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ISO/IEC JTC1/SC7

Title: Information Technology - Software Engineering Data Definition and Interchange - Integrated Meta-model
Part 1 : Foundation Subject Area

Project: 07.28.3.4

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N048R1

**Information Technology - Software Engineering Data
Definition and Interchange - Integrated Meta-model
Part 1 : Foundation Subject Area**

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Introduction

ISO/IEC JTC1 SC7 WG11, in its Project 7.28, has the objective of enabling the interchange of information between a variety of heterogeneous software engineering tools.

Many of the input documents for Project 7.28 are the result of developmental work performed by the CASE Data Interchange Format (CDIF) technical committee of the Electronics Industries Association (EIA). This is one of those documents, and is distributed as received from the CDIF editor.

At its Brisbane meeting, in June 95, SC7 approved the distribution of the committee drafts.

This document is intended to provide one part within the multipart standard resulting from Project 7.28. Documents will be reformatted to ISO Directives as part of the Committee Draft ballot and comment resolution.

Comments

Comments are requested within the timetable provided by the SC7 cover sheet (generally 100 days) to facilitate preparation for the next WG11 meeting. Comments should be sent by normal formal channels.

To facilitate planning and preparatory resolution proposals, WG11 would appreciate comments to be submitted to the WWW (www.cdif.org/comments.html) site identified for that purpose).

Comments are to be provided in electronic format, generally following the format used for the WWW page. If comments are also submitted on paper, they should use a similar format.

Please identify clearly the status of comments submitted, such as:

National Body Comments,
National Body Approved Expert Comments.

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711PRA-11
Explanatory Notes for SC7 Reviewers
of the
WG11-CDIF Documents
(Project 07.28)

- The “Overview” document (WG11 N047R1, SC7 N1540) should be read first since it describes all the other project 7.28 CD documents to be reviewed at this time (as well as several documents planned for the future). It also describes the overall architecture that applies to these documents.
- The “Framework” document (WG11 N046R1, SC7 N1541) should be read second, as it describes the entity-relationship-attribute modeling notation that is used in many of the documents.
- The “Data Modeling” document (WG11 N036, SC7 N1548) and the “Data Flow Modeling” (WG11 N035, SC7 N1549) document provide the substantive coverage of software engineering techniques within the first set of documents. These documents permit the structured representation of software designs prepared by the use of any of a number of well established software engineering techniques that produce what are commonly called data flow diagrams and/or entity-relationship- attribute diagrams. These two documents will be of the greatest interest to software engineering practitioners.
- The “Foundation”, “Common”, and “Data Definition” documents (WG11 N048R1, N049, N050 and respectively SC7 N1545, N1546, 1547) are “modeling infrastructure” documents that support the contents of the software engineering techniques document, Data Modeling and Data Flow Modeling. Elements in these three infrastructure documents are incorporated by reference into the technique documents as necessary.
- The Transfer Format documents, “General Rules”, “Syntax”, and “Encoding” (WG11 N040R1, N041R1, N042R1 and respectively SC7 N1542, N1543, N1544) describe how character sequences are formed in order to communicate software design representations. These may be read separately from the technique and infrastructure documents described above.
- Of special importance for this review is the “Foundation” document (WG11 N048R1, SC7 N1545). This document illustrates the format intended to be applied to all the documents in this set for subsequent balloting. WG11 specifically solicits reviewer comments related to the format of this document so that the reformatting effort for the other documents in this set need be done only once.

WG11 will greatly appreciate the national body review comments on these documents, and thanks in advance the reviewers for their efforts. Any early submissions of comments will be very helpful.

In order to fully ensure that all comments received are processed efficiently and consistently, WG11 requests of all reviewers to please utilize the comments template that is provided with each document. Submitting comments in electronic form rather than on paper will be especially helpful.

If assistance with the usage of the comment forms is required, or if there are any other questions, please contact either Jean Berube, the Project 7.28 coordinating editor, or myself.

Sincerely,

Peter Eirich
WG11 Convenor



WORKING DRAFT - SC7 WG11 N048 -- 96.01.11

ISO/IEC JTC 1 SC 7 WG 11

Secretariat: **ANSI**

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Current Status: **First CD ballot**

This review for: **CD**

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COMMISSION ELECTROTECHNIQUE INTERNATIONALE

CD 15476-1

**Information Technology - Software Engineering Data Definition
and Interchange - Integrated Meta-model**

Part 1 : Foundation Subject Area

Technologies de l'information —

**In accordance with the provisions of Council Resolution 21/1986
this document is submitted in the English language only.**

**Conformément aux dispositions de la Résolution du Conseil
21/1986, ce document est distribué en version anglaise seulement**

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE.

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) together form a system for worldwide standardization as a whole. National bodies that are members of ISO or IEC participate in the development of

<< This will be replaced at the DTR stage by the standard ITTF text. What follows is the EIA foreword for this current version of the document. >>

EIA Engineering standards and publications are designed to serve the public interest through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining with minimum delay the proper product for his particular need. Existence of such standards and publications shall not in any respect preclude any member or nonmember of EIA from manufacturing or selling products not conforming to such standards and publications, nor shall the existence of such standards and publications preclude their voluntary use by those other than EIA members, whether the standard is to be used either domestically or internationally.

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- EIA INTERIM STANDARDS

EIA Interim Standards contain information deemed to be of technical value to the industry, and are published at the request of the originating Committee without necessarily following the rigorous public review and resolution of comments which is a procedural part of the development of an EIA Recommended Standard.

