes**	
	DE Example	+674532 and +674531.85435
	DE Origin	ISO 6709-1983 (E), Standard representation of latitude, longitude and altitude for geographic point locations.
	DE Explanatory Comment	Latitude sexagesimal converts to latitude degrees by the following formula: seconds/60 = minutes, decimal minutes/60 = decimal degrees.
	Submitting organization	Office of Information Collection
	Stewardship Contact	Geographic Information Systems Administrator
6	**Data Element Concept and Conceptual Domain**	

© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Metadata Attribute Name		ISO 6709, Non-enumerated
	Data Element Concept (DEC) Context	Registry
	DEC Name	Latitude Distance
	DEC Definition	A measure of the angular distance of a point on the surface of the earth north or south of the equator.
	Object Class	Latitude
	Object Class Qualifier	(Not applicable)
	Property	Distance
	Property Qualifier	(Not applicable)
	DEC Item Identifier	{RAI} 23456:1
	Conceptual Domain (CD) Context	Registry
	CD Name	Measures of Latitude
	CD Definition	All latitude measures of points north or south of the equator.
	CD Item Identifier	{RAI} 2532:1
	CD Origin	ISO 6709
	Non-Enumerated CD Description	Measures of latitude.
	Value Meaning (each VM)	(Not applicable for non-enumerated)
	VM Begin Date (each VM)	(Not applicable for non-enumerated)
	VM End Date (each VM)	(Not applicable for non-enumerated)
	VM Identifier (each VM)	(Not applicable for non-enumerated)
7	**Classification Type Examples**	Classification Values for Classification Type
	Keyword	Horizontal Coordinate, Spatial, Latitude
	Group	Geographic Point Location
	Object	Latitude
	Layer of Abstraction Type	Generalization
8	**Registration and Administrative Status Information**	
	DE Registration Status	Certified
	DE Administrative Status	No further action
	VD Registration Status	Standard
	VD Administrative Status	Final
	DEC Registration Status	Standard
	DEC Administrative Status	Final
	CD Registration Status	Standard
	CD Administrative Status	Final

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.5 Example of a standard data element that uses a standard non-enumerated domain

This clause provides a specific example of the registration of a data element from a national standard that uses the representation of a non-enumerated International Standard. The International Organization for Standardization (ISO) International Standard ISO 19115:—[1)], *Geographic information — Metadata*, defines a data element for latitude that uses a data representation prescribed by the ISO 6709 *Standard representation of latitude, longitude and altitude for geographic point locations*.

The table in Subclause 6.5.12 contains a summary of the metadata attributes recorded for this non-enumerated data element that is based on an national standard and an International Standard's value domain. Annex A also contains this metadata in the second column of Table 2.

6.5.1 Understanding the data element

Latitude is a measure of the angular distance on a meridian north or sourh of the equator. ISO 19115:—[1)], *Geographic information — Metadata*, uses the standard representation of Latitude Measure in its data elements for North Bounding Coordinate and South Bounding Coordinate. In this Technical Report, the example data element to be registered is North Bounding Coordinate. Bounding coordinates describe the limits of coverage of a data set expressed by latitude and longitude values.

6.5.2 Content research

Bounding coordinates, using both latitude and longitude to limit coverage of an area, are well defined and described in ISO 19115:—[1)], *Geographic information — Metadata.* The standard application data element is appropriate for entry into a metadata registry. The representation described is degree measure. In Clause 6.4, registration of the latitude sexagesimal measure from ISO 6709 was described. ISO 6709 is an International Standard for representation of spatial coordinates, describing representation for latitude and longitude as both degree and sexagesimal. Therefore, the ISO 6709 standard conceptual domain is appropriate for the North Bounding Coordinate data element, which must be represented in a standard format.

6.5.3 Data element definition

The data element definition, "The northern-most coordinate of the limit of coverage expressed in latitude" has been taken directly from ISO 19115:—[1)], *Geographic information — Metadata*, and entered with the context of "ISO Standard." The data element has also been defined in this example under the "Registry" context, which includes the representation as part of the definition (e.g., "The measure of latitude for the northern-most coordinate that limits coverage of a data set.")

6.5.4 Permissible values and value domain

The ISO metadata standard does not list specific values that are valid for the data element; the measure of latitude is a non-enumerated domain. There are no stored permissible values in a registry for non-enumerated domains. A value domain description is required for all non-enumerated value domains. The values that are permissible for the northern-most coordinate are those values that conform to the description of the value domain and the attributes for datatype, unit of measure, and precision. The value domain name for the north bounding coordinate is “Degree Measures of Latitude,” and the value domain can be defined as " All degree measures of the distance of an angle north or south of the equator." The value domain description is "Latitude measure on or north of the equator is positive; latitude measure south of the equator is negative. The range limit for degrees is –90.0 to +90.0." By including the unit of measure in the definition, the value domain is distinguished from the value domain definition for latitude measured in sexagesimal. The definition is plural, because it includes all possible measurements of latitude determined by this type of measurement.

1) To be published.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Value domain information must be recorded. The ISO/IEC 11179 metamodel provides for the mandatory collection of administrative data for value domains. The value domain for this appllication data element is not the same representation as that described in Subclause 6.4, requiring a different value domain and different administrative data.

Other value domain attributes for this example include the following.

- Item Identifier: A system generated identifier for the value domain and its version identifier.
- Definition: All degree measures of the distance of an angle north or south of the equator.
- Description: Latitude measure on or north of the equator is positive; latitude measure south of the equator is negative. The range limit for degrees is –90.0 to +90.0.
- Datatype: The datatype for latitude measure is "CHARACTER VARYING" to explicitly include the directional symbol and decimal point, where appropriate.
- Datatype Schema/Source: ANSI ISO SQL.
- Format: The output format is +/-DD.D to +/-DD.DDDDDD.
- Maximum characters: The maximum field length is determinded to be 10 (+/- DD.DDDDDD), to accommodate up to six decimal places for degrees.
- Unit of Measure: Latitude for this example is measured in degree units.
- Precision: The number of decimal places recorded indicates the precision of the measure.

6.5.5 Representation Class

The representation class "Measure" is selected for this data element from the administration record for representation class. The representation class qualifier "Degree" is assigned to this data element to distinguish the data element from one where the representation is "Sexagesimal."

6.5.6 Identifying and naming the data element

6.5.6.1 Identifiers

A unique identifier is required for the latitude data element. For the registration authority in this example, the data element identifier and version identifier (DI:VI = 20875:1) are assigned automatically by the registry software. The IRDI for this example data element is {RAI} 20875 :1.

6.5.6.2 Name context and naming convention

In this example, the data element is assigned two names, each with its own context. First is the "ISO Standard context," since this data element was identified as being part of a standard, and retention of the name used by the standard is valuable for documentation. The naming convention that has been established for context for this standard is as follows.

- Scope: The scope of this example naming convention is ISO Standard.
- Authority: The authority for this example is the Internation Organisation for Standardisation, Technical Committee 212.
- Semantic Rules: Object, property, and representation class term need not be included in the name. Qualifiers shall be used to differentiate between names that would otherwise be the same. The name in the metadata registry shall be the same as that designated in the ISO standard.

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Lexical Rules: A data element name shall have a maximum of 100 alphanumeric characters. The language of the registry shall be English.

- Name Uniqueness: Names shall be unique within a context for a particular registration authority.

The second name to be assigned to this data element has the context Registry. It follows the naming convention for "Registry" name context, as described in Annex B.

- Scope: The scope of this example naming convention is Registry name.

- Authority: The authority for this example is the Environmental Data Registry.

- Semantic Rules: Names shall include an object class and a property, where appropriate. Qualifiers shall be used to differentiate between names that would otherwise be the same. The representation class term shall be included as the last term in the name.

- Lexical Rules: A data element name shall have a maximum of 100 alphanumeric characters. The language of the registry shall be English.

- Name Uniqueness: Names shall be unique within a context and registration authority.

6.5.6.3 Name the data element

Using the ISO naming convention, the name is entered with the context of "ISO Standard." The naming convention for that standard specifies that the name in the metadata registsry should be the same as listed in the standard, which is "North Bounding Coordinate." The Registry name includes the object (latitude), a variation of the property (bounding) and property qualifier (North) and the representation (measure). The Registry name that has been derived for the latitude data element is " Northern-most Latitude Measure."

6.5.7 Other metadata attributes

Other metadata attributes that can be recorded at this time are the following.

- Provide an example of the data value that conforms to the description in the value domain, and to the datatype and other value domain attributes for this data element.

  Data Element Example: +62.98

- Record the origin of this data element as the standard where the data element was identified.

  Data Element Origin: ISO/FDIS 19115, *Geographic information — Metadata*.

- Record explanatory comments that contain additional information about the data element that is not appropriate for the definition.

  Data Element Explanatory Comment: The northern most coordinate might refer to a point or a line that bounds a rectangle. Latitude decimal converts to latitude sexagesimal by the following formula: Decimal degrees x 60 = minutes, decimal minutes x 60 = seconds

- List the organization that submitted the data element for registration as the submitting organization.

  Submitting Organization: Office of Information Collection

- The organization or individual that has responsibility for maintaining and updating the data element is recorded as the stewardship contact for that data element.

  Stewardship Contact: Geographic Information Systems Administrator

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Administrative metadata, such as Creation Date are recorded or captured automatically by the system where applicable. Other administrative data may be entered manually.

6.5.8 Data element concept

The methodology to be used for deriving a data element concept is described in Subclause 6.1.8 and Annex B of this Technical Report. A data element concept is the data element without representation. The data element concept has been designated as North Bounding Latitude. This incorporated the object (latitude) with its property (bounding) and the property qualifier (north). Note that another data element concept included in the ISO standard, identifies a south bounding coordinate (also a measure of latitude), making the property qualifier necessary.

Administrative information must be collected about a data element concept. Therefore, both name and definition are recorded in context, which for this example is the context of the Registry (i.e., the rules that have been established by the registration authority for this example registry).

Both object classes and properties may be stored for data element concepts. For this example, "Latitude" is recorded as the object class and "Bounding" as its property. The property qualifier (North) is recorded.

A conceptual domain is a set of possible value meanings for a data element concept. The value meanings for this conceptual domain are not enumerated. For non-enumerated domains, such as bounding latitude, the value meanings are not explicitly identified. The conceptual domain for the North Bounding Latitude data element concept is the implied repository of all latitudes that mark positions on the earth with relation to the equator. The value meanings could be defined as "The distance measure of a point north or south of the equator that is <value>." No explicit value meanings are stored in the registry for latitude coordinates. Recording of administrative information about conceptual domains is required according to the ISO/IEC 11179-3 metamodel. An administered conceptual domain has the advantage of being maintained, with identification of the source of the information. This is especially appropriate where there is a possiblity that the domain will be reused. The name of the conceptual domain for this data element concept is "Measures of Latitude" and the definition of the conceptual domain is "All latitude measures of points north or south of the equator." This is the same conceptual domain that was described in Subclause 6.4, and it is, therefore, reused for this data element concept.

6.5.9 Classification

The data element in this example might be classified according to its source or by one or more of the following classification schemes.

- Identify one or more keywords, where the keyword is a name or subject matter descriptor that will facilitate grouping similar data elements for retrieval.

  Keyword: Latitude, Horizontal Coordinate, Spatial

- Group Latitiude Degree Measure with similar data elements for translation, or by general subject matter.

  Subject group: Geographic Point Location, Bounding Coordinates.

- One or more real world objects that identify this data element can be identified at this time.

  Object Class: Latitude

- Identify the abstraction layer of this data element:

  Layer of Abstraction Type: Specialization

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.5.10 Registration and administrative status information

When all of the mandatory metadata attributes have been entered for this data element, it is assigned the registration status of "Recorded" and the administrative status of "In quality review." This data element was identified in an International Standard, and so would soon be updated to reflect a higher status of the data element. This application data element would not be expected to become the preferred representation for latitude measure, and would not be assigned the status of "Standard." After quality review has been completed, the data element will be assigned the registration status of "Certified" with an administrative status of "No further action."

The ISO/IEC 11179-3 metamodel requires that both registration status and administrative status be recorded for data element concept. The descriptions of registration and administrative statuses in Annex B for data elements also apply to data element concepts and other administration records. When all of the mandatory metadata attributes have been entered for this data element concept, it is assigned the registration status of "Recorded" and the administrative status of "In Quality Review." Because the data element concept in this example was identified by a national standard and because it is not expected to become the preferred data element concept for latitude degree measure, the registration status will be updated to "Certified" with administrative status of "No further action," after the necessary quality review has been completed.

The conceptual domain was identified as an International Standard, and it has been reused from the conceptual domain descibed in Subclause 6.4. Although no value meanings were recorded for the conceptual domain, after quality review it is assigned the registration status of "Standard" and the administrative status of "Final." The value domain for this example is expected to be the standard for degrees latitude, and it will be assigned the registration status of "Standard" and administrative status of "Final."

6.5.11 Related data elements

The ISO metadata standard includes bounding coordinates as a group of data elements that establish the spatial domain of a data set. These coordinates include North and South Bounding Coordinates, both of which are latitude measures, and East and West Bounding Coordinates, both of which are longitude measures. A Registration Authority might choose to register all four of these data elements and classify them as Bounding Coordinates.

6.5.12 Summary of attributes

The following table summarizes the metadata attributes assigned to North Bounding Coordinate in the preceding paragraphs in Subclause 6.5. Table 2 in Annex A also contains this data in the first metadata column. A crosswalk of metadata attribute names used in this Technical Report to the actual ISO/IEC 11179-3 metamodel is provided in Annex C.

Metadata Attribute Name		National Standard Application	
1	**Data Element Definition**		
	Data Element (DE) Definition Context	Standard	Registry
	DE Definition	The northern-most coordinate of the limit of coverage expressed in latitude.	The measure of latitude for the northern-most coordinate that limits coverage of a data set.
2	**Permissible Values and Value Domain**		
	Permissible Values (each PV)	Measures of latitude expressed in degrees and decimal degrees. (Informational only; not recorded for non-enumerated domains)	
	PV Begin Date (each PV)	(Not applicable for non-enumerated domains)	
	PV End Date (each PV)	(Not applicable for non-enumerated domains)	

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Metadata Attribute Name		National Standard Application	
	Value Domain (VD) Context	Registry	
	VD Name	Degree Measures of Latitude	
	VD Definition	All degree measures of the distance of an angle north or south of the equator.	
	VD Description	Latitude measure on or north of the equator is positive; latitude measure south of the equator is negative. The range limit for degrees is –90.0 to +90.0.	
	VD Item Identifier	{RAI} 9877:1	
	Datatype	Alphanumeric	
	Datatype Schema/Source	ANSI ISO SQL	
	Maximum Characters	10	
	Format	+/-DD.D to +/-DD.DDDDDD	
	Unit of Measure	Degree	
	Precision	Number of decimal places recorded	
	VD Origin	ISO 6709	
	VD Explanatory Comment	(Not applicable)	
3	**Representation Class**		
	Representation Class	Measure	
	Representation Class Qualifier	Degree	
4	**Data Element Name and Identifier**		
	DE Name Context	Standard	Registry
	DE Name	North Bounding Coordinate	Northern-most Latitude Measure
	DE Identifier	{RAI} 20875:1	
5	**Other Data Element Attributes**		
	DE Example	+62.98	
	DE Origin	FGDC Content Standard for Digital Geospatial Metadata	
	DE Explanatory Comment	The northern-most coordinate might refer to a point or a line that bounds a rectangle. Latitude degree converts to latitude sexagesimal by the following formula: Decimal degrees x 60 = minutes, decimal minutes x 60 = seconds	
	Submitting organization	Office of Information Collection	
	Stewardship Contact	Geographic Information Systems Administrator	
6	**Data Element Concept and Conceptual Domain**		
	Data Element Concept (DEC) Context	Registry	
	DEC Name	North Bounding Latitude	

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Metadata Attribute Name		National Standard Application
	DEC Definition	A measure of angular distance on a meridian north or south of the equator that is the northern most limit of coverage.
	Object Class	Latitude
	Object Class Qualifier	(Not applicable)
	Property	Bounding
	Property Qualifier	North
	DEC Item Identifier	{RAI} 23457:1
	Conceptual Domain (CD) Context	Registry
	CD Name	Measures of Latitude
	CD Definition	All latitude measures of points north or south of the equator.
	CD Item Identifier	{RAI} 2532:1
	CD Origin	ISO 6709
	Value Meaning (each	(Not applicable for non-enumerated)
	VM Begin Date (each	(Not applicable for non-enumerated)
	VM End Date (each VM)	(Not applicable for non-enumerated)
	VM Identifier (each VM)	(Not applicable for non-enumerated)
7	**Classification Type Examples**	Classification Values for Classification Type
	Keyword	Horizontal Coordinate, Spatial, Latitude
	Group	Geographic Point Location, Bounding Coordinates
	Object	Latitude
	Layer of Abstraction Type	Specialization
8	**Registration and Administrative Status Information**	
	DE Registration Status	Certified
	DE Administrative Status	No further action
	VD Registration Status	Standard
	VD Administrative Status	Final
	DEC Registration Status	Certified
	DEC Administrative Status	No further action
	CD Registration Status	Standard
	CD Administrative Status	Final

© ISO/IEC 2003 - All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.6 Classification of data elements

The registration authority may determine that is appropriate to group certain data elements, out of some observed relationship among the data elements or a perceived value in identifying those data elements together. This grouping is referred to as a classification of the data elements. Data elements may be classified by grouping them according to the documents, systems or other sources where the data elements are identified. After the data elements that are to be associated with the source have been identified, the source itself is registered with the metadata that provides certain information about the source/classification. The metadata answers the following questions: How is the source identified? Why has the group of data elements been established? What is the authority for this classification or grouping of data elements? What is the potential use for the group of data elements? The examples provided in this clause describe how to formulate attributes about a document, system, or other source of data element classification. First a general procedure for registering data element classifications is described, followed by examples of registration of three types of data element classifications, including data elements from the following.

- A document that contains a list of data elements.
- A standard that identifies a group of standard data elements.

Other classifications of data elements might be identified in a registry, such as the following examples:

- An entity for a computer information system (e.g., mailing address data elements).
- A classification of data elements (e.g., geopolitical data elements).
- Data elements that comprise an information system (e.g., data elements in a hazardous waste management system).
- Data elements that are used in a data collection form.

These other classifications of data element would also be registered according to the general procedures that follow.

6.6.1 General procedures for registering a classification of data elements

The steps required to register a group of data elements by a classification are similar to those required for registering a data element. First the practitioner must understand the need for the group, identify the data elements to be contained in the group, and the source of the group of data elements.

6.6.1.1 Understanding the classified group

The perceived need for the classified group must first be identified. Will the data elements to be grouped serve a purpose such as facilitating the development of an information system, identification of all of the data elements that comprise a standard, or documentation of the data that exists in an information system?

Are there other classifications in the registry or federation of registries that provide similar groupings of data elements? Can the other groups be modified so that they meet the newly identified need for a group of data elements? For example, where there is a group of data elements contained in an International Standard, is there a need for a group of data elements that meets a specific organizational need for the same or similar data elements?

6.6.1.2 Specify the data elements

Where the need for classification of a group of data elements has been established, the next step is to identify the specific data elements to be grouped together in the registry. Are the data elements to be used together for purposes of data conversion (e.g., conversion of codes to names or conversion of data values based on units of measure)? Are all of the data elements in a group required to be present to represent a particular type

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

of data (i.e., mandatory), or are some of the data elements optional? Are some of the data elements used conditionally (i.e., required if some other data element is or is not included when the group is used together)?

6.6.1.3 Understanding the source of the group of data elements

Classification of a group of data elements in a registry requires that certain characteristics of the group be recorded to clearly describe and define it. The data elements are then associated with the group. The characteristics are stored as attributes of the group. Attributes specific to a group, as defined by one registration authority are the following.

