

**Research and Development for
Space Data System Standards**

**DATA ENTITY DICTIONARY
SPECIFICATION
LANGUAGE (DEDSL)—
XML/XSD SYNTAX**

EXPERIMENTAL SPECIFICATION

CCSDS 647.4-O-1

ORANGE BOOK

May 2018

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PREFACE

This document is a CCSDS Experimental Specification. Its Experimental status indicates that it is part of a research or development effort based on prospective requirements, and as such it is not considered a Standards Track document. Experimental Specifications are intended to demonstrate technical feasibility in anticipation of a ‘hard’ requirement that has not yet emerged. Experimental work may be rapidly transferred onto the Standards Track should a hard requirement emerge in the future.

DOCUMENT CONTROL

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

The Abstract Syntax of the Data Entity Dictionary Specification Language (DEDSL) is a Recommended Standard provided in reference [1] for the construction and interchange of data entity dictionaries. The Recommended Standard defines all the concepts that may be used consistently in the definition of data entity dictionaries.

Two recommended standards have been defined in the past, by the CCSDS: a Data Entity Specification Language using PVL syntax (see reference [9]) and a Data Entity Specification Language using XML/DTD syntax (see reference [8]).

XML Schema (XSD) is more widely used and above all more precise than DTD.

All the options of the Abstract Syntax have been addressed in this Experimental Specification.

The purpose of this Experimental Specification is therefore to provide a new implementation of the Abstract Syntax of the Data Entity Dictionary Specification Language (DEDSL) (reference [1]), using the XML Schema Definition (reference [2]) for the construction and interchange of data entity dictionaries, while being fully compatible with the previous implementation in XML (reference [8]).

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

1.2 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 reference [7]); and
- the exchange of data entity dictionary information using general data packaging techniques such as the CCSDS/XML Standard Formatted Data Unit (XFDU) (see reference [5]).

1.3 APPLICABILITY

This specification 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 specification 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 specification 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.

1.4 DOCUMENT STRUCTURE

This document presents in a layered manner the XML/XSD implementation as a ‘dedsl.xsd’ schema of the DEDSL Abstract Syntax. XML/XSD stands for XML implementation specified by the formal language XSD. The reader should be familiar with both the DEDSL Abstract Syntax (reference [1]) and the XML/XSD Recommendation (references [2], [3], and [4]) in order to fully understand this document.

In summary, the document is structured as follows:

- Section 2 presents a brief overview of the subject matter of this Experimental Specification.
- Section 3 introduces the use of XML/XSD as implementation language of the DEDSL.
- Section 4 specifies the exact XML/XSD syntax for each DEDSL dictionary attribute and how to define a data entity dictionary in XML/XSD.
- Section 5 specifies the exact XML/XSD syntax for each DEDSL data entity attribute and how to define a data entity in XML/XSD.
- Section 6 specifies the exact XML/XSD syntax for each DEDSL descriptor and how to define user-defined attribute in XML/XSD, for backward compatibility with the DEDSL XML/DTD implementation.

- Section 7 discusses the levels of conformance to the DEDSL Abstract Specification and the XML/XSD implementation, and the CCSDS Control Authority registration of this specification.
- Section 8 provides the complete XML/XSD implementation.
- Annex A presents security, SANA, and patent considerations.
- Annex B provides simple XML implementation examples.
- Annex C provides concrete examples of user-defined attributes.
- Annex D provides concrete examples of a community DED and two product DED.
- Annex E discusses implementation availability.
- Annex F provides a list of abbreviations used in this document.

1.5 DEFINITIONS

For the purposes of this document, the following definitions apply. Detailed definitions can be found in reference [1].

attribute: A piece of information that describes a data entity or Dictionary Entity.

attribute descriptor: A piece of information that describes an attribute.

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.

data entity: A concept that can 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 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.

Enumerated: A set containing a restricted number of discrete values, where each discrete value is named and unique within the set.

Identifier: An XML string, that designates something.

Integer: The set of integer values, optionally more precisely defined by a range (minimum and maximum bounds).

Model: A data entity corresponding to a reusable data entity definition, from which other data entities may inherit the attributes.

Real: The set of real values optionally more precisely defined by a range (minimum and maximum bounds).

semantics: Information that defines the meaning of data, such as the units of one data entity.

Standard Attribute: One of the attributes defined within the DEDSL Abstract Syntax Recommended Standard (reference [1]).

Syntax: Information defining the physical representation of data.

Text: A sequence of characters.

User Defined Attribute: An attribute that is defined by a particular user or project and then can be used in the same manner as a Standard Attribute within that Data Entity Dictionary.

1.6 NOMENCLATURE

1.6.1 NORMATIVE TEXT

The following conventions apply for the normative specifications in this Recommended Standard:

- a) the words ‘shall’ and ‘must’ imply a 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.