Introduction

<< This will be replaced at the DTR stage by the ITTF approved text >>

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

CDIF - CASE Data Interchange Format - Overview (ISO CD 15474-1: Information Technology - Software Engineering Data Definition and Interchange - Overview and Framework: Part 1 : Overview) and CDIF - Framework for Modeling and Extensibility (ISO CD 15474-2: Information Technology - Software Engineering Data Definition and Interchange - Overview and Framework: Part 2 : Framework for Modeling 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 modeling approach in CDIF. The CDIF Meta-meta-model and extensibility mechanism are also defined in that document.

This standard explains the Foundation subject area of the CDIF Integrated Meta-model, which is used to ensure that the information held by tools communicating using CDIF express the information they pass with an agreed meaning. This subject area contains the basic objects on which all others, including extensions, must be based.

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.

The material contained in this publication has been copyrighted by the CASE Data Interchange Format (CDIF) Division of the Electronic Industries Association (EIA). Permission to copy this material in paper and electronic form has been granted to the international software engineering standards development organization (ISO/IEC JTC1/SC7) for the sole purpose of international standards development work. Organizations receiving copies of this document may not duplicate and distribute additional copies internally for any reason other than to facilitate their organization's review and comment back to ISO/IEC JTC1/SC7.

Information Technology - Software Engineering Data Definition and Interchange - Integrated Meta-model

Part 1 : Foundation Subject Area

1 Scope and field of application

1.1 Scope Field of application

The CDIF Family of Standards is primarily designed to be used as a description of a mechanism for transferring information between CASE 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 Integrated Meta-model 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 *EIA/IS-106 CDIF - CASE Data Interchange Format - Overview*. These standards cover the overall framework, the transfer format and the CDIF Integrated Meta-model.

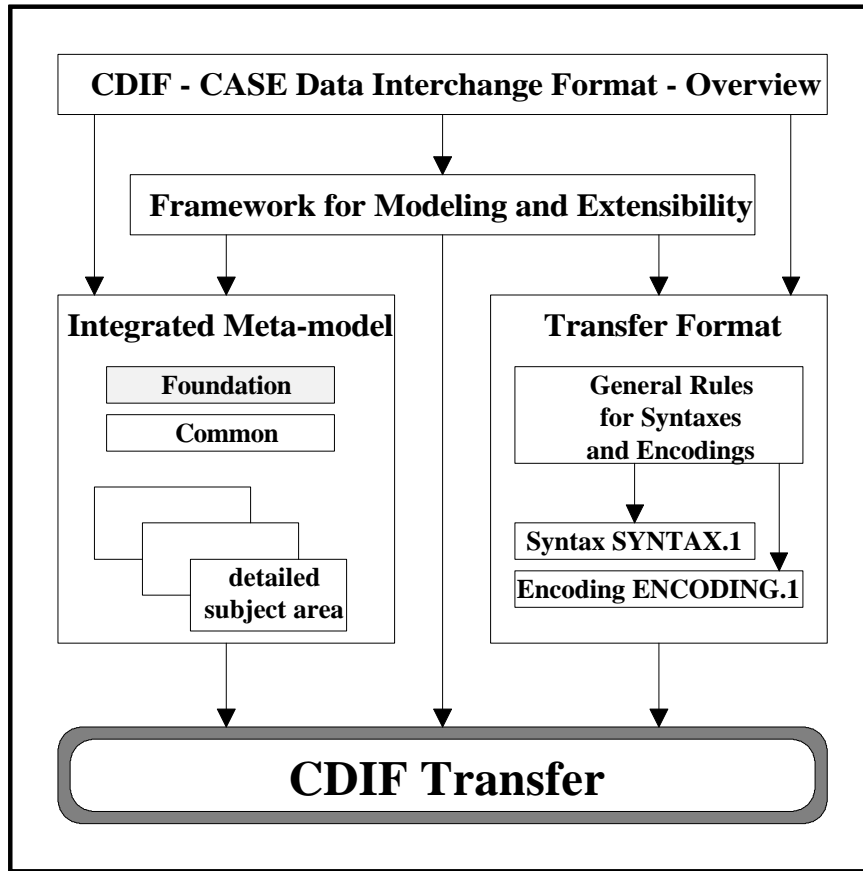


Figure 1
Position in the CDIF Family of Standards

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 Foundation subject area of the CDIF Integrated Meta-model. This subject area contains the basic objects on which all other objects, including those defined using extensibility, must be based.

1.2 Audience and purpose

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 Integrated Meta-model. It is suitable for:

- ■ those evaluating CDIF
- ■ those who wish to understand the principles and concepts of a CDIF transfer
- ■ those developing importers and exporters.

The document *EIA/IS-106 CDIF - CASE Data Interchange Format - Overview* and the document *EIA/IS-107 CDIF - Framework for Modeling 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 modeling
- CASE tools
- Information repositories
- Data dictionaries
- Multiple meta-layer modeling.

1.3 Related documents

1.4 Structure of the document

This document is organized into the following sections:

Clause 1 'Scope'

This describes the CDIF Family of Standards and positions the current document within the set of documents.

This describes the intended audience, structure and conventions used in the document.

Clause 5 'Structure of Subject Area Definition'

This describes in detail the structure of the subsequent Clauses of this standard including the notation and layout of the diagrams and the detailed definitions.

