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CDIF - CASE Data Interchange Format - Overview		

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CDIF

CASE Data Interchange Format
A Division of Electronic Industries Association

CDIF
CASE Data Interchange
Format - Overview

January 1994

Electronic Industries Association
CDIF Technical Committee



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PREFACE

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.

This standard, *EIA/IS-106 CDIF - CASE Data Interchange Format - Overview*, describes the architecture of the CDIF Family of Standards and provides an overview to all the current standards that form the CDIF Family of Standards.

The *EIA/IS-107 CDIF - Framework for Modeling and Extensibility* explains the scope, and modeling approach in CDIF. It also defines the CDIF Meta-meta-model and extensibility mechanism of CDIF.

This document and *EIA/IS-107 CDIF - Framework for Modeling and Extensibility* should be read first when initially exploring CDIF.

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 was formulated under the cognizance of the CDIF Technical Committee.

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1. SCOPE

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 CDIF Family of Standards includes an Integrated Meta-model and a Transfer Format definition. It also includes the specification of a meta-meta-model and associated rules that define a framework for the Integrated Meta-model and the Transfer Format. The language that is defined for the Transfer Format also has applicability as a general language for Import/Export for repositories. The CDIF Integrated Meta-model also has applicability as the basis of standard definitions for use in repositories.

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.

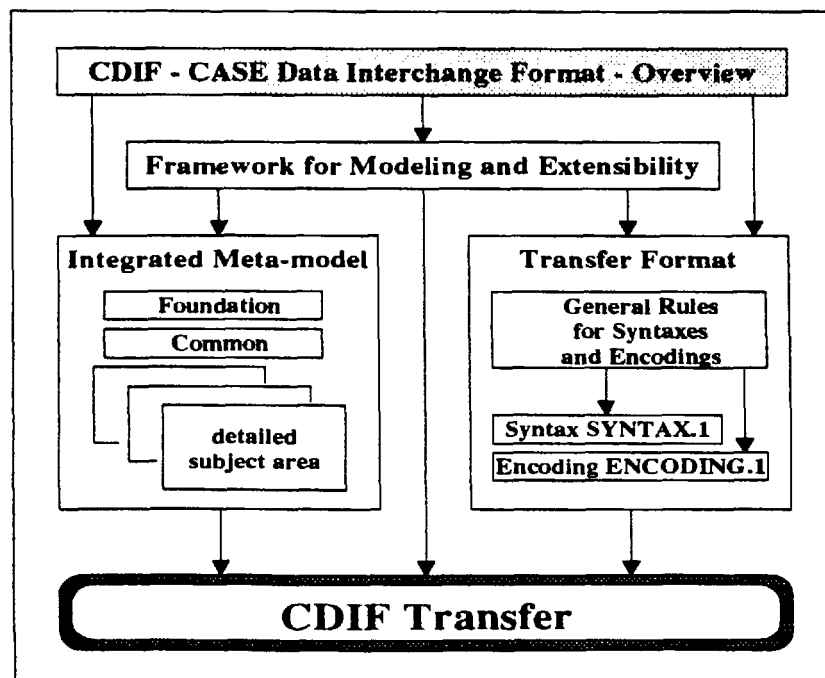


Figure 1
CDIF Family of Standards

This document introduces the CDIF Family of Standards.

Scope

2. INTRODUCTION

2.1 Audience

This document is intended to be used by anyone wishing to understand and/or use CDIF. This document provides an introduction to the entire CDIF Family of Standards. 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.

This document, *EIA/IS-106 CDIF - CASE Data Interchange Format - Overview*, and the Framework 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.

2.2 Structure of this Document

This document is organized into the following sections:

Section 1 'Scope'

This section describes the scope and purpose of this document.

Section 2 'Introduction'

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

Section 3 'CDIF Overview and Architecture'

This section describes the scope, purpose, architecture, and fundamental concepts of CDIF. This section also describes the major components of the CDIF architecture: the Framework, the Transfer Format, and the Integrated Meta-model.

