Consultative Committee for Space Data Systems

RECOMMENDATION FOR SPACE DATA SYSTEM STANDARDS

DATA ENTITY DICTIONARY SPECIFICATION LANGUAGE (DEDSL)—

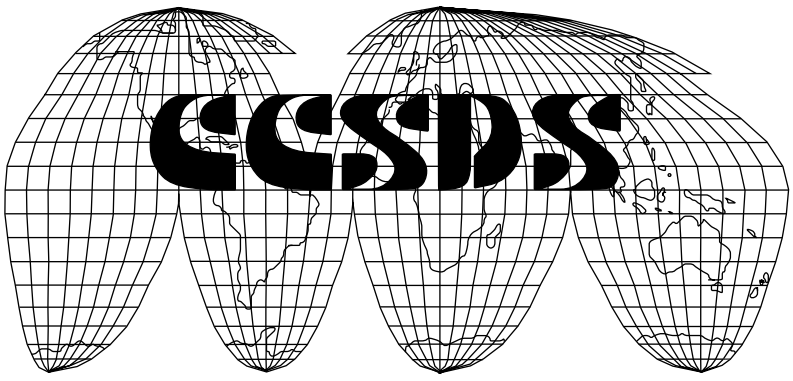
XML/DTD SYNTAX

(CCSD0013)

CCSDS 647.3-B-1

BLUE BOOK

January 2002



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FOREWORD

This Recommendation provides a standard method to represent attributes and their values, as has been defined by the Abstract Syntax of the Data Entity Dictionary Specification Language (DEDSL) (reference [1]), using the Extensible Markup Language (XML) 1.0 Document Type Declaration (DTD) for the construction and interchange of data entity dictionaries.

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DOCUMENT CONTROL

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this Recommendation is to provide a standard method to represent the attributes and their values, as has been defined by the Abstract Syntax of the Data Entity Dictionary Specification Language (DEDSL) (reference [1]), using the Extensible Markup Language (XML) 1.0 Document Type Declaration (DTD) (reference [2]) for the construction and interchange of data entity dictionaries.

This Recommendation is registered under the Consultative Committee for Space Data Systems (CCSDS) Authority and Description Identifier (ADID): CCSD0013.

This Recommendation does not exclude other implementation recommendations as described in reference [1].

1.2 APPLICABILITY

This Recommendation is intended to be used by:

- Data producers, to construct dictionaries that describe, in a more formal manner, data entities within their data products.
- Data users, to understand data received from data producers who have used this Recommendation to construct their dictionaries.
- An organization that mandates the attributes used to define each entity description in dictionaries used within that organization.
- A particular community, such as Earth observation, space physics, archives, etc., to establish a degree of standardization for the contents of any data dictionary associated or not with a data product. This would be done by using this Recommendation to define a community-wide data dictionary.
- Organizations and communities, to exchange the contents of a data dictionary in a standardized manner, i.e., to facilitate interoperability.

1.3 RATIONALE

A given data entity may take on a range of values that are represented differently within different formats or in native formats. However, there is information about that data entity, such as its definition and other semantic attributes, which is independent of the values and their representation in any given format. This information includes:

- the exchange of data entity dictionaries among disciplines and organizations which typically use differing standard formats;
- the exchange of data entity dictionary information with registration authorities such as the CCSDS/International Organization for Standardization (ISO) Control Authority (see references [5] and [B4]); and
- the exchange of data entity dictionary information using general data packaging techniques such as the CCSDS/ISO Standard Formatted Data Unit (SFDU) (see references [1] and [B2]).

1.4 DOCUMENT STRUCTURE

This document presents the XML/DTD implementation of the DEDSL Abstract Syntax in a layered manner. The reader should be familiar with both the DEDSL Abstract Syntax (reference [1]) and the XML/DTD Recommendation (reference [2]) in order to fully understand this document.

In summary, the document is structured as follows:

- Section 2 introduces the use of XML/DTD as implementation language of the DEDSL.
- Section 3 specifies the exact XML/DTD syntax for each DEDSL dictionary attribute and how to define a data entity dictionary in XML/DTD.
- Section 4 specifies the exact XML/DTD syntax for each DEDSL data entity attribute and how to define a data entity in XML/DTD.
- Section 5 specifies the exact XML/DTD syntax for each DEDSL descriptor and how to define user-defined attribute in XML/DTD.
- Section 6 discusses the levels of conformance to the DEDSL Recommendation, in relation to the abstract specification and the XML/DTD implementation, and the CCSDS Control Authority registration of this Recommendation.
- Section 7 lists the keywords associated with the XML/DTD implementation.
- Section 8 provides the complete XML/DTD implementation.
- Annex A provides an XML implementation example.
- Annex B provides a list of references that may be valuable to the user of this Recommendation as background material, or as implementation guidelines for using this Recommendation.

1.5 DEFINITIONS

1.5.1 ACRONYMS AND ABBREVIATIONS

The following acronyms and abbreviations are used throughout this Recommendation:

ADID	Authority and Description Identifier
ASCII	American Standard Code for Information Interchange
CCSDS	Consultative Committee for Space Data Systems
DED	Data Entity Dictionary
DEDSL	Data Entity Dictionary Specification Language
DTD	Document Type Declaration
ID	Identifier
ISO	International Organization for Standardization
LVO	Label Value Object
SFDU	Standard Formatted Data Unit
XML	Extensible Markup Language

1.5.2 GLOSSARY OF TERMS

For the purposes of this document, the following definitions apply:

Attribute A piece of information that describes a Data Entity or Dictionary Entity. This information characterizes or enhances the understanding of the data that is described. Attributes are used to define the semantics of data entities.

Attribute Descriptor A piece of information that describes an attribute. This document specifies a set of descriptors for attribute description.

Attribute Value A value associated with an attribute instance.

Composite Data Entity A data entity which consists of a combination of various other elementary and composite entities.

Constant A named constant value that is used within a dictionary but is not part of the data themselves. Use of constants enables data entity dictionaries to specify values which will be used by several projects or within a domain (e.g., astronomy constants, image size, etc.).

Data Entity	A concept that can, or does, take on one or more values. The concept, and optionally constraints on the representation of its value, are defined by attributes and their values.
Data Entity Dictionary	A collection of semantic definitions of various data entities, together with a few mandatory and optional attributes about the collection as a whole. Data entity dictionaries may be just for a single product, i.e., all the data entities within a single product are described in a corresponding single dictionary, or the data entity dictionary may be a discipline-oriented dictionary that holds a number of previously defined data entity definitions which may be used by data designers and users as references. Some parts of a dictionary are optional. In practical terms the dictionary could be a file or a Standard Formatted Data Unit (SFDU) Label-Value Object (LVO) value field (see references [3] and [B2]). Within this Recommendation, the expression 'data entity dictionary' can refer either to the notion of data entity dictionaries, or to a data entity dictionary instance. A data entity dictionary is also an entity, called Dictionary Entity.
Data Product	A collection of one or more data items that are packaged for or by a specific application.
Defaulted	Indication of an attribute or descriptor value that is understood when the attribute or descriptor is not explicitly included in the containing definition.
Descriptor Name	An Identifier that is the name of the descriptor.
Descriptor Type	The characterization of the descriptor value; e.g., text, identifier, integer.
Elementary Data Entity	A data entity whose data type is elementary, that is Integer, Real, Text or Enumerated.
Enumerated	A set containing a restricted number of discrete values, where each discrete value is named and unique within the set.
Identifier	An XML CDATA, that designates something.
Integer	The set of integer values. It can optionally be defined more precisely by specifying a range (minimum and maximum bounds).
Model	A data entity described independently from any instance in a data product and corresponding to a reusable data entity definition, from which other data entities may inherit the attributes and apply some specialization rules.

Real	The set of real values. It can optionally be defined more precisely by specifying a range (minimum and maximum bounds).
Semantics	Information that defines the meaning rather than the physical representation of data. Semantics potentially cover a very large domain, from the simple domain, such as the units of one data entity, to a more complex one, such as the relationship between a data entity and another.
Standard Attribute	One of the attributes defined within the DEDSL Abstract Syntax Recommendation (reference [1]).
Syntax	Information defining the physical representation of data. It includes the structural arrangement of the fields within the data on the exchanged media.
Text	A sequence of characters. The set of allowed characters is defined in the Data Entity Dictionary.
User Defined Attribute	An attribute that is defined by a particular user or project and after definition is then used in the same manner as a Standard Attribute within that data entity dictionary.

1.5.3 NOMENCLATURE

The following conventions apply throughout this Recommendation:

a) the words ‘shall’ and ‘must’ imply binding and verifiable specification;

b) The word ‘should’ implies an optional, but desirable, specification;

c) The word ‘may’ implies an optional specification;

d) The words ‘is’, ‘are’ and ‘will’ imply statements of fact.

1.6 REFERENCES

The following documents contain provisions (through references within this text) which constitute provisions of this Recommendation. At the time of publication the indicated editions were valid. All documents are subject to revision, and users of this Recommendation are encouraged to investigate the possibility of applying the most recent editions of the documents indicated below. The CCSDS Secretariat maintains a register of currently available CCSDS Recommendations.

[1] *Data Entity Dictionary Specification Language (DEDSL)—Abstract Syntax (CCSD0011)*. Recommendation for Space Data System Standards, CCSDS 647.1-B-1. Blue Book. Issue 1. Washington, D.C.: CCSDS, June 2001.

[2] Extensible Markup Language (XML) *1.0 (Second Edition)—W3C Recommendation 6, October 2000. http://www.w3.org/TR/2000/REC-xml-20001006*

[3] *Standard Formatted Data Units—Structure and Construction Rules*. Recommendation for Space Data System Standards, CCSDS 620.0-B-2. Blue Book. Issue 2. Washington, D.C.: CCSDS, May 1992. (ISO 12175)

[4] *ASCII Encoded English (CCSD0002)*. Recommendation for Space Data System Standards, CCSDS 643.0-B-1. Blue Book. Issue 1. Washington, D.C.: CCSDS, November 1992. (ISO 14962)

[5] *Standard Formatted Data Units—Control Authority Procedures*. Recommendation for Space Data System Standards, CCSDS 630.0-B-1. Blue Book. Issue 1. Washington, D.C.: CCSDS, June 1993. (ISO 13764)

[6] *Code for the Representation of Names of Languages*. International Standard, ISO 639-2-1998. Geneva: ISO, 1998.

2 DEDSL IMPLEMENTATION USING XML/DTD

2.1 OVERVIEW

Data Entity Dictionary Specification Language (DEDSL)—Abstract Syntax (CCSD0011) (reference [1]) defines an abstract standard.

One recommended method of constructing and conveying a Data Entity Dictionary is by using the XML 1.0 (reference [2]).

XML is designed to support the conveyance of named values, and is therefore suitable for implementation of the abstract standard. This Recommendation bases its implementation on XML with DTDs, but specifies additional semantic rules: new keywords and new semantic constructs (see section 7 for the complete list of keywords).

The following subsections specify the XML implementation of the abstract standard in the following order:

- Subsection 2.1 defines the general mapping of DEDSL Abstract Syntax concepts and elements to XML constructs, and it includes restrictions related to the XML implementation.
- Subsection 2.2 provides the structure of a complete data entity dictionary using XML. It is implemented as a single XML file compliant with a DTD and, is therefore separate from any data which it describes.

2.2 GENERAL DEDSL ABSTRACT SYNTAX TO XML/DTD MAPPINGS

The following mapping rules apply.

a) Descriptor names and attribute names

The descriptor names and attribute names are implemented as XML/DTD elements and attributes and are normally case-sensitive. Therefore, these names consist of a sequence of XML/DTD unrestricted Characters. See section 5 of reference [1] for further restrictions.

b) Descriptor values and attribute values

The descriptor values and attribute values are implemented as DTD elements(!ELEMENT) or Attributes (!ATTLIST). Due to DTD limitations, descriptor values that have defaults or are enumerated must be expressed as XML Attributes.

In the DTD, the optional character following the name of an element, or a list of elements, governs whether the element may occur one or more (+), zero or more (*), or zero or one

times (?) (optional and conditional descriptors). The absence of such an operator means that the element must appear exactly once (Mandatory descriptors).