- Type of Source: Document, system, standard, or other source of the data elements to be grouped. The name of the type of source is the classification scheme type name.
- Name/Title: The name or title of the classification for a group of data elements.
- Definition: Text that describes the features of, specifies relationships of, or establishes the context for classification of a group of data elements.
- Organization: The originating point of information that provides an authoritative reference for a group of data elements.
- Explanatory Comment: The text that explains the reasons for using the selected source materials in development of a group of data elements and describes how a group of data elements can be used.
- Item Identifier: The system generated identifier for a classified group of data elements, including the RAI, group ID and VI. Other administrative information, such as Creation date is recorded or captured from the system when the classification is entered into the registsry. Registration status and administrative status are recorded, following the same general guidelines as for other associated metadata items. Subclause 6.5 is not comprehensive for recording a fully defined classification scheme. Therefore, for the examples in this Technical Report, registration status is assigned the value of "Incomplete," and administrative status is assigned the value of "Awaiting information."

6.6.2 Data elements in a document

The Federal Geographic Data Committee document that records the proposed data elements for unique identification of a facility is an example of data elements in a document that might be grouped together.

6.6.2.1 Understanding the classified group

The document, *Facility Location and Identification Data Standard*, is being reviewed by the Federal Geographic Data Committee (FGDC) as a proposed standard to be used for locating and identifying facilities of interest to the Federal Government and to the private sector of the United States. The document contains a core set of the minimum amount of information necessary to uniquely identify a facility. The group of data elements can be used by other organizations to ensure that their facility information management systems support the identification of place-based objects that are generally known as facilities.

There are no other national or International Standards that contain the same core set of data elements as the FGDC proposed standard. The standard for the Agency responsible for the registry used for this example includes more detailed data elements than those required by the FGDC proposed standard.

6.6.2.2 Specify the data elements

The core set of data elements that are used to locate and identify facilities includes the following.

- Facility Name: The public or commercial name of a facility, such as is commonly recognized by the local community.

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 - All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Facility Category Type: A descriptor that indicates the type of activity that takes place at the facility or the general purpose of the facility.
- Facility Identification Number: The non-intelligent, unique identification number assigned to a facility.
- Latitude Measure: The measure of the angular distance on a meridian north or south of the equator.
- Longitude Measure: The measure of the angular distance on a meridian east or west of the prime meridian.

All data elements in the above core set are listed as mandatory (i.e., they must all be present to uniquely identify a facility).

6.6.2.3 Understanding the source of the group of data elements

The characteristics of the group of facility identification data elements includes the following:

- Type of Source/Classification Type: Document
- Name/Title: Federal Geographic Data Committee *Facility Location and Identification Standard*.
- Definition: The document provides a core set of standardized data elements that supports the location and identification of place-based objects that are generally known as facilities. Facilities incorporate the properties of being objects established at specific places for specific purposes.
- Organization: Federal Geographic Data Committee, Facility Working Group
- Explanatory Comment: The FGDC facility standard was selected for developing this core set of data elements, because it is intended to become a standard for U.S. Federal Agencies and the private sector. The purpose of the document is to facilitate the development and promulgation of a standard that supports identification of place-based objects generally known as facilities.
- Item Identifier: The system generated identifier for this group {RAI}1243:1.
- Registration status: Incomplete.
- Administrative status: Awaiting information.

6.6.3 Data elements in a standard

The data elements listed in the ISO 6709 standard representation of latitude, longitude and altitude for geographic point locations was selected for this example.

6.6.3.1 Understanding the classified group

An example of a group of data elements that are used together, both for the purpose of data translation and for identifying a precise location, is the ISO 6709 group of data elements that specify the standard representation of latitude, longitude, and altitude for geographic point locations.

6.6.3.2 Specify the data elements

Data elements for a Geographic Point Location group, based on ISO 6709, include the following data elements.

- Latitude Degrees Measure. The measure in degrees of the angular distance of a position on earth on a meridian north or south of the equator.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Longitude Degrees Measure. The measure in degrees of the angular distance of a position on earth on a meridian east or west of the prime meridian.

- Altitude Measure. The measure of the distance in meters of a position above or below the surface of a reference datum.

- Latitude Sexagesimal Measure. The sexagesimal measure of the angular distance of a position on earth on a meridian north or south of the equator.

- Longitude Sexagesimal Measure. The sexagesimal measure of the angular distance of a position on earth on a meridian east or west of the prime meridian.

The latitude and longitude data elements provide information about the formats and units of measure that enable translation (i.e., conversion) of the data for data sharing. The rules associated with the standard provide instructions for grouping the data elements for data sharing (e.g., latitude and longitude must be measured by the same unit when grouped together for data transfer, and they must precede the altitude measure).

6.6.3.3 Understanding the source of the group of data elements

The characteristics of the group of locational representation data elements includes the following.

- Type of Source/Classification Type: International data standard.

- Name/Title: *Standard representation of latitude, longitude and altitude for geographic point locations*, International Organization for Standards, ISO 6709, 1983-05-15.

- Definition: The standard includes the horizontal and vertical coordinates that define a point on earth.

- Organization: International Organization for Standardization.

- Explanatory Comment: ISO data standards are used internationally for consistent representation of data that enables data sharing. The standard also provides rules for formatting spatial data transfer files. The geographic point locations group is used by system developers to develop a system entity for spatial data, to develop translation software, and data transfer files.

- Item Identifier: The system generated identifier for this group is {RAI} 1345:1.

- Registration status: Incomplete.

- Administrative status: Awaiting information.

6.7 Linking of data elements

The ISO/IEC 11179-3 metamodel does not provide for linking of data elements. A registration authority, however, might choose to extend the model to link data elements based on their layers of abstraction, including generalization to specialization, and other relationships. Linkages can occur in both vertical relationships (e.g., from general to more specific) and horizontal relationships (e.g., with equivalent layers of specialization). They can also be linked according to other relationships (e.g., data elements that are always used together). These are defined as follows.

- Vertical relationships are those where a specialized data element that has been registered for a particular purpose is related to a generalized data element that is intended for a general purpose. For example, the following data elements can be linked vertically in parent/child relationships, based on 3 layers of generalization/specialization where 1 is the most general. The vertical linkages are incremented by one for each layer of specialization:

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

1. State USPS Code: The U.S. Postal Service abbreviation that represents a state or state equivalent for the U.S. (DI:VI 48:1)

2. Mailing Address State Code: The alphabetic code assigned by the U.S. Postal Service that represents the state where the mail is delivered. (DI:VI 5408:1)

3. Facility Mailing Address State Code: The code that represents a state of the United States in the mailing address for a facility. (DI:VI 5680:1)

- Horizontal relationships are those where data elements with different names have equivalent definitions that represent the same layer of specialization, with equivalent data value domains. For example, the following data elements can be linked horizontally as equivalent layers of specialization in Envirofacts, a data warehouse of EPA environmental systems.

The third layer: Facility Mailing Address State Code (DI:VI 5680:1) is linked horizontally to:

3.a PCS_PERMIT_FACILITY.MAILING_STATE - The state in the primary facility mailing address. (DI:VI 24684:1)

3.b BRS_SITE_INFORMATION.MAIL_STATE - The two-character state postal code for the site's mailing address. (DI:VI 23984:1)

3.c RCR_MAILING_LOCATION.STATE - The two-letter postal code for the state in the address associated with the facility mailing address. (DI:VI 24528:1)

- Related Through Use

An example of data elements that are related through use are data elements where values are recorded that must always be accompanied by a data element that records the unit of measure for that value. Data elements of this type are the following.

— Sample Quantity. The volume of sample that was collected.

— Sample Quantity Units Code. The code that represents the unit of measure for the volume of collected sample.

7 Example of top-down approach to data element registration

A top-down approach is useful in many circumstances. Although it requires more "up front" effort than the bottom-up approach, top-down registration has the potential to produce more stable and uniform metadata. A top-down approach to data element registration is used where information available to the practitioner provides an overall understanding of the data element, including knowledge of its characteristics and relationships. The practitioner can then identify and define objects and properties upon which data element concepts are based. The top-down procedure involves the following steps.

- Determine the classification/source and context of the data elements to be registered.

- Identify the object classes and properties upon which data element concepts are based. Formulate the data element concepts, including the conceptual domains and the value meanings they represent.

- Define and identify the data elements that will contain the data values.

- Identify the value domains and permissible values that represent the data value meanings.

- Record other data element metadata attributes.

- Classify the data element.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Record registration and administrative status information.

The following scenario illustrates the top-down approach to registering data elements. The scenario describes an example where professional organizations wish to track the ability of experts to communicate in various languages. For this example, assume that the submitting organization was the "Federation of Professional Associations."

7.1 Classification and Context

Data elements are often classified by the source or origin of those data elements. They might be classified by a document that establishes the scenario for registering the data elements, an information system that records data about those data elements, or other means of grouping for top-down data elements. For this example, the classification is assumed to be an information system that stores data about the skill levels of language experts in professional associations. The following data is to be recorded.

- Classification scheme type name, in this case "data system."
- Classification scheme type value, in this case "Language Expertise."
- Item identifier, in this case the {RAI}, data and version identifiers are assigned by the Registration Authority of the metadata registry to be {RAI} 991:1.
- Item name or designation, in this case, the "Language Expertise Data System."
- Item definition, in this case "The data system that collects, stores, and reports information about professional experts who have communications skills in foreign languages."
- Organization name, in this case "Federation of Professional Associations."
- Submission contact, in this case " Board of Directors of the Federation of Professional Associations (FPA).
- Create date, captured from the system date for the date when the classification scheme was registered.
- Registration and administrative statuses for the classification, in this case a registration status of "Recorded" when all mandatory information has been entered into the registry, and an administrative status of "In quality review."
- Other administrative data, including optional attributes such as explanatory comments.

Data elements and their associated metadata items, i.e., data element concepts, conceptual domains, and value domains, are registered with name and definition contexts as established for the context "Language Expertise Data System."

The convention for establishing the context for names and definitions for data elements can be described as the following.

- Scope: The scope of this example convention is Language Expertise Data System.
- Authority: The authority for this example is the Federation of Professional Associations.
- Semantic Rules: Names shall include an object class and a property, where appropriate. Qualifiers shall be used to differentiate between names that would otherwise be the same.
- Lexical Rules: Names shall have a maximum of 100 alphanumeric characters; definitions a maximum of 240 characters. The language of the registry shall be English.
- Uniqueness: Names and definitions shall be unique within a context and registration authority.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.2 Objects and properties of data element concepts

Data element concepts may be constructed from the object classes that are relevant to the concept. The example scenario includes multiple object classes, including the following.

- Organization: a group of persons organized for some purpose or to perform some function.
- Expert: a person who has special skill or knowledge in some particular field.
- Language: any system of linguistic signs or symbols used as a means of conveying thought.
- Level: a position or plane in a graded scale of values.
- Skill: the ability to do something well.

Object classes are administration records in an ISO 11179 metadata registry. The first step in top-down registration is to determine if the above object classes exist in the metadata registry. Where they exist, they are used in the creation of data element concepts. Where they do not exist in the registry, both name and definition should be entered at that time, in the context in which they have been identified. Identifiers and other administrative data for object classes are also registered at this time. Identifiers are generated according to the same algorithms as for other data item identifiers, i.e., RAI, data and version identifier.

Object classes can be modified by properties (i.e., essential, distinctive attributes or quality of a thing). Where necessary, qualifiers (a word that modifies or limits in some way) may be used for both object classes and properties. Properties are also administration records in a registry. A list of properties follows. These are the properties that are needed to modify the object classes listed above for the example scenario described in Clause 7. The practitioner should determine if the following list of properties exists in the registry. If so, they should be used in the creation of data element concepts; if not, they should be registered at this time. Names and definitions are needed, as well as administrative infomation, including item identifiers. The list of properties is as follows.

- Type: a number of things sharing a particular characteristic that causes them to be regarded as a group, class or category.
- Discriminator: a term that makes or constitutes a difference or distinction in or between objects.
- Identifier: a linguistically neutral sequence of characters, capable of uniquely identifying that with which it is associated, within a specified context.

Object classes can be used as properties (e.g., language is an object class that identifies the language used, as in Language Name; language is a property when describing a type of expertise, as in Language Expert).

Using the above objects and properties, the following data element concepts are identified and their attributes, including conceptual domains and value meanings, are formulated, using the following table to demonstrate their content. Item identifiers are also included in the table.

Data Element Concept	Object	Object Identifier	Object Qualifier	Property	Property Identifier	Property Qualifier
Professional organization identifier	Organization	{RAI} 881:1	Professional	Identifier	{RAI} 771:1	(not applicable)
Language expert identifier	Expert	{RAI} 882:1	Language	Identifier	{RAI} 771:1	(not applicable)
Language skill type	Skill	{RAI} 883:1	Language	Type	{RAI} 772:1	(not applicable)

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element Concept	Object	Object Identifier	Object Qualifier	Property	Property Identifier	Property Qualifier
Natural language identifier	Language	{RAI} 884:1	Natural	Identifer	{RAI} 771:1	(not applicable)
Skill level discriminator	Level	{RAI} 885:1	Skill	Discriminator	{RAI} 773:1	(not applicable)

After identifying the data element concepts that are needed to represent the scenario described (i.e., an example where professional organizations wish to track the ability of experts to communicate in various languages), each data element concept is analyzed and the appropriate items and attributes are formulated to register the resultant data elements in the registry. In the following subclauses, each of the five data element concepts is addressed individually, using top-down procedures. A summary of all attributes formulated for this example is provided in Annex A, Tables 3 and 4.

7.3 Professional organization identifier example

7.3.1 Data element concept, conceptual domain and value meanings

The data element concept is based on the object class, "Organization," its qualifier "Professional," and property "Identifier." The data element concept "Professional organization identifier" is defined according to ISO 11179-4 as "An identifier that recognizes or establishes the identity of a professional organization." Both name and definition of this data element concept must be registered in context, as is described in Annex B. For this example of top-down registration, the context "Language Expertise Data System," described in Clause 7, is used.

The conceptual domain for this data element concept is designated to be "Professional Organizations," defined as "All associations that pertain to, or are connected with a profession." The conceptual domain for "Professional Organizations" is not enumerated, since the set of potential organizations is not limited. Therefore, no explicit value meanings are recorded. The value meanings for this data element concept are considered to be "The professional organization known as <*identity*>." The origin of the conceptual domain is the name of the organization that requested data elements for the example scenario to be registered in the metadata registry, in this case the Federation of Professional Associations.

Identifiers for data element concepts and conceptual domains were described in Clause 6 and Annex B. Identifiers are assumed to be automatically generated by the registry application software for this example. For this example, the data element concept identifier is {RAI} 234:1. The conceptual domain identifier for this example is {RAI} 345:1.

7.3.2 Define and identify data elements

7.3.2.1 Data element definition

At this point in a top-down registration, the data element should be defined. Using the rules and guidelines for data element definitions described in ISO 11179-4, the following definition is formulated: "The name of a professional organization." Note that both of the terms "professional" and "organization" were defined as Object Classes and Properties. More than one definition can be formulated, each registered in context, where the meaning of each definition is exactly the same. The Language Expertise Data System context is used for the above definition.

7.3.2.2 Representation Class

The representation class selected for this data element is "Name," defined as "A word or combination of words by which a person, place, thing, or any object of thought is designated, called, or known." Representation class may be administered in an ISO 11179 registry, meaning that administrative data may be registered with it. Names, codes, and other frequently used representation classes are expected to exist in the registry.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Where the representation class, "Name," exists, it should be associated with this data element; where it does not exist, the name and definition should be recorded in the registry, where an identifier will be assigned. Note that representation class is not a required attribute in the metamodel, and representation class is not required to be an administration record in the registry.

7.3.2.3 Data element name and identifier

One or more data element names can be formulated at this time, each to be registered in context, using the guidelines described in ISO 11179-5. For this example, the name of the data element is based on the representation of the data element concept, in this case "Professional Organization Name." The context for this name is assumed to be Language Expertise Data System. The data element identifier is assigned in this registry by the registry software, according to the procedure described in ISO 11179-5. For this data element, the identifier is {RAI} 123:1.

7.3.3 Specify value domain and permissible values

The value domain for this data element is not enumerated. There is no specific list of permissible values for this data element containing names of professional organizations. Non-enumerated value domains require a name, definition, identifier, and a description of the appropriate values. The professional organization names must conform to the value domain description, which in this example is "Variable length character strings of names of organizations." Other value domain attributes for this example include the following.

- Identifier: A system generated identifier for the value domain and its version identifier, in this case assumed to be {RAI} 521:1.
- Item name: Professional organization names.
- Definition: All names of professional organizations.
- Description:Variable length character strings designating names of organizations.
- Datatype: The datatype is "CHARACTER VARYING."
- Datatype scheme/source: ANSI ISO SQL
- Maximum characters: The maximum field length for this data element is estimated to be 40 characters.

Administrative data are required for the value domain of a data element. The Creation Date is captured from the system date in this example registry. Registration and administrative statuses will be assigned the values "Recorded" and "In quality review" respectively, after all mandatory attributes have been completed for this administration record.

7.3.4 Other data element attributes

- Select the example for this data element; it must conform to the definition in the value domain.

  Data Element Example: United Teachers' Association

- Identify the origin for this data element as the standard from which the permissible values are obtained.

  Data Element Origin: Federation of Professional Associations (FPA)

- Record any notes or comments that might provide additional information about the data element that is not included in the definition.

  Data Element Explanatory Comment: None provided.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Submitting organization and stewardship contact were identified as part of the Classification Scheme, described in Subclause 7.1.

Other administrative metadata, such as Creation Date are recorded or captured automatically by the system where applicable. Other administrative data may be entered manually.

7.3.5 Classify the data element

In addition to its classification by data system, as described in Subclause 7.1, the data element "Professional Organization Name" can be classified according to the following Object Class: Organization

It might also be classified according to other groupings.

7.3.6 Registration and administrative status information

After all mandatory attributes have been recorded, the data element, value domain, data element concept, and conceptual domain in this example have the registration status of "Recorded" and an administrative status of "In Quality Review." They might be advanced to a registration status of "Certified" and an administrative status of "No further action" after quality review. They are not expected to become standards, since the data element was not identified by a standard and is not expected to become a preferred data element.

7.3.7 Summary of attributes

A summary of the data element associated metadata items and their attributes is provided in Annex A, Table 3, Top-Down Registration for Data Elements for Skill Levels of Language Experts.

7.4 Language expert identifier example

7.4.1 Data element concept, conceptual domain and value meanings

The data element concept is based on the object class, "Expert," object qualifier "Language," and property "Identifier." The data element concept "Language expert identifier" is defined according to ISO 11179-4 as "An identifier that recognizes or establishes the identity of a language expert." Both name and definition of this data element concept must be registered in context, as is described in Annex B. For this example of top-down registration, the context "Language Expertise Data System," described in Clause 7, is used.

The conceptual domain for this data element concept is designated to be "Language Experts," defined as "All persons with expertise in languages." The conceptual domain for "Language Experts" is not enumerated, since the set of persons with language expertise is not limited. Therefore, no explicit value meanings are recorded. The value meanings for this data element concept are considered to be "The language expert known as <person>." The origin of the conceptual domain is the name of the organization that requested that data elements for the example scenario be registered in the metadata registry, in this case the Federation of Professional Associations.

Identifiers for data element concepts and conceptual domains were described in Clause 6 and Annex B. Identifiers are assumed to be automatically generated by the registry application software for this example. For this example, the data element concept identifier is {RAI} 235:1. The conceptual domain identifier for this example is {RAI} 346:1.

7.4.2 Define and identify data elements

7.4.2.1 Data element definition

At this point in a top-down registration, the data element should be defined. Using the rules and guidelines for data element definitions described in ISO 11179-4, the following definition is formulated: "The name of a person with language expertise." Note that both of the terms "language" and "expert" were defined as Object Classes. Language in this example is used as a qualifier. More than one definition can be formulated, each

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

registered in context, where the meaning of each definition is exactly the same. The Language Expertise Data System context is used for the above definition.

