INTERNATIONAL STANDARD

ISO 2146

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Information and documentation — Registry services for libraries and related organizations

Information et documentation — Services de registre pour les bibliothèques et les organismes associés

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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

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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

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

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

ISO 2146 was prepared by Technical Committee ISO/TC 46, *Information and documentation*, Subcommittee SC 4, *Technical interoperability*.

This third edition constitutes a revision of the second edition (ISO 2146:1988), which was withdrawn in 1999. The entire text of the second edition has been reorganized and rewritten for this third edition.

Introduction

ISO 2146 was first published in 1972 under the title *Directories of libraries, information and documentation centres*. Its purpose was to assist in compiling and publishing international directories, national registries published in bi- or multilingual countries and national and regional directories intended for international use. When the second edition came up for its ten year review in 1988, the world had changed. Agencies were finding new ways of collecting and publishing directory information on the Internet and of deploying it in machine-readable form to aid discovery and delivery.

The need was identified to repurpose this International Standard as a data element directory and to take into account new usage scenarios. Development of the revision began in 2001 with support for interlibrary lending scenarios as an initial driver. The primary purpose of ISO 2146 in its new form is to offer a conceptual basis for the development of the full range of registry services needed to support digital library usage scenarios. As such, it is designed to be explanatory and extensible rather than restrictive and prescriptive. The term “registry” has been adopted in the title and the data element directory to indicate that this International Standard supports the process of collecting the required information from stakeholders as well as making it available for use.

The data element directory has been formulated as an object-oriented model that can be converted to machine readable formats such as XML. Some concepts are less developed than others but this version of this International Standard is nevertheless complete. It allows for the addition of new elements through a typing approach and provides free text elements for capturing information not explicitly modelled. It also allows any data element to be encoded using an extension schema. As a framework standard, it does not prescribe how data are recorded or what ontologies or controlled vocabularies are used. To do so would limit the applicability of this International Standard to specific usage scenarios. However, a range of examples and starter lists is provided, and implementers are encouraged to use (or to collaborate in the development of) appropriate standards for any given service, usage, or subject field.

It is anticipated that different registry applications will be based on profiles of this International Standard. The profiles will specify the objects in the information model and the data elements essential to that registry type, and define and maintain the enumerated lists appropriate to the application. The profile will also specify the bindings and protocols to be used for exchange purposes. This will enable parties in the same sector and in parallel sectors to collaborate in the development and delivery of services and content.

Other standards exist to facilitate the exchange of registry objects between systems. This International Standard is not intended to replace these standards although an XML schema version of the data element directory can be used for this purpose. Similarly, other standards exist or are under development to enable the persistent identification of registry objects. This International Standard provides data elements for the recording and management of such identifiers but does not prescribe their use.

Information and documentation — Registry services for libraries and related organizations

1 Scope

This International Standard establishes the rules for registries operating in a network environment to provide the information about collections, parties, activities and services needed by libraries and related organizations to manage their collections and deliver information and documentation services across a range of applications and domains.

This International Standard presents a data element directory that can be used as a framework for collecting the appropriate data and sharing it with other registry services, providing access to registry data through standard protocols whenever it is needed as part of an automated business workflow, publishing registries in electronic or print form, and archiving registry data when the data exist only in electronic form.

This International Standard is applicable to national registries published in bi- or multilingual countries and national and regional registries intended for international use.

The field of application includes but is not limited to

— collection management systems and digital repositories,

— discovery services, including catalogues and indexes, federated metadata repositories and metasearch portals,

— delivery services, including persistent identifier management and resolution, access management and interlending services,

— reference services including reference management systems and virtual reference services, and

— the registry services themselves, of all types, needed to support the above applications.

2 Normative references

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

ISO 639-2, *Codes for the representation of names of languages — Part 2: Alpha-3 code*

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

ISO 3166-2, *Codes for the representation of names of countries and their subdivisions — Part 2: Country subdivision code*

ISO 4217, *Codes for the representation of currencies and funds*

ISO 8601:2004, *Data elements and interchange formats — Information interchange — Representation of dates and times*

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1
attribute
data element that is a property or characteristic of a class

3.2
character
printable symbol having phonetic or pictographic meaning and usually forming part of a word of text, depicting a numeral, or expressing grammatical punctuation

3.3
code
representation of a piece of information such as a letter, word or phrase in another form, usually briefer

3.4
data element
element
basic unit of identifiable and definable data

3.5
data type
term used to qualify both the content and the structure of an element