When the descriptor is implemented as an XML attribute, #REQUIRED means that the attribute must always be provided (Mandatory descriptor) and, #IMPLIED means that no default value is provided.

The Identifier type is implemented as PCDATA or CDATA (reference [2]) restricted by the interoperability constraints. The Enumerated type is implemented as XML Enumeration; LIST as XML seq; and CHOICE as XML choice (reference [2]).

Multiple DEDSL constructs may be implemented in a single XML construct. For example, 'name, class and definition' are all a part of the XML element DATA_ENTITY_DEFINITION.

The mappings from the DEDSL Abstract Syntax types to XML/DTD representations are provided in table 2-1:

Table 2-1: DEDSL Types/XML/DTD Types Mapping

DEDSL Types	XML/DTD Types
INTEGER	PCDATA or CDATA
REAL	PCDATA or CDATA
IDENTIFIER	PCDATA or CDATA (see note 1)
TEXT	PCDATA or CDATA (see note 2)
ENUMERATED	XML Enumeration
ENTITY_TYPE	ENTITY_TYPE (see note 3)
LIST consisting of only mandatory elements	XML sequence: a DTD Element with multiple contained elements not including optional elements
LIST consisting of a variable number of elements due to optional elements	DTD Element containing mandatory and optional elements with a concluding star
CHOICE	XML choice: a DTD element containing choice of subelements
CHOICE appearing in attribute values	DTD !Attlist Attribute

NOTES

1 The interoperability constraints on Identifiers specified in the DEDSL Abstract Syntax (reference [1]) should be applied (see section 6).

2 Values of type Text are expressed as XML PCDATA or CDATA. It is recommended that they be included inside XML CDATA sections. They are used to escape blocks of text containing characters which would otherwise be recognized as XML markup. CDATA sections begin with the string <![CDATA[and end with the string]]>.

3 There is no XML Type equivalent to Entity_Type, which refers to the data type of the entity. Therefore, the keyword Entity_Type is defined.

2.3 COMPLETE DEDSL DEFINITION OF A DATA ENTITY DICTIONARY

2.3.1 OVERVIEW

The structure of a complete Data Entity Dictionary using XML is bounded by an aggregation ELEMENT called 'DATA_ENTITY_DICTIONARY'. The goal of this element is only to structure the definition of the dictionary. The Data Entity Dictionary is composed of three elements. The obligation column indicates whether an element is mandatory (M) or optional (O).

Name of element	Obligation	Occurrence
DICTIONARY_IDENTIFICATION	M	1
DATA_ENTITY_DEFINITION	M	'n'
USER_DEFINED_ATTRIBUTE_DEFINITION	O	'n'

2.3.2 DTD DEFINITION

```
<!ELEMENT DATA_ENTITY_DICTIONARY  (
    DICTIONARY_IDENTIFICATION,
    DATA_ENTITY_DEFINITION+,
    USER_DEFINED_ATTRIBUTE_DEFINITION*
)>
```

2.3.3 XML EXAMPLE

```
<DATA_ENTITY_DICTIONARY>
    <DICTIONARY_IDENTIFICATION>
    see section 3
    </DICTIONARY_IDENTIFICATION>
    <DATA_ENTITY_DEFINITION>
    see section 4
    </DATA_ENTITY_DEFINITION>
    <DATA_ENTITY_DEFINITION>
    see section 4
    </DATA_ENTITY_DEFINITION>
    <USER_DEFINED_ATTRIBUTE_DEFINITION>
```

```
    see section 5
    </USER_DEFINED_ATTRIBUTE_DEFINITION>
</DATA_ENTITY_DICTIONARY>
```

3 DICTIONARY_IDENTIFICATION

3.1 OVERVIEW

The following table provides for each category the standard attributes that are defined by this Recommendation for data entities. The obligation column indicates whether an attribute is mandatory (M), conditional (C), optional (O) or defaulted (D) in the definition of each data entity appearing in a conforming DED.

Attribute Category	Name of data entity attribute	Obligation	Occurrence
Identifying	DICTIONARY_NAME	M	1
Definitional	DICTIONARY_DEFINITION	O	1
Relational	EXTERNAL_DICTIONARY_REFERENCE	C	'n'
Representational	TEXT_FIELD_CHARACTER_SET (see note 1)	M	1
	CASE_SENSITIVITY	D	1
	DICTIONARY_LANGUAGE	M	1
Administrative	DICTIONARY_VERSION	O	1
	DICTIONARY_IDENTIFIER	O	1
	DEDSL_VERSION	M	1
User defined attributes	DICTIONARY_USER_DEFINED_ATTRIBUTES	O	1

Note The TEXT_FIELD_CHARACTER_SET attribute is already defined in the header of an XML file by the ENCODING attribute. Therefore, it does not appear in the DTD below.

DTD DEFINITION

```
<!ELEMENT DICTIONARY_IDENTIFICATION  (
    DICTIONARY_NAME,
    DICTIONARY_DEFINITION?,
    EXTERNAL_DICTIONARY_REFERENCE*,
    DICTIONARY_LANGUAGE,
    DICTIONARY_VERSION?,
    DICTIONARY_IDENTIFIER?,
    DEDSL_VERSION,
    DICTIONARY_USER_DEFINED_ATTRIBUTES?
)>
```

```
< !ATTLIST DICTIONARY_NAME CASE_SENSITIVITY
(CASE_SENSITIVE|NOT_CASE_SENSITIVE) "NOT_CASE_SENSITIVE">
```

3.2 DICTIONARY_NAME, CASE_SENSITIVITY

3.2.1 OVERVIEW

Attribute_Definition : Human-readable name for the Data Entity Dictionary

Attribute_Obligation : Mandatory

Attribute_Maximum_Occurrence : 1

Attribute _name : CASE_SENSITIVITY

Attribute_Definition : Specifies the case sensitivity for the Identifiers used as values for the attributes of the data entities contained in the dictionary

Attribute_Obligation : Defaulted

Attribute_Maximum_Occurrence 1

3.2.2 DTD DEFINITION

```
<!ELEMENT DICTIONARY_NAME  (#PCDATA)>
<!ATTLIST DICTIONARY_NAME CASE_SENSITIVITY (CASE_SENSITIVE |
NOT_CASE_SENSITIVE)  "NOT_CASE_SENSITIVE">
```

3.2.3 XML EXAMPLE

```
<DICTIONARY_NAME CASE_SENSITIVITY="NOT_CASE_SENSITIVE">
Planetary_Science_Data_Dictionary</DICTIONARY_NAME>
```

3.3 DICTIONARY_DEFINITION

3.3.1 OVERVIEW

Attribute_Definition : Human readable definition for the Data Entity Dictionary

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 1

3.3.2 DTD DEFINITION

```
<!ELEMENT DICTIONARY_DEFINITION  (#PCDATA)>
```

3.3.3 XML EXAMPLE

```
<DICTIONARY_DEFINITION>This dictionary contains data entity definitions
relative to planetary science and they may be re-used for defining data
products. </DICTIONARY_DEFINITION>
```

3.4 EXTERNAL_DICTIONARY_REFERENCE

3.4.1 OVERVIEW

Attribute_Definition : Reference to another Data Entity Dictionary whose models are re-used in the current one, defined as the local name of the Data Entity Dictionary, followed by its identifier and its associated registration authority

Attribute_Obligation : Conditional

Attribute_Maximum_Occurrence : 'n'

3.4.2 DTD DEFINITION

```
<!ELEMENT EXTERNAL_DICTIONARY_REFERENCE  (
    LOCAL_NAME,
    DICTIONARY_ID,
    REGISTRATION_AUTHORITY
)>

<!ELEMENT LOCAL_NAME  (#PCDATA)>
<!ELEMENT DICTIONARY_ID  (#PCDATA)>
<!ELEMENT REGISTRATION_AUTHORITY  (#PCDATA)>
```

3.4.3 XML EXAMPLE

```
<EXTERNAL_DICTIONARY_REFERENCE>
    <LOCAL_NAME>CDPP_Plasma_Dictionary</LOCAL_NAME>
    <DICTIONARY_ID>FCST0172</DICTIONARY_ID>
    <REGISTRATION_AUTHORITY>CCSDS_Control_Authority
    </REGISTRATION_AUTHORITY>
</EXTERNAL_DICTIONARY_REFERENCE>
```

3.5 TEXT_FIELD_CHARACTER_SET

Attribute_Definition : Name of the Character Set that is valid for TEXT value type within the dictionary

Attribute_Obligation : Mandatory

Attribute_Maximum_Occurrence : 1

Already defined in the ENCODING attribute of the XML file header.

An example of XML would be:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
```

3.6 DICTIONARY_LANGUAGE

3.6.1 OVERVIEW

Attribute_Definition	:	Main natural language that is valid for any value of type TEXT given to the attributes of the current entity. When used in a data entity, the value of the attribute overrides the value specified for the dictionary entity. It is defined as the English name of the language and its associated 2- or 3-letter code as specified in ISO 639-2 (reference [6]).
Attribute_Obligation	:	Mandatory
Attribute_Maximum_Occurrence	:	'1'

NOTE – This is the XML implementation of the LANGUAGE attribute reference [1].

3.6.2 DTD DEFINITION

```
<!ELEMENT DICTIONARY_LANGUAGE EMPTY>
<!ATTLIST DICTIONARY_LANGUAGE ISO_CODE    CDATA  #REQUIRED>
<!ATTLIST DICTIONARY_LANGUAGE IN_ENGLISH  CDATA  #REQUIRED>
```

3.6.3 XML EXAMPLE

```
<DICTIONARY_LANGUAGE ISO_CODE="fr" IN_ENGLISH="FRENCH"/>
```

3.7 DICTIONARY_VERSION

3.7.1 OVERVIEW

Attribute_Definition : Version of the Data Entity Dictionary

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 1

3.7.2 DTD DEFINITION

```
<!ELEMENT DICTIONARY_VERSION  (#PCDATA)>
```

3.7.3 XML EXAMPLE

```
<DICTIONARY_VERSION>1.0</DICTIONARY_VERSION>
```

3.8 DICTIONARY_IDENTIFIER

3.8.1 OVERVIEW

Attribute_Definition : The Identifier under which the Data Entity Dictionary has been registered at a registration Authority

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 1

3.8.2 DTD DEFINITION

```
<!ELEMENT DICTIONARY_IDENTIFIER  (#PCDATA)>
```

3.8.3 XML EXAMPLE

```
<DICTIONARY_IDENTIFIER>FCST0185</DICTIONARY_IDENTIFIER>
```

3.9 DEDSL_VERSION

3.9.1 OVERVIEW

Attribute_Definition	:	CCSDS document number of the document corresponding to the XML implementation of the Abstract Syntax. Note that this reference contains the version.
Attribute_Obligation	:	Mandatory
Attribute_Maximum_Occurrence	:	1

3.9.2 DTD DEFINITION

```
<!ELEMENT DEDSL_VERSION  (#PCDATA)>
```

3.9.3 XML EXAMPLE

```
<DEDSL_VERSION>CCSDS 647.3-B-1</DEDSL_VERSION>
```

3.10 DICTIONARY_USER_DEFINED_ATTRIBUTES

NOTE – The users can freely add new attributes for the dictionary description part. All the user's defined attributes relative to the dictionary must be grouped under the DICTIONARY_USER_DEFINED_ATTRIBUTES element. In all cases, the original DEDSL DTD must be modified to add the new attributes, and each new attribute must have a definition in the USER_DEFINED_ATTRIBUTE_DEFINITION part of the DATA_ENTITY_DICTIONARY with the ATTRIBUTE_SCOPE set to DICTIONARY or ALL (see section 5 for details).

3.10.1 DTD DEFINITION

```
This line in the default DTD :

<!ELEMENT DICTIONARY_USER_DEFINED_ATTRIBUTES EMPTY>

must be replaced by the following ones in order to have a validating DTD

<!ELEMENT DICTIONARY_USER_DEFINED_ATTRIBUTES (DICTIONARY_AUTHOR)>
<!ELEMENT DICTIONARY_AUTHOR (#PCDATA)>
```

3.10.2 XML EXAMPLE