7.4.2.2 Representation Class

The representation class selected for this data element is "Name," defined as the "A word or combination of words by which a person, place, thing, or any object of thought is designated, called, or known." Registration of Name as a representation class was described in Subclause 7.3.2.2.

7.4.2.3 Data element name and identifier

One or more data element names can be formulated at this time, each to be registered in context, using the guidelines described in ISO 11179-5. For this example, the name of the data element is based on the representation of the data element concept, in this case "Language Expert Name." The context for this name is assumed to be Language Expertise Data System. The data element identifier is assigned in this registry by the registry software, according to the procedure described in ISO 11179-5. For this data element, the identifier is {RAI} 124:1.

7.4.3 Specify value domain and permissible values

The value domain for this data element is not enumerated. There is no specific list of permissible values for this data element containing names of language experts. Non-enumerated value domains require a name, definition, identifier, and a description of the appropriate values. The values must conform to the value domain description, which in this example is "Variable length character strings representing persons' names." The name of the value domain is "Language Experts." Other value domain attributes for this example include:

- Identifier: A system generated identifier for the value domain and its version identifier, in this case assumed to be {RAI} 522:1.
- Item name: Language Experts
- Definition: All names of persons with language expertise.
- Description: Variable length character strings representing persons' names.
- Datatype: The datatype is "CHARACTER VARYING."
- Datatype Schema/Source: ANSI ISO SQL
- Maximum characters: The maximum field length for this data element is estimated to be 40 characters.

Administrative data are required for the value domain of a data element. Creation date is captured from the system date. Registration and administrative statuses are recorded after all attributes have been recorded for this value domain.

7.4.4 Other data element attributes

- Select the example for this data element; it must conform to the definition in the value domain.

  Data Element Example: Janet Smith

- Identify the origin for this data element as the standard from which the permissible values are obtained.

  Data Element Origin: Federation of Professional Associations (FPA)

- Record any notes or comments that might provide additional information about the data element that is not included in the definition.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element Explanatory Comment: Includes first and last name and excludes titles.

- Enter the name of the submitting organization, which is the organization that submitted the data element for registration.

  Submitting Organization: Federation of Professional Associations

- Record the name of the individual or organization assigned the responsibility for monitoring and maintaining the data element as the stewardship contact.

  Stewardship Contact: Board of Directors of FPA

Other administrative metadata, such as Creation Date are recorded or captured automatically by the system where applicable. Other administrative data may be entered manually.

7.4.5 Classify the data element

In addition to its classification by data system, described in Subclause 7.1, the data element "Language Expert Name" can be classified according to the following Object Classes: Language, Expert

It might also be classified according to other groupings.

7.4.6 Registration and administrative status information

The data element, data element concept, and conceptual domain in this example have the registration status of "Recorded" and an administrative status of "In Quality Review." They might be advanced to a registration status of "Certified" and an administrative status of "No further action" after quality review. They are not expected to become standards, since the data element was not identified by a standard and is not expected to become a preferred data element.

7.4.7 Summary of attributes

A summary of the data element associated metadata items and their attributes is provided in Annex A, Table 3, Top-Down Registration for Data Elements for Skill Levels of Language Experts.

7.5 Language skill type identifier example

7.5.1 Data element concept, conceptual domain and value meanings

The data element concept is based on the object class, "Skill," object qualifier "Language," and the property "Type." The data element concept "Language skill type" is defined according to ISO 11179-4 as "An identifier that establishes a type of language skill." Both name and definition of this data element concept must be registered in context, as is described in Annex B. For this example of top-down registration, the context "Language Expertise Data System," described in Clause 7, is used.

The conceptual domain for this data element concept is determined to be "Language Skills," defined as "All skills in the use of languages." The conceptual domain for "Language Skills" is enumerated, since the set of skills associated with language is limited to "reading," "writing," and "speaking." Explicit value meanings are recorded. The value meanings for this data element concept are "The ability to read a language," "The ability to write a language," and "The ability to speak a language." Each of the value meanings is registered with its begin date (i.e., the date the value meaning became valid for the registry). An identifier is assigned to each value meaning, in this case assumed to be 977, 978, and 979.

The origin of the conceptual domain is the name of the organization that requested that data elements for the example scenario be registered in the metadata registry, in this case the Federation of Professional Associations.

--`,,`--`,,`,`,,`,`,,`---

© ISO/IEC 2003 - All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Identifiers for data element concepts and conceptual domains were described in Clause 6 and Annex B. Identifiers are assumed to be automatically generated by the registry application software for this example. For this example, the data element concept identifier is {RAI} 236:1. The conceptual domain identifier for this example is {RAI} 347:1.

7.5.2 Define and identify data elements

7.5.2.1 Data element definition

At this point in a top-down registration, the data element should be defined. Using the rules and guidelines for data element definitions described in ISO 11179-4, the following definition is formulated: "The name of a type of language skill." Note that both of the terms "language" and "skill" were defined as Object Classes. More than one definition can be formulated, each registered in context, where the meaning of each definition is exactly the same. The Language Expertise Data System context is used for the above definition.

7.5.2.2 Representation Class

The representation class selected for this data element is "Name," defined as "A word or combination of words by which a person, place, thing, or any object of thought is designated, called, or known." Registration of Name as a representation class was described in Subclause 7.3.2.2.

7.5.2.3 Data element name and identifier

One or more data element names can be formulated at this time, each to be registered in context, using the guidelines described in ISO 11179-5. For this example, the name of the data element is based on the representation of the data element concept, in this case "Language Skill Type Name." The context for this name is assumed to be Language Expertise Data System. The data element identifier is assigned in this registry by the registry software, according to the procedure described in ISO 11179-5. For this data element, the identifier is {RAI} 125:1.

7.5.3 Specify value domain and permissible values

The value domain for this data element in enumerated. There is a specific list of permissible values for this data element containing names of language skill types. The data values must conform to the list of permissible values. The permissible values, "Read," "Write," and "Speak" are entered as permissible values, and related to their appropriate value domains. Each permissible value is entered with a begin date.

All value domains are administration records. Administered value domains require a name and definition to be recorded in context. The name for this value domain is determined to be "Language Skill Names" and the definition "All names that designate language skills." The context for this name and definition is "Language Expertise Data System" as is used uniformly throughout Clause 7.

Other attributes for this example include the following.

- Item Identifier: A system generated identifier for the value domain and its version identifier, in this case assumed to be {RAI} 523:1.
- Datatype: The datatype is "CHARACTER."
- Datatype Schema/Source: ANSI ISO SQL
- Maximum characters: The field length of this value domain is based on the actual field length of the permissible values; the maximum is 5 characters.
- Origin: Federation of Professional Associations

The creation date is captured from the system date. Other administrative data, such as explanatory comments, can be recorded at this time.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.5.4 Other data element attributes

- Select the example for this data element; it must conform to the definition in the value domain.

  Data Element Example: Write

- Identify the origin for this data element as the standard from which the permissible values are obtained.

  Data Element Origin: Federation of Professional Associations (FPA)

- Record any notes or comments that might provide additional information about the data element that is not included in the definition.

  Data Element Explanatory Comment: None provided.

- Enter the name of the submitting organization, which is the organization that submitted the data element for registration.

  Submitting Organization: Federation of Professional Associations

- Record the name of the individual or organization assigned the responsibility for monitoring and maintaining the data element as the stewardship contact.

  Stewardship Contact: Board of Directors of FPA

Other administrative metadata, such as Creation Date are recorded or captured automatically by the system where applicable. Other administrative data may be entered manually.

7.5.5 Classify the data element

In addition to its classification by data system, described in Subclause 7.1, the data element "Language Skill Type Name" can be classified according to the following Object Classes: Language, Skill

It might also be classified according to other groupings.

7.5.6 Registration and administrative status information

The data element, data element concept, value domain, and conceptual domain in this example have the registration status of "Recorded" and an administrative status of "In Quality Review." They might be advanced to a registration status of "Certified" and an administrative status of "No further action" after quality review. They are not expected to become standards, since the data element was not identified by a standard and is not expected to become a preferred data element.

7.5.7 Summary of attributes

A summary of the data element associated metadata items and their attributes is provided in Annex A, Table 3, Top-Down Registration for Data Elements for Skill Levels of Language Experts.

7.6 Natural language identifier example

For this registry example, natural language identifiers are based on an International Standard, ISO 639-2, *Codes for the representation of names of languages — Part 2: Alpha-3 code*. 1st Edition. Geneva: International Standardization Organization, 1998. A standard for 2-character alphabetic codes for languages, not used for this example, is provided by ISO 639-1. Note that some Registration Authorities might prefer to register such a code list as a value domain, and not as a data element.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

7.6.1 Data element concept, conceptual domain and value meanings

The data element concept is based on the object class, "Language," the object qualifier "Natural," and the property "Identifier." The data element concept "Natural Language Identifiers" is defined according to ISO 11179-4 as "An identifier that establishes a natural language." Both name and definition of this data element concept must be registered in context, as is described in Annex B. For this example of top-down registration, the context "Language Expertise Data System," described in Clause 7, is used.

The conceptual domain for this data element concept is determined to be "Natural Languages," defined as "All languages used as the native tongue by a group of persons." The conceptual domain for "Natural Languages" is enumerated, based on the languages designated in ISO 639-2. Explicit value meanings are recorded. The value meanings for this data element concept are "The natural language known as <language>." Each of the value meanings is registered with its begin date (i.e., the date the value meaning became valid for the registsry). An identifier is assigned to each value meaning, in this case assumed to be 3001, 3002, …to the extent of languages identified.

The origin of the conceptual domain is ISO 639-2. Identifiers for data element concepts and conceptual domains were described in Clause 6 and Annex B. Identifiers are assumed to be automatically generated by the registry application software for this example. For this example, the data element concept identifier is {RAI} 237:1. The conceptual domain identifier for this example is {RAI} 348:1.

7.6.2 Define and identify data elements

7.6.2.1 Data element definition

At this point in a top-down registration, the data element should be defined. Using the rules and guidelines for data element definitions described in ISO 11179-4, the following definition is formulated: "The 3-alpha code that refers to a natural language." More than one definition can be formulated, each registered in context, where the meaning of each definition is exactly the same. The Language Expertise Data System context is used for the above definition.

7.6.2.2 Representation Class

The representation class selected for this data element is "Code," defined as the "A word, letter, number, or other symbol used to represent or identify something." The practitioner will search for the term "Code" as an existing representation class in the registry. If it does not exist in the registry, it should be entered at this time. A representation qualifier for the representation class, "3-alpha," is appropriate for this example.

7.6.2.3 Data element name and identifier

One or more data element names can be formulated at this time, each to be registered in context, using the guidelines described in ISO 11179-5. For this example, the name of the data element is based on the representation of the data element concept, in this case "Natural Language 3-Alpha Code." The context for this name is assumed to be Language Expertise Data System. The data element identifier is assigned in this registry by the registry software, according to the procedure described in ISO 11179-5. For this data element, the identifier is {RAI} 126:1.

7.6.3 Specify value domain and permissible values

The value domain for this data element is enumerated. There is a specific list of permissible values for this data element containing codes for natural languages. The codes must conform to the list of permissible values. The 3-alpha codes from ISO 739-2 are entered as permissible values, and related to their appropriate value domains. Each permissible value is entered with a begin date.

Value domains are administration records, requiring a name and definition to be recorded in context. The name for this value domain is determined to be "Codes for Natural Languages" and the definition "All 3-alpha codes listed in ISO 639-2 for representation of natural languages." The context for this name and definition is "Language Expertise Data System" as is used uniformly throughout Clause 7.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Other attributes for this example include the following.

- Item Identifier: A system generated identifier for the value domain and its version identifier, in this case assumed to be {RAI} 524:1.
- Datatype: The datatype is "CHARACTER."
- Datatype Schema/Source: ANSI ISO SQL.
- Maximum characters: The field length of this value domain is based on the actual field length of the permissible values; the maximum field length is 3.
- Origin: ISO 639-2, 1998.

The creation date is captured from the system date. Other administrative data, such as explanatory comments, can be recorded at this time.

7.6.4 Other data element attributes

- Select the example for this data element; it must conform to the definition in the value domain.

  Data Element Example: ENG (English)

- Identify the origin for this data element as the standard from which the permissible values are obtained.

  Data Element Origin: ISO 639-2, 1998.

- Record any notes or comments that might provide additional information about the data element that is not included in the definition.

  Data Element Explanatory Comment: None provided.

- Enter the name of the submitting organization, which is the organization that submitted the data element for registration.

  Submitting Organization: Federation of Professional Associations

- Record the name of the individual or organization assigned the responsibility for monitoring and maintaining the data element as the stewardship contact.

  Stewardship Contact: Board of Directors of FPA

Other administrative metadata, such as Creation Date are recorded or captured automatically by the system where applicable. Other administrative data may be entered manually.

7.6.5 Classify the data element

In addition to the classification by data system, described in Subclause 7.1, the data element "Natural Language 3-Alpha Code" can be classified according to its object class: Language

It might also be classified according another grouping.

7.6.6 Registration and administrative status information

The data element, data element concept, value domain, and conceptual domain in this example have the registration status of "Recorded" and an administrative status of "In Quality Review" when all attributes have been entered. The conceptual domain might be advanced to a registration status of "Standard" with an administrative status of "Final" after quality review since that might become the preferred conceptual domain

© ISO/IEC 2003 - All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

for Natural Language Code. The value domain might be advance to the registration status of "Certified" with an administrative status of "No further action" unless the 3-alpha code becomes the preferred representation for natural languages. The data element and data element concept might be expected to advance to "Certified" and "No further action" after quality review is complete.

7.6.7 Summary of attributes

A summary of the data element associated metadata items and their attributes is provided in Annex A, Table 4, Top-Down Registration for Data Elements for Skill Levels of Language Experts.

7.7 Skill level discriminator example

7.7.1 Data element concept, conceptual domain and value meanings

The data element concept is based on the object class, "Level," its qualifier "Skill," and the property "Discriminator." The data element concept "Skill Level Discriminator" is defined according to ISO 11179-4 guidelines as "A characteristic that distinguishes among skill levels." Both name and definition of this data element concept must be registered in context, as is described in Annex B. For this example of top-down registration, the context "Language Expertise Data System," described in Clause 7, is used.

The conceptual domain for this data element concept is determined to be "Skill Levels," defined as "All levels of ability in performing a task." The conceptual domain for "Skill Levels" is enumerated, based the levels of evaluation specified by the Federation of Professional Associations. Explicit value meanings are recorded. The value meanings for this data element concept are "The level of ability known as <Excellent>." Other skill levels include: good, fair, and poor. Each of the value meanings is registered with its begin date (i.e., the date the value meaning became valid for the registsry). An identifier is assigned to each value meaning, in this case assumed to be 4001, 4002, 4003, and 4004.

The origin of the conceptual domain is the Federation of Professional Associations. Identifiers for data element concepts and conceptual domains were described in Clause 6 and Annex B. Identifiers are assumed to be automatically generated by the registry application software for this example. For this example, the data element concept identifier is {RAI} 238:1. The conceptual domain identifier for this example is {RAI} 349:1.

7.7.2 Define and identify data elements

7.7.2.1 Data element definition

At this point in a top-down registration, the data element should be defined. Using the rules and guidelines for data element definitions described in ISO 11179-4, the following definition is formulated: "The level of capability to perform a skill." The terms "skill" and "level" were defined as Object Classes and "discriminator" was defined as a Property. More than one definition can be formulated, each registered in context, where the meaning of each definition is exactly the same. The Language Expertise Data System context is used for the above definition.

7.7.2.2 Representation Class

The representation class selected for this data element is "Name," defined as "A word or combination of words by which a person, place, thing, or any object of thought is designated, called, or known." Registration of Name as a representation class is described in Subclause 7.3.2.2.

7.7.2.3 Data element name and identifier

One or more data element names can be formulated at this time, each to be registered in context, using the guidelines described in ISO 11179-5. For this example, the name of the data element is based on the representation of the data element concept, in this case "Skill Level Discriminator Name." The context for this name is assumed to be Language Expertise Data System. The data element identifier is assigned in this

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

registry by the registry software, according to the procedure described in ISO 11179-5. For this data element, the identifier is {RAI} 127:1.

7.7.3 Specify value domain and permissible values

The value domain for this data element is enumerated. There is a specific list of permissible values for this data element containing names for skill levels. The names must conform to the list of permissible values. The appropriate names are entered as permissible values, and related to their appropriate value domains. Each permissible value is entered with a begin date.

Value domains are administration records, requiring a name and definition to be recorded in context. The name for this value domain is determined to be "Names of Skill Level Discriminators" and the definition "All names that designate skill level discriminators." The context for this name and definition is "Language Expertise Data System" as is used uniformly throughout Clause 7.

Other attributes for this example include the following.

- Item Identifier: A system generated identifier for the value domain and its version identifier, in this case assumed to be {RAI} 525:1.
- Datatype: The datatype is "CHARACTER VARYING."
- Datatype Schema/Source: ANSI ISO SQL.
- Maximum characters: The field length of this value domain is based on the actual field lengths of the permissible values; the maximum field length is 9.
- Origin: Federation of Professional Associations

The creation date is captured from the system date. Other administrative data, such as explanatory comments, can be recorded at this time.

7.7.4 Other data element attributes

- Select the example for this data element; it must conform to the definition in the value domain.

  Data Element Example: Good

- Identify the origin for this data element as the standard from which the permissible values are obtained.

  Data Element Origin: Federation of Professional Associations

- Record any notes or comments that might provide additional information about the data element that is not included in the definition.

  Data Element Explanatory Comment: None provided.

- Enter the name of the submitting organization, which is the organization that submitted the data element for registration.

  Submitting Organization: Federation of Professional Associations

- Record the name of the individual or organization assigned the responsibility for monitoring and maintaining the data element as the stewardship contact.

  Stewardship Contact: Board of Directors of FPA

© ISO/IEC 2003 - All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Other administrative metadata, such as Creation Date are recorded or captured automatically by the system where applicable. Other administrative data may be entered manually.

7.7.5 Classify the data element

In addition to classification by data system, as described in Subclause 7.1, the data element "Skill Level Discriminator Name" can be classified according to its object class: Language.

It might also be classified by another group.

7.7.6 Registration and administrative status information

The data element, data element concept, value domain, and conceptual domain in this example have the registration status of "Recorded" and an administrative status of "In Quality Review" when all attributes have been entered. They might be advanced to "Certified" and "No further action" after quality review is completed.

7.7.7 Summary of attributes

A summary of the data element associated metadata items and their attributes is provided in Annex A, Table 4, Top-Down Registration for Data Elements for Skill Levels of Language Experts.

7.8 Example summary table of attributes

A summary table of the attributes recorded for the top-down scenario for registering data elements, described in Clause 7, is found in Annex A, Tables 3 and 4.

8 Example of complex data

Some data elements are derived from other data elements through a transformation or rule. These rules come in many types, and some examples are mathematical calculations (e.g., variance estimations), statistical aggregation (e.g., creation of tables from categorized data), or format aggregation (e.g., home mailing address). In principle, the rule can be expressed in a formal logic such as first order predicate logic, a programming language (e.g., C), mathematics, or some other formalism. In practice, this is not feasible or useful for very complex derivations. It is sufficient to describe a rule with enough detail so that the meaning of the derivation is understood. Formalizing rules so computers can make use of them is not practical in every circumstance.

Formally, a **derived data element** is a data element whose allowed values are in the range of some function on the allowed values of one or more input data elements. The function is called a **rule**. The rule must describe how the allowed values of the input data elements are used to obtain the allowed values for the derived data element. In addition, rules can derive more than one data element at once. The calculation of latitude and longitude of geographic points on the surface of the earth from a rectangular coordinate system is an example.