Clause 6 'Subject Area Overview'

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

Clause 7 'Subject Area Detailed Definitions'

This gives the detailed definitions of all the objects used in the subject area.

Clause ? 'Referenced Meta-object Definitions'

This gives the detailed definitions of objects which are not used in the subject area defined in this Standard, but are referenced by objects which are. These definitions are included to avoid the need to reference multiple standards to obtain the complete definition of the current subject area.

This clause/section does not appear in the document

Annex A 'Questions and Answers'

This includes detailed responses to questions that have been raised by those reviewing this document. It is intended that the inclusion of these will aid the reader in understanding this document, and related issues concerning CDIF.

Annex B Glossary

The Glossary contains definitions of terms used within this Standard.

Annex C Index

A comprehensive index is provided.

2 References

EIA/IS-106 CDIF - CASE Data Interchange Format - Overview

EIA/IS-107 CDIF - Framework for Modeling and Extensibility

3 Definitions

For the purposes of this report, the following definitions apply. Unless otherwise noted, the definitions are specific to this report.

Maybe the Glossary (annex B) should be in Section 3

4 Notation and conventions

4.1 Diagramming notations

4.2 Abbreviations

4.3 Conventions

The typographical and naming conventions defined below are used throughout the CDIF Family of Standards.

- Double quotes are used to introduce new terms (e.g., "model layer")

- Bold type is used for emphasis (e.g., this is **important**)

- All meta-objects and meta-meta-objects in CDIF (in meta-models and meta-meta-models) are named by concatenating all the words that name the meta-object or meta-meta-object; the first letter of each word is upper-case, the rest are lower-case (e.g., *MetaAttribute*, *AttributeDerivation*, *IsDrawnUsing*, *IsOptional*)

Full details of the CDIF Graphical Notation used in the Meta-model and Meta-meta-model can be found in *EIA/IS-107 CDIF - Framework for Modeling and Extensibility*. A summary of the major concepts is given in Section 3.2.3, Diagram.

5 Structure of Subject Area Definition

5.1 Introduction

The following subsections describe how the subject area is defined in the remainder of this document. The subject area is first introduced in the Subject Area Overview Section, and the detailed definitions of the objects contained in the subject area are given in the Subject Area Definitions Section.

5.2 Structure of Subject Area Overview

5.2.1 Summary

The Subject Area Overview Section consists of the following sub-sections:

- Description of Major Concepts
- Diagram
- AttributableMetaObject Hierarchy
- MetaObject Summaries

5.2.2 Description of Major Concepts

This provides a textual description of the major concepts in the subject area. It explains the coverage of this subject area and outlines what it is capable of representing.

5.2.3 Diagram

Included in the Subject Area Overview are one or more diagrams. These diagrams are intended to present graphically an overview of the meta-entities and meta-relationships used in this subject area. All CDIF subject area diagrams use the following diagramming notation conventions.

Meta-entities used in the subject area are shown as rectangular boxes, with the name of the meta-entity on a white background. An example is **Meta-entity A** in Figure 2. An additional special notation may be used to represent meta-entities on diagrams of meta-models. If the meta-entity is not used in the subject area, but is used in another subject area and is included for clarity, the box shall be shaded. An example is **Meta-entity B** in Figure 2.

Error! Not a valid filename.

Figure 2
Conventions for Representing Meta-entities

Meta-relationships are normally represented by a line joining the source and destination entities, with the name of the meta-relationship given next to the line. An arrow on the line indicates the direction in which to read the name. **Meta-relationship A** in Figure 3 is an example of this. Additionally, two special notations may be used to represent meta-relationships on diagrams of meta-models.

If a meta-relationship is included in the diagram for clarification, but it is not used in the subject area, the text of the meta-relationship name shall be back-shaded. This is shown for **Meta-relationship B** in Figure 3.

If a supertype meta-entity that participates in a meta-relationship is not included in the diagram, the inherited meta-relationship shall be shown on the diagram as a broken line to/from the inheriting subtype meta-entity. This is shown for **Meta-relationship C** in Figure 3.

Error! Not a valid filename.

Figure 3
Conventions for Representing Meta-relationships

Full details of the CDIF Graphical Notation used in the Meta-model and the Meta-meta-model can be found in *EIA/IS-107 CDIF - Framework for Modeling and Extensibility*.

5.2.4 AttributableMetaObject Hierarchy

The AttributableMetaObject Hierarchy in the Subject Area Overview section contains all the meta-entities and meta-relationships used in the subject area. It also identifies all supertypes required to relate the meta-objects used back to *RootObject*. Other subtypes of objects shown in the hierarchy, where neither they nor any of their subtypes are used in this subject area, are not shown.

The AttributableMetaObject Hierarchy is presented as an indented list of meta-object names. The indentation indicates the subtyping; all names indented below a given name are subtypes of that meta-object. For example, if **Car** and **Truck** are both subtypes of **Vehicle**, this would be shown as follows:

```
Vehicle
  Car
  Truck
```

A meta-entity or meta-relationship and all its subtypes can be duplicated in the hierarchy due to multiple inheritance.. Where this occurs, the duplicate entries will be shown in *italics*.

5.2.5 Meta-object Summaries

A summary of the AttributableMetaObject *RootObject* is given first. Summaries are then given of all the meta-entities, followed by all the meta-relationships used in the Subject Area. The definitions are given in alphabetical order within each meta-object type.