NOTE – These conventions do not imply constraints on diction in text that is clearly informative in nature.

1.6.2 INFORMATIVE TEXT

In the normative sections of this document, informative text is set off from the normative specifications either in notes or under one of the following subsection headings:

- Overview;
- Background;
- Rationale;
- Discussion.

1.7 CONVENTIONS

While the document is written in ‘Times New Roman’ 12 points, the XML elements are written in ‘Arial’ 10 points.

1.8 REFERENCES

The following publications contain provisions which, through reference in this text, constitute provisions of this document. At the time of publication, the editions indicated were valid. All publications are subject to revision, and users of this specification are encouraged to investigate the possibility of applying the most recent editions of the publications indicated below. The CCSDS Secretariat maintains a register of currently valid CCSDS publications.

- [1] *Data Entity Dictionary Specification Language (DEDSL)—Abstract Syntax (CCSD0011)*. Issue 1. Recommendation for Space Data System Standards (Blue Book), CCSDS 647.1-B-1. Washington, D.C.: CCSDS, June 2001.
- [2] Tim Bray, et al., eds. *Extensible Markup Language (XML) 1.0*. 5th ed. W3C Recommendation. N.p.: W3C, 26 November 2008.
- [3] Shudi (Sandy) Gao, C. M. Sperberg-McQueen, and Henry S. Thompson, eds. *W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures*. Version 1.1. W3C Recommendation. N.p.: W3C, 5 April 2012.
- [4] David Peterson, et al., eds. *W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes*. Version 1.1. W3C Recommendation. N.p.: W3C, 5 April 2012.
- [5] *XML Formatted Data Unit (XFDU) Structure and Construction Rules*. Issue 1. Recommendation for Space Data System Standards (Blue Book), CCSDS 661.0-B-1. Washington, D.C.: CCSDS, September 2008.

- [6] *ASCII Encoded English (CCSD0002)*. Issue 1. Recommendation for Space Data System Standards (Blue Book), CCSDS 643.0-B-1. Washington, D.C.: CCSDS, November 1992.
- [7] *Standard Formatted Data Units—Control Authority Procedures*. Issue 1. Recommendation for Space Data System Standards (Blue Book), CCSDS 630.0-B-1. Washington, D.C.: CCSDS, June 1993.
- [8] *Data Entity Dictionary Specification Language (DEDSL)—XML/DTD Syntax (CCSD0013)*. Issue 1. Recommendation for Space Data System Standards (Blue Book), CCSDS 647.3-B-1. Washington, D.C.: CCSDS, January 2002.
- [9] *Data Entity Dictionary Specification Language (DEDSL)—PVL Syntax (CCSD0012)*. Issue 1. Recommendation for Space Data System Standards (Blue Book), CCSDS 647.2-B-1. Washington, D.C.: CCSDS, June 2001.

2 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 (see references [2], [3], and [4]).

XML is designed to support the conveyance of named values and is therefore suitable for implementation of the abstract standard. This specification bases its implementation on XML Schema Definition while being compatible with the XML/DTD Syntax (CCSD0013).

The following subsections specify the XML/XSD implementation in the following order:

- Subsection 3.1 defines the general mapping of DEDSL Abstract Syntax concepts and elements to XML constructs, and it includes restrictions related to the XML/XSD implementation.
- Subsection 3.2 provides the structure of a complete Data Entity Dictionary using XML. It is implemented as a single XML file compliant with a XSD and is therefore separate from any data which it describes.

Not all characteristics provided in DEDSL Abstract Syntax (reference [1]) are addressed in the following sections.

3 DEDSL IMPLEMENTATION USING XML SCHEMA DEFINITION

3.1 GENERAL DEDSL ABSTRACT SYNTAX TO XML/XSD MAPPINGS

3.1.1 GENERAL

The following mapping rules apply.

The **'dedsl.xsd'** schema contains the different XML Schema Definitions implementing the DEDSL Abstract Syntax. However, users can freely add new attributes for the dictionary or data entity description part according to the needs of the projects and communities. Consequently, in order to benefit from XSD syntactic validation, the user-defined attributes can be defined within the **'dedsl.xsd'** schema starting from a specific part and in accordance with rules specified later on in the document.

User-defined attributes must not be named as standard attributes.

3.1.2 TOP-LEVEL SCHEMA ELEMENT OF THE 'DEDSL.XSD'

The top-level schema element contains the following information:

- it is an XML Schema compliant with the definition of XML Schema 2001;
- it has an XML Namespace made up of:
 - a namespace prefix set to 'dedsl',
 - a namespace URI compliant with CCSDS URN namespace policy: = 'urn:ccsds:schema:dedsl:1';
- it has its 'elementFormDefault' attribute set to 'qualified' so that the specific DEDSL types are pointed out;
- it has its 'attributeFormDefault' attribute set to 'unqualified' for backward compatibility with dictionary definitions compliant with DEDSL XML/DTD implementation.