Data element format aggregates, which are formatted sets of other data elements (see example #3 below), are a special class of derivations that Registration Authorities may choose not to register as (derived) data elements. Format aggregates fall into a larger class of sets of data elements called **groups**, where a group is any finite set of two or more data elements. The choice to register format aggregates as derived data elements or register them as groups is made by the individual Registration Authority. The choice is similar to the one that Registration Authorities must make when they register value domains (see Clause 1).

8.1 Examples

The following examples illustrate several kinds of derivations. These are only examples and are not meant to be a list of all possible types of derivation.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

1) Mathematical: estimated yearly household income from monthly household income.

2) Statistical Aggregation: counts of persons by race by age by sex from person race, person age, and person sex.

3) Format Aggregate: home address from home address building number, home address street name, home address city, home address state, home address postal code, and home address country name.

4) Recode: eligibility for retirement in US Federal government from type of retirement, age of employee, employee years of service, and special requirements.

The details for these examples follow in the tables below. A limited set of metadata attributes for the data elements in these examples is provided. Not all the attributes are required to illustrate the principles of derivation.

The examples use the names, definitions, and allowed values (*permissible values* for enumerated domains and *non-enumerated domain description* for non-enumerated domains) of the input and derived data elements. The name of the data elements is used in the description of the rule. This choice is made for readability. In practice, the data element identifier is used instead.

These examples make clear that the description of rules can serve two quite different purposes. They help a human understand the derivation when expressed in an easy to read format, and they can be expressed in a formal language translatable into computer code. The choice is up to the submitting organization and knowledge of the primary user of the registry.

It is possible that some derivations are so complex that expressing them in a formal language is not practicable. An example of such a derivation is the computation of the Consumer Price Index by the US Bureau of Labor Statistics. In this case, supplying pointers to documents describing the derivation is the only reasonable approach to expressing the rule.

Example #1		**Mathematical Derivation**
1	**Input Data Element Name, Definition, and Value Domain**	
	Name	Monthly Household Income
	Definition	Total income earned by each member of the household 16 years of age or older for the previous month in whole dollars.
	Non-Enumerated Domain description	All non-negative integers
2	**RULE**	
	Derivation Rule description	Estimated Yearly Household Income = Monthly Household Income * 12
3	**Derived Data Element Name, Definition, and Value Domain**	
	Name	Yearly Household Income
	Definition	Total income earned by each member of the household 16 years of age or older for the previous year in whole dollars.
	Non-Enumerated Domain description	All non-negative integers

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Example #2		Derivation by Statistical Aggregation
1	**Input Data Element Name, Definition, and Value Domain**	
	Name	Person Race
	Definition	Race of the person
	Permissible Values	American Indian, Asian, Black, White, Other
2	**Input Data Element Name, Definition, and Value Domain**	
	Name	Person Age
	Definition	Age in years since last birthday of the person, reported in categories
	Permissible Values	1: 0 – 15 4: 46 - 64 2: 16 – 25 5: 65 - above 3: 26 - 45
3	**Input Data Element Name, Definition, and Value Domain**	
	Name	Person Sex
	Definition	Sex of the person
	Permissible Values	Female, Male, Other, Unknown
4	**RULE**	
	Derivation Rule description	For each of the 100 combinations of values of Person Race, Person Age, and Person Sex, count the number of persons with those characteristics
5	**Derived Data Element Name, Definition, and Value Domain**	
	Name	Counts of Persons by Race by Age by Sex
	Definition	Number of people by cell, where the 100 cells are defined by the cross product of the categories defined in each of the input data elements.
	Non-Enumerated Domain description	All non-negative integers for each of 100 cells

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Example #3		Derivation by Format Aggregation
1	**Input Data Element Name, Definition, and Value Domain**	
	Name	Home Address Building Number
	Definition	A unique number assigned by the Post Office to each location of a dwelling on a given street
	Non-Enumerated Domain description	1-5 Digit Numeric String
2	**Input Data Element Name, Definition, and Value Domain**	
	Name	Home Address Street Name
	Definition	The name of the street where a dwelling is located
	Non-Enumerated Domain description	Character String
3	**Input Data Element Name, Definition, and Value Domain**	
	Name	Home Address City
	Definition	Name of the city in which the home is located
	Non-Enumerated Domain description	4 Digit Numeric String
4	**Input Data Element Name, Definition, and Value Domain**	
	Name	Home Address State Code
	Definition	State in which home is located
	Permissible Values	US Postal State Codes
5	**Input Data Element Name, Definition, and Value Domain**	
	Name	Home Address ZIP Code
	Definition	US Postal ZIP Code for home
	Permissible Values	US Postal ZIP Codes (5 Digit Numeric)

© ISO/IEC 2003 - All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6	**RULE**	
	Derivation Rule description	Combine input data elements into following format: Home Address Building Number / Home Address Street Name \n Home Address City /,/ Home Address State Code / Home Address Postal Code \n Home Address Country Name where the symbol / means string concatenation, and the symbol \n means begin a new line
5	**Derived Data Element Name, Definition, and Value Domain**	
	Name	Home Address
	Definition	Full address of home
	Non-Enumerated Domain description	Character string in format N+ (5 max) C+ (unlimited) C+ (unlimited), CC, C+ (10 max) C+ (unlimited) where N signifies numeric characters, C signifies alpha characters, + means at least one character of the given type

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Example #4		Derivation by Recode
1	**Input Data Element Name, Definition, and Value Domain**	
	Name	Type of Retirement
	Definition	The name of the rules under which eligibility is determined
	Permissible Values	Optional, Special Optional, Early Optional, Discontinued Service, Disability
2	**Input Data Element Name, Definition, and Value Domain**	
	Name	Age of Employee
	Definition	Age in number of years since last birthday
	Non-Enumerated Domain description	Integer between 0 and 125
3	**Input Data Element Name, Definition, and Value Domain**	
	Name	Employee Years of Service
	Definition	Number of years employee has worked for US Federal government including active military service
	Non-Enumerated Domain description	Integer between 0 and 125

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

4	**Input Data Element Name, Definition, and Value Domain**	
	Name	Special Requirements
	Definition	Requirements that must be met for each type of retirement to be in effect
	Non-Enumerated Domain description	Text
5	**RULE**	
	Derivation Rule description	See “Example #4 — Derivation Rule Description” below for the description of this Rule. This lengthy text would be placed here as the value of the description attribute
6	**Derived Data Element Name, Definition, and Value Domain**	
	Name	US Federal Government Civil Service Retirement System, Employee Eligibility for Retirement
	Definition	Indicator whether US Federal employee is eligible to retire under Civil Service Retirement System
	Permissible Values	Yes, No

Employee may retire under the Civil Service Retirement System (CSRS) at the following ages, and receive an immediate annuity, if employee has at least the amount of Federal Service shown in the table below:

Type of retirement	Minimum Age	Minimum Service(Years)	Special Requirements
Optional	62	5	None
	60	20	None
	55	30	None
Special Optional	50	20	You must retire under special provisions for air traffic controllers or law enforcement and firefighter personnel. Air traffic controllers can also retire at any age with 25 years of service as an air traffic controller.
Early Optional	Any Age 50	25 20	Your agency must be undergoing a major reorganization, reduction-in-force, or transfer of function determined by the Office of Personnel Management. Annuity is reduced if under 55.
Discontinued Service	Any Age 50	25 20	Your separation is involuntary and not a removal for misconduct deliquency.
Disability	Any Age	5	You must be disabled for useful and efficient service in your current position and any other vacant position at the same grade or pay level within your commuting area and current agency for which you are qualified. Must be prior to retirement, or within one year of separation, except in cases of mental incompetence.

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex A
(informative)

Tables of data element attributes for examples

Annex A contains two tables that includes the data element attributes for the examples provided earlier in this Technical Report. Table 1 provides examples of the metadata associated with the English-language short name from the ISO 3166 enumerated data standard and a data element from an application system; Table 2 provides examples of the metadata associated with data elements that are non-enumerated, using the ISO 6709 standard for domain information. The data element attributes are named in the first column and the illustrative data that could be registered for each of the example data elements is given in subsequent columns.

Table A.1 — Bottom-Up Registration for Data Elements with Enumerated Domains, based on ISO 3166

	Metadata Name	ISO 3166, Enumerated	Application System	
1	**Data Element Definition**			
	Data Element (DE) Definition Context	Registry	Registry	Facility Data System
	DE Definition	The short, ISO-recognized name of a country, represented in the English language.	The name of the country where a mail piece is delivered.	The name of a country where the addressee is located.
2	**Permissible Values and Value Domain**			
	Permissible Values (each PV)	All English-language short country names from ISO 3166, matched with value meanings. (recorded as: Afghanistan, Albania,...., Zimbabwe)	All English-language short country names from ISO 3166, matched with value meanings. (recorded as: Afghanistan, Albania,....., Zimbabwe)	
	PV Begin Date (each PV)	19970110	19970110	
	PV End Date (each PV)	(Not applicable)	(Not applicable)	
	Value Domain (VD) Context	Registry	Registry	
	VD Name	ISO English-Language Country Short Names	ISO English-Language Country Short Names	
	VD Definition	All short, ISO-recognized English-language names of all countries.	All short, ISO-recognized English-language names of all countries.	
	VD Description	(Not applicable)	(Not applicable)	
	VD Item Identifier	{RAI} 5678:1	{RAI} 5678:1	
	Datatype	CHARACTER VARYING	CHARACTER VARYING	
	Datatype Schema/Source	ANSI ISO SQL	ANSI ISO SQL	
	Maximum Characters	44	44	
	Format	(Not applicable)	(Not applicable)	
	Unit of Measure	(Not applicable)	(Not applicable)	
	Precision	(Not applicable)	(Not applicable)	
	VD Origin	ISO 3166-1:1997	ISO 3166-1:1997	

© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table A.1 (*continued*)

	Metadata Name	ISO 3166, Enumerated	Application System	
	VD Explanatory Comment	The value domain includes only the subset of names that designate countries; it does not include names of territories.	The value domain includes only the subset of names that designate countries; it does not include names of territories.	
3	**Representation Class Item**			
	Representation Class	Name	Name	
	Representation Class Qualifier	Short	Short	
4	**Data Element Name and Identifier**			
	DE Name Context	Registry	Registry	Facility Data System
	DE Name	ISO English-Language Country Short Name	Mailing Address Country Name	Mailing_Address. Country_Name
	DE Identifier	{RAI} 209033:1	{RAI} 5394:1	
5	**Other Data Element Attributes**			
	DE Example	China	Denmark	
	DE Origin	ISO 3166-1:1997, Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes	Application system	
	DE Explanatory Comment	This data element is included in the mailing address standard.	This data element is required for delivery of mail outside the country of origin.	
	Submitting organization	Office of Information Collection	Office of Enforcement and Compliance Assurance	
	Stewardship Contact	Geopolitical Data Administrator	Facility Data Systems Administrator	
6	**Data Element Concept and Conceptual Domain**			
	Data Element Concept (DEC) Context	Registry	Registry	
	DEC Name	Country Identifier	Address Country Identifier	
	DEC Definition	An identifier for a primary geopolitical entity of the world.	An identifier for a primary geopolitical entity of the world that indicates a mailing address.	
	Object Class	Country	Address	
	Object Class Qualifier	(Not applicable)	(Not applicable)	
	Property	Identifier	Identifier	
	Property Qualifier	(Not applicable)	Country	
	DEC Item Identifier	{RAI}12345:1	{RAI}12468:1	
	Conceptual Domain (CD) Context	Registry	Registry	
	CD Name	Countries of the World	Countries of the World	
	CD Definition	The primary geopolitical entities of the world.	The primary geopolitical entities of the world.	
	CD Item Identifier	{RAI} 2468:1	{RAI} 2468:1	
	CD Origin	ISO 3166:1	ISO 3166:1	

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table A.1 (*continued*)

	Metadata Name	ISO 3166, Enumerated	Application System
	Value Meaning (for each VM)	The primary geopolitical entity known as <China>	The primary geopolitical entity known as <China>
	VM Begin Date (for each VM)	19970110	19970110
	VM End Date (for each VM)	(Not applicable)	(Not applicable)
	VM Identifier (for each VM)	<Assigned by system as 1001…1230: one to each VM>	<Assigned by system as 1001…1230: one to each VM>
7	**Classification Type Examples**	**Classification Values for Classification Type**	
	Keyword	Country	Country, Address, Mailing
	Group	Geopolitical Entities, Country Identifiers	Mailing Address
	Object	Country	Address, Country
	Layer of Abstraction Type	Generalization	Specialization
8	**Registration and Administrative Status**		
	DE Registration Status	Standard	Recorded
	DE Administrative Status	Final	In Quality Review
	VD Registration Status	Standard	Standard
	VD Administrative Status	Final	Final
	DEC Registration Status	Standard	Recorded
	DEC Administrative Status	Final	In Quality Review
	CD Registration Status	Standard	Standard
	CD Administrative Status	Final	Final

© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table A.2 — Bottom-Up Registration for Data Elements with Non-Enumerated Domains, based on ISO 6709

	Metadata Name	ISO 6709, Non-enumerated	FGDC Application	
1	**Data Element Definition**			
	Data Element (DE) Definition Context	Registry	Standard	Registry
	DE Definition	The sexagesimal measure of the angular distance of a position on the earth on a meridian north or south of the equator.	The northern-most coordinate of the limit of coverage expressed in latitude.	The measure of latitude for the northern-most coordinate that limits coverage of a data set.
2	**Permissible Values and Value Domain**			
	Permissible Values (each PV)	Measures of latitude in degrees, minutes, and seconds. (Informational only; not recorded for non-enumerated domains)	Measures of latitude expressed in degrees and decimal degrees. (Informational only; not recorded for non-enumerated domains)	
	PV Begin Date (each PV)	(Not applicable for non-enumerated domains)	(Not applicable for non-enumerated domains)	
	PV End Date (each PV)	(Not applicable for non-enumerated domains)	(Not applicable for non-enumerated domains)	
	Value Domain (VD) Context	Registry	Registry	
	VD Name	Sexagesimal Measures of Latitude	Decimal Measures of Latitude	
	VD Definition	All sexagesimal measures of the distance of an angle north or south of the equator.	All decimal measures of the distance of an angle north or south of the equator.	
	VD Description	Latitude measure on or north of the equator is positive; latitude measure south of the equator is negative. The range limit for degrees is 0-90, for minutes is 0-59, and for seconds is 0-59.	Latitude measure on or north of the equator is positive; latitude measure south of the equator is negative. The range limit for degrees is –90.0 to +90.0.	
	VD Item Identifier	{RAI} 9876:1	{RAI} 9877:1	
	Datatype	CHARACTER VARYING	CHARACTER VARYING	
	Datatype Schema/Source	ANSI ISO SQL	ANSI ISO SQL	
	Maximum Characters	13	10	
	Format	+/-DDMMSS to +/-DDMMSS.SSSSS	+/-DD.D to +/-DD.DDDDDD	
	Unit of Measure	Sexagesimal	Degree	
	Precision	Number of decimal places recorded	Number of decimal places recorded	
	VD Origin	ISO 6709	ISO 6709	
	VD Explanatory Comment	(Not applicable)	(Not applicable)	
3	**Representation Class**			
	Representation Class	Measure	Measure	
	Representation Class Qualifier	Sexagesimal	Degree	

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table A.2 (*continued*)

	Metadata Name	ISO 6709, Non-enumerated	FGDC Application	
4	**Data Element Name and Identifier**			
	DE Name Context	Registry	Standard	Registry
	DE Name	Latitude Sexagesimal Measure	North Bounding Coordinate	Northern-most Latitude Measure
	DE Identifier	{RAI} 312345:1	{RAI} 20875:1	
5	**Other Data Element Attributes**			
	DE Example	+674532 and +674531.85435	+62.98	
	DE Origin	ISO 6709-1983 (E), Standard representation of latitude, longitude and altitude for geographic point locations.	ISO FDIS 19115 *Geographic Information — Metadata*.	
	DE Explanatory Comment	Latitude sexagesimal converts to latitude degrees by the following formula: seconds/60 = minutes, decimal minutes/60 = decimal degrees.	The northern most coordinate might refer to a point or a line that bounds a rectangle. Latitude degree converts to latitude sexagesimal by the following formula: Decimal degrees x 60 = minutes, decimal minutes x 60 = seconds	
	Submitting organization	Office of Information Collection	Office of Information Collection	
	Stewardship Contact	Geographic Information Systems Administrator	Geographic Information Systems Administrator	
6	**Data Element Concept and Conceptual Domain**			
	Data Element Concept (DEC) Context	Registry	Registry	
	DEC Name	Latitude Distance	North Bounding Latitude	
	DEC Definition	A measure of the angular distance of a point on the surface of the earth north or south of the equator.	A measure of angular distance on a meridian north or south of the equator that is the northern most limit of coverage.	
	Object Class	Latitude	Latitude	
	Object Class Qualifier	(Not applicable)	(Not applicable)	
	Property	Distance	Bounding	
	Property Qualifier	(Not applicable)	North	
	DEC Item Identifier	{RAI} 23456:1	{RAI} 23457:1	
	Conceptual Domain (CD) Context	Registry	Registry	
	CD Name	Measures of Latitude	Measures of Latitude	
	CD Definition	All latitude measures of points north or south of the equator.	All latitude measures of points north or south of the equator.	
	CD Item Identifier	{RAI} 2532:1	{RAI} 2532:1	
	CD Origin	ISO 6709	ISO 6709	
	Value Meaning (each VM)	(Not applicable for non-enumerated)	(Not applicable for non-enumerated)	
	VM Begin Date (each VM)	(Not applicable for non-enumerated)	(Not applicable for non-enumerated)	
	VM End Date (each VM)	(Not applicable for non-enumerated)	(Not applicable for non-enumerated)	

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table A.2 (*continued*)

	Metadata Name	ISO 6709, Non-enumerated	FGDC Application
	VM Identifier (each VM)	(Not applicable for non-enumerated)	(Not applicable for non-enumerated)
7	**Classification Type Examples**	**Classification Values for Classification Type**	
	Keyword	Horizontal Coordinate, Spatial, Latitude	Horizontal Coordinate, Spatial, Latitude
	Group	Geographic Point Location	Geographic Point Location, Bounding Coordinates
	Object	Latitude	Latitude
	Layer of Abstraction Type	Generalization	Specialization
8	**Registration and Administrative Status Information**		
	DE Registration Status	Certified	Certified
	DE Administrative Status	No further action	No further action
	VD Registration Status	Standard	Standard
	VD Administrative Status	Final	Final
	DEC Registration Status	Standard	Certified
	DEC Administrative Status	Final	No further action
	CD Registration Status	Standard	Standard
	CD Administrative Status	Final	Final

Table A.3 — Top-Down Registration for Data Elements for Skill Levels of Language Experts

	Metadata Name	Organization	Expert	Skill Type
6	**Data Element Concept and Conceptual Domain**			
	Data Element Concept (DEC) Context	Language Expertise Data System	Language Expertise Data System	Language Expertise Data System
	DEC Name	Professional organization identifier	Language expert identifier	Language skill type
	DEC Definition	An identifier that recognizes or establishes the identity of a professional organization.	An identifier that recognizes or establishes the identity of a language expert.	An identifier that establishes a type of language skill.
	DEC Item Identifier	{RAI} 234:1	{RAI} 235:1	{RAI} 236:1
	Object Class	Organization	Expert	Skill
	Object Class Identifier	{RAI} 881:1	{RAI} 882:1	{RAI} 883:1
	Object Class Qualifier	Professional	Language	Language
	Property	Identifier	Identifier	Type
	Property Identifier	{RAI} 771:1	{RAI} 771:1	{RAI} 772:1
	Property Qualifier	(not applicable)	(not applicable)	(not applicable)

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table A.3 (*continued*)

	Metadata Name	Organization	Expert	Skill Type
	Conceptual Domain (CD) Context	Language Expertise Data System	Language Expertise Data System	Language Expertise Data System
	CD Name	Professional Organizations	Language Experts	Language Skills
	CD Definition	All associations that pertain to, or are connected with a profession.	All persons with expertise in languages.	All skills in the use of languages.
	CD Item Identifier	{RAI} 345:1	{RAI} 346:1	{RAI} 347:1
	CD Origin	Federation of Professional Associations	Federation of Professional Associations	Federation of Professional Associations
	Value Meaning (each VM)	The professional organization known as <*identity*> (Informative only for non-enumerated domains.)	The language expert known as <person> (Informative only for non-enumerated domains.)	The ability to read a language. The ability to write a language. The ability to speak a language.
	VM Begin Date (each VM)	(not applicable to non-enumerated domains)	(not applicable to non-enumerated domains)	2000-11-20 for each VM.
	VM End Date (each VM)	(not applicable to non-enumerated domains)	(not applicable to non-enumerated domains)	(not applicable at this time)
	VM Identifier (each VM)	(not applicable to non-enumerated domains)	(not applicable to non-enumerated domains)	977, 978, 979 respectively
1	**Data Element Definition**			
	Data Element (DE) Definition Context	Language Expertise Data System	Language Expertise Data System	Language Expertise Data System
	DE Definition	The name of a professional organization.	The name of a person with language expertise.	The name of a type of language skill.
3	**Representation Class**			
	Representation Class	Name	Name	Name
	Representation Class Qualifier	(not applicable)	(not applicable)	(not applicable)
4	**Data Element Name and Identifier**			
	DE Name Context	Language Expertise Data System	Language Expertise Data System	Language Expertise Data System
	DE Name	Professional Organization Name	Language Expert Name	Language Skill Type Name
	DE Identifier	{RAI} 123:1	{RAI} 124:1	{RAI} 125:1
2	**Permissible Values and Value Domain**			
	Permissible Values (each PV)	(not applicable to non-enumerated domains)	(not applicable to non-enumerated domains)	Read, Write, Speak
	PV Begin Date (each PV)	(not applicable to non-enumerated domains)	(not applicable to non-enumerated domains)	2000-11-22
	PV End Date (each PV)	(not applicable to non-enumerated domains)	(not applicable to non-enumerated domains)	(not applicable at this time)
	Value Domain (VD) Context	Language Expertise Data System	Language Expertise Data System	Language Expertise Data System
	VD Name	Professional Organization Names	Language Experts	Language Skill Names
	VD Definition	All names of professional organizations.	All names of persons with language expertise.	All names that designate language skills.

© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table A.3 (*continued*)

	Metadata Name	Organization	Expert	Skill Type
	VD Description	Variable length character strings designating names of organizations.	Variable length character strings representing persons' names.	(not applicable for enumerated VD)
	VD Item Identifier	{RAI} 521:1	{RAI} 522:1	{RAI} 523:1
	Datatype	CHARACTER VARYING	CHARACTER VARYING	CHARACTER
	Datatype Schema/Source	ANSI ISO SQL	ANSI ISO SQL	ANSI ISO SQL
	Maximum Characters	40	40	5
	Format	(not applicable)	(not applicable)	(not applicable)
	VD Origin	(not applicable)	(not applicable)	(none provided)
	VD Explanatory Comment	(not applicable)	(not applicable)	(none provided)
5	**Other Data Element Attributes**			
	DE Example	United Teachers' Association	Janet Smith	Write
	DE Origin	Federation of Professional Associations	Federation of Professional Associations	Federation of Professional Associations
	DE Explanatory Comment	(not applicable)	Includes first and last name and excludes titles.	(none provided)
	Submitting organization	Federation of Professional Associations	Federation of Professional Associations	Federation of Professional Associations
	Stewardship Contact	Board of Directors of FPA	Board of Directors of FPA	Board of Directors of FPA
7	**Classification Type Examples**	**Classification Values for Classification Type**		
	Data System	Language Expertise	Language Expertise	Language Expertise
	Object Class	Organization	Language, Expert	Language
	Layer of Abstraction Type			
8	**Registration and Administrative Status Information**			
	DE Registration Status	Recorded	Recorded	Certified
	DE Administrative Status	In quality review	In quality review	No further action
	VD Registration Status	Recorded	Recorded	Certified
	VD Administrative Status	In quality review	In quality review	No further action
	DEC Registration Status	Recorded	Recorded	Certified
	DEC Administrative Status	In quality review	In quality review	No further action
	CD Registration Status	Recorded	Recorded	Certified
	CD Administrative Status	In quality review	In quality review	No further action

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table A.4 — Top-Down Registration for Data Elements for Skill Levels of Language Experts

	Metadata Name	Language Identifier	Skill Level Discriminator
6	**Data Element Concept and Conceptual Domain**		
	Data Element Concept (DEC) Context	Language Expertise Data System	Language Expertise Data System
	DEC Name	Natural Language Identifier	Skill Level Discriminator
	DEC Definition	An identifier that establishes a natuaral language.	A characteristic that distinguishes among skill levels.
	DEC Item Identifier	{RAI} 237:1	{RAI} 238:1
	Object Class	Language	Level
	Object Class Identifier	{RAI} 884:1	{RAI} 885:1
	Object Class Qualifier	Natural	Skill
	Property	Identifier	Discriminator
	Property Identifier	{RAI} 771:1	{RAI} 773:1
	Property Qualifier	(not applicable)	(not applicable)
	Conceptual Domain (CD) Context	Language Expertise Data System	Language Expertise Data System
	CD Name	Natural Languages	Skill Levels
	CD Definition	All languages used as the native tongue by a group of persons.	Alll levels of ability in performing a task.
	CD Item Identifier	{RAI} 348:1	{RAI} 349:1
	CD Origin	ISO 639-2	Federation of Professional Associations
	Value Meaning (each VM)	The natural language known as <language>.	The level of ability known as <excellent>, <good>, <fair>, or <poor>.
	VM Begin Date (each VM)	2000-11-19	2000-11-19
	VM End Date (each VM)	(not applicable at this time)	(not applicable at this time)
	VM Identifier (each VM)	3001, 3002, 3003, … to last of domain.	4001, 4002, 4003, 4004, respectively.
1	**Data Element Definition**		
	Data Element (DE) Definition Context	Language Expertise Data System	Language Expertise Data System
	DE Definition	The 3-alpha code that refers to a natural language.	The level of capability to perform a skill.
3	**Representation Class**		
	Representation Class	Code	Name
	Representation Class Qualifier	3-Alpha	(not applicable)
4	**Data Element Name and Identifier**		
	DE Name Context	Language Expertise Data System	Language Expertise Data System
	DE Name	Natural Language 3-Alpha Code	Skill Level Discriminator Name
	DE Identifier	{RAI}126:1	{RAI}127:1
2	**Permissible Values and Value Domain**		
	Permissible Values (each PV)	(all 3-alpha codes listed in ISO 639-2)	Excellent, Good, Fair, and Poor
	PV Begin Date (each PV)	2000-11-23	2000-11-20
	PV End Date (each PV)	(not applicable at this time)	(not applicable at this time)
	Value Domain (VD) Context	Language Expertise Data System	Language Expertise Data System
	VD Name	Codes for Natural Languages	Names of Skill Level Discriminators

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Table A.4 (*continued*)

	Metadata Name	Language Identifier	Skill Level Discriminator
	VD Definition	All 3-alpha codes listed in ISO 639-2 for representation of natural languages.	All names that designate skill level discriminators.
	VD Description	(not applicable for enumerated domains)	(not applicable for enumerated domains)
	VD Item Identifier	{RAI} 524:1	{RAI} 525:1
	Datatype	CHARACTER	CHARACTER VARYING
	Datatype Schema/Source	ANSI ISO SQL	ANSI ISO SQL
	Maximum Characters	3	9
	Format	(not applicable)	(not applicable)
	VD Origin	ISO 639-2	Federation of Professional Associations
	VD Explanatory Comment	(none provided)	(none provided)
5	**Other Data Element Attributes**		
	DE Example	ENG (English)	Excellent
	DE Origin	ISO 639-2, 1998	Federation of Professional Associations
	DE Explanatory Comment	(none provided)	(none provided)
	Submitting organization	Federation of Professional Associations	Federation of Professional Associations
	Stewardship Contact	Board of Directors FPA	Board of Directors FPA
7	**Classification Type Examples**	**Classification Values for Classification Type**	
	System	Language Expertise	Language Expertise
	Object Class	Language	Language
	Layer of Abstraction Type		
8	**Registration and Administrative Status Information**		
	DE Registration Status	Certified	Certified
	DE Administrative Status	No further action	No further action
	VD Registration Status	Certified	Certified
	VD Administrative Status	No further action	No further action
	DEC Registration Status	Certified	Certified
	DEC Administrative Status	No further action	No further action
	CD Registration Status	Standard	Certified
	CD Administrative Status	Final	No further action

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex B
(informative)

Application of ISO/IEC 11179-2, -4, -5 and -6

This Annex includes additional detailed examples of using ISO/IEC 11179-2, -4, -5 and -6 for registering data element metadata. It is intended to be used to supplement to the description of data element registration provided in Subclause 6.1 of this Technical Report.

B.1 Data element definition

The purpose of a data element definition is to define a data element with words or phrases that describe, explain, or make definite and clear its meaning. Precise and unambiguous data element definitions are one of the most critical aspects of ensuring data shareability. The value domain, described in Clause B.2, identifies the complete set of values that can be contained in a data element. Each data value in a domain must conform to the definition for that data element.

ISO/IEC 11179-4 provides the standard for formulating data element definitions. There are mandatory rules, to which all data element definitions must comply, and there are guidelines that should be followed in formulating a definition. The standard does not specify syntactical requirements (i.e., word order and structure) that may be established by the registration authority. A registration authority might choose to allow multiple definitions, in context, for a data element in the same manner that multiple names, in context, are allowed. In the case of multiple definitions, each definition must convey the same, exact meaning so that there is no ambiguity to the values for that data element. See Clause 6 for examples of names and definitions in context.

The rules and guidelines applicable to the Registry Definition (i.e., the unique definition that has been assigned to the data element for registration in a registry) follow. A syntax that has been adopted by one registration authority is also included in this clause.

B.1.1 Rules for definitions

Rules for formulating a data element definition are mandatory and testable for compliance. The following rules must be followed when formulating a data element definition.

- Unique (within any data dictionary in which it appears within a specific context).
- Singular.
- State what the concept is, not only what it is not (i.e., never exclusively in the negative).
- Descriptive phrase or sentence.
- Contain only commonly used abbreviations.
- Does not contain embedded definitions of other data elements or concepts.

Examples of definitions that meet the above requirements are described in the following paragraphs.

B.1.1.1 Uniqueness

According to the standard rules for formulating data definitions, a data definition and context shall be unique for a specific context within any registry and registration authority in which it appears. Each definition shall be distinguishable from every other definition within a registration authority to ensure that specificity is

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

maintained. One or more characteristics expressed in the definition must differentiate its concept from other concepts.

Note that a registration authority that registers incomplete application data elements might contain several data elements with the same definition, each within the context of the source of that data element. These data elements should be linked to the appropriate well-formulated data elements that contain the same data values. See Subclause 6.7 for linking of data elements.

Examples:

Good: Regulation Effective Date: The calendar date when a regulation became effective.

Sample Collection Start Date: The calendar date when collection of the sample began.

Poor: Regulation Effective Date: The date when the event started.

Sample Collection Start Date: The date when the event started.

B.1.1.2 Singular

The concept expressed by the data definition shall be expressed in the singular.

Examples:

Good: The commonly known, short name of a country.

Poor: The commonly known, short name of countries.

Note: The poor definition implies that a name might identify more than one country.

B.1.1.3 State the concept; not only its negative

A definition cannot be constructed exclusively by saying what the concept is not. The following are definitions of "Country Name" demonstrate good and bad definitions.

Examples:

Good: The ISO-recognized short name of a country.

Poor: The ISO-recognized name that is not the long name of a country.

Note: In some instances, a good definition that specifies what the concept is, might also specify what the concept is not, as in the following example:

The ISO-recognized, short name of a country that is not its long name.

B.1.1.4 Descriptive phrase or sentence

A phrase or sentence is necessary to describe the essential characteristics of the concept. Stating the name as a synonym, or restating it with the same words is insufficient.

Examples:

Good: The commonly known, short name that identifies a country.

Poor: Name of a country.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Note: The poor definition does not describe the concept that this is the short name, not an expanded or long name.

B.1.1.5 Contain only commonly used abbreviations or acronyms

Understanding the meaning of an abbreviation, including acronyms and initials, is usually confined to a certain environment. In other environments the same abbreviation can cause misinterpretation or confusion. An exception to this rule can be made if an abbreviation is more readily understood than the full form and has been adopted as a term in its own right, such as *email* (i.e., electronic mail), *radar* (i.e., radio detecting and ranging) and *fax* (i.e., facsimile). When an abbreviation or an acronym is included in a definition, it should follow the full term and be enclosed in parentheses.

Example 1:

Good: The code that represents the economic activity of a company as specified by the Standard Industrial Classification (SIC) of Establishments.

Poor: The SIC code for a company.

Example 2:

Good: The code that represents the unit for measuring the mass per unit (m.p.u.) volume.

Poor: The code that represents the unit for measuring the m.p.u. volume.

B.1.1.6 No embedded definitions

The definition of a second data element or related concept should not appear in the definition proper of the primary data element.

Examples:

Good: The text that describes the method used to calibrate the analysis equipment.

Poor: The text that describes the method used to calibrate the analysis equipment. Calibration is the process of rectifying the graduation of an instrument that gives quantitative measurements.

Note: The term calibration should be defined in an associated glossary or dictionary.

B.1.2 Guidelines for definitions

Highly recommended guidelines, although not mandatory, are principles that should be followed when formulating a data element definition. 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, domain information, or procedural information.
- Avoid circular reasoning.
- Use the same terminology and consistent logical structure for related definitions.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Examples of these guidelines are provided in the following paragraphs.

B.1.2.1 Essential meaning of concept

Include all primary aspects of the concept, but avoid non-essential characteristics. Examples:

Good: The name of a country where mail is delivered.

Poor: The last line of a mail piece that names the country where mail is being sent.

Note: The poor definition contains extraneous information (i.e., the line where the country name is placed on a mail piece). This information is valuable to those who are preparing mail pieces (e.g., letters and packages), but does not serve to define the data element. This information might be included in a comment about the data element, or in business rules applicable to mailing address.

B.1.2.2 Precise and unambiguous

The exact meaning of a data element should be apparent from the definition. Codes that are derived from different standards or identifiers assigned by different sources must be distinguished.

Example 1:

Good: The 2-character alphabetic code assigned by the International Standard Organization (ISO) 3166-1 to represent a country.

Poor: The code that represents a country.

Note: Country Codes are assigned by ISO 3166-1:1997, FIPS PUB 10-4, FIPS PUB 104-1, and ANSI Z39.27-1984. Some are alphabetic (both 2- and 3-character), and at least one is numeric. The poor definition is imprecise, making it difficult to clarify the source of the code and its decode.

Note: The source of standard data values in a domain is documented by the Origin attribute in the value domain. The source is sometimes reflected in the definition, however, so that there is no misunderstanding as to the source of the data content for the data element.

Example 2:

Other examples of **good** definitions that clearly distinguish between similar data elements are:

The commonly recognized, short name that identifies a country.

The official name that identifies a country.

B.1.2.3 Concise

The definition should be brief and comprehensive. Extraneous terms are to be avoided.

Examples:

Good: The surname of a person.

Poor: The part of a person's name that describes the surname of a person.

Note: The person’s surname does not describe the surname — it is the surname of a person. It is extraneous to say that the surname is "part of a person's name."

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

B.1.2.4 Stand alone

A good definition must be able to stand alone, without further definition to understand its meaning.

Examples:

Good: The Hydrologic Unit Code (HUC) that represents a geographic area that includes part or all of a surface drainage basin, a combination of drainage basins, or a distinct hydrologic feature.

Poor: The Hydrologic Unit Code (HUC) code that represents a cataloging unit.

Note: The term "cataloging unit" does not provide the understanding that the code represents a drainage basin. For data registries that include a dictionary or thesaurus, the term cataloging unit should be defined in the thesaurus.

B.1.2.5 No embedded information

A good definition does not include embedded rationale, functional usage, domain information, or procedural information.

Example: The rationale for using meters instead of feet should not be embedded in the definition.

Good: The distance in meters either above or below a reference surface.

Poor: The distance either above or below a reference surface, measured in meters instead of feet because meters is an International Standard for measuring distance.

Example: Functional usage should not be included in the definition (i.e., this data element is [or is not] used for….).

Good: The code assigned by a state to uniquely identify a facility.

Poor: The code assigned by a state to uniquely identify a facility and to be used by the state in all data transfer for that facility.

Example: Procedural remarks (e.g., optionality) should not be part of a data element definition.

Good: The name of the capacity that an organization serves for a facility.

Poor: The name of the capacity that a company serves for a facility. The role name is used in conjunction with an organization name in association with a facility.

Note: A data element may have a "Note" or "Comment" attribute that can be used to capture usage, procedure, and other explanatory information that is not appropriate to include in the definition attribute.

B.1.2.6 Avoid circular reasoning

Two definitions should not be defined in terms of each other. A definition should not use the definition of another concept as its definition. Examples of poor definitions with circular reasoning are:

Examples:

Poor: A code number assigned to an object.

Poor: An object identified by a code number.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

B.1.2.7 Consistency for related definitions

A common terminology and syntax (i.e., consistent logical structure) should be used for similar or related definitions to facilitate understanding. Where the terminology and syntax is not the same, a user might assume that there is an implied difference between related definitions.

Example of Good Consistency. The following three definitions represent good consistency for the code and the name of the method for determining the vertical coordinate, and also with the name of the method for determining vertical and horizontal coordinates:

The code that represents the method used to determine the vertical coordinate.

The name of the method used to determine the vertical coordinate.

The name of the method used to determine the horizontal coordinates.

Example of Poor Consistency. The following two definitions represent poor consistency for code and name of the method for determining horizontal coordinates:

The name of the method used to determine the horizontal coordinates.

The code that represents the method used to determine the latitude and longitude.

Note: Because the terminology is different (horizontal coordinates vs. latitude and longitude), the registry user might assume that the different terms have a somewhat different meaning, even though they are simply different representations of the same concept.

B.1.3 Data element definition syntax

Only semantic structures of data element definitions are addressed in ISO/IEC 11179-4. For consistency, a registration authority might choose to establish syntax rules for the registry, as in the following examples.

- Use a phrase, not a sentence.

  Phrase: The name of the country where a mail piece is delivered.

  Sentence: The mailing address country name is the name of the country where a mail piece is delivered

Note: The sentence above is not as concise as the phrase. It repeats the data element name, and adds nothing that clarifies or further defines the data element.

- Since a data element always includes representation, begin the phrase that defines the data element by stating the representation class for the data element and its value domain. The definite article "the" is used, because the definition refers to a specific data value.

  Name: The name of ....

  Code: The code that represents ....

  Text: The text that describes (or defines)....

  Number: The number assigned by (Dun & Bradstreet; Chemical Abstracts Service; the state) to identify a (business establishment, chemical substance, legislative district)....

  OR The number that represents ....

  Measure: The measure of the (distance, area, mass)....

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Picture: The picture of ....

Graphic: The graph that depicts ....

Quantity: The (sum, dimension, capacity, amount) of ....

Note: For quantity, instead of repeating the term "quantity" in the definition, more specific terms are used to describe the type of quantity for which the data element is applicable. This avoids the wordiness of a phrase such as "The quantity that indicates the sum of ...."