For *RootObject*, the local meta-attributes are listed alphabetically and the optionality of each meta-attribute (mandatory or optional) is given.

For each meta-entity used in the subject area all the meta-attributes are listed. The inherited meta-attributes are shown first, in italics sequenced alphabetically within parent meta-entity. The local meta-attributes are then listed alphabetically in normal font. The optionality of each meta-attribute is given.

For each meta-relationship all the meta-attributes are listed sequenced alphabetically. Inherited and local meta-attributes are shown in the same way as for meta-entities. The optionality of each meta-attribute is given.

5.3 Structure of Subject Area Detailed Definitions

5.3.1 Summary

The Subject Area Detailed Definitions section consists of the following sub-sections:

- Subject Area Definition
- AttributableMetaObject Definition
- Meta-entity Definitions
- Meta-relationship Definitions

5.3.2 Subject Area Definition

This is the formal definition of the instance of the meta-entity called *SubjectArea* (SA), and it contains the information listed in Table 1.

Table 1
Contents of Subject Area Definition

<p>7.2 SubjectArea Definition</p> <p>NAME subject area name</p> <p>CDIFMETAIDENTIFIER</p> <p>DESCRIPTION</p> <p>USAGE</p> <p>ALIASES.....</p> <p>CONSTRAINTS</p> <p>VERSIONNUMBER.....</p>

5.3.3 AttributableMetaObject Definition

The structure of the definition of the *AttributableMetaObject* used in the subject area is the same as for a meta-entity and is shown in Table 2.

5.3.4 Meta-entity Definitions

The definition of each meta-entity used in the subject area is structured according to the classes of information listed in Table 2.

For each meta-entity:

- Inherited meta-attributes and inherited meta-relationships are listed by supertype meta-entity in a top-down hierarchical order. Within each sub-list, meta-attributes and meta-relationships are listed alphabetically.
- Local meta-attributes are listed alphabetically.
- Detailed local meta-attribute descriptions are listed alphabetically. These definitions are structured according to the classes of information listed in Table 3.

Table 2
Contents of Meta-entity Definition

7.N.N	Meta-entity Name
NAME	meta-entity name
CDIFMETAIDENTIFIER.....	
SUBTYPEOF	List of direct supertypes of the meta-entity... meta-entity name [not] in this SA
SUPERTYPEOF	List of direct subtypes of the meta-entity within this subject area... meta-entity name
DESCRIPTION.....	
USAGE	
ALIASES	
CONSTRAINTS.....	
TYPE.....	
<hr/>	
INHERITED META-ATTRIBUTES	
List of meta-attributes inherited from all supertypes of the meta-entity, with the name of the meta-object for which the meta-attribute is defined...	
meta-attribute name	from meta-entity name [not] in this SA
<hr/>	
LOCAL META-ATTRIBUTES	
List of meta-attributes defined for the meta-entity...	
meta-attribute name	
<hr/>	
INHERITED META-RELATIONSHIPS	
List of instantiable meta-relationships inherited from all supertypes of the meta- entity...	
meta-relationship name	[not] in this SA
<hr/>	
LOCAL META-RELATIONSHIPS	
List of meta-relationships defined for the meta-entity...	
meta-relationship name	
<hr/>	
Full definitions of all local meta-attributes appear at this point. See Table 3 for format of local meta-attribute definitions.	

Table 3
Contents of Local Meta-attribute Definition

META-ATTRIBUTE NAME..... meta-attribute name
CDIFMETAIDENTIFIER
DESCRIPTION
USAGE
ALIASES.....
CONSTRAINTS
DATA TYPE
DOMAIN
LENGTH
ISOPTIONAL

5.3.5 Meta-relationship Definitions

The definition of each meta-relationship used in the subject area is structured according to the classes of information listed in Table 4.

For each meta-relationship:

- Inherited meta-attributes are listed by parent meta-relationship in a top-down hierarchical order. Within each sub-list, meta-attributes are listed alphabetically.
- Local meta-attributes are listed alphabetically.
- Detailed local meta-attribute descriptions are listed alphabetically. These definitions are structured according to the classes of information listed in Table 3.

Table 4
Contents of Meta-relationship Definition

7.N.N	Full Meta-relationship Name
NAME.....	meta-relationship name
CDIFMETAIDENTIFIER.....	
SUBTYPEOF	List of direct supertypes of the meta-relationship... meta-relationship name[not] in this SA
SUPERTYPEOF	List of direct subtypes of the meta-relationship within this subject area... meta-relationship name ..[not] in this SA
MINSOURCECARD	Minimum source meta-entity cardinality
MAXSOURCECARD	Maximum source meta-entity cardinality
MINDESTCARD	Minimum destination meta-entity cardinality
MAXDESTCARD.....	Maximum destination meta-entity cardinality
DESCRIPTION.....	
USAGE	
ALIASES	
CONSTRAINTS.....	
<hr/>	
INHERITED META-ATTRIBUTES	
List of meta-attributes inherited from all supertypes of the meta-relationship, with the name of the meta-object for which the meta-attribute is defined...	
meta-attribute name	from meta-relationship name [not] in this SA
<hr/>	
LOCAL META-ATTRIBUTES	
List of meta-attributes defined for the meta-relationship...	
meta-attribute name	
<hr/>	
Full definitions of all local meta-attributes appear at this point. See Table 3 for format of local meta-attribute definitions.	