```
<DICTIONARY_USER_DEFINED_ATTRIBUTES>
    <DICTIONARY_AUTHOR>PHIL COLLINS</DICTIONARY_AUTHOR>
</DICTIONARY_USER_DEFINED_ATTRIBUTES>
```

4 DATA_ENTITY_DEFINITION

4.1 OVERVIEW

The following table provides for each category the standard attributes that are defined by this Recommendation for data entities. The obligation column indicates whether an attribute is mandatory (M), conditional (C), optional (O) or defaulted (D) in the definition of each data entity appearing in a conforming DED.

Attribute Category	Name of data entity attribute	Obligation	Occurrence
Identifying	NAME	M	1
	ALIAS	O	'n'
	CLASS	D	1
Definitional	DEFINITION	M	1
	SHORT_DEFINITION	O	1
	COMMENT	O	'n'
	UNITS (see note 1)	C	1
	SPECIFIC_INSTANCE	O	'n'
Relational	INHERITS_FROM	O	1
	KEYWORD	O	'n'
	RELATION	O	'n'
Representational	INTEGER_TYPE, REAL_TYPE, TEXT_TYPE, ENUMERATED_TYPE, COMPOSITE_TYPE (see notes 2 and 3)	C	1
	ENUMERATION_VALUES	C	'n'
	ENUMERATION_MEANING	O	'n'
	ENUMERATION_CONVENTION	O	'n'
	RANGE	O	1
	TEXT_SIZE	C	1
	CASE_SENSITIVITY	O	1
	LANGUAGE	O	1
	CONSTANT_VALUE	O	1

User defined attributes	USER_DEFINED_ATTRIBUTES_PART	O	1

NOTES

1 If the data entity is non-scalar, then the attribute shall not be specified.

2 This attribute must be present for a product data field definition and for a constant definition (CLASS attribute set to DATA_FIELD or CONSTANT), and is optional for a model definition (CLASS attribute set to MODEL).

3 Several data type-dependent attributes have been moved to REPRESENTATIONAL to allow their Conditionality to be expressed in the DTD with minimum new constructs.

DTD DEFINITION

```
<!ELEMENT DATA_ENTITY_DEFINITION (
    ALIAS*,
    DEFINITIONAL_PART,
    RELATIONAL_PART?,
    REPRESENTATIONAL_PART?,
    USER_DEFINED_ATTRIBUTES_PART?
)>
<!ATTLIST DATA_ENTITY_DEFINITION  NAME CDATA #REQUIRED>
<!ATTLIST DATA_ENTITY_DEFINITION  CLASS (MODEL|DATA_FIELD|CONSTANT)
"DATA_FIELD">


<!ELEMENT ALIAS (#PCDATA)>
<!ATTLIST ALIAS NAME CDATA #REQUIRED>



<!-- *** DEFINITIONAL PART *** -->



<!ELEMENT DEFINITIONAL_PART (
    DEFINITION,
    SHORT_DEFINITION?,
    COMMENT*,
    UNITS*,
    SPECIFIC_INSTANCE*
)>

<!ELEMENT DEFINITION (#PCDATA)>

<!ELEMENT SHORT_DEFINITION (#PCDATA)>

<!ELEMENT COMMENT (#PCDATA)>
```

```
<!ELEMENT UNITS (#PCDATA)>

<!ELEMENT SPECIFIC_INSTANCE (#PCDATA)>
<!ATTLIST SPECIFIC_INSTANCE VALUE CDATA #REQUIRED>



<!-- *** RELATIONAL PART *** -->



<!ELEMENT RELATIONAL_PART (
       INHERITS_FROM?,
       RELATION*,
       KEYWORD*
)>

<!ELEMENT INHERITS_FROM (#PCDATA)>
<!ATTLIST INHERITS_FROM EXTERNAL_DICTIONARY CDATA #IMPLIED>

<!ELEMENT RELATION (#PCDATA)>
<!ATTLIST RELATION WITH CDATA #REQUIRED>
<!ATTLIST RELATION EXTERNAL_DICTIONARY CDATA #IMPLIED>

<!ELEMENT KEYWORD (#PCDATA)>



<!-- *** REPRESENTATIONAL PART *** -->



<!ELEMENT REPRESENTATIONAL_PART (
INTEGER_TYPE | REAL_TYPE | TEXT_TYPE | ENUMERATED_TYPE | COMPOSITE_TYPE
)>



<!-- *** INTEGER TYPE *** -->

<!ELEMENT INTEGER_TYPE (
      (INTEGER_RANGE)?,
      (INTEGER_CONSTANT_VALUE)?
)>

<!ELEMENT INTEGER_RANGE EMPTY>
<!ATTLIST INTEGER_RANGE MIN CDATA #REQUIRED>
<!ATTLIST INTEGER_RANGE MAX CDATA #REQUIRED>

<!ELEMENT INTEGER_CONSTANT_VALUE (#PCDATA)>



<!-- *** REAL TYPE *** -->

<!ELEMENT REAL_TYPE (
      (REAL_RANGE)?,
      (REAL_CONSTANT_VALUE)?
)>
```

```
<!ELEMENT REAL_RANGE EMPTY>
<!ATTLIST REAL_RANGE MIN CDATA #REQUIRED>
<!ATTLIST REAL_RANGE MAX CDATA #REQUIRED>

<!ELEMENT REAL_CONSTANT_VALUE (#PCDATA)>



<!-- *** COMPOSITE TYPE *** -->

<!ELEMENT COMPOSITE_TYPE (COMPONENT+)>

<!ELEMENT COMPONENT (#PCDATA)>
<!ATTLIST COMPONENT MIN CDATA "1">
<!ATTLIST COMPONENT MAX CDATA "1">



<!-- *** TEXT TYPE *** -->

<!ELEMENT TEXT_TYPE (
      TEXT_SIZE?,
      LANGUAGE?
)>


<!ELEMENT TEXT_SIZE (#PCDATA)>
<!ATTLIST TEXT_SIZE MIN CDATA #IMPLIED>
<!ATTLIST TEXT_SIZE MAX CDATA #IMPLIED>


<!ELEMENT LANGUAGE EMPTY >
<!ATTLIST LANGUAGE IN_ENGLISH CDATA    #REQUIRED>
<!ATTLIST LANGUAGE ISO_CODE CDATA #REQUIRED>



<!-- *** ENUMERATION TYPE *** -->

<!ELEMENT ENUMERATED_TYPE (
      (ENUMERATION)+
)>

<!ELEMENT ENUMERATION (
     ENUMERATION_MEANING?,
     ENUMERATION_CONVENTION?
)>

<!ATTLIST ENUMERATION VALUE CDATA #REQUIRED>

<!ELEMENT ENUMERATION_MEANING (#PCDATA)>

<!ELEMENT ENUMERATION_CONVENTION (#PCDATA)>



<!-- *** USER DEFINED ATTRIBUTES PART *** -->

<!-- User defined attributes relative to data entity  -->
<!-- must be declared here (see section 4.5) !! -->
<!ELEMENT USER_DEFINED_ATTRIBUTES_PART EMPTY>
```

4.2 IDENTIFYING ATTRIBUTES

4.2.1 NAME, CLASS

4.2.1.1 Overview

The attributes NAME and CLASS are associated with the DATA_ENTITY_DEFINITION in order to sort easily the different entities.

Attribute_Name	:	**Class**
Attribute_Definition	:	The value of this attribute makes a clear statement of what kind of entity is defined by the current entity definition. This definition can be a model definition, a data field definition, or a constant definition.
Attribute_Obligation	:	Defaulted
Attribute_Maximum_Occurrence	:	1
Attribute_Default_Value	:	data_field

Attribute_Name	:	**Name**
Attribute_Definition	:	The value of this attribute may be used to link a collection of attributes with an equivalent identifier in, or associated with, the data entity. The value of this attribute may also be used by the software developer to name corresponding variables in software code or designate a field to be searched for locating particular data entities. The **name** shall be unique within a Data Entity Dictionary.
Attribute_Obligation	:	Mandatory
Attribute_Maximum_Occurrence	:	1

4.2.1.2 DTD DEFINITION

```
<!ELEMENT DATA_ENTITY_DEFINITION (
    ALIAS*,
    DEFINITIONAL_PART,
    RELATIONAL_PART?,
    REPRESENTATIONAL_PART?,
    USER_DEFINED_ATTRIBUTES_PART?
)>
<!ATTLIST DATA_ENTITY_DEFINITION  NAME CDATA #REQUIRED>
<!ATTLIST DATA_ENTITY_DEFINITION  CLASS (MODEL|DATA_FIELD|CONSTANT)
"DATA_FIELD">
```

4.2.1.3 XML EXAMPLE

```
<DATA_ENTITY_DEFINITION NAME="A_MODEL" CLASS="MODEL" >

    <DEFINITIONAL_PART>
    See section 4.2
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
    See section 4.3
    </RELATIONAL_PART>
    <REPRESENTATIONAL_PART>
    See section 4.4
    </REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>
```

4.2.2 ALIAS

4.2.2.1 Overview

Attribute_Definition : Single- or multi-word designation that differs from the given name, but represents the same data entity concept, followed by the context in which this name is applied

The value of this attribute provides an alternative designation of the data entity that may be required for the purpose of compatibility with historical data or data deriving from different sources. For example, different sources may produce data including the same entities, but giving them different names. Through the use of this attribute it will be possible to define the semantic information only once. Along with the alternative designation, this attribute value shall provide a description of the context of when the alternative designation is used.

The value of the alternative designation can also be searched when a designation used in a corresponding syntax description is not found within the **NAME** values.

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 'n'

4.2.2.2 DTD DEFINITION

```
<!ELEMENT ALIAS (#PCDATA)>
<!ATTLIST ALIAS NAME CDATA #REQUIRED>
```

4.2.2.3 XML EXAMPLE

```
<ALIAS NAME="ACQUTIME">Used in the FITS header</ALIAS>
```

4.3 DEFINITIONAL ATTRIBUTES

4.3.1 DEFINITION

Attribute_Definition : Statement that expresses the essential nature of a data entity and permits its differentiation from all the other data entities

This attribute is intended for human readership and, therefore, any information that will increase the understanding of the identified data entity should be included.

It is intended that the value of this attribute can be of significant length and, hence, provide a description of the data entity as completely as possible. The value of this attribute can be used as a field to be searched for locating particular data entities.

Attribute_Obligation : Mandatory

Attribute_Maximum_Occurrence : 1

Attribute_Comment : The value of this attribute may include the same semantic information in natural language as the one carried in a more formal manner by other attributes. This is neither a requirement nor illegal, but the user must make sure that inconsistencies do not arise.

4.3.1.1 DTD DEFINITION

```
<!ELEMENT DEFINITION (#PCDATA)>
```

4.3.1.2 XML EXAMPLE

```
<DEFINITION>The PRODUCT_ID represents a permanent unique identifier
assigned to a data product by its producer</DEFINITION>
```

4.3.2 SHORT_DEFINITION

4.3.2.1 Overview

Attribute_Definition : Statement that expresses the essential nature of a data entity in a shorter and more concise manner than the statement of the mandatory attribute: **definition.**

This attribute provides a summary of the more detailed information provided by the **definition** attribute.

The value of this attribute can be used as a field to be searched for locating particular data entities. It is also intended to be used for display purposes by automated software, where the complete DEFINITION value would be too long to be presented in a convenient manner to users.

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 1

4.3.2.2 DTD DEFINITION

```
<!ELEMENT SHORT_DEFINITION (#PCDATA)>
```

4.3.2.3 XML EXAMPLE

```
<SHORT_DEFINITION>Product Identification</SHORT_DEFINITION>
```

4.3.3 COMMENT

4.3.3.1 Overview

Attribute_Definition : Associated information about a data entity. It enables adding information which does not correspond to definition information.

Attribute_Obligation : Optional

Attribute_Value_Type : **Text**

Attribute_Maximum_Occurrence : 'n'

4.3.3.2 DTD DEFINITION