Example:

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:dedsl="urn:ccsds:schema:dedsl:1"
  targetNamespace="urn:ccsds:schema:dedsl:1"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified">
```

3.1.3 TOP-LEVEL SCHEMA ELEMENT OF A DICTIONARY DEDSL XML/XSD DESCRIPTION

The top-level schema element of a DEDSL instance contains the following information:

The same XML namespace as the dedsl.xsd namespace with an empty prefix for backward compatibility.

Example:

```
<DATA_ENTITY_DICTIONARY xmlns:"urn:ccsds:schema:dedsl:1">
  <!--dictionary description to be completed -->
</DATA_ENTITY_DICTIONARY>
```

A DEDSL instance does not contain the reference to the schema which is mentioned in the DEDSL attribute <DEDSL_VERSION> at dictionary level.

3.1.4 DESCRIPTOR NAMES AND ATTRIBUTE NAMES

The descriptor names and attribute names are implemented as XML/XSD elements and attributes and are normally case-sensitive. On that point, descriptor names and attribute names are not compliant with the Abstract Syntax (reference [1]). Therefore these names consist of a sequence of XML/XSD unrestricted characters (see section 5 of reference [1] for further restrictions) and are identical to the descriptor and attribute names defined in the XML/DTD Syntax (reference [8]) for backward compatibility. Consequently, they do not follow the recommended XML Style Guide.

3.1.5 DESCRIPTOR VALUES AND ATTRIBUTE VALUES

The descriptor values and attribute values are implemented as XSD Elements (xsd:element) or Attributes (xsd:attribute) and are identical to the descriptor and attribute names defined in the XML/DTD Syntax (reference [8]) for backward compatibility. Consequently, they do not follow the recommended XML Style Guide.

3.1.6 DEDSL TYPES/XSD TYPES MAPPING

Table 3-1: DEDSL Types/XSD Types Mapping

DEDSL Types	XML/XSD Types
Integer	<xsd:int>, <xsd:unsignedInt>, <xsd:long> according to the nature of the integer (unsigned or not) and the sizes in bits
Real	<xsd:double>
Identifier	<xsd:string> with a pattern: [a-zA-Z]([a-zA-Z0-9_])*[:]?([a-zA-Z0-9_])* Length constraints are specified according to the Identifier context.
Text	<xsd:string> with its <xsd:minLength> and its <xsd:maxLength> set to values. Specific characters such as ‘&’ and ‘<’ must be replaced by their equivalent ‘&’ and ‘<’.
Enumerated	A restriction of <xsd:string> with a list of <xsd:enumeration> corresponding to the different enumeration values.
ENTITY_TYPE	There is no XML Type equivalent to Entity_Type, which refers to the data type of the entity. Therefore it has been replaced by the following xsd types: xsd:double, xsd:long or xsd:string. Composite are not handled.
List consisting of a number of elements (mandatory or optional)	<xsd:sequence> with for each optional or repeated element the attributes minOccurs and/or maxOccurs set to values.
List of a repeated element	<xsd:element> with minOccurs set to 1 (0 if empty list is allowed) and maxOccurs set to unbounded (or set to the number of elements if the number is known).
Non-exclusive Choice between different elements	<xsd:sequence> with optional or required elements.
Exclusive Choice between different elements	<xsd:choice> If there can be no element, minOccurs set to 0 at choice level.
Multiple DEDSL constructs may be implemented in a single XML construct.	For example, ‘name, class and definition’ are all part of the XML element DATA_ENTITY_DEFINITION. Some become attributes of others.
Optional element	minOccurs = 0

3.2 COMPLETE DEDSL DEFINITION OF A DATA ENTITY DICTIONARY

3.2.1 OVERVIEW

The structure of a complete Data Entity Dictionary using XML/XSD is bounded by an aggregation `<xsd:element>` named '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).

Table 3-2: Data Entity Dictionary Structure

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

3.2.2 XML SCHEMA DEFINITION

```
<xsd:element name="DATA_ENTITY_DICTIONARY"
type="dedsl:A_DATA_ENTITY_DICTIONARY">
  <xsd:annotation>
    <xsd:documentation>The DEDSL Data Entity Dictionary
    </xsd:documentation>
  </xsd:annotation>
  <xsd:key name="dataEntityNameKey">
    <xsd:annotation>
      <xsd:documentation>This key ensures a unique data entity name within the current
      dictionary being defined.</xsd:documentation>
    </xsd:annotation>
    <xsd:selector xpath="dedsl:DATA_ENTITY_DEFINITION"/>
    <xsd:field xpath="@NAME"/>
  </xsd:key>
</xsd:element>
```

With its type defined as:

```
<xsd:complexType name="A_DATA_ENTITY_DICTIONARY">
  <xsd:sequence>
    <xsd:element name="DICTIONARY_IDENTIFICATION"
      type="dedsl:A_DICTIONARY_IDENTIFICATION"/>
    <xsd:element name="DATA_ENTITY_DEFINITION"
      type="dedsl:A_DATA_ENTITY_DEFINITION" maxOccurs="unbounded"/>
    <xsd:annotation>
      <xsd:documentation>Collection of data entities making up the dictionary
      </xsd:documentation>
    </xsd:annotation>
  </xsd:sequence>
  <xsd:element name="USER_DEFINED_ATTRIBUTE_DEFINITION"
```

```

    type="dedsl:AN_USER_DEFINED_ATTRIBUTE_DEFINITION" minOccurs="0"
      maxOccurs="unbounded">
    <xsd:annotation>
    <xsd:documentation>Set of definitions of user-defined attributes: kept for backward
    compatibility with CCSDS DEDSL/XML(DTD)</xsd:documentation>
    </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>

```

3.2.3 XML EXAMPLE

```

<DATA_ENTITY_DICTIONARY>
  <DICTIONARY_IDENTIFICATION> (see sections 4 and 6)
  </DICTIONARY_IDENTIFICATION>
  <DATA_ENTITY_DEFINITION> (see sections 5 and 6) </DATA_ENTITY_DEFINITION>
  <DATA_ENTITY_DEFINITION> (see sections 5 and 6) </DATA_ENTITY_DEFINITION>
  <USER_DEFINED_ATTRIBUTE_DEFINITION> (see section 6)
  </USER_DEFINED_ATTRIBUTE_DEFINITION>
</DATA_ENTITY_DICTIONARY>

```

4 DICTIONARY_IDENTIFICATION

4.1 OVERVIEW

This section implements the DEDSL Abstract Syntax concepts presented in subsection 4.3 of reference [1]).

4.2 GENERAL

The Dictionary Identification Structure standard attributes for each category for data entities shall be those defined in table 4-1. 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.

Table 4-1: Dictionary Identification Structure

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

NOTES

- 1 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 XSD below.

Here is an example: `<?xml version="1.0" encoding="UTF-8"?>`

- 2 The DICTIONARY_LANGUAGE attribute is named according to reference [8].

XML SCHEMA DEFINITION

```

<xsd:complexType name="A_DICTIONARY_IDENTIFICATION">
  <xsd:annotation>
    <xsd:documentation>Set of DEDSL standard attributes characterizing the current dictionary
with identifying, definitional, relational, representational and administrative information with additional
user-defined attributes if necessary</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="DICTIONARY_NAME" type="dedsl:A_DICTIONARY_NAME"/>
    <xsd:element name="DICTIONARY_DEFINITION"
      type="dedsl:A_DICTIONARY_DEFINITION" minOccurs="0"/>
    <xsd:element name="EXTERNAL_DICTIONARY_REFERENCE"
      type="dedsl:AN_EXTERNAL_DICTIONARY_REFERENCE" minOccurs="0"
      maxOccurs="unbounded"/>
    <xsd:element name="DICTIONARY_LANGUAGE"
      type="dedsl:A_DICTIONARY_LANGUAGE"/>
    <xsd:element name="DICTIONARY_VERSION"
      type="dedsl:A_DICTIONARY_VERSION" minOccurs="0"/>
    <xsd:element name="DICTIONARY_IDENTIFIER" type="dedsl:A_DICTIONARY_ID"
      minOccurs="0"/>
    <xsd:element name="DEDSL_VERSION" type="dedsl:A_DEDSL_VERSION"/>
  </xsd:sequence>
  <!-- *****-->
  <!-- Replace here the definition with the expected user-defined dictionary attributes -->
  <!-- *****-->
  <xsd:element name="DICTIONARY_USER_DEFINED_ATTRIBUTES"
    type="dedsl:any" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>

```


4.3 DICTIONARY_NAME, CASE_SENSITIVITY

4.3.1 GENERAL

Dictionary_Name implementation is combined with Case_Sensitivity implementation, Case_Sensitivity being an XML attribute of the Dictionary_Name XML element.

Attribute_name	:	DICTIONARY_NAME
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. Its default value is NOT_CASE_SENSITIVE.
Attribute_Obligation	:	Defaulted
Attribute_Maximum_Occurrence	:	1
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

4.3.2 XML SCHEMA DEFINITION

```
<xsd:element name="DICTIONARY_NAME" type="dedsl:A_DICTIONARY_NAME"/>
```

With its type defined as:

```
<xsd:complexType name="A_DICTIONARY_NAME">
  <xsd:annotation>
    <xsd:documentation>Human readable name for the Data Entity
Dictionary</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:A_DICTIONARY_IDENTIFIER">
      <xsd:attribute name="CASE_SENSITIVITY"
type="dedsl:A_CASE_SENSITIVITY" default="NOT_CASE_SENSITIVE"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="A_CASE_SENSITIVITY">
  <xsd:annotation>
    <xsd:documentation>Specifies the case sensitivity for the Identifiers used as values
```

```

for the attributes.</xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string">
  <xsd:enumeration value="CASE_SENSITIVE"/>
  <xsd:enumeration value="NOT_CASE_SENSITIVE"/>
</xsd:restriction>
</xsd:simpleType>

```

Used common definitions:

```

<xsd:simpleType name="A_DICTIONARY_IDENTIFIER">
  <xsd:annotation>
    <xsd:documentation>Identifier of a dictionary with length constraints</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="dedsl:AN_IDENTIFIER">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="400"/>
  </xsd:restriction>
</xsd:simpleType>

```

```

<xsd:simpleType name="AN_IDENTIFIER">
  <xsd:annotation>
    <xsd:documentation>A sequence of characters that designates something without any white
spaces (e.g., one or more space characters, carriage returns, line feeds, form feeds or
tabs).</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[a-zA-Z]([a-zA-Z0-9_])*[:]?([a-zA-Z0-9_])*"/>
  </xsd:restriction>
</xsd:simpleType>

```

4.3.3 XML EXAMPLE

```

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

```

NOTE –

```

<DICTIONARY_NAME>Planetary_Science_Data_Dictionary</DICTIONARY_NAME>

```

is also legal and equivalent to the previous declaration.

4.4 DICTIONARY_DEFINITION

4.4.1 GENERAL

Attribute_Definition	:	Human readable definition for the Data Entity Dictionary
Attribute_Obligation	:	Optional
Attribute_Maximum_Occurrence	:	1
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

4.4.2 XML SCHEMA DEFINITION

```
<xsd:element name="DICTIONARY_DEFINITION" type="dedsl:A_DICTIONARY_DEFINITION"
minOccurs="0"/>
```

With its type defined as:

```
<xsd:simpleType name="A_DICTIONARY_DEFINITION">
  <xsd:annotation>
    <xsd:documentation>Human readable definition for the Data Entity Dictionary with length
constraints</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>
```

4.4.3 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>
```

4.5 EXTERNAL_DICTIONARY_REFERENCE

4.5.1 GENERAL

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'
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

Since the publication of the DEDSL Abstract Syntax, DEDSL dictionaries are not all managed at CCSDS Control Authority level. (See also INHERITS_FROM attribute.) Therefore the DICTONARY_ID and the REGISTRATION_AUTHORITY have become optional.

4.5.2 XML SCHEMA DEFINITION

```
<xsd:element name="EXTERNAL_DICTIONARY_REFERENCE"
  type="dedsl:AN_EXTERNAL_DICTIONARY_REFERENCE"
  minOccurs="0" maxOccurs="unbounded"/>
```

With its type defined as:

```
<xsd:complexType name="AN_EXTERNAL_DICTIONARY_REFERENCE">
  <xsd:annotation>
    <xsd:documentation>A reference to another Data Entity Dictionary whose models are reused
    in the current one.</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="LOCAL_NAME" type="dedsl:A_DICTIONARY_LOCAL_NAME"/>
    <xsd:element name="DICTIONARY_ID" type="dedsl:A_DICTIONARY_ID" minOccurs="0"/>
    <xsd:element name="REGISTRATION_AUTHORITY"
      type="dedsl:A_REGISTRATION_AUTHORITY" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>
```

Used common definitions:

```
<xsd:simpleType name="A_DICTIONARY_LOCAL_NAME">
  <xsd:annotation>
    <xsd:documentation>The local name to use to refer to the referenced external Data Entity
    Dictionary - unique within this dictionary.</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="dedsl:AN_IDENTIFIER">
    <xsd:minLength value="1"/>
  </xsd:restriction>
</xsd:simpleType>
```

```

        <xsd:maxLength value="400"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_DICTIONARY_ID">
    <xsd:annotation>
        <xsd:documentation>The dictionary Identifier within a registration authority, e.g., an official
reference registration (ADID) by a CCSDS Control Authority, or the prefix of the target namespace of
the referred external dictionary (if xsd/xml)</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="dedsl:AN_IDENTIFIER">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="400"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_REGISTRATION_AUTHORITY">
    <xsd:annotation>
        <xsd:documentation>Text which identifies the registration authority.</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="400"/>
    </xsd:restriction>
</xsd:simpleType>