6. Subject Area Overview

6.1 Description

The Foundation Subject Area, shown in Figure 4, provides the basic definitions which underpin the remainder of the CDIF Integrated Meta-model. It consists of an *AttributableMetaObject* called *RootObject*, which is purely abstract, and acts as the root of the *AttributableMetaObject* Hierarchy. It has a single meta-attribute called *CDIFIdentifier*. This is used as the sole identifier of an object within the CDIF Transfer.

It has two subtypes, a meta-entity called *RootEntity*, and a meta-relationship called *RootEntity.IsRelatedTo.RootEntity*. These act as the supertypes for all other meta-entities and meta-relationships.

The meta-entity *RootEntity* has no additional local meta-attributes.

Additional meta-attributes can be added to **every** meta-entity by extending the meta-attributes of *RootEntity*. Similarly, additional meta-relationships can be defined for **every** meta-entity by using *RootEntity* as either the Source or Destination of a new meta-relationship.

Additional meta-attributes can be added to **every** meta-relationship by extending the meta-attributes of *RootEntity.IsRelatedTo.RootEntity*.

Use of this Subject Area is required, even when none of the other subject areas of the CDIF Integrated Meta-model are being used, and all other objects are defined through the use of extensibility.

6.2 Diagram

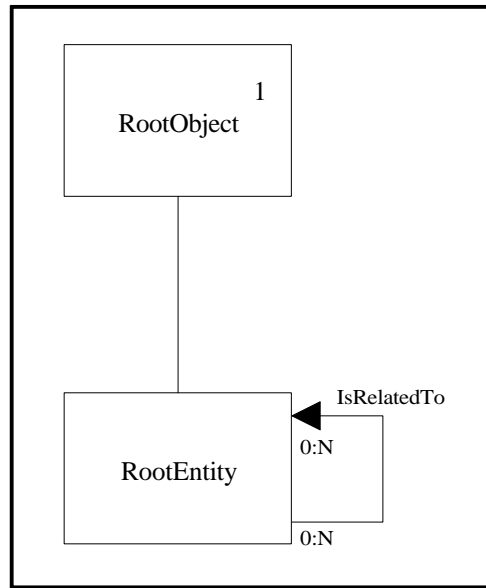


Figure 4
Foundation Subject Area¹

6.3 AttributableMetaObject Hierarchy

MetaObject

RootObject
 RootEntity
 RootEntity.IsRelatedTo.RootEntity

SubjectArea

in this SA
 in this SA
 in this SA

¹RootObject is of type AttributableMetaObject

6.4 **AttributableMetaObject** Summary

AttributableMetaObject Name	
<i>Inherited MetaAttribute Name</i>	<i>Mandatory/Optional</i>
Local MetaAttribute Name	Mandatory/Optional

RootObject

CDIFIdentifier	Mandatory
DateCreated	Optional
DateUpdated	Optional
TimeCreated	Optional
TimeUpdated	Optional

6.5 **MetaEntity** Summary

MetaEntity Name	
<i>Inherited MetaAttribute Name</i>	<i>Mandatory/Optional</i>
Local MetaAttribute Name	Mandatory/Optional

RootEntity

<i>CDIFIdentifier</i>	<i>Mandatory</i>
<i>DateCreated</i>	<i>Optional</i>
<i>DateUpdated</i>	<i>Optional</i>
<i>TimeCreated</i>	<i>Optional</i>
<i>TimeUpdated</i>	<i>Optional</i>

6.6 **MetaRelationship** Summary

MetaRelationship Name	
<i>Inherited MetaAttribute Name</i>	<i>Mandatory/Optional</i>
Local MetaAttribute Name	Mandatory/Optional

RootEntity.IsRelatedTo.RootEntity

<i>CDIFIdentifier</i>	<i>Mandatory</i>
<i>DateCreated</i>	<i>Optional</i>
<i>DateUpdated</i>	<i>Optional</i>
<i>TimeCreated</i>	<i>Optional</i>
<i>TimeUpdated</i>	<i>Optional</i>

7. Subject Area Detailed Definition.

7.1 Introduction

This section provides the full definition of each object used in the Foundation Subject Area of the CDIF Integrated Meta-model.

The layout of the definitions in this section is described in Section 3, Structure of Subject Area Definition.

7.2 Subject Area Definition

NAME..... **Foundation**
 CDIFMETAIDENTIFIER..... 10
 DESCRIPTION..... This subject area forms the foundation of the CDIF Integrated Meta-model.
 USAGE The use of this subject area is required in all CDIF Transfers, even where no other standard subject area is being used. All meta-entities and meta-relationships must be subtypes of *RootObject* or *RootEntity.IsRelatedTo.RootEntity*, which are defined in this subject area.
 ALIASES
 CONSTRAINTS.....
 VERSIONNUMBER "01.00"

7.3 AttributableMetaObject Definitions

7.3.1 RootObject

NAME..... **RootObject**
 CDIFMETAIDENTIFIER..... 1
 SUBTYPEOF
 SUPERTYPEOF RootEntity
 DESCRIPTION..... This object is the root object of the CDIF AttributableMetaObject Hierarchy. It can be extended by the addition of new meta-attributes, which will have the effect of adding the new meta-attribute to every meta-entity and meta-relationship.
 USAGE It is abstract, and cannot be instantiated.
 ALIASES
 CONSTRAINTS..... No supertypes can be added to *RootObject* through extensibility.