```
<!ELEMENT COMMENT (#PCDATA)>
```

4.3.3.3 XML EXAMPLE

```
<COMMENT>The image is an array of W_IMAGE_SIZE items called
DATA_2_PIXEL</COMMENT>
```

4.3.4 UNITS

4.3.4.1 Overview

Attribute_Definition	:	Attribute that specifies the scientific units that should be associated with the value of the data entity so as to make the value meaningful in the 'real-world'.
Attribute_Obligation	:	Conditional
Attribute_Condition	:	If the data entity is non-scalar, then the attribute shall not be specified. If the data entity is of a scientific scalar type (Integer or Real), then this attribute is mandatory for data field entities and is optional for model entities. If the scalar type has no unit, e.g. a ratio, then the value of this attribute has to be «**NO_UNIT**».
Attribute_Maximum_Occurrence	:	1 if the data entity is a DATA_FIELD or a CONSTANT 'n' if the data entity is a MODEL

4.3.4.2 DTD DEFINITION

```
<!ELEMENT UNITS (#PCDATA)>
```

4.3.4.3 XML EXAMPLE

```
<UNITS>NO_UNIT</UNITS>
```

For multiple units :

```
<UNITS>kilometers</UNITS>
<UNITS>miles</UNITS>
```

4.3.5 SPECIFIC_INSTANCE

4.3.5.1 Overview

Attribute_Definition : Attribute that provides a real-world meaning for a specific instance (a value) of the data entity being described. The reason for providing this information is so that the user can see that there is some specific meaning associated with a particular value instance that indicates something more than just the abstract value. For example, the fact that zero degree latitude is the equator could be defined. This means that the value of this attribute must provide both an instance of the entity value and a definition of its specific meaning.

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 'n'

Attribute_Comment : The values of the attribute can be used to enhance user interfaces and, therefore, user understanding. For example, instead of displaying to the user the abstract value of an entity, the 'system' could first check the DEDSL definition to see if there is a specific meaning for this abstract value, and if there is, display the specific meaning string instead. Likewise, a user could enter a meaning definition by name, e.g., **`equator`**, and the 'system' could automatically (via the DEDSL definition) translate this name to a specific instance value.

4.3.5.2 DTD DEFINITION

```
<!ELEMENT SPECIFIC_INSTANCE (#PCDATA)>
<!ATTLIST SPECIFIC_INSTANCE VALUE CDATA #REQUIRED>
```

4.3.5.3 XML EXAMPLE

```
<SPECIFIC_INSTANCE VALUE="+00.00">Equator</SPECIFIC_INSTANCE>
```

4.4 RELATIONAL ATTRIBUTES

4.4.1 INHERITS_FROM

4.4.1.1 Overview

Attribute_Definition : Gives the name of a model or data field from which the current entity description inherits attributes. This name must be the value of the **NAME** attribute found in the referred entity description. If the entity is part of an external dictionary, that dictionary is given in the EXTERNAL_DICTIONARY attribute which must match LOCAL_NAME in one of the EXTERNAL_DICTIONARY_REFERENCE statements.

Referencing this data entity description means that all the values of its attributes having their **attribute_inheritance** set to **inheritable** apply to the current description.

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 1

Attribute_Comment : This attribute is intended to enable reuse. Each data entity description referring to the same entity should be qualified using the same value of this attribute.

4.4.1.2 DTD DEFINITION

```
<!ELEMENT INHERITS_FROM (#PCDATA)>
<!ATTLIST INHERITS_FROM EXTERNAL_DICTIONARY CDATA #IMPLIED>
```

4.4.1.3 XML EXAMPLE

```
<INHERITS_FROM>A_DATA_TYPE</INHERITS_FROM>
```

Inherits from the A_ROCKET model from the SPACE_VEHICLE dictionary:

```
<INHERITS_FROM EXTERNAL_DICTIONARY="SPACE_VEHICLE">
A_ROCKET</INHERITS_FROM>
```

4.4.2 KEYWORD

4.4.2.1 Overview

Attribute_Definition : Significant One or several significant words or phrase used for retrieving data entities

Attribute_Obligation : Optional

Attribute_Value_Type : **Text**

Attribute_Maximum_Occurrence : 'n'

4.4.2.2 DTD DEFINITION

```
<!ELEMENT KEYWORD (#PCDATA)>
```

4.4.2.3 XML EXAMPLE

```
<KEYWORD>IMAGE</KEYWORD>
```

4.4.3 RELATION

4.4.3.1 Overview

Attribute_Definition	:	This attribute is to be used to express a relationship between two entity definitions when this relation cannot be expressed using a precise standard relational attribute. In that case the relationship is user-defined and expressed using free text. If the entity is part of an external dictionary, that dictionary is given in the EXTERNAL_DICTIONARY attribute which must match LOCAL_NAME in one of the EXTERNAL_DICTIONARY_REFERENCE statements.
Attribute_Obligation	:	Optional.
Attribute_Maximum_Occurrence	:	'n'
Attribute_Comment	:	- The first attribute value provides the reader with the kind of relation that links the two related entities. - The second one is the name of the entity in relation with the one being defined. - The last one is used when the previous entity is described in an external Data Entity Dictionary to give the name of this dictionary for more clarity.

4.4.3.2 DTD DEFINITION

```
<!ELEMENT RELATION (#PCDATA)>
<!ATTLIST RELATION WITH CDATA #REQUIRED>
<!ATTLIST RELATION EXTERNAL_DICTIONARY CDATA #IMPLIED>
```

4.4.3.3 XML EXAMPLE

```
<RELATION WITH="DATA_2">number of pixels of a spacecraft W2
image</RELATION>

<RELATION WITH="POIDS" EXTERNAL_DICTIONARY="FRENCH_DICTIONARY"> translation
in French of WEIGHT</RELATION>
```

4.5 REPRESENTATIONAL ATTRIBUTES

4.5.1 INTEGER_TYPE, INTEGER_RANGE, CONSTANT_VALUE

4.5.1.1 Overview

Attribute_Name : **INTEGER_TYPE**

Attribute_Definition : Specifies the type of the data_entity values as INTEGER

Attribute_Obligation : Conditional

Attribute_Maximum_Occurrence : 1

Attribute_Name : **INTEGER_RANGE**

Attribute_Definition : The minimum bound and the maximum bound of an INTEGER data entity

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 1

NOTE – This is the XML implementation of the RANGE attribute in reference [1].

Attribute_Name : **CONSTANT_VALUE**

Attribute_Definition : The value of this attribute is the value given to a constant

Attribute_Obligation : Conditional

Attribute_Maximum_Occurrence : 1

4.5.1.2 DTD DEFINITION

```
<!ELEMENT INTEGER_TYPE (
      INTEGER_RANGE?
)>

<!ELEMENT INTEGER_RANGE EMPTY>
<!ATTLIST INTEGER_RANGE MIN CDATA #REQUIRED>
<!ATTLIST INTEGER_RANGE MAX CDATA #REQUIRED>

<!ATTLIST INTEGER_TYPE CONSTANT_VALUE (#PCDATA)>
```

4.5.1.3 XML EXAMPLE

```
<INTEGER_TYPE>
<INTEGER_RANGE MIN="0" MAX="10"/>
</INTEGER_TYPE>

<INTEGER_TYPE CONSTANT_VALUE="12"/>
```

4.5.2 REAL_TYPE,REAL_RANGE,CONSTANT_VALUE

4.5.2.1 Overview

Attribute_Name : **REAL_TYPE**

Attribute_Definition : Specifies the type of the data_entity values as REAL

Attribute_Obligation : Conditional

Attribute_Maximum_Occurrence : 1

Attribute_Name : **REAL_RANGE**

Attribute_Definition : The minimum bound and the maximum bound of an REAL data entity

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 1

NOTE – Note: This is the XML implementation of the RANGE attribute in reference [1]

Attribute_Name : **CONSTANT_VALUE**

Attribute_Definition : The value of this attribute is the value given to a constant.

Attribute_Obligation : Conditional

Attribute_Maximum_Occurrence : 1

4.5.2.2 DTD DEFINITION

```
<!ELEMENT REAL_TYPE (
      REAL_RANGE?
)>

<!ELEMENT REAL_RANGE EMPTY>
<!ATTLIST REAL_RANGE MIN CDATA #REQUIRED>
<!ATTLIST REAL_RANGE MAX CDATA #REQUIRED>

<!ATTLIST REAL_TYPE CONSTANT_VALUE (#PCDATA)>
```

4.5.2.3 XML EXAMPLE

```
<REAL_TYPE>
<REAL_RANGE MIN="0.0" MAX="10.2"/>
</REAL_TYPE>

<REAL_TYPE CONSTANT_VALUE="3.14"/>
```

4.5.3 TEXT_TYPE,TEXT_SIZE,LANGUAGE

4.5.3.1 Overview

Attribute_Name : **TEXT_TYPE**

Attribute_Definition : Specifies the type of the data_entity values as TEXT

Attribute_Obligation : Conditional

Attribute_Maximum_Occurrence : 1

Attribute_Name : **TEXT_SIZE**

Attribute_Definition : The limitation on the size of the values of a TEXT data entity

Attribute_Obligation : Mandatory

Attribute_Maximum_Occurrence : 1

Attribute_Name : **LANGUAGE**

Attribute_Definition : Language used by the current data entity

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 1

4.5.3.2 DTD DEFINITION

```
<!ELEMENT TEXT_TYPE (
      TEXT_SIZE,
      LANGUAGE?
)>


<!ELEMENT TEXT_SIZE (#PCDATA)>
<!ATTLIST TEXT_SIZE MIN CDATA #IMPLIED>
<!ATTLIST TEXT_SIZE MAX CDATA #IMPLIED>


<!ELEMENT LANGUAGE EMPTY >
<!ATTLIST LANGUAGE IN_ENGLISH  CDATA    #REQUIRED>
<!ATTLIST LANGUAGE ISO_CODE CDATA #REQUIRED>
```

4.5.3.3 XML EXAMPLE

```
<TEXT_TYPE>
<TEXT_SIZE MIN="0" MAX="10"/>
<LANGUAGE ISO_CODE="fr" IN_ENGLISH="French"/>
```

```
</TEXT_TYPE>
```

4.5.4 ENUMERATED_TYPE, ENUMERATION_VALUE, ENUMERATION_MEANING, ENUMERATION_CONVENTION

4.5.4.1 Overview

Attribute_Name	: **ENUMERATED_TYPE**
Attribute_Definition	: Specifies the type of the data_entity values as ENUMERATED
Attribute_Obligation	: Conditional
Attribute_Maximum_Occurrence	: 1
Attribute_Name	: **ENUMERATION VALUE**
Attribute_Definition	: The set of permitted values of the enumerated data entity
Attribute_Obligation	: Mandatory
Attribute_Maximum_Occurrence	: 1
Attribute_Name	: **ENUMERATION_MEANING**
Attribute_Definition	: Enable to give a meaning to the enumeration VALUE
Attribute_Obligation	: Optional
Attribute_Maximum_Occurrence	: 1
Attribute_Name	: **ENUMERATION_CONVENTION**
Attribute_Definition	: Gives guidance on the correspondence between the enumeration VALUE and the numeric or textual values found within products
Attribute_Obligation	: Optional
Attribute_Maximum_Occurrence	: 1

4.5.4.2 DTD DEFINITION

```
<!ELEMENT ENUMERATED_TYPE (ENUMERATION)+ >
<!ELEMENT ENUMERATION (
    ENUMERATION_MEANING?,
    ENUMERATION_CONVENTION?
)>
<!ATTLIST ENUMERATION VALUE CDATA #REQUIRED>
<!ELEMENT ENUMERATION_MEANING (#PCDATA)>
<!ELEMENT ENUMERATION_CONVENTION (#PCDATA)>
```

4.5.4.3 XML EXAMPLE

```
<ENUMERATED_TYPE>
<ENUMERATION VALUE="BLUE">
   <ENUMERATION_MEANING>The BLUE color</ENUMERATION_MEANING>
   <ENUMERATION_CONVENTION>#0000CC</ENUMERATION_CONVENTION>
</ENUMERATION>
<ENUMERATION VALUE="RED">
   <ENUMERATION_MEANING>The RED color</ENUMERATION_MEANING>
   <ENUMERATION_CONVENTION>#FF3333</ENUMERATION_CONVENTION></ENUMERATION>
</ENUMERATED_TYPE>
```

4.5.5 COMPOSITE_TYPE,COMPONENT

4.5.5.1 Overview

Attribute_Name : **COMPOSITE_TYPE**

Attribute_Definition : Specifies the type of the data_entity values as COMPOSITE

Attribute_Obligation : Conditional

Attribute_Maximum_Occurrence : 1

Attribute_Name : **COMPONENT**

Attribute_Definition : Name of a component, followed by the number of times it occurs in the composite data entity. The number of times is specified by a range.

Attribute_Obligation : Optional

Attribute_Maximum_Occurrence : 'n'

4.5.5.2 DTD DEFINITION