B.1.4 Terms commonly used in definitions

Although not part of the standard, there are action terms commonly used in definitions that are frequently misused or mistakenly interchanged. The terms have similar, but different, meanings that make subtle changes to the interpretation of the definitions. These terms might be included in a user manual, to provide guidance for formulating definitions. The following are examples of terms that a registration authority might designate to be used in definitions, according to the meanings provided.

- Define. To set forth the meaning of a word or phrase.
- Depict. To represent by, or as if by painting, or to characterize by words with vividness of detail.
- Describe. To convey in words the appearance, nature, or attributes of something.
- Designate. To select or nominate for a purpose.
- Identify. To recognize or establish as being a particular person or thing; to verify the identity of something.
- Indicate. To show (as by measuring or recording), point to, draw attention to, or make known briefly in a general way.

For definitions to be precise and unambiguous, the above terms should be used carefully so that the exact meaning of the concepts reflected by the definitions is well understood.

B.2 Representational attributes

One of the first things to consider when registering a data element is how the data element is to be represented in an implementation. The relational aspects of a data element include the permissible values (i.e., code sets), value domain, representation class, and examples of data values. The value domain is the set of permissible values that will be stored in the data field as well as other representational attributes.

B.2.1 Permissible values

Permissible values are the exact names, codes, and text that can be stored in a data field in an information management system. For value domains that are enumerated, permissible values must be entered into the registry. The permissible values for country identification in "ISO English-Language Country Short Name" will be those names that are listed in the ISO 3166 standard for that category.

The permissible values for an enumerated value domain are associated with the value meanings (i.e., the names and definitions that are included in the conceptual domain of possible values). The entry of value meanings and their association with permissible values is described later in this Annex as B.5.3.

For non-enumerated domains, the permissible values are those defined by the value domain description and the rule description, as described in Subclause B.2.2.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

B.2.2 Value domain

The value domain is defined as a set of permissible values. It is formulated, based on an understanding of the data content. A data element is associated with only one value domain, and the name of the value domain describes all of the data values that are included in that domain. Value domains can have the attributes identified in the following list.

- Data Identifier and Version Number. The identifier and version number that represents the set of permissible values in the value domain. Each value domain must have an identifier, which can be generated by computer software to ensure uniqueness.

- Name. The name by which a value domain is known. The name should be plural, since a value domain encompasses all values that are included in the domain (e.g., English-Language Country Short Names). Note that a definition can also be used to describe the value domain.

- Definition. A phrase expressing the essential value of the value domain. The definition is plural, because it encompasses all values for that domain.

- Name and Definition Context. A designation or description of the application environment or discipline in which a name is applied or from which it originates. A registration authority will determine the contexts in which names and definitions are appropriate for a value domain. Context is required whenever administrative data are recorded for a value domain.

- Datatype. The format used for the collection of letters, digits, and/or symbols, to depict values of a data element, determined by the operations that may be performed on the data element. Datatypes are characterized as language independent. They do not follow any particular Database Management System (DBMS) or software language. The standard does not specify the datatypes to be used for the value domains. The standard does require that the datatype schema/source be recorded for the datatype. ISO 11404 provides guidance on language independent datatypes. The metamodel requires that the datatype description be recorded for generated datatypes, as specified in ISO 11404.

  Examples of datatypes, such as are used in this Technical Report, and their sources are compared in the following table:

ANSI ISO SQL Datatype	DB2 or SQL/DS Datatype	Oracle Datatype
CHARACTER (n), CHAR (n)	CHARACTER (n)	CHAR (n)
CHARACTER VARYING (n), CHAR VARYING (n)	VARCHAR (n)	VARCHAR2 (n)
	LONG VARCHAR	LONG
NUMERIC (p,s), DECIMAL (p,s), DEC (p,s)	DECIMAL (p,s)	NUMBER (p,s)
INTEGER, INT, SMALLINT	INTEGER, SMALLINT	NUMBER (38)
FLOAT (p)	FLOAT (p)	FLOAT (p)
REAL		FLOAT (63)
DOUBLE PRECISION		FLOAT (126)
	DATE	DATE

- Domain Type. Value domains are either enumerated or non-enumerated:

Enumerated domains are those for which all values can be explicitly expressed in a structured or unstructured set. Structured sets (e.g., taxonomies or thesauri) are not addressed in this Technical Report. Country names

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

are a fixed list of countries, maintained by International Standards; therefore, the domain type is enumerated. Enumerated domains are identified by their association with specified permissible values.

Non-enumerated domains have a set of values that are specified by a rule, recorded in the non-enumerated value domain description. Latitude measures are not restricted to a fixed list. Therefore, the domain type is non-enumerated. A non-enumerated domain must be identified by a definition that clearly describes the values that are permissible for the data element.

Domain type is not an attribute in the 11179-3 model, but it has been found to be a useful attribute for differentiating between enumerated and non-enumerated domains in a registry.

- Non-enumerated domain description. An explanatory comment is required to describe the procedure, rule, reference, range, or other process for which a set of all permissible values is defined for the non-enumerated value domain.

  — Procedure. Measurements and quantities are determined by procedure (e.g., they are calculated, measured, or generated).

  — Reference. Telephone numbers and facility names are determined by reference (e.g., they can be validated in some type of directory).

  — Range. Percentages and temperatures are examples of range determinations. Maximum and minimum values are always required for range determinations. Examples**:** 1-100% and 32-212°B.

- Maximum characters.

For non-enumerated domains, the maximum length must be adequate to accommodate the largest, reasonable amount of data for that value domain (e.g., the maximum length for a text field might be 240 characters).

For enumerated domains, the actual permissible values determine the maximum field lengths. For a 3-digit code, the maximum field length is three. For short, English-language country names, the minimum length is 4 (e.g., Peru or Oman) and the maximum length is 44 (e.g., South Georgia and the South Sandwich Islands). Only the maximum field length is recorded.

- Unit of Measure. Some value domains require that values for a data element be measured in only one unit (e.g., a requirement that altitude be measured in meters). This attribute contains the name of the unit of measure for all data values for the value domain.

- Precision. Where the value for a data element must be measured or recorded according to a specific level of precision, that information is recorded in the precision attribute (e.g., a requirement that the molecular weight for a chemical substance be recorded to two decimal places). Examples of value domain identifiers (i.e., labels) have been assigned to the examples provided in Annex A to demonstrate uniqueness and reusability of the value domain.

Closely related to the value domain is the Rule and the Rule Description. The rule is the logical, mathematical, or other operation that specifies the derivation of the data element values. The rule can identify data elements upon which a mathematical process is used to calculate or determine the value of a data element.

B.2.3 Representation class

Representation class is the value domain for representation. The set of classes make it easy to distinguish among the elements in the registry. For instance, a data element categorized with the representation class 'amount' is different from an element categorized as 'number'. It probably won't make sense to compare the contents of these elements, or perform calculations using them together.

Representation class is a mechanism by which the functional and/or presentational category of an item may be conveyed to the user. An informational list of representation class terms is provided in ISO/IEC 11179-5.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

The list has been expanded in this Technical Report to provide a more comprehensive list of examples that might be used to describe representation classes, including the following:

- Amount - Monetary quantity.
- Average - Numeric value representing an arithmetic mean.
- Count - Non-monetary numeric value arrived at by counting.
- Code - A system of valid symbols that substitute for longer values.
- Date - Calendar date.
- Measure - A record of the dimensions, capacity/amount (non-monetary) of an object.
- Name - A designation for an object.
- Number - A number associated with an object, used as an identifier.
- Quantity - Non-monetary numeric value not arrived at by counting.
- Rate - A quantity or amount considered in relation to another quantity or amount.
- Text - An unformatted descriptive field.
- Time - Time of day or duration.
- Group - A designation for a set of data elements that have relationships to each other. For example: Employee Address Group.
- Graphic - Diagrams, graphs, mathematical curves, or the like.
- Icon - A sign or representation that stands for its object by virtue of a resemblance or analogy to it.
- Picture - A visual representation of a person, object, or scene.

None of the terms in this list is required in any specific implementation of representation class.

By using representation class, enhanced semantic control over the contents of value domains can be maintained. Rules can be drawn against representation classes that allow enforcement of content within and among value domains. For example:

- "A number-class data element cannot be used in a calculation."
- "A date-class data element must be in the format YYYYMMDD."
- "A relationship must exist between a code data element and the longer form of the value meanings which the code represents."

Qualifiers can be used with representation classes to modify the representation class term or limit it in some way. Qualifiers are particularly useful in a metadata registry to differentiate between two or more objects or entities that have the same representation, such as codes or names.

B.2.4 Data Element Example

Each set of metadata attributes for a data element includes an example of the kind of data value that can be stored in that data element. Data element names and definitions are always defined as singular; therefore, examples are always singular. More than one example can be used, however, where necessary to illustrate

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

the value domain. The example can be a name, text, code, number, or any of the data representations described in the value domain. The following rules apply:

- For enumerated domains, the data element example must be one of the permitted values for that value domain.

  Example for "Country Name": Australia

When the representation for the data element is a coded value, a registration authority might choose to use one of the permitted values for the code as the example, followed by the value meaning name, enclosed in parentheses.

  Example for "Country Numeric Code": 036 (Australia)

- For non-enumerated domains, the data element example must be representative of the data that complies with the definition of the value domain.

  Example for "Latitude Degrees Measure": +87.123456

Example for "Location Comments Text"**:** The coordinates reference the flagpole in the North parking lot of the installation. This location is near the center of the facility.

B.3 Identifying and naming a data element

The data element name can be constructed, based on the value domain values and the data element definitions.

Names are not used as identifiers for data elements, but as designators that enable humans to refer to a data element. The definition is the attribute that provides a full understanding of the data element, and the registration authority identifier, data element identifier, and version identifier together uniquely identify a data element, as described in ISO/IEC 11179-5.

Every data element must have at least one name, and each name must be identified with a context. Each context (e.g., source of a data element name) can have its own naming convention. Rules for formulating a data element name are dependent upon the registry in which the data element is registered. An example follows in Subclause B.3.3.

Multiple names may be appropriate for a data element based on the intended use for the data element. Contexts for names are described in Subclause B.3.1. Each registry establishes its own naming convention. Suggestions for establishing a naming convention are provided in Subclause B.3.2.

B.3.1 Name context

Context names are not listed in the standard. Examples of name contexts that might be used for a registration authority include the following.

- Legacy - a name that has been used in the past.

- Standard - a name that has been used in a standard (e.g., ANSI, ISO, or other standard).

- Short Abbreviation - a name that is used in a computer system.

- <*source system name*> - the name that is used by the source that submitted the data element for registration.

- Registry - the unique name that has been assigned to the data element for registration by a registration authority.

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 - All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

An attribute for Language context is also contained in the model. This attribute is useful for registries that represent more than one language. For example, a registry might have a Standard name context for both French and Spanish.

The multiple names for a single data element might be the same or different names, depending upon their contexts. The names in context are often associated with definitions for that context. The definitions must state the exact same concept for the data element as the registry definition, even if they are defined in different terms. Examples of non-unique names and definitions, associated with the same data element but stating the same concept, are listed as follows.

Registry: Vertical Measure. The vertical measure, in meters, of the measured point, above or below a reference point.

Legacy: Vertical Measure. The measure of elevation (i.e., the altitude), in meters, above or below a reference datum.

Standard: Altitude. The vertical distance in meters either above or below a reference surface.

It is clear when reading these three definitions, that the concept is the same for all (i.e., the measure of the height (or depth) of an object above or below some point of reference). The following definition would not be appropriate, because it would convey a different concept:

Facility Altitude: The height or depth of a facility relative to sea level.

This definition includes the concept of "facility," which limits the objects where measurements are appropriate; "sea level," which limits the point of reference for the measurement; and it does not restrict the unit of measure to meters. The last data element described (i.e., Facility Altitude) is not the same data element as was the previous example of Vertical Measure/Altitude.

Note: ISO/IEC 11179-3 includes an attribute for "Unit of Measure" in the value domain of the registry. This is the appropriate attribute to indicate the unit by which the data value is to be recorded. In a standard developed by the American National Standard Institute (ANSI), however, unit of measure was included in the definition, so it has been replicated in this example. The registry model also includes an attribute for the precision required for recording the data value.

B.3.2 Establish a naming convention

The Registration Authority should establish a naming convention for each name context in the registry. Where data element names are provided from other sources, the naming convention may not be fully known (e.g., the names assigned to data elements in an application software system). The naming convention shall be constructed according to ISO/IEC 11179-5 naming conventions, as explained in the following paragraphs.

- **The Scope of the Naming Convention**. The scope of the naming convention determines how broadly the naming convention is applied. For the example registry described in this Technical Report, the scope is limited to the Registry name context. For example, a data element might have the name Regulation Abstract Text with the context Registry and the name Abstract in another context. The conventions used for names in contexts other than for the Registry name context may not be known to the registration authority and the naming convention would be documented as Unknown.

- **The Authority That Establishes Names**. The registration authority establishes the naming convention for a registry for the context of Registry. The Environmental Data Registry (EDR) has as its registration authority a government agency. The stewardship contact appointed by that agency is the final authority for the assignment of names. Other registries will establish their own naming conventions.

- **Semantic Rules for Source and Content of Terms**. Semantic rules enable meaning to be conveyed. Each registry shall specify the guidelines used, if any, that govern the source and content of words used in a name. Name components may come from object class terms, property terms, representation terms, and qualifier terms. These terms may be part of a thesaurus or terminology system. The logical group or entity where a data element might be modeled and the conceptual domain where the data values are

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

defined and maintained can be used as source terms in a data element name. The naming convention for some name contexts might specify that the data element name is simply what the data element is commonly called in the organization, and that no semantic rules are enforced.

- **Syntactic Rules for Word Order**. Syntactic principles specify the arrangement of components within a name. The specific syntactic rules for a registry, if any, should be specified in the naming convention. In the examples in this Technical Report, the convention for syntax for the Registry name context is to include the representation class term as the last term in the name, as in Regulation Abstract *Text*. Representation class terms are defined in Subclause B.2.3 of this Annex.

- **Lexical Rules**. These principles concern preferred and non-preferred terms, synonyms, abbreviations, component length, spelling, case sensitivity, and similar rules. Rules for these subjects, if any, are part of the specifications of the naming convention. A registration authority might choose to establish controlled, well-defined word lists for formulating a name.

- **Name Uniqueness**. Each registration authority determines whether a name within a context must be unique. Because users often rely on names as an indication of data values, *qualifiers* may be used to distinguish similar data elements within a registry (e.g., *Horizontal* Collection Method Code and *Vertical* Collection Method Code; *Mailing* Address Country Name and *Geographic* Address Country Name).

B.3.3 Example of a naming convention

An example of a naming convention for the context "Registry," and its adaptation for a specific registration authority is provided in this clause. For this example, registry name is considered to be the official name by which a data element is registered in a specific registry.

- Scope. The scope of this example naming convention is for use in the example registry. Each data element must be assigned a "Registry Name". It is not intended to be the official or preferred name for the organization or industry.

- Authority. The authority for this example is the Environmental Data Registry.

- Semantic Rules. Names shall include a term that indicates the type of values that will be stored in that data element. For example, a data element that represents a domain of Country Identifiers, should have the term Country in its name. Properties and qualifiers shall be used to differentiate between names that would otherwise be the same. The representation class term shall always be included as the last term in the name.

- Lexical Rules. A data element name in the example registry shall have a maximum of 100 alphanumeric characters. The language of the registry shall be English.

- Name Uniqueness. Names shall be unique within a registration authority for the context Registry.

B.3.4 Formulating a data element name

The examples used in this Technical Report are based on a naming convention for name context “registry,” established by one registration authority. The example requires that the data element name be constructed to reflect both the logical entity (i.e., the object) and the attribute which identifies the type of data value to be contained in the data element (i.e., the property). Although the entity is not always required to be a term in the name, the attribute (i.e., type of data value) is a requirement. For the registration authority used in this example, data element name would always include the representation class term, such as name, measure, amount, number, code, quantity, text, or others, as defined in Subclause B.2.3.

The data element names in the following table are provided as examples of names to be found in one registry, with the context Registry Name. The table columns identify the name components. Syntactic rules for name are relative. The only rule in this example is for syntax; the representation should be the last component in a name.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Object (Entity)	Property (Data Values)	Representation	Qualifier	Resultant Data Element Name
Primary Geopolitical Entity	Country Name	Name[1]		Country Name
Address	Country Name	Name[1]	Mailing	Mailing Address Country Name
Address	Country Identifier	Code	Geographic	Geographic Address Country Code
Address	Person Name	Name[1]	Mailing	Mailing Address Person Name
Facility	Legal Name	Name[1]		Facility Legal Name
Geographic Coordinates[2]	Latitude	Measure		Latitude Measure
Location	Latitude	Measure	Facility	Facility Location Latitude Measure
Location	Latitude	Measure	Stack	Stack Location Latitude Measure
Geographic Coordinates[2]	Collection Method	Code	Horizontal	Horizontal Collection Method Code
Geographic Coordinates[2]	Collection Method	Code	Vertical	Vertical Collection Method Code

[1] "Name Name" is redundant, so only one "Name" is used in the data element name.

[2] "Geographic Coordinates" is an implied entity not included in the data element name.

B.4 Identification

B.4.1 Data element identifier

ISO/IEC 11179-5 gives principles for naming and identification of data elements. Each data element registered within a Registration Authority, i.e., an organization authorized to register metadata, is unambiguously identified with a unique identifier. This number takes the form ICD-OI-OPI-OPI_SRC, where ICD = international code designator, OI = organization identifier, OPI = organization part identifier, and OPI_SRC = OPI source. At the time a data element is registered into a registry, a Data Element Identifier (DI) is assigned to the data element. When a data element is first registered, it is assigned a Version Identifier (VI) of "1". The version number is incremented by "1" for each subsequent change to the data element. The DI and VI can be assigned by the system software when a data element is registered in the registry (i.e., a new data element record is created in the system). Each registration authority should develop business rules for versioning data elements and their attributes.

The combination of RAI, DI, and VI shall constitute the International Registration Data Identifier (IRDI). This identifier provides unique identification to a data element internationally. For the examples listed in Annex A, DI and VI have been recorded to demonstrate uniqueness.

A registration authority might require certain associated administrative information for a data element. Some attributes are specified in the standard (e.g., registration status). Others are determined by the registration authority. Examples of administrative attributes that might be established by a registration authority are described in this clause. No administrative data attributes have been assigned to the examples described in the text of this Technical Report or in the table provided in Annex A.

--`,,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

B.4.2 Versioning

Any administration record in a metadata registry may need to be versioned: value domains, data elements, classification schemes (models, systems, message sets, standards, documents, groups, forms, term sets, and others), conceptual domains, data concepts, object classes, properties, representation classes, and rules.

B.4.2.1 General rules

1. In order to ensure versioning is appropriately applied, it cannot be decided by software, but requires interpretation of the business rules by a data analyst.

2. Versions would be incremented only for non-trivial changes (not typos). In some cases, the stewardship contact and the registrar would need to agree on changes. In the case of standards, the working group would have to approve changes.

B.4.2.2 Value domains

1. Value meanings and permissible values will be date stamped with begin and end dates for valid values.

2. A change in a permissible value or value meaning would result in adding the new value to the table with an effective (or beginning) date. For example, if the country name for the Belgian Congo is changed to Zaire, Zaire will be added to the file with a begin date, and an end date would be recorded for the date that the Belgian Congo ceased to be a country.

3. Value domains will be reviewed for potential versioning when a new value domain set is published. For example, if the State Department releases a new set of country codes, the new country code values would need to be reflected in the metadata registry. When information about changes to individual values in the domain is available, permissible values and value meanings will be individually updated and date stamped. In the event that change information is unavailable, the entire new domain would be published in the metadata registry and the old domain retained. The new value domains will have a new version number and carry their source information. Each value domain can be linked to the related data element, such as Country Code.