INHERITED META-ATTRIBUTES

 LOCAL META-ATTRIBUTES

CDIFIdentifier
 DateCreated
 DateUpdated
 TimeCreated
 TimeUpdated

 INHERITED META-RELATIONSHIPS

 LOCAL META-RELATIONSHIPS

 META-ATTRIBUTE NAME **CDIFIdentifier**

CDIFMETAIDENTIFIER 5

DESCRIPTION *CDIFIdentifier* is an unique identifier. A unique value shall be provided for this meta-attribute for all instances of meta-entities and meta-relationships in a transfer.
 No semantic meaning is conveyed by the *CDIFIdentifier*. Uniqueness is within the scope of a single transfer.

USAGE *CDIFIdentifier* is used to identify referenced instances in the Model Section of a Transfer.

ALIASES.....

CONSTRAINTS

DATATYPE Identifier

DOMAIN

LENGTH

 ISOPTIONAL False

 META-ATTRIBUTE NAME **DateCreated**

CDIFMETAIDENTIFIER 6

DESCRIPTION This contains the date of creation of the object.

USAGE

ALIASES.....

CONSTRAINTS None

DATATYPE Date

DOMAIN Any valid Date value.

LENGTH

 ISOPTIONAL True

META-ATTRIBUTE NAME DateUpdated

CDIFMETAIDENTIFIER..... 7

DESCRIPTION..... This contains the date of most recent update of the object.

USAGE.....

ALIASES.....

CONSTRAINTS..... The absolute timestamp indicated by this value together with the *TimeUpdated* should be later than that of *DateCreated* and *TimeCreated*, if this is supplied.

DATATYPE Date

DOMAIN.....

LENGTH.....

ISOPTIONAL..... True

META-ATTRIBUTE NAME TimeCreated

CDIFMETAIDENTIFIER..... 8

DESCRIPTION..... This contains the time of creation of the object, and shall be specified in UTC (Universal Co-ordinated Time).

USAGE.....

ALIASES.....

CONSTRAINTS..... If a *TimeCreated* value is specified, there must be a value provided for *DateCreated*.

DATATYPE Time

DOMAIN..... Any valid time.

LENGTH.....

ISOPTIONAL..... True

META-ATTRIBUTE NAME TimeUpdated

CDIFMETAIDENTIFIER..... 9

DESCRIPTION..... This contains the time of most recent update of the object, and shall be specified in UTC (Universal Co-ordinated Time).

USAGE.....

ALIASES.....

CONSTRAINTS..... If a *TimeUpdated* value is specified, there must be a value provided for *DateUpdated*. The absolute timestamp indicated by this value together with the *DateUpdated* should be later than that of *DateCreated* and *TimeCreated*, if this is supplied.

DATATYPE Time

DOMAIN..... Any valid time.

LENGTH.....

ISOPTIONAL..... True

7.4 Meta-entity Definitions

7.4.1 RootEntity

NAME **RootEntity**
 CDIFMETAIDENTIFIER 2
 SUBTYPEOF RootObject in this SA
 SUPERTYPEOF
 DESCRIPTION This is the supertype of all meta-entities in the CDIF Integrated Meta-model and all extensions to it. This exists to define the meta-attributes and meta-relationships that can be given to any meta-entity instance in a CDIF Transfer.
 USAGE
 ALIASES
 CONSTRAINTS *RootEntity* should not be used directly, since all instances should be more precisely classified. The addition of new supertypes to *RootEntity* through extensibility is not permitted.
 TYPE Kernel

INHERITED META-ATTRIBUTES

CDIFIdentifier	from RootObject	not in this SA
DateCreated	from RootObject	not in this SA
DateUpdated	from RootObject	not in this SA
TimeCreated	from RootObject	not in this SA
TimeUpdated	from RootObject	not in this SA

LOCAL META-ATTRIBUTES

INHERITED META-RELATIONSHIPS

LOCAL META-RELATIONSHIPS

RootEntity.IsRelatedTo.RootEntity

7.5 Meta-relationship Definitions

7.5.1 RootEntity.IsRelatedTo.RootEntity

NAME..... **IsRelatedTo**
 CDIFMETAI DENTIFIER..... 3
 SUBTYPEOF RootObject in this SA
 SUPERTYPEOF

MINSOURCECARD 0
 MAXSOURCECARD N
 MINDESTCARD 0
 MAXDESTCARD..... N

DESCRIPTION..... This is the supertype of all meta-relationships in the CDIF Integrated Meta-model and all extensions to it. This exists to define the meta-attributes that can be given to any meta-relationship instance in a CDIF Transfer.

USAGE It should not be used directly, since all instances should be more precisely classified.

ALIASES

CONSTRAINTS..... The addition of new supertypes to *RootEntity.IsRelatedTo.RootEntity* through extensibility is not permitted.

INHERITED META-ATTRIBUTES

CDIFIdentifier	from RootObject
DateCreated	from RootObject
DateUpdated	from RootObject
TimeCreated	from RootObject
TimeUpdated	from RootObject

LOCAL META-ATTRIBUTES

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Figure 2 Conventions for Representing Meta-entities **Error! Bookmark not c**

Figure 3 Conventions for Representing Meta-relationships **Error! Bookmark not c**

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Figure A1 Single Subtype 27

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Table 2 Contents of Meta-entity Definition
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Table 3 Contents of Local Meta-attribute Definition
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Table 4 Contents of Meta-relationship Definition
Error! Bookmark not defined.