```
<!ELEMENT COMPOSITE_TYPE (COMPONENT?)>

<!ELEMENT COMPONENT (#PCDATA)>
<!ATTLIST COMPONENT MIN CDATA "1">
<!ATTLIST COMPONENT MAX CDATA "1">
```

4.5.5.3 XML EXAMPLE

```
<COMPOSITE_TYPE>
<COMPONENT>HEADER</COMPONENT>
<COMPONENT>BODY</COMPONENT>
</COMPOSITE_TYPE>

An array of W_IMAGE_SIZE DATA_2_PIXELs:

<COMPOSITE_TYPE>
<COMPONENT MAX="W_IMAGE_SIZE">DATA_2_PIXEL</COMPONENT>
</COMPOSITE_TYPE>
```

4.6 USER_DEFINED_ATTRIBUTES_PART

NOTE – The user can freely add new attributes for the data entity description part. All of the user's defined attributes relative to the data entity must be grouped under the USER_DEFINED_ATTRIBUTES_PART element. In all cases, the original DEDSL DTD must be modified to add the new attributes, and each new attribute must have a definition in the USER_DEFINED_ATTRIBUTE_DEFINITION part of the DATA_ENTITY_DICTIONARY with the ATTRIBUTE_SCOPE set to DATA or ALL (see section 5 for details).

4.6.1 DTD DEFINITION

```
This line in the default DTD:

<!ELEMENT USER_DEFINED_ATTRIBUTES_PART EMPTY>

must be replaced by the following ones in order to have a validating DTD

<!ELEMENT USER_DEFINED_ATTRIBUTES_PART (DATA_FORTRAN_FORMAT)>
<!ELEMENT DATA_FORTRAN_FORMAT (#PCDATA)>
```

4.6.2 XML EXAMPLE

```
<USER_DEFINED_ATTRIBUTES_PART>
    <DATA_FORTRAN_FORMAT>I3</DATA_FORTRAN_FORMAT>
</USER_DEFINED_ATTRIBUTES_PART>
```

5 USER_DEFINED_ATTRIBUTE_DEFINITION

5.1 OVERVIEW

The following table provides the set of general descriptors that are defined by this Recommendation. The obligation column indicates whether a descriptor is mandatory (M), conditional (C), optional (O) or defaulted (D).

Descriptor of Attribute	Obligation	Occurrence
ATTRIBUTE_NAME	M	1
ATTRIBUTE_DEFINITION	M	1
ATTRIBUTE_OBLIGATION	M	1
ATTRIBUTE_CONDITION	C	1
ATTRIBUTE_MAXIMUM_OCCURRENCE	M	1
ATTRIBUTE_VALUE_TYPE	M	1
ATTRIBUTE_MAXIMUM_SIZE	O	1
ATTRIBUTE_ENUMERATION_VALUES	C	'n'
ATTRIBUTE_COMMENT	O	'n'
ATTRIBUTE_INHERITANCE	D	1
ATTRIBUTE_DEFAULT_VALUE	C	1
ATTRIBUTE_VALUE_EXAMPLE	O	1
ATTRIBUTE_SCOPE	D	1

DTD DEFINITION

```
<!ELEMENT USER_DEFINED_ATTRIBUTE_DEFINITION (
    ATTRIBUTE_NAME,
    ATTRIBUTE_DEFINITION,
    ATTRIBUTE_CONDITION?,
    ATTRIBUTE_MAXIMUM_OCCURRENCE,

    (ATTRIBUTE_INTEGER_TYPE | ATTRIBUTE_REAL_TYPE |
ATTRIBUTE_ENUMERATED_TYPE | ATTRIBUTE_IDENTIFIER_TYPE | ATTRIBUTE_TEXT_TYPE
| ATTRIBUTE_ENTITY_TYPE),

    ATTRIBUTE_COMMENT?,
    ATTRIBUTE_INHERITANCE?,
    ATTRIBUTE_DEFAULT_VALUE?,
    ATTRIBUTE_VALUE_EXAMPLE?
)>

<!ELEMENT ATTRIBUTE_NAME (#PCDATA)>
```

```
<!ATTLIST ATTRIBUTE_NAME OBLIGATION
(MANDATORY|CONDITIONAL|OPTIONAL|DEFAULTED) #REQUIRED>
<!ATTLIST ATTRIBUTE_NAME SCOPE (DATA|DICTIONARY|ALL) "DATA">

<!ELEMENT ATTRIBUTE_DEFINITION (#PCDATA)>
<!ELEMENT ATTRIBUTE_CONDITION (#PCDATA)>
<!ELEMENT ATTRIBUTE_MAXIMUM_OCCURRENCE (#PCDATA)>

<!ELEMENT ATTRIBUTE_INTEGER_TYPE EMPTY>
<!ELEMENT ATTRIBUTE_REAL_TYPE EMPTY>
<!ELEMENT ATTRIBUTE_IDENTIFIER_TYPE EMPTY>
<!ATTLIST ATTRIBUTE_IDENTIFIER_TYPE MAXIMUM_SIZE CDATA>

<!ELEMENT ATTRIBUTE_ENTITY_TYPE EMPTY>

<!ELEMENT ATTRIBUTE_TEXT_TYPE EMPTY>
<!ATTLIST ATTRIBUTE_TEXT_TYPE MAXIMUM_SIZE CDATA>

<!ELEMENT ATTRIBUTE_ENUMERATED_TYPE (ATTRIBUTE_ENUMERATION_VALUE+)>
<!ELEMENT ATTRIBUTE_ENUMERATION_VALUE (#PCDATA)>

<!ELEMENT ATTRIBUTE_COMMENT (#PCDATA)>

<!ELEMENT ATTRIBUTE_INHERITANCE EMPTY>
<!ATTLIST ATTRIBUTE_INHERITANCE OPTION (INHERITABLE|NOT_INHERITABLE)
"INHERITABLE">

<!ELEMENT ATTRIBUTE_DEFAULT_VALUE (#PCDATA)>

<!ELEMENT ATTRIBUTE_VALUE_EXAMPLE (#PCDATA)>
)>
```

5.2 ATTRIBUTE_NAME, OBLIGATION, SCOPE

5.2.1 OVERVIEW

ATTRIBUTE_NAME

Purpose Label assigned to a data entity attribute

Obligation This descriptor is mandatory.

Descriptor Type The value of this descriptor is of type **Identifier.**

The **attribute_name** shall be unique within a Data Entity Dictionary.

OBLIGATION

Purpose Descriptor indicating whether a data entity attribute shall always, or only sometimes, be present according to specified conditions

Obligation This descriptor is mandatory.

Descriptor Type This descriptor is of type **Enumerated** with four discrete values corresponding to the following cases:

- **Mandatory**: The data entity attribute shall always be present.
- **Conditional**: The data entity attribute shall be present if conditions specified by the descriptor **attribute_condition** occur for the same data entity attribute.
- **Optional**: The data entity attribute may be present or not.
- **Defaulted**: A data entity attribute that assumes a specified default value if it is omitted from a data entity description. The specified default value is provided by the **attribute_default_value** descriptor.

SCOPE

Purpose Descriptor specifying the category of entities in which the attribute may appear

Obligation This descriptor is defaulted.

Descriptor Type The value of this descriptor is of type **Enumerated** with three discrete values: **data**, **dictionary** and **all**.

- **Data**: means that the attribute may appear only as a data entity attribute.
- **Dictionary**: means that the attribute may appear only as a data entity dictionary attribute and is applicable to the entire collection of data entities in the dictionary.
- **All**: means that the attribute may appear as a data entity attribute as well as a data entity dictionary attribute, in which case the value in the data entity definition takes precedence.

5.2.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_NAME (#PCDATA)>
<!ATTLIST ATTRIBUTE_NAME OBLIGATION
(MANDATORY|CONDITIONAL|OPTIONAL|DEFAULTED) #REQUIRED>
<!ATTLIST ATTRIBUTE_NAME SCOPE (DATA|DICTIONARY|ALL) "DATA">
```

5.2.3 XML EXAMPLE

Define the dictionary attribute TREE optional:

```
<ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DICTIONARY">
TREE</ATTRIBUTE_NAME>
```

5.3 ATTRIBUTE_DEFINITION

5.3.1 OVERVIEW

Purpose The definition is required to give the description of the data entity attribute. This definition is intended for human readership and, therefore, any information that increases the understanding of the identified attribute should be included.

Obligation This descriptor is mandatory.

5.3.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_DEFINITION (#PCDATA)>
```

5.3.3 XML EXAMPLE

```
<ATTRIBUTE_DEFINITION>This is the picture of the TREE of the DATA
</ATTRIBUTE_DEFINITION>
```

5.4 ATTRIBUTE_CONDITION

5.4.1 OVERVIEW

Purpose Descriptor indicating the circumstances under which a data entity attribute shall be present

Obligation This descriptor is conditional.

It shall be present if the **attribute_obligation** descriptor of the same data entity attribute has the value **'conditional'**.

5.4.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_CONDITION (#PCDATA)>
```

5.4.3 XML EXAMPLE

```
<ATTRIBUTE_CONDITION>Attribute ORIGIN appears only for extra-terrestrial
data</ATTRIBUTE_CONDITION>
```

5.5 ATTRIBUTE_MAXIMUM_OCCURRENCE

5.5.1 OVERVIEW

Purpose Descriptor specifying the maximum number of instances which the data entity attribute may have in the specification of a data entity

Obligation This descriptor is mandatory.

Descriptor Type The value of this descriptor is of type **Integer,** or of type **Character** with the value of **'n'**. The character 'n' specifies that there is no upper limit on the number of times that the data entity attribute may occur.

5.5.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_MAXIMUM_OCCURRENCE (#PCDATA)>
```

5.5.3 XML EXAMPLE

```
<ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
```

5.6 ATTRIBUTE_INTEGER_TYPE

5.6.1 OVERVIEW

Purpose Descriptor specifying the attribute with the type INTEGER

Obligation This descriptor is optional.

5.6.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_INTEGER_TYPE EMPTY>
```

5.6.3 XML EXAMPLE

```
<ATTRIBUTE_INTEGER_TYPE/>
```

5.7 ATTRIBUTE_REAL_TYPE

5.7.1 OVERVIEW

Purpose Descriptor specifying the attribute with the type REAL

Obligation This descriptor is optional.

5.7.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_REAL_TYPE EMPTY>
```

5.7.3 XML EXAMPLE

```
<ATTRIBUTE_REAL_TYPE/>
```

5.8 ATTRIBUTE_IDENTIFIER_TYPE

5.8.1 OVERVIEW

ATTRIBUTE_IDENTIFIER_TYPE

Purpose Descriptor specifying the attribute with the type IDENTIFIER

Obligation This descriptor is optional.

MAX_SIZE

Purpose Descriptor specifying the maximum number of characters for representing the value of the attribute

Obligation This descriptor is conditional.

Descriptor Type The value of this descriptor is of type **Integer.**

5.8.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_IDENTIFIER_TYPE EMPTY>
<!ATTLIST ATTRIBUTE_IDENTIFIER_TYPE MAX_SIZE CDATA #IMPLIED>
```

5.8.3 XML EXAMPLE

```
<ATTRIBUTE_IDENTIFIER_TYPE MAX_SIZE="20"/>
```

5.9 ATTRIBUTE_TEXT_TYPE

5.9.1 OVERVIEW

ATTRIBUTE_TEXT_TYPE

Purpose Descriptor specifying the attribute with the type TEXT

Obligation This descriptor is optional.

MAX_SIZE

Purpose Descriptor specifying the maximum number of characters for representing the value of the attribute

Obligation This descriptor is conditional.