```

4.5.3 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>

```

4.6 TEXT_FIELD_CHARACTER_SET

4.6.1 GENERAL

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.

4.6.2 EXAMPLE

An example of XML would be:

```
<?xml version="1.0" encoding="UTF-8"?>
```

4.7 DICTIONARY_LANGUAGE

4.7.1 GENERAL

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

Interoperability Constraints : DEDSL Abstract Syntax constraints

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

4.7.2 XML SCHEMA DEFINITION

```
<xsd:element name="DICTIONARY_LANGUAGE" type="dedsl:A_DICTIONARY_LANGUAGE"/>
```

With its type defined as:

```
<xsd:complexType name="A_DICTIONARY_LANGUAGE">
  <xsd:annotation>
    <xsd:documentation>Main natural language valid for any value of TEXT type given to the
    attributes. The IN_ENGLISH attribute corresponds to the English name of the language as specified
    in ISO 639-2 and the ISO_CODE refers to a 2 or 3 letter country code as specified in ISO 639-2.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:attribute name="IN_ENGLISH" type="dedsl:AN_IN_ENGLISH" use="required"/>
  <xsd:attribute name="ISO_CODE" type="dedsl:AN_ISO_CODE" use="required"/>
</xsd:complexType>
```

Used common types:

```
<xsd:simpleType name="AN_IN_ENGLISH">
  <xsd:annotation>
    <xsd:documentation>The English name of the language as specified in ISO 639-2
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="40"/>
  </xsd:restriction>
</xsd:simpleType>
```

```
<xsd:simpleType name="AN_ISO_CODE">  
  <xsd:annotation>  
    <xsd:documentation>The ISO_CODE refers to a 2 or 3 letter country code as specified in  
ISO 639-2</xsd:documentation>  
  </xsd:annotation>  
  <xsd:restriction base="xsd:string">  
    <xsd:minLength value="2"/>  
    <xsd:maxLength value="3"/>  
  </xsd:restriction>  
</xsd:simpleType>
```

4.7.3 XML EXAMPLE

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


4.8 DICTIONARY_VERSION

4.8.1 GENERAL

Attribute_Definition	: Version of the Data Entity Dictionary
Attribute_Obligation	: Optional
Attribute_Maximum_Occurrence	: 1
Interoperability Constraints	: DEDSL Abstract Syntax constraints

4.8.2 XML SCHEMA DEFINITION

```
<xsd:element name="DICTIONARY_VERSION" type="dedsl:A_DICTIONARY_VERSION"
minOccurs="0"/>
```

With its type defined as:

```
<xsd:simpleType name="A_DICTIONARY_VERSION">
  <xsd:annotation>
    <xsd:documentation> Version of the Data Entity Dictionary.</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="3"/>
    <xsd:maxLength value="40"/>
    <xsd:pattern value="([0-9])+.[a-z0-9]([0-9])*"/>
  </xsd:restriction>
</xsd:simpleType>
```

4.8.3 XML EXAMPLE

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

4.9 DICTIONARY_IDENTIFIER

4.9.1 GENERAL

Attribute_Definition	:	The Identifier under which the Data Entity Dictionary has been registered at a registration Authority
Attribute_Obligation	:	Optional
Attribute_Maximum_Occurrence	:	1
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

4.9.2 XML SCHEMA DEFINITION

```
<xsd:element name="DICTIONARY_IDENTIFIER" type="dedsl:A_DICTIONARY_ID"
minOccurs="0"/>
```

With its type defined as:

```
<xsd:simpleType name="A_DICTIONARY_ID">
  <xsd:annotation>
    <xsd:documentation>The dictionary Identifier within a registration authority, e.g., an official
reference registration (ADID) by a CCSDS Control Authority, or the prefix of the target namespace of
the referred external dictionary (if xsd/xml)</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="dedsl:AN_IDENTIFIER">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="400"/>
  </xsd:restriction>
</xsd:simpleType>
```

4.9.3 XML EXAMPLE

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

4.10 DEDSL_VERSION

4.10.1 GENERAL

Attribute_Definition	:	CCSDS document number of the document corresponding to the XML implementation of the Abstract Syntax. It should be noted that this reference contains the version.
Attribute_Obligation	:	Mandatory
Attribute_Maximum_Occurrence	:	1
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

4.10.2 XML SCHEMA DEFINITION

```
<xsd:element name="DEDSL_VERSION" type="dedsl:A_DEDSL_VERSION"/>
```

With its type defined as:

```
<xsd:simpleType name="A_DEDSL_VERSION">
  <xsd:annotation>
    <xsd:documentation> Version of the Data Entity Dictionary of the document corresponding to
the implementation of the Abstract Syntax (CCSDS reference).</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="CCSDS 647.4-O-1"/>
  </xsd:restriction>
</xsd:simpleType>
```

4.10.3 XML EXAMPLE

```
<DEDSL_VERSION>CCSDS 647.4-O-1</DEDSL_VERSION>
```

4.11 DICTIONARY_USER_DEFINED_ATTRIBUTES

4.11.1 GENERAL

Users can freely add new attributes to the dictionary description part. All the users' defined attributes relative to the dictionary must be grouped under the `DICTIONARY_USER_DEFINED_ATTRIBUTES` element. In all cases, the original DEDSL XSD 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`.

Each new attribute must be syntactically defined in the XML schema in order to be validated but it must also be semantically defined so as to be correctly understood by various organizations. Current section addresses syntactic description whereas section 6 addresses semantic description.

4.11.2 XML SCHEMA DEFINITION

The line in the default XSD:

```
<xsd:element name="DICTIONARY_USER_DEFINED_ATTRIBUTES" type="dedsl:any"
minOccurs="0"/>
```

must be replaced with the following ones in order to have a validating XSD, otherwise no control is performed on the values of the different user-defined attributes:

```
<xsd:element name="DICTIONARY_USER_DEFINED_ATTRIBUTES"
type="dedsl:AUTHORIZED_DICTIONARY_USER_DEFINED_ATTRIBUTES"/>
```

With its type defined as a complex type (sequence or choice) containing as many elements as there are specific user-defined attributes.

In the example, two new user attributes are added to the dictionary definition as follows:

- `DICTIONARY_AUTHOR` defined as string,
- `DICTIONARY_STATUS` defined as a specific simple type with two possible values (`DRAFT`, `RELEASE`):

```
<xsd:simpleType name="A_DICTIONARY_STATUS">
<xsd:restriction base="xsd:string">
    <xsd:enumeration value="DRAFT"/>
    <xsd:enumeration value="RELEASE"/>
</xsd:restriction>
</xsd:simpleType>
```

The definition of DICTONARY_USER_DEFINED_ATTRIBUTES becomes:

```
<xsd:element name="DICTIONARY_USER_DEFINED_ATTRIBUTES"
type="dedsl:AUTHORIZED_DICTIONARY_USER_DEFINED_ATTRIBUTES"/>
<xsd:complexType name="AUTHORIZED_DICTIONARY_USER_DEFINED_ATTRIBUTES">
<xsd:annotation>
  <xsd:documentation>Set of user-defined attributes specific to a project or community and
authorized within a dictionary definition</xsd:documentation>
</xsd:annotation>
  <xsd:choice minOccurs="0" maxOccurs="2">
    <xsd:element name="DICTIONARY_AUTHOR" type="xsd:string"/ >
    <xsd:element name="DICTIONARY_STATUS"
      type="dedsl:A_DICTIONARY_STATUS"/>
  </xsd:choice>
</xsd:complexType>
```

Convention: The simple type ‘A_DICTIONARY_STATUS’ must be defined after the type ‘AUTHORIZED_DICTIONARY_USER_DEFINED_ATTRIBUTES’ for backward compatibility.

4.11.3 XML EXAMPLE

```
<DICTIONARY_USER_DEFINED_ATTRIBUTES>
  <DICTIONARY_AUTHOR>French Space Agency</DICTIONARY_AUTHOR>
  <DICTIONARY_STATUS>RELEASE</DICTIONARY_AUTHOR>
</DICTIONARY_USER_DEFINED_ATTRIBUTES>
```

5 DATA_ENTITY_DEFINITION

5.1 OVERVIEW

This section implements the DEDSL Abstract Syntax concepts presented in subsection 4.4 of reference [1]).

5.2 GENERAL

The data entity definition structure standard attributes for each category for data entities shall be those defined in table 5-1. 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.

Table 5-1: Data Entity Definition Structure

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 note 2)	C	1	
	ENUMERATION_VALUE	C	'n'	
	ENUMERATION_MEANING	O	'n'	
	ENUMERATION_CONVENTION	O	'n'	
	INTEGER_RANGE	O	1	
	REAL_RANGE	O	1	
	TEXT_SIZE	C	1	
	CASE_SENSITIVITY	O	1	
	LANGUAGE	O	1	
	CONSTANT_VALUE	C	1	
	COMPONENT	O	'n'	
	User defined attributes	USER_DEFINED_ATTRIBUTES_PART	O	1

NOTES

- 1 If the data entity is non-scalar, then the attribute is not specified.
- 2 These data-type-dependent attributes have been gathered in a sequence named REPRESENTATIONAL_PART as they are mutually exclusive.

XML SCHEMA DEFINITION