Notes to the reader

Footnotes

Annex A

Questions and Answers

A1. Introduction

The following questions and answers are presented in order to help the reader's understanding of the standard. They have been derived from discussions held within the CDIF Technical Committee and during presentations to outside observers.

A2. General

Question 1:

Why have no keys or unique identifiers been defined for any of the objects?

Answer:

In general, there is no attribute or set of attributes that can be defined as the unique identifier for an object across all analysis and design methods that have a need for a definition of that object. In some cases, a name may need to be unique, whereas in others it may be qualified by the name of some scoping object. It is not the intention of this standard to define or enforce some arbitrary name-uniqueness rules.

For the purposes of the transfer of information between tools, a unique identifier for each object in the transfer that can be referenced by other objects in the same transfer is required. This is achieved by the use of the *CDIFIdentifier* meta-attribute of the *RootObject*, which is defined in this document. This has no meaning other than as an unique identifier for the meta-object for the duration of the transfer.

Question 2:

Why is there no Name attribute defined for every object?

Answer:

Name has not been provided as an attribute on the generic supertypes to be inherited by all the subtypes since its occurrence can be mandatory on some objects, optional on some objects, and without meaning on others. Also, the definition of the precise semantics of the Name meta-attribute varies from object to object and must be precisely specified in each case.

Question 3:

Why is there no general decomposition mechanism?

Answer:

A general decomposition mechanism that would allow any semantic object to decompose into any other semantic object would make the task of the importing tool nearly impossible. The CDIF Integrated Meta-model provides defined semantics for decomposition in relevant subject areas, where the scope of the decomposition is finite and constrained. On this basis, importing tools can be expected to interpret a CDIF transfer.

Question 4:

What does having a single subtype of a supertype mean?

Answer:

A single subtype of a supertype is used as a classification mechanism. For example, in Figure A1 the supertype Customer has a single subtype CreditCustomer. This subtype has properties peculiar to a credit customer, such as credit limit. All other types of customer are thus treated in a generic manner through the supertype properties.

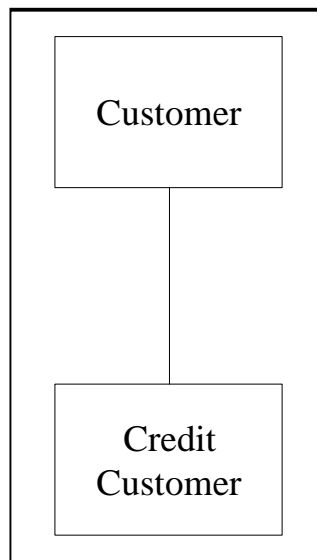


Figure A1
Single Subtype

Question 6:

How do you enforce the rules of 'xyz' methodology?

Answer:

It is not the role of an Interface Format to enforce the rules of any specific methodology; it must be capable of supporting information in the areas covered, expressed by any methodology covering that area. There is no way of expressing the methodology itself in the standard at present. In a future release of the standard, support for methodology-specific rules may be included as a new subject area of the CDIF Integrated Meta-model.

Question 7:**Why are 'Foundation' and 'Common' two distinct subject areas?****Answer:**

The Foundation Subject Area has been kept distinct from all the other subject areas because it defines the fundamental supertypes of the CDIF type hierarchy, which are required to be used even when no other parts of the Integrated Meta-model are used. Even if an exporter is using only extensibility, the Foundation Subject Area must be referenced.

The Common Subject Area contains objects which are common to all other subject areas of the standard CDIF Integrated Meta-model; these concepts may not be applicable to, or may even conflict with, those used by an exporter solely using extensibility. For this reason, the two subject areas have been kept distinct.

Annex B

Glossary

ASSOCIATIVE ENTITY	An entity used to represent a relationship between other entities. An Associative Entity is used when a relationship does not otherwise provide sufficient mechanisms.
ATTRIBUTE	A single-valued characteristic of an entity or relationship.
ATTRIBUTED RELATIONSHIP	A relationship that has attributes.
CARDINALITY	Describes the constraint on the number of entity instances that are related to the subject entity through a relationship. Cardinality is represented for each entity participating in a relationship by indicating the minimum and maximum number of its instances that may be associated with one particular instance of the related entity.
CDIF	See <i>CDIF Family of Standards</i> .
CDIF FAMILY OF STANDARDS	The CDIF Family of Standards is composed of a set of standards that, when used together, provide a standard definition for the interchange of information between CASE tools.
CDIF IDENTIFIER	An attribute that uniquely identifies an object in the Model Section of a transfer.
CDIF INTEGRATED META-MODEL	The description of the set of concepts and notations used to define a model. The CDIF Integrated Meta-model defines an Entity-Relationship-Attribute model that is used to construct and define models used in systems development.
CDIF METAIDENTIFIER	A meta-meta-attribute that uniquely identifies a meta-object in the Meta-model Section of a transfer.
CDIF META-META-MODEL	The description of the set of concepts and notations used to define a meta-model. Specifically, the CDIF Meta-meta-model defines an Entity-Relationship-Attribute model that is used to construct and define both meta-models and the CDIF Meta-meta-model itself.

CHARACTERISTIC ENTITY

A meta-entity that provides additional attribution for another meta-object. Other common names for Characteristic Entity are: Attributive Entity and Dependent Entity. Each instance of a characteristic meta-entity is logically only related to one instance of one other meta-object, therefore an importer could incorporate the meta-attributes of a characteristic meta-entity with those of the 'owning' meta-object, where the owning meta-object is the one to which the characteristic meta-entity is related with a cardinality of 1:1.

CONSTRAINT

A constraint is generally a restriction on the value of an attribute or the existence of any object based on the value or existence of one or more others. In CDIF a constraint may be classed as computable (i.e., code may be built to implement the constraint) or non-computable (e.g., a constraint expressed in natural language). An example of a non-computable constraint -- "No two instances of *DFMProcess* may have the same value for the meta-attribute *Name*." An example of a computable *textual constraint* "*ForAny (DFMProcess,c) Unique (c.Name).*"

DATA MODEL

A model about data by which a reasonable interpretation of the data can be obtained. In the CASE industry a data model is one that may be encoded and manipulated by a computer.

ENTITY

An object (i.e., thing, event or concept) that occurs in a model (i.e., transfer).

INFORMATION CONTENT

The Information Content is the set of meta-model and model instances found in a CDIF Transfer.

INSTANCE

An individual occurrence of a type (e.g., the diagram *MyDiagram* is an instance of the *Diagram* type).

Usually, an instance is an object which occurs one meta-level beneath its (type's) definition. This is not always true, however (e.g., within the CDIF presentation subject areas where icon type definitions and their instances are both contained within the same meta-level).

INTEGRATED META-MODEL

See *CDIF Integrated Meta-model* .

KERNEL ENTITY

This classification is used for a meta-entity whose instances are meaningful without the occurrences of other meta-entities. For example, an instance of the meta-entity called *Attribute*, having a name, full description and brief description, is significant without the knowledge of the *DataObject* it describes.

META

According to Webster's Ninth New Collegiate Dictionary: *more comprehensive: transcending - used with the name of a discipline to designate a new but related discipline designed to deal critically with the original one.*

Meta- is used in CDIF generally as a prefix to a concept to imply definition information about the concept. Specifically, used to designate the location of an object in the three model layers.

META-ATTRIBUTE

A definition of a characteristic of a meta-entity or meta-relationship. Instances of a meta-attribute occur in a model as data values.

META-ENTITY

A definition of a type of data object that occurs in CDIF models. Specifically, a meta-entity represents a set of zero or more meta-attributes, stored together to represent a thing, event or concept that has instances in a model.

META-LAYERS

See *Model Layers*.

META-META-ATTRIBUTE

A definition of a characteristic of a meta-meta-entity or meta-meta-relationship. Instances of a meta-meta-attribute occur in a meta-model as meta-data values.

META-META-ENTITY

A definition of the behavior and structure of meta-entities, meta-relationships, meta-attributes, or subject areas (i.e., a definition of the meta-object definitions used to describe information in models).

META-META-MODEL

See *CDIF Meta-meta-model*.

META-META-RELATIONSHIP

A definition of a type of data object that occurs in CDIF meta-models. Specifically, a meta-meta-relationship represents the definition of a relationship between instances of meta-meta-entities.

META-MODEL

A meta-model contains detailed definitions of the meta-entities, meta-relationships and meta-attributes whose instances represent an actual CDIF transfer.

The CDIF Integrated Meta-model (as defined in the set of standards that comprise the CDIF Family of Standards) is a definition of all of the types of information that can be transferred in a CDIF Transfer without using the CDIF extensibility mechanism.

META-OBJECT

A meta-object is a generic term for meta-entities and meta-relationships

META-RELATIONSHIP

A definition of a type of data object that occurs in CDIF models. Specifically, a meta-relationship represents the definition of a relationship between meta-entities that has instances in a model. A meta-relationship may also define a set of zero or more meta-attributes, stored together to represent characteristics of a relationship between meta-entities.

MODEL

A specific collection of software engineering data. This is called a model because it usually represents a model of a software system under development.

A collection of instances of meta-objects.

MODEL LAYERS

The different layers of definition (or abstraction) used in defining the CDIF Family of Standards. The four model layers in CDIF are: user data, model, meta-model, meta-meta-model.

Any given model layer provides an accurate and complete definition of all the instances that may occur one layer below the given layer. For example, the meta-meta-model provides a set of definitions that are used to construct and understand the meta-model; the meta-model provides a set of definitions that are used to construct and understand a model.

N-ARY RELATIONSHIP

A relationship with arity (degree) $n > 2$. A relationship that has more than two participating entities. (Note that a single entity may participate several times in a single relationship.)

RELATIONSHIP	A real-world association among one or more entities. Where the association is between an entity and itself, the relationship is said to be recursive.
ROLE	The participation of an entity in a relationship. Each instance of a role has a minimum and maximum cardinality, direction, and may be attributed.
SUBJECT AREA	A related collection of meta-object instance definitions. Subject areas are used to define scoped areas of interest. Subject areas overlap to ensure the integration of the overall Meta-model, but a tool need only use those subject areas relevant to the data to be exported/imported.
VIRTUAL REFERENCE	References made to concepts, other than specific meta-entities in a meta-model, are known as virtual references and are represented by boxes with diagonal striping.
WORKING META-MODEL	The working meta-model is the definition of the specific meta-objects that may be instantiated in the model section of a CDIF Transfer. The working meta-model comprises the meta-objects in the CDIF Integrated Meta-model that are used by the subject areas referenced in the meta-model section of the transfer, and the meta-objects defined as extensions in the meta-model section.

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References to existing documents have been inserted, using the following references

Notes for the reader

Notes for the author

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