Descriptor Type The value of this descriptor is of type **Integer.**

5.9.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_TEXT_TYPE EMPTY>
<!ATTLIST ATTRIBUTE_TEXT_TYPE MAX_SIZE CDATA #IMPLIED>
```

5.9.3 XML EXAMPLE

```
<ATTRIBUTE_TEXT_TYPE MAX_SIZE="256"/>
```

5.10 ATTRIBUTE_ENUMERATED_TYPE, ATTRIBUTE_ENUMERATION_VALUE

5.10.1 OVERVIEW

ATTRIBUTE_ENUMERATED_TYPE

Purpose Descriptor specifying the attribute with the type ENUMERATED

Obligation This descriptor is optional.

ATTRIBUTE_ENUMERATION_VALUE

Purpose Descriptor specifying the distinct and discrete values of the attribute

Obligation This descriptor is conditional.

Descriptor Type The value of this descriptor is of type **Identifier**.

5.10.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_ENUMERATED_TYPE (ATTRIBUTE_ENUMERATION_VALUE+)>
<!ELEMENT ATTRIBUTE_ENUMERATION_VALUE (#PCDATA)>
```

5.10.3 XML EXAMPLE

For the declaration of an attribute BOOLEAN, there are 2 values:

```
<ATTRIBUTE_ENUMERATED_TYPE>
<ATTRIBUTE_ENUMERATION_VALUE>TRUE</ATTRIBUTE_ENUMERATION_VALUE>
<ATTRIBUTE_ENUMERATION_VALUE>FALSE</ATTRIBUTE_ENUMERATION_VALUE>
</ATTRIBUTE_ENUMERATED_TYPE>
```

5.11 ATTRIBUTE_ENTITY_TYPE

5.11.1 OVERVIEW

Purpose Descriptor specifying the attribute has the type of the entity being defined.

Obligation This descriptor is optional.

5.11.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_ENTITY_TYPE EMPTY>
```

5.11.3 XML EXAMPLE

```
<ATTRIBUTE_ENTITY_TYPE/>
```

5.12 ATTRIBUTE_COMMENT

5.12.1 OVERVIEW

Purpose Descriptor providing information which is not directly required to understand the meaning of the attribute, but which could still assist the user of the attribute in some manner. It may also contain examples.

Obligation This descriptor is optional.

5.12.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_COMMENT (#PCDATA)>
```

5.12.3 XML EXAMPLE

```
<ATTRIBUTE_COMMENT>The value is expressed as a path
name.</ATTRIBUTE_COMMENT>
```

5.13 ATTRIBUTE_INHERITANCE

5.13.1 OVERVIEW

Purpose Descriptor providing information about the inheritance rules for the attribute in a context of data entity modeling

Obligation This descriptor is defaulted.

Descriptor Type The value of this descriptor is of type **Enumerated** with two discrete values: **inheritable** and **not_inheritable**.

The context is as follows: a data entity description A inherits from another data entity description B. The following cases describe what may happen for the values of the attributes of A for the different possible values of attribute_inheritance for the attributes of B.

- When the value of an attribute of B cannot be inherited, the attribute may be defined locally in the description of A.

- When the value of an attribute of B can be inherited, the value of this attribute is the value of the corresponding attribute of A, to which specialization rules have been applied as mentioned in subsection 4.6.3 of reference [1].

5.13.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_INHERITANCE EMPTY>
<!ATTLIST ATTRIBUTE_INHERITANCE OPTION (INHERITABLE|NOT_INHERITABLE)
"INHERITABLE">
```

5.13.3 XML EXAMPLE

```
<ATTRIBUTE_INHERITANCE OPTION="INHERITABLE" />
```

5.14 ATTRIBUTE_DEFAULT_VALUE

5.14.1 OVERVIEW

Purpose Descriptor providing a default value for the attribute

Obligation This descriptor is conditional.

This descriptor must be present if and only if the current described data attribute has its **attribute_obligation** descriptor equal to ‘defaulted’.

Descriptor Type The format of this descriptor must conform to the type of the attribute that it illustrates.

5.14.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_DEFAULT_VALUE (#PCDATA)>
```

5.14.3 XML EXAMPLE

```
<ATTRIBUTE_DEFAULT_VALUE>FALSE</ATTRIBUTE_DEFAULT_VALUE>
```

5.15 ATTRIBUTE_VALUE_EXAMPLE

5.15.1 OVERVIEW

Purpose Descriptor providing examples for the value of the attribute.

Obligation This descriptor is optional.

5.15.2 DTD DEFINITION

```
<!ELEMENT ATTRIBUTE_VALUE_EXAMPLE (#PCDATA)>
```

5.15.3 XML EXAMPLE

```
<ATTRIBUTE_VALUE_EXAMPLE>examples for the ORIGIN attribute:
MARS,JUPITER,MOON… </ATTRIBUTE_VALUE_EXAMPLE>
```

6 DEDSL CONFORMANCE

NOTE – This DEDSL—XML/DTD Syntax specification is version 1.0 of the Recommendation and provides an XML/DTD implementation for the DEDSL—Abstract Syntax Recommendation (reference [1]). Note that this part of the specification does not specify how the attribute names and values are to be linked to any given physical occurrence of a data entity within a data product. This allows a variety of formatting approaches to be used for this linking.

6.1 CONFORMANCE LEVEL 1: NOTATION COMPLIANCE

Implementations which conform to all of sections 2, 3, 4 and 5 will be notation-compliant with this Recommendation.

6.2 CONFORMANCE LEVEL 2: INTEROPERABILITY COMPLIANCE

Implementations which conform to all of sections 2, 3, 4 and 5 and the interoperability constraints from the Abstract Specification will be interoperable-compliant with this Recommendation.

7 RESERVED KEYWORDS

The following reserved keywords are not available for use as declared elements or attributes.

ALIAS
ATTRIBUTE_COMMENT
ATTRIBUTE_CONDITION
ATTRIBUTE_DEFAULT_VALUE
ATTRIBUTE_DEFINITION
ATTRIBUTE_ENTITY_TYPE
ATTRIBUTE_ENUMERATED_TYPE
ATTRIBUTE_ENUMERATION_VALUE
ATTRIBUTE_IDENTIFIER_TYPE
ATTRIBUTE_INHERITANCE
ATTRIBUTE_INTEGER_TYPE
ATTRIBUTE_MAXIMUM_OCCURRENCE
ATTRIBUTE_NAME
ATTRIBUTE_REAL_TYPE
ATTRIBUTE_TEXT_TYPE
ATTRIBUTE_VALUE_EXAMPLE
CASE_SENSITIVITY
CLASS
COMMENT
COMPONENT
COMPOSITE_TYPE
DATA_ENTITY_DEFINITION
DATA_ENTITY_DICTIONARY
DEDSL_VERSION
DEFINITION
DEFINITIONAL_PART
DICTIONARY_DEFINITION
DICTIONARY_ID
DICTIONARY_IDENTIFICATION
DICTIONARY_IDENTIFIER
DICTIONARY_LANGUAGE
DICTIONARY_NAME
DICTIONARY_USER_DEFINED_ATTRIBUTES
DICTIONARY_VERSION
ENUMERATED_TYPE
ENUMERATION
ENUMERATION_CONVENTION
ENUMERATION_MEANING
EXTERNAL_DICTIONARY
EXTERNAL_DICTIONARY
EXTERNAL_DICTIONARY_REFERENCE
IN_ENGLISH

INHERITS_FROM
INTEGER_CONSTANT_VALUE
INTEGER_RANGE
INTEGER_TYPE
ISO_CODE
KEYWORD
LOCAL_NAME
MAX
MAXIMUM_SIZE
MIN
NAME
OBLIGATION
OPTION INHERITABLE
REAL_CONSTANT_VALUE
REAL_RANGE
REAL_TYPE
REGISTRATION_AUTHORITY
RELATION
RELATIONAL_PART
REPRESENTATIONAL_PART
SCOPE
SHORT_DEFINITION
SPECIFIC_INSTANCE
TEXT_SIZE
TEXT_TYPE
UNITS
USER_DEFINED_ATTRIBUTE_DEFINITION
USER_DEFINED_ATTRIBUTES_PART
VALUE
WITH