Section 4 'CDIF Family of Standards Overview'

This section describes the components of the CDIF Integrated Meta-model. These components are presented as a series of subject areas that serve to address key areas of the System's Development Life Cycle.

Appendix A 'Questions and Answers'

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

Glossary

The Glossary contains the definitions of terms used in the CDIF Family of Standards.

Index

A comprehensive index is provided.

2.3 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 the Meta-meta-model can be found in the Framework document (*EIA/IS-107 CDIF - Framework for Modeling and Extensibility*).

3. CDIF OVERVIEW AND ARCHITECTURE

3.1 Introduction

CDIF has been developed to define the structure and content of a transfer that may be used to exchange data between two CASE tools. The fundamental objectives of the CDIF Family of Standards are:

- To provide a precise, unambiguous definition of information to be transferred
- To define a transfer that may be read and understood directly (i.e., without interpretation by a computer)
- To provide the importer with sufficient information to enable the importer to reproduce the transferred data consistent with the original sense.

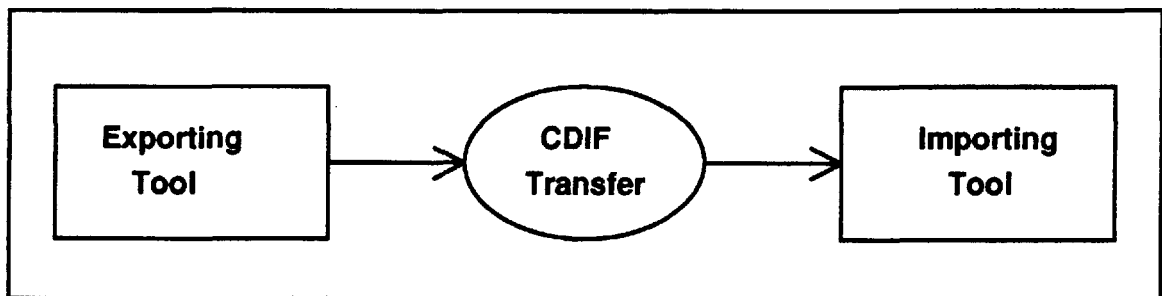


Figure 2
Use of the CDIF Family of Standards

The CDIF Family of Standards defines the content and format of the transfer of information between tools. Figure 2 shows the use of the CDIF Family of Standards. The transfer is usually from one CASE tool to another and is usually via a file. Additional types of transfer include inter-process communication, inter-machine (i.e., network) transfer, repository-to-tool transfer, etc.

While the CDIF Family of Standards makes no statements about the exact mechanism used to get conforming transfers accomplished, CDIF is designed to support all of the above types of transfers.

There are many different types of information that a user could want to transfer between CASE tools. Often, these types of information are identified by describing their location in a model of a System's Development Life Cycle (SDLC, also known as the Software Development Life Cycle). There are many models of the SDLC. While CDIF does not define any specific life cycle model, for purposes of discussion, Figure 3 provides a hypothetical representation of an SDLC. CDIF can support transfer of information that lies anywhere within the SDLC.