3.6
entity
record in a database or registry consisting of one or more elements that has a discrete existence

3.7
ILL
inter library loan
lending or copying transaction between two libraries on behalf of an end user

3.8
registry
collection of registry objects compiled to support the business of a given community

3.9
role
function played by an entity such as a party or address, often specific to a transaction

3.10
transaction
creation or modification of a message required to support the searching and maintenance of a registry record or record element

3.11
word
unit of language consisting of one or more characters that carries meaning

4 Presentation

4.1 Information model hierarchy

In this International Standard a registry is defined as a collection of registry objects that has been compiled to support the business of a given community. The data element directory which makes up the body of this International Standard is based on an object-oriented data model which has a registry object as its primary object class. A registry object may be a collection, party, activity or service. A collection is an aggregation of physical or digital objects. A party is a person or group. An activity is something occurring over time that generates one or more outputs. A service is a system (analogue or digital) that provides one or more functions of value to an end user.

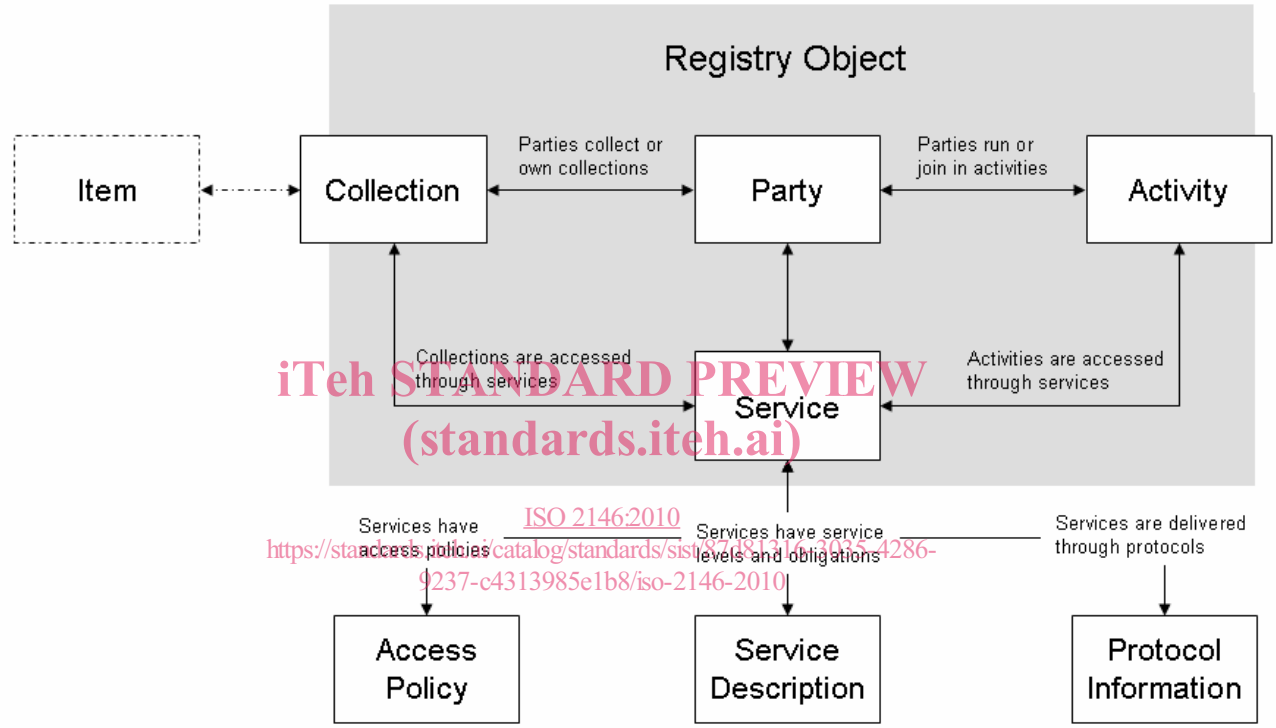

Figure 1 — Registry object and its sub-classes

Figure 1 shows the relationships between these sub-classes. Amongst other roles, parties collect or own collections and run or join in activities. Parties also manage and use services through which collections and activities are accessed.

Figure 1 also shows that services may have policies that permit or deny access to users under certain conditions, that they have service levels and obligations that need to be described and that they may be delivered through protocols in a network environment. The data elements needed to describe access policies, service descriptions and protocol information are the key to building interoperable services and also to developing service-oriented applications. When bound into appropriate schemas they become interface objects that can be exchanged as messages whenever this information is needed to perform a function. In this context, a registry is itself a collection that can be accessed through a service using standard protocols.