8 DTD

```
<?xml version="1.0" encoding="ISO-8859-1" ?>


<!-- CCSDS DEDSL - XML implementation -->
<!-- CCSDS 647.3-B-1  -->



<!-- ************************************ -->
<!--       DATA ENTITY DICTIONARY         -->
<!-- ************************************ -->



<!ELEMENT DATA_ENTITY_DICTIONARY  (
    DICTIONARY_IDENTIFICATION,
    (DATA_ENTITY_DEFINITION)+,
    USER_DEFINED_ATTRIBUTE_DEFINITION*
)>



<!ELEMENT DICTIONARY_IDENTIFICATION  (
    DICTIONARY_NAME,
    DICTIONARY_DEFINITION?,
    EXTERNAL_DICTIONARY_REFERENCE*,
    DICTIONARY_LANGUAGE,
    DICTIONARY_VERSION?,
    DICTIONARY_IDENTIFIER?,
    DEDSL_VERSION,
    DICTIONARY_USER_DEFINED_ATTRIBUTES?
)>


<!ELEMENT DICTIONARY_NAME  (#PCDATA)>
<!ATTLIST DICTIONARY_NAME CASE_SENSITIVITY
(CASE_SENSITIVE|NOT_CASE_SENSITIVE) "NOT_CASE_SENSITIVE">

<!ELEMENT DICTIONARY_DEFINITION  (#PCDATA)>

<!ELEMENT EXTERNAL_DICTIONARY_REFERENCE  (
    LOCAL_NAME,
    DICTIONARY_ID,
    REGISTRATION_AUTHORITY
)>

<!ELEMENT LOCAL_NAME  (#PCDATA)>
<!ELEMENT DICTIONARY_ID  (#PCDATA)>
<!ELEMENT REGISTRATION_AUTHORITY  (#PCDATA)>


<!ELEMENT DICTIONARY_LANGUAGE EMPTY>
<!ATTLIST DICTIONARY_LANGUAGE IN_ENGLISH CDATA    #REQUIRED>
<!ATTLIST DICTIONARY_LANGUAGE ISO_CODE  CDATA    #REQUIRED>

<!ELEMENT DICTIONARY_VERSION  (#PCDATA)>

<!ELEMENT DICTIONARY_IDENTIFIER  (#PCDATA)>
```

```
<!ELEMENT DEDSL_VERSION  (#PCDATA)>



<!-- *** DICTIONARY USER DEFINED ATTRIBUTES PART *** -->

<!-- User defined attributes relative to the dictionary -->
<!-- must be declared here (see section 3.10) !! -->
<!ELEMENT DICTIONARY_USER_DEFINED_ATTRIBUTES EMPTY>



<!-- ************************************ -->
<!--       DATA ENTITY DEFINITION         -->
<!-- ************************************ -->



<!ELEMENT DATA_ENTITY_DEFINITION (
    ALIAS*,
    DEFINITIONAL_PART,
    RELATIONAL_PART?,
    REPRESENTATIONAL_PART?,
    USER_DEFINED_ATTRIBUTES_PART?
)>
<!ATTLIST DATA_ENTITY_DEFINITION  NAME CDATA #REQUIRED>
<!ATTLIST DATA_ENTITY_DEFINITION  CLASS (MODEL|DATA_FIELD|CONSTANT)
"DATA_FIELD">


<!ELEMENT ALIAS (#PCDATA)>
<!ATTLIST ALIAS NAME CDATA #REQUIRED>



<!-- *** DEFINITIONAL PART *** -->



<!ELEMENT DEFINITIONAL_PART (
    DEFINITION,
    SHORT_DEFINITION?,
    COMMENT*,
    UNITS*,
    SPECIFIC_INSTANCE*
)>

<!ELEMENT DEFINITION (#PCDATA)>

<!ELEMENT SHORT_DEFINITION (#PCDATA)>

<!ELEMENT COMMENT (#PCDATA)>

<!ELEMENT UNITS (#PCDATA)>

<!ELEMENT SPECIFIC_INSTANCE (#PCDATA)>
<!ATTLIST SPECIFIC_INSTANCE VALUE CDATA #REQUIRED>
```

```
<!-- *** RELATIONAL PART *** -->


<!ELEMENT RELATIONAL_PART (
       INHERITS_FROM?,
       RELATION*,
       KEYWORD*
)>

<!ELEMENT INHERITS_FROM (#PCDATA)>
<!ATTLIST INHERITS_FROM EXTERNAL_DICTIONARY CDATA #IMPLIED>

<!ELEMENT RELATION (#PCDATA)>
<!ATTLIST RELATION WITH CDATA #REQUIRED>
<!ATTLIST RELATION EXTERNAL_DICTIONARY CDATA #IMPLIED>

<!ELEMENT KEYWORD (#PCDATA)>


<!-- *** REPRESENTATIONAL PART *** -->


<!ELEMENT REPRESENTATIONAL_PART (
INTEGER_TYPE | REAL_TYPE | TEXT_TYPE | ENUMERATED_TYPE | COMPOSITE_TYPE
)>


<!-- *** INTEGER TYPE *** -->

<!ELEMENT INTEGER_TYPE (
      (INTEGER_RANGE)?,
      (INTEGER_CONSTANT_VALUE)?
)>

<!ELEMENT INTEGER_RANGE EMPTY>
<!ATTLIST INTEGER_RANGE MIN CDATA #REQUIRED>
<!ATTLIST INTEGER_RANGE MAX CDATA #REQUIRED>

<!ELEMENT INTEGER_CONSTANT_VALUE (#PCDATA)>


<!-- *** REAL TYPE *** -->

<!ELEMENT REAL_TYPE (
      (REAL_RANGE)?,
      (REAL_CONSTANT_VALUE)?
)>

<!ELEMENT REAL_RANGE EMPTY>
<!ATTLIST REAL_RANGE MIN CDATA #REQUIRED>
<!ATTLIST REAL_RANGE MAX CDATA #REQUIRED>

<!ELEMENT REAL_CONSTANT_VALUE (#PCDATA)>
```

```
<!-- *** COMPOSITE TYPE *** -->

<!ELEMENT COMPOSITE_TYPE (COMPONENT+)>

<!ELEMENT COMPONENT (#PCDATA)>
<!ATTLIST COMPONENT MIN CDATA "1">
<!ATTLIST COMPONENT MAX CDATA "1">



<!-- *** TEXT TYPE *** -->

<!ELEMENT TEXT_TYPE (
      TEXT_SIZE?,
      LANGUAGE?
)>


<!ELEMENT TEXT_SIZE (#PCDATA)>
<!ATTLIST TEXT_SIZE MIN CDATA #IMPLIED>
<!ATTLIST TEXT_SIZE MAX CDATA #IMPLIED>


<!ELEMENT LANGUAGE EMPTY >
<!ATTLIST LANGUAGE IN_ENGLISH CDATA    #REQUIRED>
<!ATTLIST LANGUAGE ISO_CODE CDATA #REQUIRED>



<!-- *** ENUMERATION TYPE *** -->

<!ELEMENT ENUMERATED_TYPE (
      (ENUMERATION)+
)>

<!ELEMENT ENUMERATION (
     ENUMERATION_MEANING?,
     ENUMERATION_CONVENTION?
)>

<!ATTLIST ENUMERATION VALUE CDATA #REQUIRED>

<!ELEMENT ENUMERATION_MEANING (#PCDATA)>

<!ELEMENT ENUMERATION_CONVENTION (#PCDATA)>



<!-- *** USER DEFINED ATTRIBUTES PART *** -->

<!-- User defined attributes relative to data entity  -->
<!-- should be declared here (see section 4.5) !! -->
<!ELEMENT USER_DEFINED_ATTRIBUTES_PART EMPTY>



<!-- ************************************* -->
<!--     USER DEFINED ATTRIBUTE DEFINITION  -->
<!-- ************************************* -->
```

```
<!ELEMENT USER_DEFINED_ATTRIBUTE_DEFINITION (
    ATTRIBUTE_NAME,
    ATTRIBUTE_DEFINITION,
    ATTRIBUTE_CONDITION?,
    ATTRIBUTE_MAXIMUM_OCCURRENCE,

    (ATTRIBUTE_INTEGER_TYPE | ATTRIBUTE_REAL_TYPE |
ATTRIBUTE_ENUMERATED_TYPE | ATTRIBUTE_IDENTIFIER_TYPE | ATTRIBUTE_TEXT_TYPE
| ATTRIBUTE_ENTITY_TYPE),

    ATTRIBUTE_COMMENT?,
    ATTRIBUTE_INHERITANCE?,
    ATTRIBUTE_DEFAULT_VALUE?,
    ATTRIBUTE_VALUE_EXAMPLE?
)>

<!ELEMENT ATTRIBUTE_NAME (#PCDATA)>
<!ATTLIST ATTRIBUTE_NAME OBLIGATION
(MANDATORY|CONDITIONAL|OPTIONAL|DEFAULTED) #REQUIRED>
<!ATTLIST ATTRIBUTE_NAME SCOPE (DATA|DICTIONARY|ALL) "DATA">

<!ELEMENT ATTRIBUTE_DEFINITION (#PCDATA)>
<!ELEMENT ATTRIBUTE_CONDITION (#PCDATA)>
<!ELEMENT ATTRIBUTE_MAXIMUM_OCCURRENCE (#PCDATA)>

<!ELEMENT ATTRIBUTE_INTEGER_TYPE EMPTY>

<!ELEMENT ATTRIBUTE_REAL_TYPE EMPTY>

<!ELEMENT ATTRIBUTE_IDENTIFIER_TYPE EMPTY>
<!ATTLIST ATTRIBUTE_IDENTIFIER_TYPE MAXIMUM_SIZE CDATA #IMPLIED>

<!ELEMENT ATTRIBUTE_ENTITY_TYPE EMPTY>

<!ELEMENT ATTRIBUTE_TEXT_TYPE EMPTY>
<!ATTLIST ATTRIBUTE_TEXT_TYPE MAXIMUM_SIZE CDATA #IMPLIED>

<!ELEMENT ATTRIBUTE_ENUMERATED_TYPE (ATTRIBUTE_ENUMERATION_VALUE+)>
<!ELEMENT ATTRIBUTE_ENUMERATION_VALUE (#PCDATA)>

<!ELEMENT ATTRIBUTE_COMMENT (#PCDATA)>

<!ELEMENT ATTRIBUTE_INHERITANCE EMPTY>
<!ATTLIST ATTRIBUTE_INHERITANCE OPTION (INHERITABLE|NOT_INHERITABLE)
"INHERITABLE">

<!ELEMENT ATTRIBUTE_DEFAULT_VALUE (#PCDATA)>

<!ELEMENT ATTRIBUTE_VALUE_EXAMPLE (#PCDATA)>
```

ANNEX A

EXAMPLES

(This annex **is not** part of the Recommendation)

This annex presents a community DED, showing the semantic information relative to the data entities chosen as models, followed by the definition of a product DED, using this community DED for the definition of some of its data entities.

A1 COMMUNITY DED

```
      <DEFINITION></DEFINITION>
      <SHORT_DEFINITION>Latitude</SHORT_DEFINITION>
      <UNITS>deg</UNITS>
      <SPECIFIC_INSTANCE VALUE="+00.000">Equator</SPECIFIC_INSTANCE>
    </DEFINITIONAL_PART>
    <REPRESENTATIONAL_PART>
      <REAL_TYPE>
        <REAL_RANGE MAX="90.000" MIN="-90.000"/>
      </REAL_TYPE>
    </REPRESENTATIONAL_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="MODEL" NAME="LONGITUDE_MODEL">
    <ALIAS NAME="LON">Used by the historical projects EARTH_PLANET</ALIAS>
    <DEFINITIONAL_PART>
      <DEFINITION>Longitudes east of Greenwich shall be designated by the
use of the plus (+) sign, longitudes west of Greenwich shall be designated
by the use of the minus sign (-). The Prime Meridian  shall be designated
by the use of the plus sign (+ ). The 180th meridian shall be designated by
the use of the minus sign (-).</DEFINITION>
      <SHORT_DEFINITION>Longitude</SHORT_DEFINITION>
      <UNITS>deg</UNITS>
      <SPECIFIC_INSTANCE VALUE="-180.000">The 180th
Meridian</SPECIFIC_INSTANCE>
    </DEFINITIONAL_PART>
    <REPRESENTATIONAL_PART>
      <REAL_TYPE>
        <REAL_RANGE MAX="+180.000" MIN="-180.000"/>
      </REAL_TYPE>
    </REPRESENTATIONAL_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="MODEL" NAME="PRODUCT_ID_MODEL">
    <ALIAS NAME="PRODUCT_NAME">Used by the historical projects EARTH_PLANET
to identify their data products</ALIAS>
    <DEFINITIONAL_PART>
      <DEFINITION>The PRODUCT_ID represents a permanent unique identifier
assigned to a data product by its producer</DEFINITION>
      <SHORT_DEFINITION>Product Identification</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
    <REPRESENTATIONAL_PART>
      <TEXT_TYPE>
        <TEXT_SIZE MAX="40" MIN="0"/>
```

```
      </TEXT_TYPE>
    </REPRESENTATIONAL_PART>
  </DATA_ENTITY_DEFINITION>
</DATA_ENTITY_DICTIONARY>
```

A2 DATA ENTITY DICTIONARY ASSOCIATED WITH PRODUCT_X

The models of LATITUDE_MODEL, LONGITUDE_MODEL and PRODUCT_ID_MODEL match the data entities appearing within the data product PRODUCT_X and, therefore, they are referenced within the current DED.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!DOCTYPE DATA_ENTITY_DICTIONARY SYSTEM "file://localhost/D:/productXY.dtd"
>
<DATA_ENTITY_DICTIONARY>
  <!--Data Entity Dictionary attributes-->
  <DICTIONARY_IDENTIFICATION>
    <DICTIONARY_NAME
CASE_SENSITIVITY="NOT_CASE_SENSITIVE">PRODUCT_X_Dictionary</DICTIONARY_NAME
>
    <DICTIONARY_DEFINITION>
      <![CDATA[This dictionary contains the data entity definitions
relative to the data product PRODUCT_X]]>
    </DICTIONARY_DEFINITION>
    <EXTERNAL_DICTIONARY_REFERENCE>
      <LOCAL_NAME>Planetary_Science_Data_Dictionary</LOCAL_NAME>
      <DICTIONARY_ID>FCST0172</DICTIONARY_ID>

<REGISTRATION_AUTHORITY>CCSDS_Control_Authority</REGISTRATION_AUTHORITY>
    </EXTERNAL_DICTIONARY_REFERENCE>
    <DICTIONARY_LANGUAGE IN_ENGLISH="English" ISO_CODE="En"/>
    <DEDSL_VERSION>CCSDS647.3-B-1</DEDSL_VERSION>
  </DICTIONARY_IDENTIFICATION>
  <!--Dictionary entities-->
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="HEADER">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[It represents the header of the data product PRODUCT_X. It
identifies an agregation of values which are associated with an image
array.]]>
      </DEFINITION>
      <SHORT_DEFINITION>Image Header Values</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
    <REPRESENTATIONAL_PART>
      <COMPOSITE_TYPE>
        <COMPONENT>PRODUCT_ID_X</COMPONENT>
        <COMPONENT>ACQ_STATION</COMPONENT>
        <COMPONENT>ACQ_TIME</COMPONENT>
        <COMPONENT>CENTRE_COORD</COMPONENT>
      </COMPOSITE_TYPE>
    </REPRESENTATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>HEADER</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="PRODUCT_ID">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[It represents a permanent, unique identifier assigned to
the data product PRODUCT_X]]>
      </DEFINITION>
      <SHORT_DEFINITION>Product Identification</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
```