4. Value domain changes would prompt the need to review related data elements to determine whether or not they should be versioned. For example, if the Country Name Value Domain changed, the related data element of Country Name would be reviewed for potential versioning.

B.4.2.3 Data elements

1. Data elements may be versioned based on changes to definition, representation, format, or a related value domain.

2. All changes made to standard data elements require some documentation of authorization. This could be indicated within a text field for each standard.

3. Data elements would be reviewed for versioning based on changes in related groups, documents, applications, or standards.

4. New data element versions would be indicated by incrementing the version number associated with the identifier. This is a new physical record for the data element, and the registry would continue to record the earlier versions (6125:1, as well as 6125:2).

B.4.2.4 Classification schemes

1. A classification scheme would be versioned when a new release is entered into the registry.

2. Terms would not be versioned, but definitions would be versioned when a source submitted a revised definition.

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

3. Changing versions of classification scheme or term definitions would trigger the need to review existing classifications of data elements and other objects in the model.

B.5 Conceptual relationships

Data element concepts, conceptual domains, and value meanings are described in this clause.

B.5.1 Data element concept

The data element concept is a concept that can be represented in the form of a data element, described independently of any particular representation. The data element "Country Name" is a representation of the data element concept "Country Identifier."

The following list is provided as guidance for terms that might be used in names and definitions of data element concepts. Terms that do not denote representation include the following.

- Identifier. Something that represents to be, regards, or treats as the same or identical.
- Label. A short word or phrase descriptive of a person, group, or intellectual movement, or indicating that what follows belongs in a particular category or classification.
- Tag. A descriptive word or phrase applied to a person, group, organization, etc., as a label or means of identification or epithet.
- Indicator. Anything that serves to point out or direct attention to, as of a measuring device.
- Discriminator. A distinction that differentiates one from another.

The following list of characteristics is provided as guidance to ensure consistency in formulating the names and definitions of data element concepts.

- Singular. Each data element concept represents only one concept.
- Does not include representation. It does not incorporate the representation terms such as name, code, text, number, or other terms that denote how the concept can be represented in either the name or the definition of the concept.
- Indefinite article. The definition is stated with the indefinite articles "a" or "an" since the concept does not specify a particular data value or representation.
- Can be associated with multiple data elements, each with its own representation and value domain.

ISO 3166, for example, represents the data element concept "Country Identifier," which can be represented as names or by codes (e.g., "Country Name" or "Country Code"). There is more than one name and more than one code associated with the concept for "Country Identifier." Each name and each code requires its own data element and value domain.

- Can be associated with only one conceptual domain.

The appropriate level for exchanging data values is the conceptual level, through data element concept and conceptual domain. The value domains of country codes and country names are translatable, where the value meanings associated with the conceptual domain reference the same data element concept for countries of the world.

The system software can create a data element concept identifier. It provides unique identification and versioning for data element concepts. It is an identifier that can be used to indicate the domain for translation of data values.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

B.5.2 Conceptual domain

An enumerated conceptual domain is a set of all possible, valid value meanings of a data element concept expressed without representation. The conceptual domain for the "Country Identifier" data element concept is the collection of all the value meanings that can be used to identify all of the countries of the world. A non-enumerated conceptual domain constrains the meaning of a data element concept, describing the possible valid values of a non-enumerated set of value meanings, without representation.

Characteristics of conceptual domains include the following.

- Plural. Whether enumerated or non-enumerated, a conceptual domain encompasses the entire body of information that might be included as meanings of the data values in a particular data element for a particular concept. Therefore, the name and definition are always described as plural.

- Object oriented. The name is used to identify the item contained in the conceptual domain. It does not require a property identifier or an object class. For example, "Countries of the World" includes the identification of all countries.

- Lacking representation. The definition identifies the type of information that a conceptual domain encompasses, without using representation class terms such as code, name, text, number, picture, measure, quantity, and identifier. For example: "Countries of the World" is defined as "The primary geopolitical entities of the world," not as "The *names of* the primary geopolitical entities of the world."

- Conceptual domains can be, and often are, associated with more than one data element concept. Data element concepts that "Countries of the World" could be associated with include, but are not limited to:

  — Address Country Identifier.

  — North American Country Identifier.

  — NATO Country Identifier.

  — Geographic Country Identifier.

A conceptual domain can be associated with any data element concept that uses the same value meanings (e.g., United States, Canada, and Mexico are value meaning names for both the Address Country Identifier and the North American Country Identifier concepts). Different value meanings require a different conceptual domain. For example, in a database about countries, a data element that contains information about a country other than country identification (e.g., size of government, type of government, economic activities) would each have its own conceptual domain.

A rule for determining if a data element concept can be associated with a conceptual domain is to consider the value meanings associated with the conceptual domain. Names such as Frigid, Tropical, or Temperate could be permissible values for a conceptual domain about geographic zones where countries are located, but they cannot be defined as "The principal geopolitical division of the world known as <*country name*>." They would not be associated with the conceptual domain "Countries of the World."

Where the content of the value meanings is the same for more than one data element/data element concept/value domain, the conceptual domain can be reused for multiple data element concepts as described previously in this clause. Conceptual domain identifiers have been recorded for the examples provided in Annex A to demonstrate uniqueness and reusability.

B.5.3 Value meanings

Every enumerated conceptual domain is associated with more than one value meaning. A value meaning is the meaning (description) of a permissible value that will be stored in a data element. Value meanings can have both name and definition. Often the "name" of a value meaning becomes the permissible value of that

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

value meaning in a data element with "name" representation. Characteristics of value meaning names and definitions are the following.

- Cannot be a representation. The name and definition do not contain representation class terms such as name, number, text, code, or other representation terms.
- Must be associated with at least one conceptual domain.
- Can be associated with more than one conceptual domain.

Example 1: Value meaning names associated with the conceptual domain "States of the United States" is also associated with the conceptual domain "Data Collection Sources" in one registry.

Example 2: The value meaning name "Unknown," indicating that the data value for a particular data element is not known, can be associated with many conceptual domains.

- Begin and End dates. The date when a value meaning was entered into a conceptual domain and the date when a value meaning was no longer valid for a conceptual domain are required in a registry.
- Unique Identifier. Each value meaning has a unique identifier (VMID) in a registry. The VMID and the data element unique identifier (IRDI) provide unique identification of an occurrence of a particular data element item. This combination of identifiers is valuable for data transfer.

In addition, the value meaning should be singular. Each value meaning represents one instance of the meaning of a value to be found in a data element.

B.6 Classification

Classification helps to add information not easily included in definitions, helps to organize the contents of a registry, and helps to provide access by supporting more meaningful queries. ISO/IEC 11179-2 describes general categories of classification, including the following.

- Keywords (i.e., controlled word lists), which can be applied to object classes, properties, representations, data elements, and data element concepts.
- Thesaurus terms, which can be associated with data elements and data element concepts.
- Taxonomy and ontology taxa, which may be related to the classified data registration items: object class, property, representation class, and data element concept.

ISO/IEC 11179-5 describes three classified metadata items: object class, property, and representation class. An object class term represents an activity or object in a context. Property terms are terms that modify an object term. Representation class terms describe the form of representation. Representation terms are described in Annex B, Subclause B.2.3.

A registry might also choose to classify data elements as one or more of the following.

- Groups, e.g., the group of data elements used in a mailing address, the group of data elements used to identify chemical substances, or the group of data elements that locate a point on the surface of the earth.
- Keywords, e.g., altitude, date, facility, industrial, and organization.
- Documents, e.g., all the data elements listed in a document.
- Computer information system, e.g., all the data elements used in a computer system.
- Data Standard, e.g., data elements defined in a data standard.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Form, e.g., forms that identify data elements for a particular data collection.
- Other sources of data elements.

One of the sources that classify a data element is also considered to be the origin of that data element or value domain in a registry.

B.7 Quality review

As metadata for data elements are completed, the data element progresses through a review process toward standardization, where appropriate. The Registration and Administrative Statuses indicate the status of a data element in the registration/standardization process.

B.7.1 Registration status

The standard values for registration status include the following.

- Incomplete. The data element does NOT have all the necessary metadata.
- Recorded. The data element has all the necessary metadata, but has NOT met all the quality requirements.
- Certified. The data element has all the necessary metadata and has met all quality requirements.
- Standard. The data element has all necessary metadata, has met all quality requirements, and has been approved by the Registration Authority.
- Retired. The data element is no longer used in the registry.

The registration authority might also choose to use Legacy as a registration status as follows.

- Legacy. The data element was obtained from a Legacy System and may be missing some metadata. It has not been considered for standardization.

The registration status for a new data element is always listed as "Incomplete" until such time as all attributes associated with that data element are completed. After all of the data element attributes have been verified to be complete, the registration status is changed to "Recorded." The registration authority determines other status changes.

B.7.2 Administrative status

There is no list of values in the ISO/IEC 11179 standard for administrative status; the registration authority establishes these. One registration authority uses the following values for administrative status.

- Awaiting information. The data element is not described by the minimum required attributes.
- In Quality Review. The data element attributes are under review for quality.
- Interim. The data element is designated for use as a standard during final review.
- Final. The data element is a standard.
- Inactive. The data element is not currently active.
- No Further Action. The data element will not receive further review for standardization.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

- Proposed for Certified. The data element is complete and has undergone quality review by the Data Registrar for certification.
- Proposed for Standard. The data element has undergone review and is proposed as a standard.
- Proposed to Retire. The data element is no longer used within the registration authority and is proposed for retirement.
- Review for Standard. The data standard is under review to become a standard.
- Superseded. The data element was replaced by another data element.

For this example, the administrative status for a new data element that has a registration status of "Incomplete" is always "Awaiting Information." When all mandatory attributes are complete and the registration status has been changed to "Recorded," the administrative status is updated to "In Quality Review." The registration authority determines all changes in administrative status.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex C
(informative)

Crosswalk of names in Technical Report to ISO/IEC 11179-3 metamodel

Optionality is indicated as: Mandatory, Optional, Conditional

Op-tion-ality	Metadata Attribute Name in this document	Entity/Attribute Names in Metamodel	Context of Metamodel Entities
1	**Data Element Definition**		
M	Data Element Definition Context	The Designation.name of the Context	Data Element is always an Administered item
M	Description of the Context	Document identified in Reference_Document	Describes the naming convention for an Administered item
M	Data Element Definition	Definition.definition_text	Data Element is always an Administered Item
2	**Permissible Values and Value Domain**		
C[1]	Permissible Values	Value:value_item	Associated with Permissible_Value(s) for Enumerated_Domain(s)
C[1]	PV Begin Date	Permissible_Value. permissible_value_begin_date	Used when the Value Domain has an Enumerated_Domain
O	PV End date	Permissible_Value. permissible_value_end_date	Used when the Value Domain has an Enumerated_Domain
M	Value Domain Context	The Designation.name of the Context	
M	Value Domain Name	Designation.name	
M	Value Domain Definition	Definition.definition_text	
C[3]	VD Description	Non-enumerated_Domain. non-enumerated_domain_description	Associated with Value Domain and required for non-enumerated domains.
C[1]	Value Domain Item Identifier	Value_Domain.value_domain_ administration_record	Related through Administration_Record
M	Datatype	Value_Domain. value_domain_datatype	Related to Datatype
M	Datatype Schema/Source	Datatype.datatype_scheme_ reference	Relates to Value_Domain through Datatype
O	Maximum Characters	Value_Domain. maximum_character_quantity	
O	Unit of Measure	Value_Domain. value_domain_unit_of_measure	Relates to Unit_of_Measure.unit_of_measure_ name
O	Precision	Unit_of_Measure.precision	Relates to Value_Domain through Unit_of_Measure. unit_of_measure_precision
M	VD Origin	Administration_Record.origin	
M	VD Explanatory Comment	Administration_Record. explanatory_comment	

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Op-tion-ality	Metadata Attribute Name in this document	Entity/Attribute Names in Metamodel	Context of Metamodel Entities
3	**Representation Class**		
O	Representation Class	Representation_Class.representation_class_administration_record	
O	Representation Class Qualifier	Data_Element. representation_class_qualifier	
4	**Data Element Name and Identifier**		
M	Data Element Name Context	Context (for Administered Item)	Data Element is always an Administered item.
M	Data Element Name	Designation.name	Data Element is always an Administered item.
M	Data Element Identifier	Administration_Record.administered item_identifier	Data Element is always an Administered item.
5	**Other Metadata Attributes**		
M	DE Example	Data_Element_Example. data_element_example_item	Every data element must be exemplified by a data element example.
O	DE Origin	Administration_Record.origin	Every Data Element is an Administered item.
O	DE Explanatory Comment	Administration_Record. explanatory_comment	Every Data Element is Administered item.
M	Submitting Organization	Organization.organization_name	
M	Stewardship Contact	Stewardship.stewardship_contact	The stewardship contact is usually represented as an organization or a hot line telephone number.
M	Creation Date	Administration_Record. creation_date	Usually captured as the system date.
6	**Data Element Concept and Conceptual Domain**		
M	Data Element Concept Context	The Designation.name of the Context	
M	Data Element Concept Name	Designation.name	Data Element Concept is always an Administered item.
M	Data Element Concept Definition	Definition.definition_text	Data Element Concept is always an Administered item.
O	Object Class	Data_Element_Concept. data_element_concept_object_class	Relates to Object_Class. object_class_administration_record
O	Object Class Qualifier	Data_Element_Concept. object_class_qualifier	
O	Property	Data_Element_Concept. data_element_concept_property	Relates to Property. Property_administration_record
O	Property Qualifier	Data_Element_Concept. property_ qualifier	
M	Data Element Concept Item Identifier	Administration_Record.administered item_identifier	Data Element Concept is always an Administered item.
O	Conceptual Domain Context	The Designation.name of the Context	Used when the Conceptual Domain is administered.
O	Conceptual Domain Name	Designation.name	Used when the Conceptual Domain is administered.

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Op-tion-ality	Metadata Attribute Name in this document	Entity/Attribute Names in Metamodel	Context of Metamodel Entities
O	Conceptual Domain Definition	Definition.definition_text	Used when the Conceptual Domain is administered.
O	Conceptual Domain Item Identifier	Administration_Record.administered item_identifier	Used when the Conceptual Domain is administered.
C[3]	Non-Enumerated Conceptual Domain Description	Non_enumerated_Value_Domain .non_enumerated_conceptual_domain_description	Associated with Value Domain and required for non-enumerated domains.
C[1]	Value Meaning Identifier	Value_Meaning. value_meaning_identifier	Contained in a Conceptual_Domain and used by Permissible_Values for enumerated domains.
C[1]	Enumerated Value Meaning Text	Value_Meaning. value_meaning_description	Contained in a Conceptual_Domain and used by Permissible_Values for enumerated domains
O	VM Begin Date	Value_Meaning. value_meaning_begin_date	Contained in a Conceptual_Domain for enumerated domains.
O	VM End date	Value_Meaning. value_meaning_until_date	Contained in a Conceptual_Domain for enumerated domains.
7	**Data Element Classification**		
O	Classification Types	Classification_Scheme_Item. csi_type_name	Classification Scheme
C[4]	Examples of Classification Types	Classification_Scheme_Item. csi_value	Classification Scheme
8	**Registration and Administrative Status Information**		
M	Registration Status	Administration_Record. registration_status	Required for all Administered Items. Always required for Data Element and Data Element Concept.
M	Administrative Status	Administration_Record. administrative_status	Required for all Administered Items. Always required for Data Element and Data Element Concept.
9	**Classification Scheme for Groups**		
C[4]	Type of Source/Classification Scheme Type	Classification_Scheme. classification_scheme_type_name	
C[4]	Name/Title	Designation.designation_name	Classification scheme is an Administered Item.
C[4]	Definition	Definition.definition_text	Classification scheme is an Administered Item.
M	Organization	Organization.organization_name	
O	Explanatory Comment	Administration_Record. explanatory_comment	Administration record for the classification scheme.
M	Item Identifier	Administration_Record. item_identifier	Related through Administration_Item. Item_Identifier
M	Registration Status	Administration_Record. registration_status	Administration record for the classification scheme.
M	Administrative Status	Administration_Record. administrative_status	Administration record for the classification scheme.

[1] Mandatory for enumerated domains.

[2] One of the alternative fields is mandatory.

[3] Mandatory for non-enumerated domains.

[4] Mandatory when classification types are recorded.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Annex D
(informative)

Example of complete associated metadata item descriptions using top-down approach to data element registration

The body of this document focuses on data elements. However, in this Annex, the development of elements from a data model with all associated metadata items is presented. A top-down approach to data element registration is typically used where a data model of the subject area already exists or can readily be created.

D.1 Example data model

The following figure (Figure D.1) shows a simple data model for the purposes of illustrating the top-down approach to registering data elements. The model represents a scenario where organizations wish to track experts in particular specialties, and the ability of these experts to communicate in various languages. (In a real life scenario, there would most likely be a many-to-many relationship between experts and specialties, but we wish to keep the example simple.)

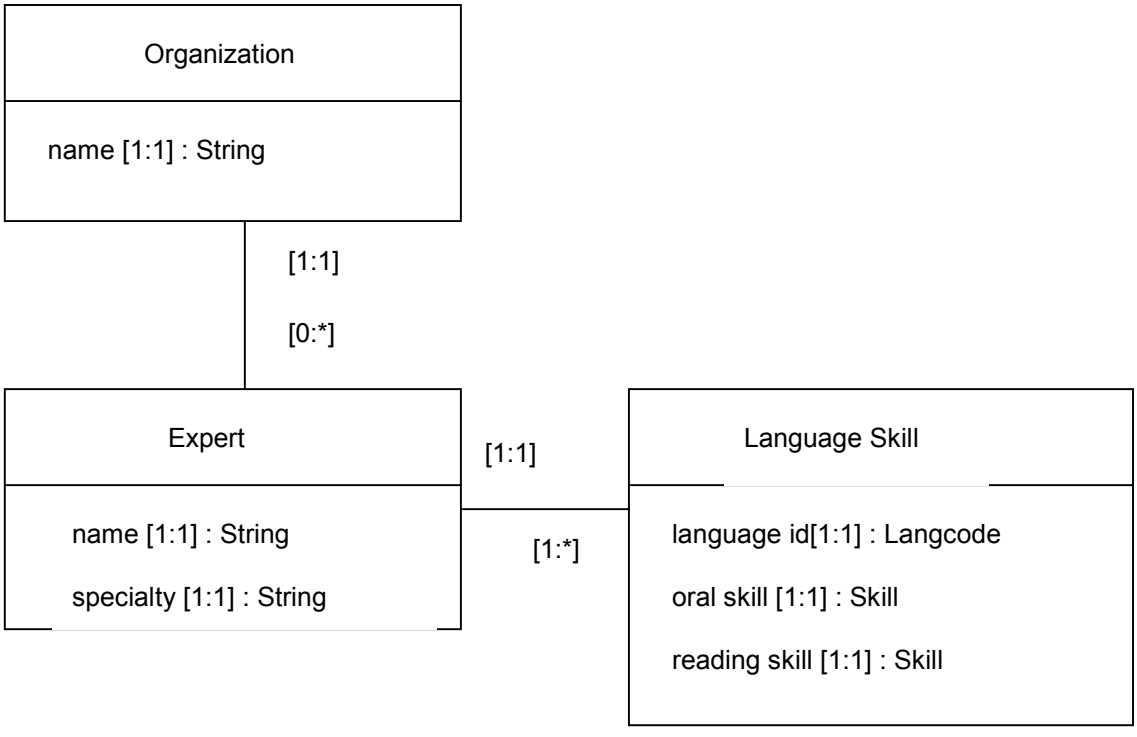

Figure D.1 — Example data model

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.2 Presentation of Information

The attributes associated with each item to be recorded in the registry are listed in tabular form, as they are introduced. The attributes come from several places in the 11179-3 metamodel.