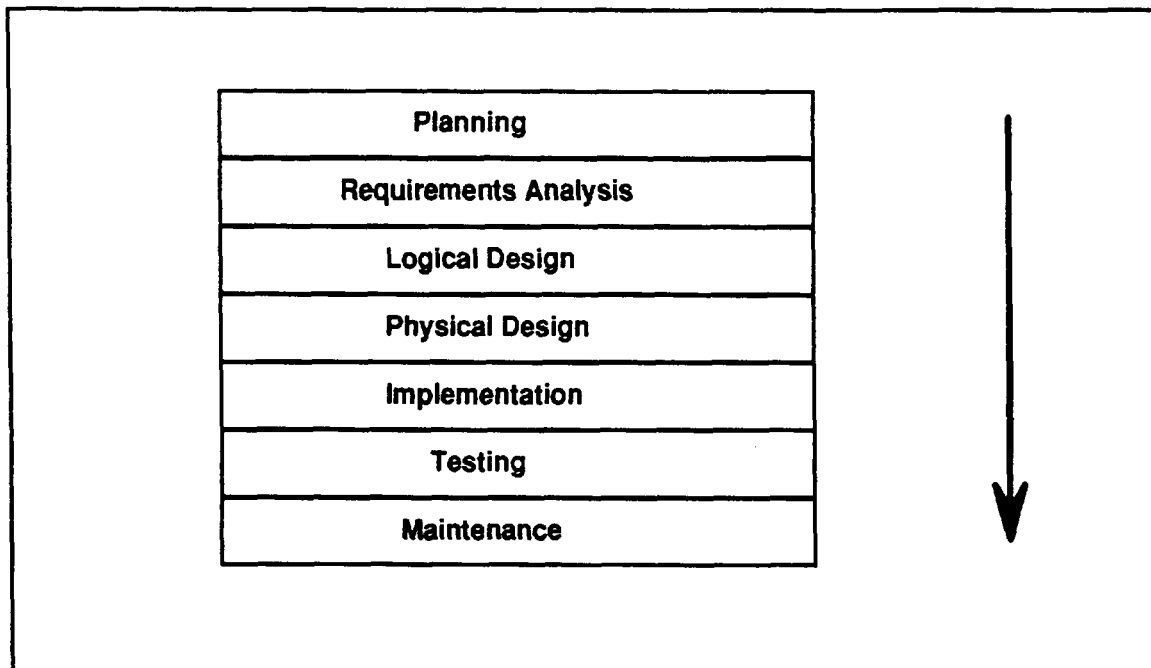


Figure 3
An Example of the Model of a System's Development Life Cycle

3.2 Fundamental Goals

3.2.1 Extensibility

The CDIF Integrated Meta-model aims to cover the superset of concepts for the entire systems development life cycle in due course. This is an ambitious goal and will not be met for several years. Some concepts are unique to any given tool and may not be included in the CDIF Integrated Meta-model, and certainly at present the entire life cycle is not covered by the CDIF Integrated Meta-model.

Because CDIF can not anticipate all of the information needs of the tools that utilize it, an extensibility mechanism exists. This mechanism, an integral part of the standards, allows tools to extend the capabilities of CDIF easily and cleanly to support the transfer of information that the standard CDIF Integrated Meta-model does not cover. This mechanism is described fully in *EIA/IS-107 CDIF - Framework for Modeling and Extensibility*.

3.2.2 Principle of Maximum Information Transfer

Exporters shall be built without knowledge of any prospective destination CASE tool. Since the capabilities of the destination tool are unknown (for example, the support of n-ary relationships, or the techniques supported), it is a fundamental principle of CDIF that an exporter shall transfer all available information within the intended scope of the transfer. Each importer may then discard any information for which it has no use.

3.3 Architecture of CDIF

3.3.1 Framework

3.3.1.1 Layers of Information

CDIF uses models to define the information content of a transfer. Several layers of model are used; the second being an abstraction of the first, the third of the second, and so on. Each abstraction, or meta-layer as it is called, defines the rules for the level from which it is abstracted. Figure 4 and the following text describe the meta-layers used in CDIF.

When an end-user information system is operating, it is manipulating information (e.g., Order Number 453 is for Customer Ted Cooper Inc., etc.). This information is known as "user data." User data is not relevant to the CDIF Family of Standards beyond the fact that CDIF deals with the tools that are used to create these information systems.

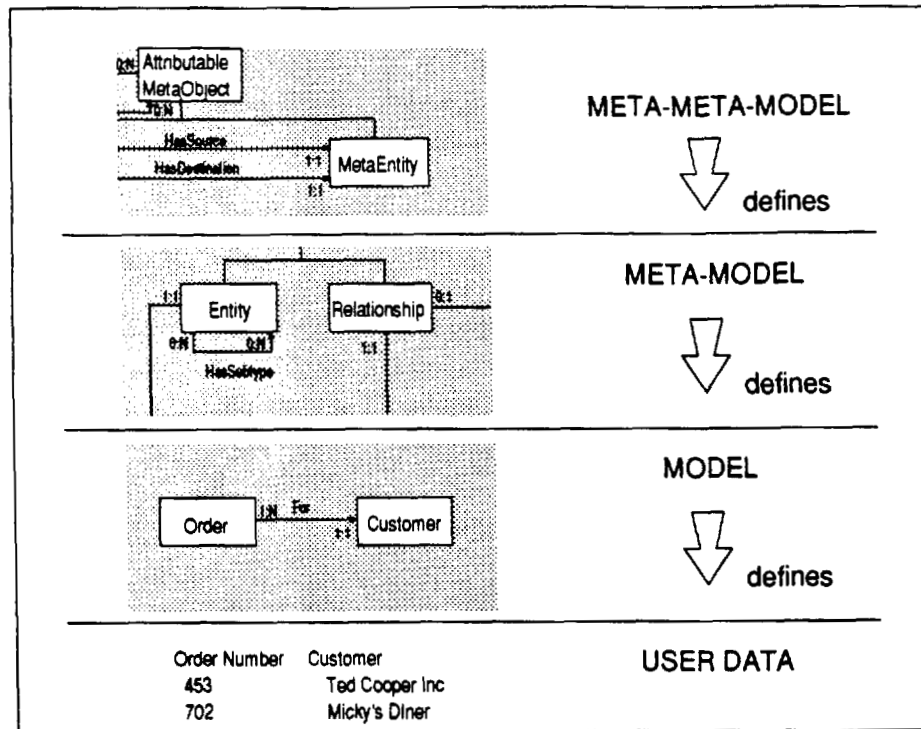


Figure 4
Multiple Layers

The information that is exchanged between two CASE tools through CDIF is known as a "model." The model is a description of the user data; for example, a model of the data that supports a Sales Order Processing information system (e.g., a system where 'Orders' are placed 'For' 'Customers', etc.). A model is exchanged in a "transfer."

Standard structures of the data used in software engineering methods and techniques have been defined to store the models in transfers. The abstract representation of such data structures is defined using Entity-Relationship-Attribute modeling. This representation contains data items which are the type definitions for data items found in models; for example, entities, data types, and processes. It is known as the "meta-model" because it contains data about data (in models).

To document the meta-model, an agreed set of meta-data structures (diagram types, definitions, notations, techniques and syntax) have been defined. Together, this set is known as the "meta-meta-model" because it contains data about data (in meta-models) about data (in models). The CDIF Meta-meta-model is defined in the Framework document (*EIA/IS-107 CDIF - Framework for Modeling and Extensibility*).

3.3.1.2 Separation of the What from the How

The basic concepts of the CDIF Architecture are embodied in the separation of the definition of what information is transferred from the definition of how that information is transferred. The information content of a CDIF transfer is defined by a meta-model. CDIF provides a standardized meta-model that is called the CDIF Integrated Meta-model. The Transfer Format provides the definition of how that information is to be put into a standardized form for transfer.

The following diagram depicts the separation of the Transfer Format and Information Content of a CDIF Transfer. The common element that unites these is the CDIF Meta-meta-model. It establishes the rules and building blocks from which the CDIF Integrated Meta-model and the CDIF Transfer Format are defined.