While the scope of this International Standard is limited to the four sub-classes of registry object shown in Figure 1, an item object has been included in the diagram to show the continuum between item and collection. Items and collections are both resources and can be described using the bibliographic entities defined in the IFLA *Functional requirements for bibliographic records* (FRBR) model. Resource description standards such as the *DCMI Metadata terms* enable the description of both collections and items and their discovery using

common access points. These map readily to data elements defined in this International Standard when collections need to be treated as registry objects (see Note). Collections become registry objects when further properties and relations need to be described to support their management and use than is needed for resource discovery. Implementers may, however, elect to extend the number of sub-classes to support the description of items or of any other business object genre that might need to be treated as a registry object to support the business of a community.

NOTE See for example, the DCMI Collections Application Profile mappings in Annex E.

4.2 Structure

The data element directory reflects the information model hierarchy through the following structure.

— Clause 5 describes data elements applicable to all registry objects.

— Clauses 6 to 8 describe data elements applicable to parties, collections and activities.

— Clause 9 describes data elements applicable to services.

— Clause 10 describes data elements specific to access policies.

— Clause 11 describes data elements specific to service descriptions.

— Clause 12 describes data elements specific to service protocols.

— Clause 13 describes common data elements that are referenced in more than one clause.

Annex A contains an alphabetical list of data elements cross-referenced to the appropriate numbered entry.

Annexes B to F are informative annexes which discuss how this International Standard might be applied to address the needs of libraries and related organizations for registry services.

4.3 Arrangement

Each element in the data element directory has its own numbered clause with the name of the data element as the heading, a description defining its purpose and its data type. An element may also have guidelines as to how it should be used and examples drawn from existing applications. Data elements of type class also have a list of their attributes (data elements that are properties or characteristics of the class), with information about whether or not they are mandatory (obligation) within the parent class and how often they can occur (occurrence).

Annex A also includes the description and lists the classes in which the data element is used.

NOTE Examples of controlled vocabularies are for guidance only and will need to be formalized in profiles.

4.4 Obligation

Obligation can have the following values.

4.4.1
M
mandatory
information indicating that a data element shall be present within a specific record

4.4.2
O
optional
information indicating that a data element may be present within a specific record

4.4.3
CM
conditional mandatory
information indicating that one of two or more data elements shall be present within a record

4.4.4
CO
conditional optional
information indicating that a data element is optional but when it is used one of two or more data elements shall be present within a record

NOTE In this International Standard, an attribute is only designated as mandatory if it is needed to uniquely identify multiple instances of a class. It will be up to profiles to specify what other elements need to be mandatory to support specific usage scenarios.

4.5 Occurrence

4.5.1
1
one and only one instance of the element shall occur in an instance of the class

4.5.2
0-1
the element is optional but if it occurs there shall be one and only one instance

4.5.3
0-N
the element is optional but may occur any number of times

4.5.4
1-N
the element is mandatory but may occur any number of times

4.6 Data types

For the purposes of this International Standard the following data types are defined.

4.6.1
boolean
data type having two values: one and zero [which are equivalent to true and false]

4.6.2
class
set of data elements describing the abstract characteristics of an object

4.6.3
date time
string formed according to the rules specified for Date and Time in ISO 8601:2004

4.6.4
decimal
data type consisting of numbers expressed in the base ten numeral system

4.6.5
label, class
complex data type used when values may need to be associated with an authority

Ref.	Attribute	Obl.	Occ.	Data type
4.6.5.1	value	M	1	string
4.6.5.2	authority	O	0-1	string
4.6.5.3	other value	O	0-1	string

The authority may be a registration agency, a controlled vocabulary or a set of rules governing the form of the value. The authority data element is optional for two reasons: the authority may be derivable from the value without needing to specify it explicitly; or a decision has been made not to associate the value with an authority in a given context.

In cases where a string is associated with a controlled vocabulary, there may be a requirement to record values not included in the core list. In this case, set the value to other and record the string in other value.

In XML schema bindings data elements of class label may be denormalized to elements of type string with the authority encoded as an XML attribute.

NOTE The label class in this International Standard is not equivalent to the enumeration data type in XML. Although some data elements of this class may have values drawn from a simple controlled list that can be enumerated in an XML schema binding, others will have values generated independently by a registration authority, or draw their values from collections of terms that are separately maintained.

In an XML schema that binds a data element of class label to a data element of type enumeration, use XML case conventions unless the terms are not easily converted from one case to another for rendering in displays.

4.6.5.1
value, string
string or code that may need to be associated with an authority to control its form or content or to make it unique in a given context

4.6.5.2
authority, string
agency that controls the form or content of a value or its uniqueness in a given context

4.6.5.3
other value, string
string that represents the other value when ‘other’ is recorded as the value

4.6.6
metadata, class
complex data type enabling the embedding of data formatted in a designated extension schema

Ref.	Attribute	Obl.	Occ.	Data type
4.6.6.1	metadata format	M	1	label
4.6.6.2	bindata	CM	1	string
4.6.6.3	xmldata			

The data type of any element in the data element directory may be replaced by the metadata data type if there is a requirement to extend the information to be collected, stored and exchanged to meet the specific needs of a designated community.

4.6.6.1
metadata format, label
string or code specifying the metadata format

EXAMPLES

1) CERIF (Common European research information format)

2) DCMI (Dublin Core Metadata Initiative metadata terms)

3) EAC (Encoded archival context)

4) EAD (Encoded archival description)

5) ebXML (OASIS/ebXML registry services specification)

6) IESR (IESR [Information Environment Service Registry] application profile)

7) LOM (Learning object metadata)

8) MADS (Metadata authority description schema)

9) MARC (Machine-readable cataloging)

10) MODS (Metadata object description schema)

11) RSLP (Research Support Libraries Programme collection description)

12) UDDI (Universal description, discovery and integration)

13) WSDL (Web service definition language)

14) X.500

15) XACML (eXtensible Access Control Markup Language)

16) Z39.91-200x (NISO Z39.92-200x, Collection description specification)

17) Z39.92-200x (NISO Z39.92-200x, Information retrieval service description specification)

18) ZeeRex

4.6.6.2
bindata, string
element containing Base64 encoded metadata

4.6.6.3
xmldata, string
element containing XML encoded metadata

4.6.7
positive integer
data type consisting of all the whole numbers with values greater than zero

4.6.8
seq lang string, class
complex data type enabling the recording of one or more language strings expressing the same concept in different languages or language systems

Ref.	Attribute	Obl.	Occ.	Data type
4.6.8.1	language string	M	1-N	string

National registries published in bi- or multilingual countries and national and regional registries intended for international use shall use seq lang string to record the language of a string, any transformations it has undergone from the original language and the system used to create these transformations. In implementations seq lang string may be denormalized to string where there is no requirement to publish a registry in more than one language or language string type and no transformations have been performed.

EXAMPLES

1) A Canadian registry published in both French and English

2) A New Zealand registry published in both Maori and English

3) A Chinese registry published in Chinese and transliterated using the Pin Yin transliteration system

4.6.8.1
language string, class
value of an element expressed in a specified language and language string type

Ref.	Attribute	Obl.	Occ.	Data type
4.6.8.1.1	language string value	M	1	string
13.9	language	O	0-1	label
4.6.8.1.2	language string type	O	0-1	label
4.6.8.1.3	language string type system	O	0-1	label
13.7	is default	O	0-1	Boolean

Create one language string for each language and language string type. Use default to indicate that a string is to be used as the default when no specific language or language string type or language string type system is requested.

4.6.8.1.1
language string value, string
text value of a language string

4.6.8.1.2
language string type, label
code or string delineating the nature of the language string when it has undergone a transformation from its original form

EXAMPLE Equivalent, Translated, Transliterated, Transcribed

4.6.8.1.3
language string type system, label
standard or system followed for transliteration or transcription

EXAMPLE ISO 9, ISO 259, ISO 843

4.6.9
string
data type consisting of a sequence of one or more characters

4.6.10
time
string formed according to the rules specified for time in ISO 8601:2004

Data elements of type date time and time may be stored in a form that represents local time as long as it can be converted on export to coordinated universal time (UTC) or local time with offset to UTC.

4.7 Attributes

Attributes are presented in table form with the following information.

4.7.1
ref.
reference
clause number of the referenced element

4.7.2
attribute
name of the referenced element

4.7.3
obl.
obligation
information about whether or not a data element is mandatory within a specific record

4.7.4
occ.
occurrence
information about whether or not a data element may be repeated within a specific record

4.7.5
data type
data type of the referenced element

NOTE Lists of attributes are not separately captioned and numbered because they can be uniquely referenced within the standard by the clause number and heading. They form an integral part of the entry and help to quantify properties of a data element in an easy-to-read form.