```
    <RELATIONAL_PART>
      <INHERITS_FROM>PRODUCT_ID_MODEL</INHERITS_FROM>
    </RELATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>PRODUCT_ID</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="ACQ_STATION">
    <ALIAS NAME="ACQUSTAT">Used in the header</ALIAS>
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[It includes the identifier of the station which has
acquired the data]]>
      </DEFINITION>
      <SHORT_DEFINITION>Identifier of the acquisition
station</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
    <REPRESENTATIONAL_PART>
      <ENUMERATED_TYPE>
        <ENUMERATION VALUE="AMERICA">
          <ENUMERATION_MEANING>station located in
America</ENUMERATION_MEANING>
        </ENUMERATION>
        <ENUMERATION VALUE="EUROPE">
          <ENUMERATION_MEANING>station located in
Europe</ENUMERATION_MEANING>
        </ENUMERATION>
        <ENUMERATION VALUE="ASIA">
          <ENUMERATION_MEANING>station located in
Asia</ENUMERATION_MEANING>
        </ENUMERATION>
      </ENUMERATED_TYPE>
    </REPRESENTATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>ACQ_STATION</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="ACQ_TIME">
    <ALIAS NAME="ACQUTIME">Used in the header</ALIAS>
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[It represents the date and time of the acquisition of the
data. Its format is the following one: YYYY-MM-DDThh:mm:ss.d_>Z. It
conforms to the CCSDS ISO rules for date/time definitions.
The acquisition time should correspond to the first scan line of the
data.]]>
      </DEFINITION>
      <SHORT_DEFINITION>Date/Time of the data
acquisition</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
    <REPRESENTATIONAL_PART>
      <TEXT_TYPE>
        <TEXT_SIZE MAX="40" MIN="0"/>
      </TEXT_TYPE>
    </REPRESENTATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>ACQ_TIME</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="CENTRE_COORD">
    <DEFINITIONAL_PART>
```

```
      <DEFINITION>
        <![CDATA[Its represents a coordinate centre]]>
      </DEFINITION>
      <SHORT_DEFINITION>Centre coordinates</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <KEYWORD>LATITUDE BY LONGITUDE COORDINATE CENTRE</KEYWORD>
    </RELATIONAL_PART>
    <REPRESENTATIONAL_PART>
      <COMPOSITE_TYPE>
        <COMPONENT>LATITUDE</COMPONENT>
        <COMPONENT>LONGITUDE</COMPONENT>
      </COMPOSITE_TYPE>
    </REPRESENTATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>CENTRE_COORD</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="LATITUDE">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[Its represents the latitude used for the center
coordinate]]>
      </DEFINITION>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <INHERITS_FROM>LATITUDE_MODEL</INHERITS_FROM>
    </RELATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>CENTRE_COORD.LATITUDE</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="LONGITUDE">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[Its represents the longitude used for the center
coordinate]]>
      </DEFINITION>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <INHERITS_FROM>LONGITUDE_MODEL</INHERITS_FROM>
    </RELATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>CENTRE_COORD.LONGITUDE</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="CONSTANT" NAME="W_IMAGE_SIZE">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[Its represnets the number of pixels for an image take from
spacecraft W]]>
      </DEFINITION>
      <SHORT_DEFINITION>Spacecraft W Image pixel</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <RELATION WITH="DATA_1">Number of pixels of a spacecraft W
image</RELATION>
    </RELATIONAL_PART>
    <REPRESENTATIONAL_PART>
      <INTEGER_TYPE>
        <INTEGER_CONSTANT_VALUE>1440000</INTEGER_CONSTANT_VALUE>
```

```
      </INTEGER_TYPE>
    </REPRESENTATIONAL_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="DATA_1">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[It represents an image taken from spacecraft W]]>
      </DEFINITION>
      <SHORT_DEFINITION>Spacecraft W Image</SHORT_DEFINITION>
      <COMMENT>
        <![CDATA[The image is an array of W_IMAGE_SIZE times called
DATA_1_PIXEL]]>
      </COMMENT>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <KEYWORD>IMAGE</KEYWORD>
    </RELATIONAL_PART>
    <REPRESENTATIONAL_PART>
      <COMPOSITE_TYPE>
        <COMPONENT MAX="W_IMAGE_SIZE" MIN="1">DATA_1_PIXEL</COMPONENT>
      </COMPOSITE_TYPE>
    </REPRESENTATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>DATA_1</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="DATA_1_PIXEL">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[It represents a pixel belonging to the image taken from
spacecraft W]]>
      </DEFINITION>
      <SHORT_DEFINITION>Spacecraft W Image pixel</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
    <REPRESENTATIONAL_PART>
      <INTEGER_TYPE>
        <INTEGER_RANGE MAX="255" MIN="0"/>
      </INTEGER_TYPE>
    </REPRESENTATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>DATA_1.DATA_1_PIXEL</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <USER_DEFINED_ATTRIBUTE_DEFINITION>
    <ATTRIBUTE_NAME OBLIGATION="CONDITIONAL"
SCOPE="DATA">FIELD_LOCATION</ATTRIBUTE_NAME>
    <ATTRIBUTE_DEFINITION>
      <![CDATA[Provides the location of the field within the data product.
It corresponds to the series of the names of the encapsulating composite
entities separated by a point and ending with the name of the field]]>
    </ATTRIBUTE_DEFINITION>
    <ATTRIBUTE_CONDITION>for data fields only</ATTRIBUTE_CONDITION>
    <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
    <ATTRIBUTE_TEXT_TYPE MAXIMUM_SIZE="1024"/>
    <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
    <ATTRIBUTE_VALUE_EXAMPLE>date.year</ATTRIBUTE_VALUE_EXAMPLE>
  </USER_DEFINED_ATTRIBUTE_DEFINITION>
</DATA_ENTITY_DICTIONARY>
```

A3 DATA ENTITY DICTIONARY ASSOCIATED WITH PRODUCT_Y

The models of LATITUDE_MODEL, LONGITUDE_MODEL and PRODUCT_ID_MODEL match the data entities appearing within the data product PRODUCT_Y and, therefore, they are referenced within the current DED.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!DOCTYPE DATA_ENTITY_DICTIONARY SYSTEM "file://localhost/D:/productXY.dtd"
>
<DATA_ENTITY_DICTIONARY>
  <!--Data Entity Dictionary attributes-->
  <DICTIONARY_IDENTIFICATION>
    <DICTIONARY_NAME>PRODUCT_Y_Dictionary</DICTIONARY_NAME>
    <DICTIONARY_DEFINITION>
      <![CDATA[This dictionary contains the data entity definitions
relative to the data product PRODUCT_Y]]>
    </DICTIONARY_DEFINITION>
    <EXTERNAL_DICTIONARY_REFERENCE>
      <LOCAL_NAME>Planetary_Science_Data_Dictionary</LOCAL_NAME>
      <DICTIONARY_ID>FCST0172</DICTIONARY_ID>

<REGISTRATION_AUTHORITY>CCSDS_Control_Authority</REGISTRATION_AUTHORITY>
    </EXTERNAL_DICTIONARY_REFERENCE>
    <DICTIONARY_LANGUAGE IN_ENGLISH="English" ISO_CODE="En"/>
    <DEDSL_VERSION>CCSDS647.3-B-1</DEDSL_VERSION>
  </DICTIONARY_IDENTIFICATION>
  <!--Dictionary entities-->
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="PRODUCT_ID">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[It represents a permanent, unique identifier assigned to
the data product PRODUCT_Y]]>
      </DEFINITION>
      <SHORT_DEFINITION>Product Identification</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <INHERITS_FROM>PRODUCT_ID_MODEL</INHERITS_FROM>
    </RELATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>PRODUCT_ID</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="LATITUDE">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[Its represents the latitude used for the center
coordinate]]>
      </DEFINITION>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <INHERITS_FROM>LATITUDE_MODEL</INHERITS_FROM>
    </RELATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>CENTRE_COORD.LATITUDE</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="LONGITUDE">
    <DEFINITIONAL_PART>
```

```
      <DEFINITION>
        <![CDATA[Its represents the longitude used for the center
coordinate]]>
      </DEFINITION>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <INHERITS_FROM>LONGITUDE_MODEL</INHERITS_FROM>
    </RELATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>CENTRE_COORD.LONGITUDE</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="CONSTANT" NAME="W_IMAGE_SIZE">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[Its represnets the number of pixels for an image take from
spacecraft W]]>
      </DEFINITION>
      <SHORT_DEFINITION>Spacecraft W Image pixel</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <RELATION WITH="DATA_1">Number of pixels of a spacecraft W
image</RELATION>
    </RELATIONAL_PART>
    <REPRESENTATIONAL_PART>
      <INTEGER_TYPE>
        <INTEGER_CONSTANT_VALUE>1440000</INTEGER_CONSTANT_VALUE>
      </INTEGER_TYPE>
    </REPRESENTATIONAL_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="DATA_2">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[It represents an image taken from spacecraft W]]>
      </DEFINITION>
      <SHORT_DEFINITION>Spacecraft W Image</SHORT_DEFINITION>
      <COMMENT>
        <![CDATA[The image is an array of W_IMAGE_SIZE items called
DATA_2_PIXEL]]>
      </COMMENT>
    </DEFINITIONAL_PART>
    <RELATIONAL_PART>
      <KEYWORD>IMAGE</KEYWORD>
    </RELATIONAL_PART>
    <REPRESENTATIONAL_PART>
      <COMPOSITE_TYPE>
        <COMPONENT MAX="W_IMAGE_SIZE" MIN="1">DATA_2_PIXEL</COMPONENT>
      </COMPOSITE_TYPE>
    </REPRESENTATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>DATA_2</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="DATA_2_PIXEL">
    <DEFINITIONAL_PART>
      <DEFINITION>
        <![CDATA[It represents a pixel belonging to the image taken from
spacecraft W]]>
      </DEFINITION>
      <SHORT_DEFINITION>Spacecraft W Image pixel</SHORT_DEFINITION>
    </DEFINITIONAL_PART>
```

```
    <REPRESENTATIONAL_PART>
      <INTEGER_TYPE>
        <INTEGER_RANGE MAX="255" MIN="0"/>
      </INTEGER_TYPE>
    </REPRESENTATIONAL_PART>
    <USER_DEFINED_ATTRIBUTES_PART>
      <FIELD_LOCATION>DATA_2.DATA_2_PIXEL</FIELD_LOCATION>
    </USER_DEFINED_ATTRIBUTES_PART>
  </DATA_ENTITY_DEFINITION>
  <USER_DEFINED_ATTRIBUTE_DEFINITION>
    <ATTRIBUTE_NAME OBLIGATION="CONDITIONAL"
SCOPE="DATA">FIELD_LOCATION</ATTRIBUTE_NAME>
    <ATTRIBUTE_DEFINITION>
      <![CDATA[Provides the location of the field within the data product.
It corresponds to the series of the names of the encapsulating composite
entities separated by a point and ending with the name of the field]]>
    </ATTRIBUTE_DEFINITION>
    <ATTRIBUTE_CONDITION>for data fields only</ATTRIBUTE_CONDITION>
    <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
    <ATTRIBUTE_TEXT_TYPE MAXIMUM_SIZE="1024"/>
    <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
    <ATTRIBUTE_VALUE_EXAMPLE>date.year</ATTRIBUTE_VALUE_EXAMPLE>
  </USER_DEFINED_ATTRIBUTE_DEFINITION>
</DATA_ENTITY_DICTIONARY>
```

ANNEX B

INFORMATIVE REFERENCES

(This annex **is not** part of the Recommendation)

This annex provides a list of references that may be valuable to the user of this Recommendation as background material, or to provide implementation guidelines for using this Recommendation.

[B1] *Procedures Manual for the Consultative Committee for Space Data Systems*. CCSDS A00.0-Y-7. Yellow Book. Issue 7. Washington, D.C.: CCSDS, November 1996.

[B2] *Standard Formatted Data Units—A Tutorial*. Report Concerning Space Data System Standards, CCSDS 621.0-G-1. Green Book. Issue 1. Washington, D.C.: CCSDS, May 1992.

[B3] *Parameter Value Language—A Tutorial*. Report Concerning Space Data System Standards, CCSDS 641.0-G-2. Green Book. Issue 2. Washington, D.C.: CCSDS, June 2000.

[B4] *Standard Formatted Data Units—Control Authority Procedures Tutorial*. Report Concerning Space Data System Standards, CCSDS 631.0-G-2. Green Book. Issue 2. Washington, D.C.: CCSDS, November 1994.

[B5] *UNIDATA Units Package.* NCAR, Version 1.11.5, 18 August 1997.

[B6] *Time Code Formats*. Recommendation for Space Data Systems Standards, CCSDS 301.0-B-2. Blue Book. Issue 2. Washington, D.C.: CCSDS, April 1990.

[B7] *Information Technology—Open Systems Interconnection—Specification of Abstract Syntax Notation One (ASN.1)*. International Standard, ISO/IEC 8824:1990. 2nd ed. Geneva: ISO, 1990.