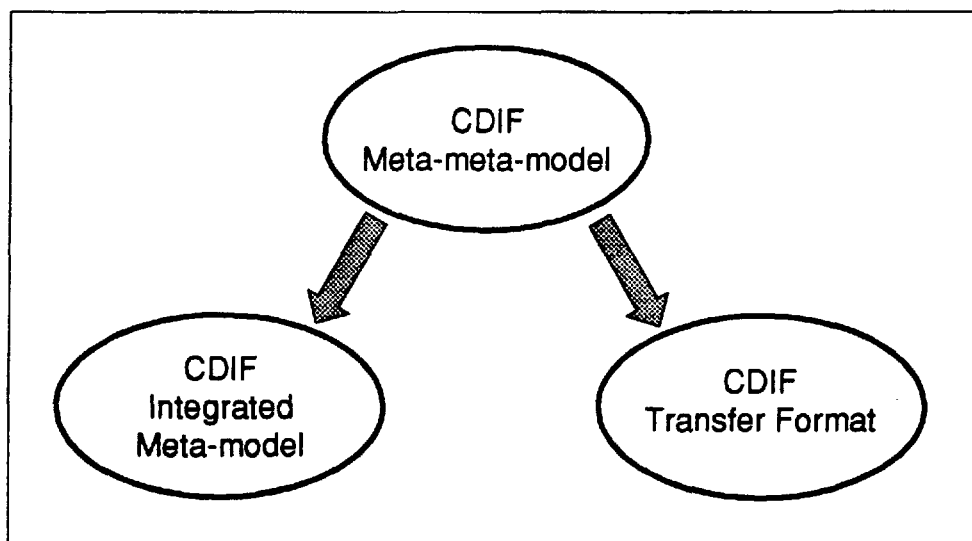


Figure 5
Architecture of CDIF

3.3.1.3 Modeling Approach

Because of the clear separation in CDIF between the definition of the information that is transferred during a transfer and the actual transfer format (i.e., syntax and encoding), as well as CDIF's support for multiple transfer formats, a concrete definition vehicle for the semantic (as opposed to representational) contents of a transfer is required; the definition can not be done at the syntax level. This semantic content, which is contained in the CDIF Integrated Meta-model, is defined using a variant of Entity-Relationship-Attribute (ERA) modeling.

This modeling approach was developed by extracting the necessary elements from industry-standard ERA modeling techniques. Although a few extensions have been made to meet the specific requirements of CDIF, anyone familiar with basic ERA modeling techniques should be able to interpret the CDIF Integrated Meta-model with little effort.

The detailed definition of this technique is contained in *EIA/IS-107 CDIF - Framework for Modeling and Extensibility*.

The goal of the CDIF Integrated Meta-model is to provide definitions of all information of interest to CASE tools. However, this is a major task that cannot be undertaken in one standard due to its size and complexity, and due to the fact that Software Engineering is continually advancing and changing.

The approach that has been taken in the CDIF Integrated Meta-model is to provide definitions of small areas of CASE in a manner that relates those areas while enabling each area to be used without the need of knowledge or understanding of all the other areas covered by the CDIF Family of Standards. These are called "Subject Areas". Each Subject Area is defined in a separate standard that forms part of the set of Standards which define the overall CDIF Integrated Meta-model.

In each Subject Area, the meta-entities, meta-attributes and meta-relationships included support the common concepts required by methods using the area covered. The extensibility mechanism provides a way for tool builders to extend the information definition when additional information is required either between similar or different tools.

The Meta-model is a definition of information held within a Model; in this case the models used by CASE tools to represent the systems being described by the users of the tools. For the Meta-model itself to be understood, the notation and technique used to describe it must be well defined. This definition of the CDIF Integrated Meta-model is described by the CDIF Meta-meta-model. A detailed description of the CDIF Meta-meta-model can be found in *EIA/IS-107 CDIF - Framework for Modeling and Extensibility*. The CDIF Meta-meta-model provides a consistent way of defining meta-entities, their meta-attributes, and the meta-relationships between them.

3.3.2 Information Content

3.3.2.1 Separation of Semantic Information and Presentation Information

The CDIF Integrated Meta-model Standards each define a subject area. Subject areas are views on the underlying meta-model. Objects in the meta-model can appear in more than one subject area. The subject areas of the Integrated Meta-model can be grouped into two distinct categories: semantic information subject areas and presentation information subject areas.