1. Common attributes:
    a. From Administration Record:
        i. Item identifier
        ii. Registration status
        iii. Administrative status
        iv. Creation date
    b. From Designation for each Context:
        i. Designation name
        ii. Language identifier
    c. From Definition for each Context:
        i. Definition text
        ii. Language identifier
2. Attributes specific to individual object classes
3. Item identifiers representing relationships between object classes.
    a. From Context:
        i. Context item identifier

D.2.1 Format of Item identifier

Arbitrary identifiers have been assigned to each item to enable them to be referenced from other items. ISO/IEC 11179-3 defines a multi-part item identifier, with the following structure.

- Registration authority identifier;
- Data identifier;
- Version.

For simplicity in this example, we omit the registration authority identifier and version, and present the Data Identifier as six characters, where the first three characters are an abbreviation for the object class, and the last three are a numeric suffix. We use these identifiers rather than names as references between objects, because in a registry, metadata items may have different names in different contexts. The identifiers are unique and unambiguous.

© ISO/IEC 2003 - All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.3 Context

The starting point for top-down registration is to define the context(s) for which metadata is being recorded. In an organization, the context may be a specific function or business unit. Multiple contexts may be specified, each with its own name and definition. Within a single context, names and definitions may be provided in more than one language. In this example, the context is specified as being Clause 6 of this Technical Report.

As an administration record, a context must itself have a context. In this example, we use a self-reference, such that this context provides its own context. Alternatives to self-reference would be to define a general context for a registry, or to refer to ISO/IEC 11179 as a general context. In a registry, there has to be either at least one context that is self-referencing, or a collection of contexts that provide circular referencing (e.g. A refers to B and B refers to A).

Context - ISO/IEC 20943 Clause 7	
Common Attributes	
Item identifier	**CXT001**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**ISO/IEC 20943 Clause 7**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The context assigned to the example of top-down registration in ISO/IEC 20943 Clause 7.
CXT001.Language.identifier	EN
Specific Attributes	
Context description	See definition.
Relationships	
Context	CXT001

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.4 Object classes and properties

The object classes and associated properties are explicit in the data model. The names of the object classes and properties may be taken from the model. Associated definitions must be provided, and a context has to be specified within which the names and definitions apply.

Object Class — Organization	
Common Attributes	
Item identifier	**OCL001**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Organization**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	A legal entity.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

Object Class — Expert	
Common Attributes	
Item identifier	**OCL002**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Expert**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	An individual named as an expert for a specialty.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

© ISO/IEC 2003 – All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Object Class — Language Skill	
Common Attributes	
Item identifier	**OCL003**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language Skill**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	A rating of an expert's ability to communicate his/her specialty in a particular language.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

When identifying properties, if a property appears in more than one object class, it is recorded only once. To qualify as a single property, it has to be possible to assign a single name and definition that applies equally well in each object class. More specific names and definitions will be applied when data element concepts are defined later.

Property — Name	
Common Attributes	
Item identifier	**PRP001** (System generated)
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Name**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	A designation used to refer to a concept or an object.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Property — Specialty	
Common Attributes	
Item identifier	**PRP002**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Specialty**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	An area of expertise.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

Property — Language Id	
Common Attributes	
Item identifier	**PRP003**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language id**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	An identifier for a natural language.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

Property — Oral Skill	
Common Attributes	
Item identifier	**PRP004**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)

© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Property — Oral Skill	
CXT001.Designation.name	**Oral skill**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	A rating of an individual's ability to communicate orally in a particular language.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

Property — Reading Skill	
Common Attributes	
Item identifier	**PRP005**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Reading skill**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	A rating of an individual's ability to comprehend a particular written language.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

Property — Writing Skill	
Common Attributes	
Item identifier	**PRP006**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Writing skill**
CXT001.Language.identifier	EN

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Property — Writing Skill	
CXT001.Definition.definition text	A rating of an individual's ability to communicate in writing in a particular language.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

D.5 Data element concepts and conceptual domains

A data element concept is a property in the context of an object class. Simply concatenating the names of the object class and the property may provide an initial form of the name of the data element concept. Redundant words may then be deleted. (e.g. see DEC005, DEC006 and DEC007.) In general, the use of a Representation Class term as part of a data element name will be sufficient to distinguish it from the corresponding data element concept. Where this is not true, a prefix or suffix (DEC or DE) might be added to one to distinguish it from the other.

Each data element concept is to be associated with a conceptual domain. Where data element concepts share a common set of associated value meanings, they should be defined on a common conceptual domain. In this example, because organization names and individual names typically take different forms, they are assigned to different domains, but the three types of skill are assigned to a single domain.

We list the conceptual domains first, because they are referenced from the data element concepts.

Conceptual Domain — CD Organization Name	
Common Attributes	
Item identifier	**CDM001**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**CD Organization name**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of possible value meanings for an organization name.
CXT001.Language.identifier	EN
Specific Attributes	
Dimensionality	(Not applicable)
Relationships	
Context	CXT001

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 - All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Conceptual Domain — CD Individual Name	
Common Attributes	
Item identifier	**CDM002**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**CD Individual name**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of possible value meanings for an individual's name.
CXT001.Language.identifier	EN
Specific Attributes	
Dimensionality	(Not applicable)
Relationships	
Context	CXT001

Conceptual Domain — CD Specialty	
Common Attributes	
Item identifier	**CDM003**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**CD Specialty**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of possible value meanings for Specialty.
CXT001.Language.identifier	EN
Specific Attributes	
Dimensionality	(Not applicable)
Relationships	
Context	CXT001

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Conceptual Domain — CD Language Id	
Common Attributes	
Item identifier	**CDM004**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**CD Language id**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of possible language identifier meanings taken from ISO 639 English Name.
CXT001.Language.identifier	EN
Specific Attributes	
Dimensionality	(Not applicable)
Relationships	
Context	CXT001

Conceptual Domain — CD Skill Level	
Common Attributes	
Item identifier	**CDM005**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**CD Skill level**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of possible value meanings for skill level.
CXT001.Language.identifier	EN
Specific Attributes	
Dimensionality	(Not applicable)
Relationships	
Context	CXT001

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element Concept — Organization Name	
Common Attributes	
Item identifier	**DEC001**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Organization Name**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	A designation used to refer to an organization.
CXT001.Language.identifier	EN
Specific Attributes	
Object class qualifier	(Not applicable)
Property qualifier	(Not applicable)
Relationships	
Conceptual domain	CDM001
Context	CXT001
Object class	OCL001
Property	PRP001

Data Element Concept — Expert Name	
Common Attributes	
Item identifier	**DEC002**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Expert name (DEC)**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	A designation used to refer to an expert.
CXT001.Language.identifier	EN
Specific Attributes	
Object class qualifier	(Not applicable)
Property qualifier	(Not applicable)

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element Concept — Expert Name	
Relationships	
Conceptual domain	CDM002
Context	CXT001
Object class	OCL002
Property	PRP001

Data Element Concept — Expert Specialty	
Common Attributes	
Item identifier	**DEC 003**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Expert specialty (DEC)**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	An expert's area of expertise.
CXT001.Language.identifier	EN
Specific Attributes	
Object class qualifier	(Not applicable)
Property qualifier	(Not applicable)
Relationships	
Conceptual domain	CDM003
Context	CXT001
Object class	OCL002
Property	PRP002

Data Element Concept — Language Skill Language Id	
Common Attributes	
Item identifier	**DEC004**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language skill language id**

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element Concept — Language Skill Language Id	
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The identifier for the natural language in which skill is to be rated.
CXT001.Language.identifier	EN
Specific Attributes	
Object class qualifier	(Not applicable)
Property qualifier	(Not applicable)
Relationships	
Conceptual domain	CDM004
Context	CXT001
Object class	OCL003
Property	PRP003

Data Element Concept — Language Oral Skill	
Common Attributes	
Item identifier	**DEC005**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language oral skill**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The rating of an expert's ability to communicate his/her specialty orally in a particular language.
CXT001.Language.identifier	EN
Specific Attributes	
Object class qualifier	(Not applicable)
Property qualifier	(Not applicable)
Relationships	
Conceptual domain	CDM005
Context	CXT001
Object class	OCL003
Property	PRP004

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element Concept — Language Reading Skill	
Common Attributes	
Item identifier	**DEC006**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language reading skill**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The rating of an expert's ability to comprehend his/her specialty in a particular written language.
CXT001.Language.identifier	EN
Specific Attributes	
Object class qualifier	(Not applicable)
Property qualifier	(Not applicable)
Relationships	
Conceptual domain	CDM005
Context	CXT001
Object class	OCL003
Property	PRP005

Data Element Concept — Language Writing Skill	
Common Attributes	
Item identifier	**DEC007**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language skill — writing (DEC)**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The rating of an expert's ability to communicate his/her specialty in writing in a particular language.
CXT001.Language.identifier	EN
Specific Attributes	
Object class qualifier	(Not applicable)

© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element Concept — Language Writing Skill	
Property qualifier	(Not applicable)
Relationships	
Conceptual domain	CDM005
Context	CXT001
Object class	OCL003
Property	PRP006

D.6 Value Meanings

For enumerated conceptual domains, value meanings need to be listed. In our example, “Language id conceptual domain” and “Skill level conceptual domain” are enumerated. Individual value meanings are not Administration records.

Value Meanings are not Administration records, so they have no Common Attributes.

Value Meanings for Conceptual Domain CDM004 (from ISO 639)	
Specific Attributes	
Value Meaning Identifier	VLM001
Value Meaning Description	English
Value Meaning Effective Date	2000-10-10
Value Meaning Until Date	
Relationships	
Conceptual domain	CDM004
Specific Attributes	
Value Meaning Identifier	VLM002
Value Meaning Description	French
Value Meaning Effective Date	2000-10-10
Value Meaning Until Date	
Relationships	
Conceptual domain	CDM004
Etc	

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Value Meanings for Conceptual Domain CDM005	
Specific Attributes	
Value Meaning Identifier	VLM003
Value Meaning Description	Poor
Value Meaning Effective Date	2000-10-10
Value Meaning Until Date	
Relationships	
Conceptual domain	CDM005
Specific Attributes	
Value Meaning Identifier	VLM004
Value Meaning Description	Fair
Value Meaning Effective Date	2000-10-10
Value Meaning Until Date	
Relationships	
Conceptual domain	CDM005
Specific Attributes	
Value Meaning Identifier	VLM005
Value Meaning Description	Good
Value Meaning Effective Date	2000-10-10
Value Meaning Until Date	
Relationships	
Conceptual domain	CDM005
Specific Attributes	
Value Meaning Identifier	VLM006
Value Meaning Description	Excellent
Value Meaning Effective Date	2000-10-10
Value Meaning Until Date	
Relationships	
Conceptual domain	CDM005

© ISO/IEC 2003 - All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.7 Value Domains and Representation Classes

A value domain defines a set of permissible values (listed explicitly if they are enumerated, or specified by a rule if they are not). Each value domain is associated with one conceptual domain. In this example, we define a single value domain for most conceptual domains, but define two value domains for the representation of "Language id conceptual domain" (CDM004), namely, "Language code (2 char)" (VDM004) and "Language code (3 char)" (VDM005).

A Representation Class is an optional way of classifying Value Domains and associated Data Elements that support similar types of representation. We identify "name" and "code" as two examples of representation class.

Representation Class — Name	
Common Attributes	
Item identifier	**RCL001**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Name (Representation class)**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The classification of types of representation applicable to names.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

Representation Class — Code	
Common Attributes	
Item identifier	**RCL002**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Code (Representation class)**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The classification of types of representation applicable to codes.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Value Domain — VD Organization Name	
Common Attributes	
Item identifier	**VDM001**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**VD Organization name**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of permissible values for an organization name.
CXT001.Language.identifier	EN
Specific Attributes	
Datatype	String
Unit of Measure	(Not applicable)
Relationships	
Conceptual domain	CDM001
Context	CXT001
Representation class	RCL001

Value Domain — VD Individual Name	
Common Attributes	
Item identifier	**VDM002**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**VD Individual name**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of permissible values for an individual's name.
CXT001.Language.identifier	EN
Specific Attributes	
Datatype	String
Unit of Measure	(Not applicable)

© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Value Domain — VD Individual Name	
Relationships	
Conceptual domain	CDM002
Context	CXT001
Representation class	RCL001

Value Domain — VD Specialty	
Common Attributes	
Item identifier	**VDM003**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**VD Specialty**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of permissible values for Specialty.
CXT001.Language.identifier	EN
Specific Attributes	
Datatype	String
Unit of Measure	(Not applicable)
Relationships	
Conceptual domain	CDM003
Context	CXT001
Representation class	RCL001

Value Domain — Language Code (2 char)	
Common Attributes	
Item identifier	**VDM004**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language code (2 char)**
CXT001.Language.identifier	EN

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Value Domain — Language Code (2 char)	
CXT001.Definition.definition text	The domain of permissible language identifiers taken from ISO 639 two character codes.
CXT001.Language.identifier	EN
Specific Attributes	
Datatype	String
Unit of Measure	(Not applicable)
Relationships	
Conceptual domain	CDM004
Context	CXT001
Representation class	RCL002

Value Domain — Language Code (3 char)	
Common Attributes	
Item identifier	**VDM005**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language code (3 char)**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of permissible language identifiers taken from ISO 639 three character codes.
CXT001.Language.identifier	EN
Specific Attributes	
Datatype	String
Unit of Measure	(Not applicable)
Relationships	
Conceptual domain	CDM004
Context	CXT001
Representation class	RCL002

© ISO/IEC 2003 · All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Value Domain — VD Skill Level	
Common Attributes	
Item identifier	**VDM006**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**VD Skill level**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The domain of permissible values for skill level.
CXT001.Language.identifier	EN
Specific Attributes	
Datatype	String
Unit of Measure	(Not applicable)
Relationships	
Conceptual domain	CDM005
Context	CXT001
Representation class	RCL002

D.8 Permissible Values

For each enumerated value domain, the permissible values are to be listed.

Permissible Values are not Administration records, so they have no Common Attributes.

Permissible Values for Value Domain VDM004 (from ISO 639)	
Specific Attributes	
Value Item	**EN**
Permissible Value Effective Date	2000-10-10
Permissible Value Until Date	
Relationships	
Value Domain	VDM004
Conceptual Domain	CDM004
Value Meaning Identifier	VLM001

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Permissible Values for Value Domain VDM004 (from ISO 639)	
Specific Attributes	
Value Item	**FR**
Permissible Value Effective Date	2000-10-10
Permissible Value Until Date	
Relationships	
Value Domain	VDM004
Conceptual Domain	CDM004
Value Meaning Identifier	VLM002
Etc	

Permissible Values for Value Domain VDM005 (from ISO 639)	
Specific Attributes	
Value Item	**ENG**
Permissible Value Effective Date	2000-10-10
Permissible Value Until Date	
Relationships	
Value Domain	VDM005
Conceptual Domain	CDM004
Value Meaning Identifier	VLM001
Specific Attributes	
Value Item	**FRA**
Permissible Value Effective Date	2000-10-10
Permissible Value Until Date	
Relationships	
Value Domain	VDM005
Conceptual Domain	CDM004
Value Meaning Identifier	VLM002
Etc	

© ISO/IEC 2003 - All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Permissible Values for Value Domain VDM006	
Specific Attributes	
Value Item	**0**
Permissible Value Effective Date	2000-10-10
Permissible Value Until Date	
Relationships	
Value Domain	VDM006
Conceptual Domain	CDM005
Value Meaning Identifier	VLM001
Specific Attributes	
Value Item	**1**
Permissible Value Effective Date	2000-10-10
Permissible Value Until Date	
Relationships	
Value Domain	VDM006
Conceptual Domain	CDM005
Value Meaning Identifier	VLM002
Specific Attributes	
Value Item	**2**
Permissible Value Effective Date	2000-10-10
Permissible Value Until Date	
Relationships	
Value Domain	VDM006
Conceptual Domain	CDM005
Value Meaning Identifier	VLM003
Specific Attributes	
Value Item	**3**
Permissible Value Effective Date	2000-10-10
Permissible Value Until Date	
Relationships	
Value Domain	VDM006
Conceptual Domain	CDM005
Value Meaning Identifier	VLM004

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

D.9 Data elements

Data elements represent the combination of a data element concept with a particular value domain. A Representation Class is an optional way of classifying Value Domains and associated Data Elements that use similar types of representation. As documentation is being developed using the top-down approach, a data element may be assigned a generic representation class prior to assigning a specific value domain. By the time the data element reaches recorded status, any representation class specified for the data element must be consistent with the representation class specified for the corresponding domain.

Data Element — Organization Name	
Common Attributes	
Item identifier	**DEL001**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Organization name**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	A designation used to refer to an organization.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001
Data element concept	DEC001
Representation class	RCL001
Value domain	VDM001

Data Element — Expert Name	
Common Attributes	
Item identifier	**DEL002**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Expert name**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	A designation used to refer to an expert.
CXT001.Language.identifier	EN

--`,,`-`-`,,`,,`,`,,`---

© ISO/IEC 2003 - All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element — Expert Name	
Relationships	
Context	CXT001
Data element concept	DEC002
Representation class	RCL001
Value domain	VDM002

Data Element — Expert Specialty	
Common Attributes	
Item identifier	**DEL 003**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Expert specialty**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	An expert's area of expertise.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001
Data element concept	DEC003
Representation class	RCL001
Value domain	VDM003

Data Element — Language skill Language Id	
Common Attributes	
Item identifier	**DEL004**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language skill language id**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The identifier for the natural language in which skill is to be rated.
CXT001.Language.identifier	EN

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element — Language skill Language Id	
Relationships	
Context	CXT001
Data element concept	DEC004
Representation class	RCL002
Value domain	VDM004

Data Element — Language Oral Skill Code	
Common Attributes	
Item identifier	**DEL005**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language oral skill code**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The rating of an expert's ability to communicate his/her specialty orally in a particular language.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001
Data element concept	DEC005
Representation class	RCL002
Value domain	VDM006

Data Element — Language Reading Skill Code	
Common Attributes	
Item identifier	**DEL006**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language reading skill code**
CXT001.Language.identifier	EN

--`,,`-`-`,,`,,`,`,,`---
© ISO/IEC 2003 - All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Data Element — Language Reading Skill Code	
CXT001.Definition.definition text	The rating of an expert's ability to comprehend his/her specialty in a particular written language.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001
Data element concept	DEC006
Representation class	RCL002
Value domain	VDM006

Data Element — Language Writing Skill Code	
Common Attributes	
Item identifier	**DEL007**
Registration status	Recorded
Administrative status	(R.A. defined)
Creation date	(System generated)
CXT001.Designation.name	**Language writing skill code**
CXT001.Language.identifier	EN
CXT001.Definition.definition text	The rating of an expert's ability to communicate his/her specialty in writing in a particular language.
CXT001.Language.identifier	EN
Relationships	
Context	CXT001
Data element concept	DEC007
Representation class	RCL002
Value domain	VDM006

© ISO/IEC 2003 — All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Bibliography

[1] ISO 639-2:1998, *Codes for the representation of names of languages — Part 2: Alpha-3 code*

[2] ISO 3166-1:1997*, Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

[3] ISO 6709:1983, *Standard representation of latitude, longitude and altitude for geographic point locations*

[4] ISO 11180:1993, *Postal addressing*

[5] ISO/IEC 11404:1996 *Information technology — Programming languages, their environments and system software interfaces — Language-independent datatypes*

[6] ISO 19111:2003, *Geographic information — Spacial referencing by coordinates*

[7] ISO 19115:—[1)], *Geographic information — Metadata*

[8] ANSI X3.285-1998, *Metamodel for the Management of Sharable Data*

[9] FGDC-STD-001-1998, *Content Standard for Digital Geospatial Metadata*

1) To be published.

© ISO/IEC 2003 · All rights reserved

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

ICS 35.040

Price based on 125 pages

© ISO/IEC 2003 – All rights reserved
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale