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Information technology — CDIF semantic metamodel —

Part 2: **Common**

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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 3.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 15476 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 15476-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and system engineering*.

ISO/IEC 15476 consists of the following parts, under the general title *Information technology — CDIF semantic metamodel*:

— *Part 1: Foundation*

— *Part 2: Common*

— *Part 3: Data definition*

— *Part 4: Data models*

— *Part 5: Data flow models*

— *Part 6: State/event models*

Introduction

This standard will assist the vendors and users of modelling tools and meta-data repositories in developing mechanisms for interchanging information. This standard specifies an element of a family of related standards. When used together, these standards specify a mechanism for transferring information between tools.

ISO/IEC 15474-1:2002, *Information technology — CDIF framework — Part 1: Overview*, and ISO/IEC 15474-2:2002, *Information technology — CDIF framework — Part 2: Modelling and extensibility*, should be read first when initially exploring CDIF. The first explains the overall CDIF architecture and how the family of standards fits together. The second explains the scope, and modelling approach in CDIF. The CDIF meta-metamodel and extensibility mechanism are also defined in that document.

This standard explains the Common subject area of the CDIF semantic metamodel, that defines information common to all other objects in the semantic Meta-model. The CDIF semantic metamodel is used to ensure that the information transferred by tools communicating using CDIF is expressed with an agreed meaning.

This standard has been developed with the wide support and participation of vendors, users, academia and government involved in or familiar with the CASE industry, its products and the general requirements associated with interchanging information between these products.

This document is organized into the following Clauses:

— Clauses 1 to 5 are prescribed ISO/IEC Clauses

— Clause 6: Subject area overview

This Clause gives an overview of the coverage of this subject area.

— Clause 7: Subject area summary

This Clause gives an overview of the content of this subject area.

— Clause 8: Subject area specification

This Clause gives the formal specification of all the objects defined in the subject area, and the formal reference to those used, but not defined in the subject area.

Information technology — CDIF semantic metamodel —

Part 2: Common

1 Scope

The CDIF family of standards is primarily designed to be used as a description of a mechanism for transferring information between modelling tools. It facilitates a successful transfer when the authors of the importing and exporting tools have nothing in common except an agreement to conform to CDIF. The language that is defined for the transfer format also has applicability as a general language for import/export from repositories. The CDIF semantic metamodel defined for CASE also has applicability as the basis of standard definitions for use in repositories.

The standards which form the complete family of CDIF standards are documented in ISO/IEC 15474-1:2002, *Information technology — CDIF framework — Part 1: Overview*. These standards cover the overall framework, the transfer format and the CDIF semantic metamodel.

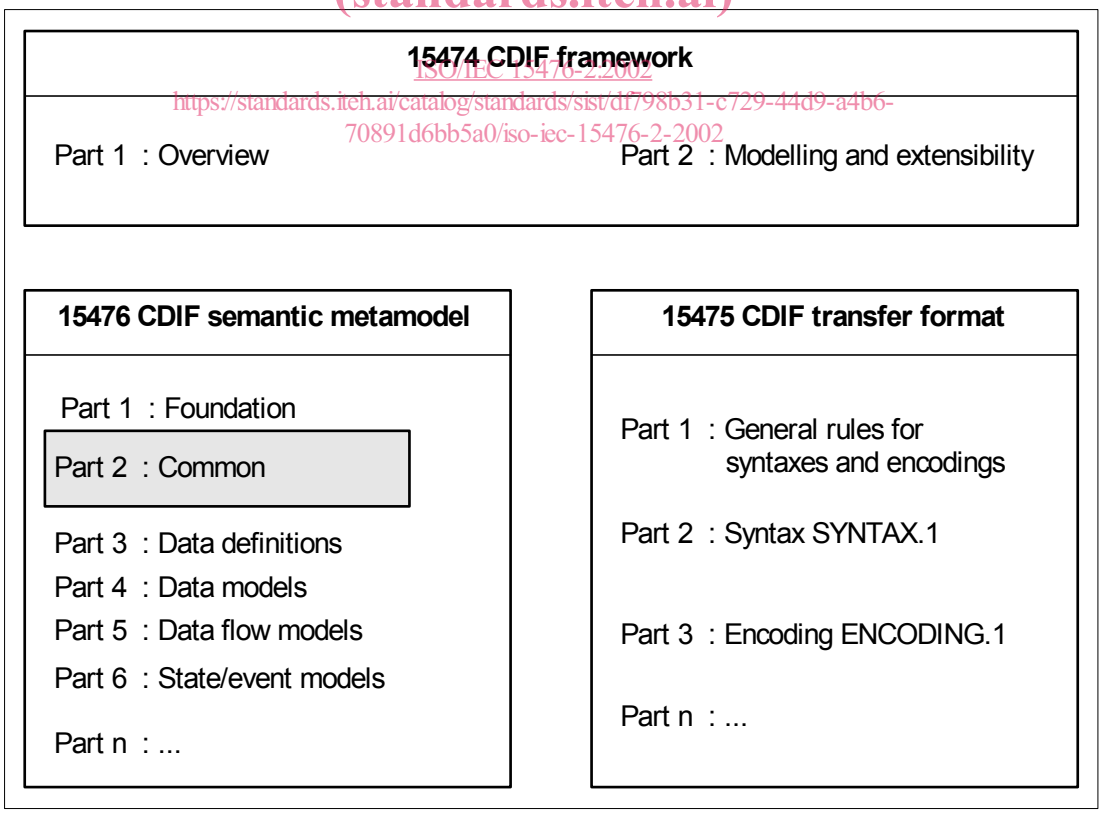

Figure 1 – CDIF family of standards

The diagram in Figure 1 depicts the various standards that comprise the CDIF family of standards. The shaded box depicts this Standard and its position in the CDIF family of standards.

This standard defines the Common Subject Area of the CDIF semantic metamodel. This subject area contains meta-objects that are used as the basis of the other subject area standards, and also meta-relationships and meta-attributes that are applicable to all meta-objects.

This document is intended to be used by anyone wishing to understand and/or use CDIF. This document provides a definition of a single subject area of the CDIF semantic metamodel. It is suitable for:

— Those evaluating CDIF,

— Those who wish to understand the principles and concepts of a CDIF transfer, and

— Those developing importers and exporters.

This document, ISO/IEC 15474-1:2002*, Information technology — CDIF framework — Part 1: Overview*, and the Framework document ISO/IEC 15474-2:2002*, Information technology — CDIF framework — Part 2: Modelling and extensibility*, should be read first when initially exploring CDIF and before attempting to read other documents in the CDIF family of standards.

While there are no specific prerequisites for reading this document, it will be helpful for the reader to have familiarity with the following:

— Entity-Relationship-Attribute modelling;

— Modelling (CASE) tools;

— Information repositories;

— Data dictionaries;

— Multiple meta-layer modelling.

2 Conformance

A product is fully standards conformant to a CDIF subject area standard if and only if it is input-conformant, output-conformant and round-trip conformant to each and every *MetaEntity*, *MetaRelationship*, *MetaAttribute*, and *AttributableMetaObject* which is defined and/or used in that standard, and it is also CDIF architecture conformant. A product may be partially input-conformant, and/or partially output-conformant, and/or partially round-trip conformant to a CDIF subject area standard.

2.1 Input conformance

Input conformance for a specific *MetaEntity*, *MetaRelationship*, *MetaAttribute*, or *AttributableMetaObject* (short: *CollectableMetaObject*) is determined by applying the following test:

A set of meta-data containing all meanings and structures standardized by a CDIF subject area is imported by the product under test. Then the meta-data which has arrived in the product is examined. The following options exist for the relation between the input (CDIF) meta-data and the imported (product) meta-data:

For a specific *CollectableMetaObject*:

1 The product is input conformant if each instance of the specific *CollectableMetaObject* has arrived in the product without change of meaning or structure. If the *CollectableMetaObject* is a meta-entity or meta-relationship, its structural relationships to other *CollectableMetaObjects* have been preserved. If the *CollectableMetaObject* is a meta-attribute, the value of the meta-attribute has been preserved.

2 The product is input morphing conformant if each instance of the specific *CollectableMetaObject* has arrived in the product, but with some changes in meaning or structure. If the *CollectableMetaObject* is a meta-attribute, the value(s) for some instances of the meta-attribute have changed.

3 The product is not input conformant for that *CollectableMetaObject* if neither of the previous tests is satisfied.

2.2 Output conformance

Output conformance for a specific *CollectableMetaObject* is determined by applying the following test:

For the product being tested, a set of meta-data that includes all possible meanings and structures representable in that product is exported. Then the meta-data that has been exported is examined. The following options exist for the relation between the product's meta-data and the exported (CDIF) meta-data:

For a specific *CollectableMetaObject*:

1 The product is output conformant if all of the meaning and structure for the specific *CollectableMetaObject* has been represented as meta-data in the product and has been exported as one or more instances of that *CollectableMetaObject*. If the *CollectableMetaObject* is a meta-attribute, the correct value of the meta-attribute has been exported.

2 The product is output morphing conformant if each instance of meta-data in the product that has the same meaning and structure as the *CollectableMetaObject* has been exported, but some instances have been exported as a different *CollectableMetaObject* or some of the meaning and structure has been changed.

3 If the product does not represent the meaning and structure associated with the *CollectableMetaObject*, output conformance for that *CollectableMetaObject* is not applicable to the product.

4 In all other cases, the product is not output conformant for that *CollectableMetaObject*.

2.3 Round-trip conformance

Round-trip conformance for a specific *CollectableMetaObject* is determined by applying the following test:

A set of meta-data containing all meanings and structures standardized by a CDIF subject area is imported by the product under test. Then the meta-data is exported again. The following options exist for the relation between the input meta-data and the output meta-data:

For a specific *CollectableMetaObject*:

1 The product is round-trip conformant if the meaning and structure of each instance of the *CollectableMetaObject* is preserved without changes during the round-trip. For a vendor to claim round-trip conformance, it is also necessary for the tool to be able to perform create, read, update, and delete operations on the imported (product) meta-data corresponding to the instances of the *CollectableMetaObject*.

2 The product is round-trip morphing conformant if each instance of the input *CollectableMetaObject* is preserved, but with some changes in meaning and/or structure. If the *CollectableMetaObject* is a meta-entity or meta-relationship, some of its instances' structural relationships to other *CollectableMetaObjects* have changed, or some instances have been transformed into other *CollectableMetaObjects*, or instances of other *CollectableMetaObjects* have been transformed into instances of the *CollectableMetaObject.* If the *CollectableMetaObject* is a meta-attribute, the values of some instances of the meta-attribute have changed or the domain of the meta-attribute has changed.

3 In all other cases, the product is not round-trip conformant for that CollectableMetaObject.

3 Normative references

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of ISO/IEC 15476. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 15476 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 13238-1:—[1)], *Information technology — Data management export/import — Part 1: Standardization framework*

ISO/IEC 15474-1:2002, *Information technology — CDIF framework — Part 1: Overview*

ISO/IEC 15474-2:2002, *Information technology — CDIF framework — Part 2: Modelling and extensibility*

ISO/IEC 15476-1:2002, *Information technology — CDIF semantic metamodel — Part 1: Foundation*

4 Terms and definitions

For the purposes of this part of ISO/IEC 15476, the following definitions apply. Unless otherwise noted, the definitions are specific to this part of ISO/IEC 15476.

4.1 From other standards

4.1.1 ISO/IEC 15474-1

This part of ISO/IEC 15476 makes use of the following terms defined in ISO/IEC 15474-1:

CDIF
CDIF family of standards
CDIF semantic metamodel
CDIF meta-metamodel
CDIF transfer
Instance
Meta-attribute
Meta-entity
Metamodel
Meta-object
Meta-relationship
Model
Subject area
Transfer
Transfer format

4.1.2 ISO/IEC 13238-1

This part of ISO/IEC 15476 makes use of the following terms from ISO/IEC 13238-1:

Exporter
Importer

4.1.3 For this standard

For the purposes of this part of ISO/IEC 15476 new terms are defined when introduced. Double quotes are used to introduce new terms (e.g., “model layer”)

1) To be published.

5 Symbols (and abbreviated terms)

5.1 Naming, diagramming and definition conventions

Conventions for naming, diagramming, describing and defining meta-objects can be found in Clause 7 of the framework document (ISO/IEC 15474-2:2002*, Information technology — CDIF framework — Part 2: Modelling and extensibility*).

5.2 Abbreviations

The following abbreviation is used in this international standard:

CDIF CASE Data Interchange Format (originally)

6 Common subject area overview

6.1 Introduction

The Common subject area is intended to cover concepts such as synonyms, decomposition, and audit data, that are common or useful to all of the CDIF semantic metamodel. The Common subject area covers aspects required for all objects described in a CDIF transfer. Concepts defined here include alternate names, details of the tool user who created or updated any object, and constraints on objects.

6.2 Diagram

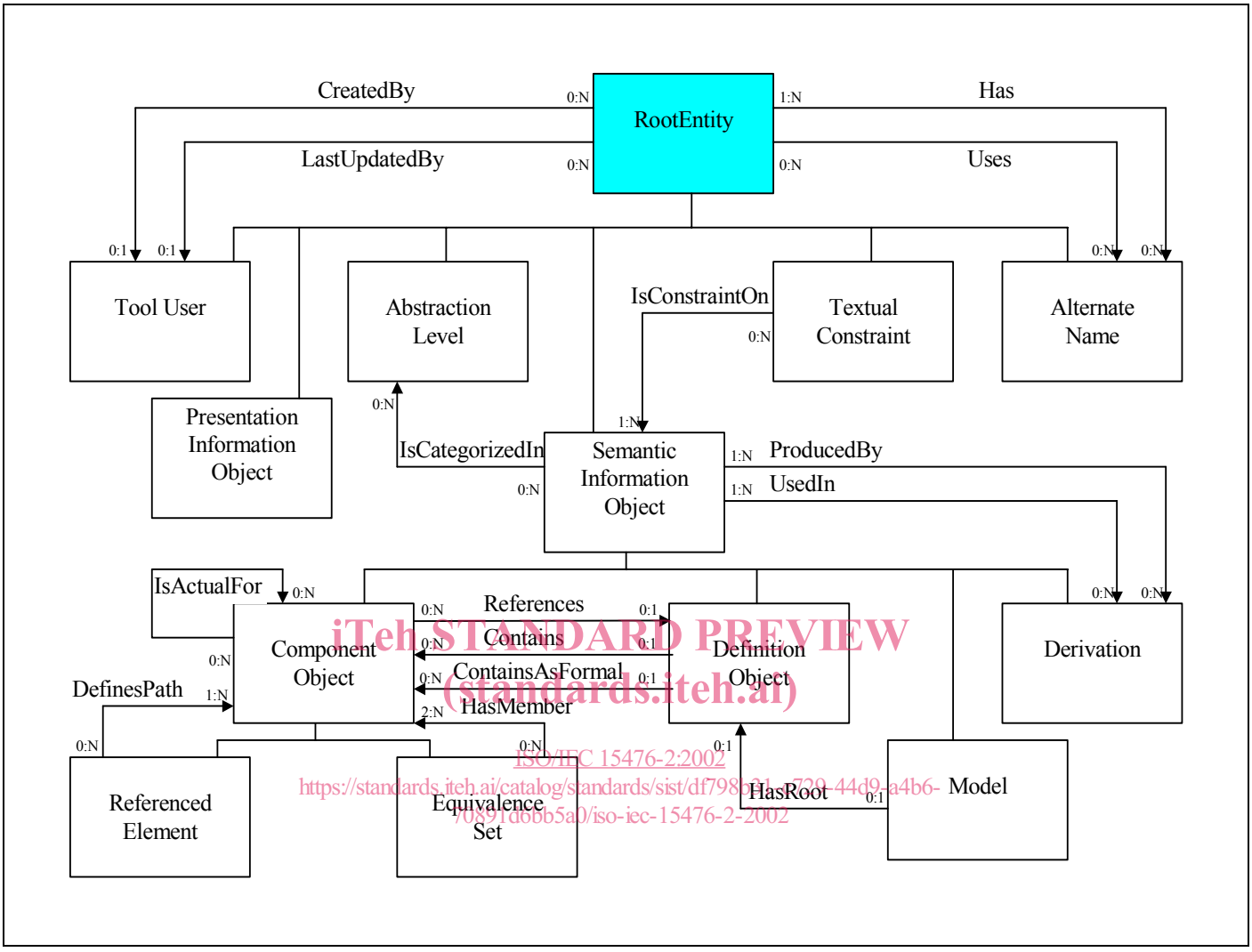

Figure 2 – Common subject area

6.3 Classification

The CDIF semantic metamodel is hierarchical in nature. The top of the semantic metamodel is *RootEntity*. *RootEntity* establishes a set of common meta-attributes and meta-relationships to be inherited by all meta-objects. *RootEntity* is an abstract supertype that should not be instantiated and shall not have any supertypes defined.

There are two main subtypes defined for *RootEntity* — *SemanticInformationObject* and *PresentationInformationObject*. The other subtypes are *AbstractionLevel*, *AlternateName*, *TextualConstraint,* and *ToolUser*. These are all described in the following sub-clauses.

6.4 Semantic information

SemanticInformationObject is the supertype of all meta-entities defined within the semantic information portion of the CDIF semantic metamodel. These describe model objects (e.g., objects in a general business model). All meta-entities that convey semantic information, defined in the set of standards forming the CDIF semantic metamodel,

other than *RootEntity* and *SemanticInformationObject*, are defined as either direct or indirect subtypes of *SemanticInformationObject*.

The meta-entity *SemanticInformationObject* is given local meta-attributes of *BriefDescription* and *FullDescription*.

6.5 Presentation information

PresentationInformationObject is the supertype for all the meta-entities defined within the presentation information portion of the CDIF semantic metamodel. These contain the graphical information about the associated semantic models. For example, the location and shape of an object in the semantic model.

6.6 Naming

The concept of a "Name" for an object varies considerably from method to method and object to object. In some cases, an object can have a short name, a long name and alternates or synonyms for each. In other cases, no distinct name is required. Due to these differences, no *Name* meta-attributes have been provided at a high level in the *AttributableMetaObject* hierarchy to be automatically inherited. Name meta-attributes have been added specifically as required. These meta-attributes have been called *Name* and *LongName* when used.

Often objects can be given alternate names, or synonyms. These are optional, and there may be more than one provided. To cater for this in a standard manner, an *AlternateName* meta-entity has been provided which can be related to any instance of *RootEntity* and its other subtypes, except *AlternateName*. This provides a simple way of defining such alternates, but it shall only be used where either *Name*, *LongName,* or both, are provided as meta-attributes of the meta-entity to which it is related. Alternatives for *Name* and *LongName* are recorded in the *OtherName* and *OtherLongName* meta-attributes of *AlternateName*, respectively. *AlternateName* shall not be used to provide a name for an object where no *Name* or *LongName* meta-attribute has been provided since a name is only **alternate** where there is one already defined. When it is necessary to add a name to an unnamed object, such naming should be done through the use of extensibility by adding an explicit *Name* meta-attribute.

Consider a data type called ***CustomerNumber***; it may also be known by other names in the system being modeled, including ***CustomerNo*** and ***CustNo***. These are synonyms for the same data type. The name ***CustomerNumber*** would be held in the *Name* meta-attribute of the instance of *DataType*. Each of the synonyms would be held in a separate instance of *AlternateName* in the *OtherName* meta-attribute. These two instances of *AlternateName* would be related to the instance of *DataType* by the meta-relationship *RootEntity.Has.AlternateName*. This set of meta-objects records that the data type has two synonyms.

Now consider how to record which synonym is being used in any particular context - this is where the meta-relationship *RootEntity.Uses.AlternateName* is required. The following example, where different organizations refer to vendors as either Vendors, Contractors, or Suppliers, shows how the CDIF semantic metamodel supports this concept. Assume that the part of a subject area dealing with contracts includes the *Organization* and *Resource* meta-entities and a meta-relationship called *Organization.Utilizes.Resource*. Assume, also, that the ***Vendor*** instance of *Resource* has two *AlternateName*s: ***Supplier*** and ***Contractor***. If an organization, say Reprographics, uses the term ***Vendor*** to refer to those it relies on for service, this would be recorded with an instance of *Organization.Utilizes.Resource* from the ***Reprographics*** instance of *Organization* to the ***Vendor*** instance of *Resource*. If another organization, FoodServices, refers to the vendor for cafeteria operations as a ***Supplier***, this would be recorded via an instance of *Organization.Utilizes.Resource* relating the ***FoodServices*** instance of *Organization* to the ***Vendor*** instance of *Resource*. But an instance of *RootEntity.Uses.AlternateName* between ***FoodServices*** and ***Supplier*** is used to indicate that the ***Supplier*** *AlternateName* is what FoodServices calls vendors. Figure 3 shows both the subject area fragment and a depiction of the instances discussed in this example.