```

<xsd:complexType name="A_DATA_ENTITY_DEFINITION">
  <xsd:annotation>
    <xsd:documentation>Set of DEDSL standard attributes characterizing the current data entity
with identifying, definitional, relational and representational information, and additional user-defined
attributes if necessary.</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="ALIAS" type="dedsl:AN_ALIAS" minOccurs="0"
      maxOccurs="unbounded"/>
    <xsd:element name="DEFINITIONAL_PART"
      type="dedsl:A_DEFINITIONAL_PART"/>
    <xsd:element name="RELATIONAL_PART" type="dedsl:A_RELATIONAL_PART"
      minOccurs="0"/>
    <xsd:element name="REPRESENTATIONAL_PART"
      type="dedsl:A_REPRESENTATIONAL_PART" minOccurs="0"/>
  </xsd:sequence>
  <!-- *****-->
  <!-- Replace here the definition with the expected user-defined data entity attributes -->
  <!-- *****-->
    <xsd:element name="USER_DEFINED_ATTRIBUTES_PART" type="dedsl:any"
      minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="NAME" type="dedsl:A_DATA_ENTITY_NAME" use="required">
    <xsd:annotation>
      <xsd:documentation>Unique Identifier of the current data entity</xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
  <xsd:attribute name="CLASS" type="dedsl:A_DATA_ENTITY_CLASS"
    default="DATA_FIELD">
    <xsd:annotation>
      <xsd:documentation>Kind of entity being defined: a model or a data field or a
constant definition</xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
  <xsd:attribute name="CASE_SENSITIVITY" type="dedsl:A_CASE_SENSITIVITY"
    use="optional"/>
</xsd:complexType>

```

Used common types:

- A_DEFINITIONAL_PART (see 5.4);
- A_RELATIONAL_PART (see 5.5);
- A_REPRESENTATIONAL_PART (see 5.6);
- A_DATA_ENTITY_NAME (see 5.3);
- A_DATA_ENTITY_CLASS (see 5.3);
- A_CASE_SENSITIVITY (see 5.3).

5.3 IDENTIFYING ATTRIBUTES

5.3.1 NAME, CLASS, CASE_SENSITIVITY

5.3.1.1 General

The attributes **NAME** and **CLASS** are gathered in the **DATA_ENTITY_DEFINITION** element 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. In some descriptions, occurrences of data entities used at different levels of composition may have the same name; it is then recommended to use the qualified name (‘.’ as separator) instead so as to ensure uniqueness of the data entity name.

Attribute_Obligation	:	Mandatory
Attribute_Maximum_Occurrence	:	1
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

Attribute_name	:	CASE_SENSITIVITY
Attribute_Definition	:	Specifies the case sensitivity for the Identifiers used as values for the attributes of the current entity. When explicitly used in a data entity, the value of the attribute overrides the value specified at the dictionary level
Attribute_Obligation	:	Defaulted
Attribute_Maximum_Occurrence	:	1
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

5.3.1.2 XML SCHEMA DEFINITION

The attribute CLASS is implemented as an XML attribute (see 5.2) typed with:

```
<xsd:simpleType name="A_DATA_ENTITY_CLASS">
  <xsd:annotation>
    <xsd:documentation>Indicates what kind of entity is defined: a model or a data field or a
    constant definition</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="MODEL"/>
    <xsd:enumeration value="DATA_FIELD"/>
    <xsd:enumeration value="CONSTANT"/>
  </xsd:restriction>
</xsd:simpleType>
```

The attribute NAME is implemented as an XML attribute (see 5.2) typed with:

```
<xsd:simpleType name="A_DATA_ENTITY_NAME">
  <xsd:annotation>
    <xsd:documentation>Identifier of a data entity - unique within a Data Entity Dictionary
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="dedsl:AN_IDENTIFIER">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="400"/>
  </xsd:restriction>
</xsd:simpleType>
```

5.3.1.3 XML EXAMPLE

```
<DATA_ENTITY_DEFINITION NAME="A_MODEL" CLASS="MODEL" >
  <DEFINITIONAL_PART> (see 5.4) </DEFINITIONAL_PART>
  <RELATIONAL_PART> (see 5.5) </RELATIONAL_PART>
  <REPRESENTATIONAL_PART> (see 5.6) </REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>
```

5.3.2 ALIAS

5.3.2.1 General

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’

Interoperability Constraints : DEDSL Abstract Syntax constraints

5.3.2.2 XML SCHEMA DEFINITION

```
<xsd:element name="ALIAS" type="dedsl:AN_ALIAS" minOccurs="0" maxOccurs="unbounded"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ALIAS">
  <xsd:annotation>
    <xsd:documentation>Single- or multi-word designation that differs from the given name but
    represents the same data entity concept</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:AN_ALIAS_TEXT">
      <xsd:attribute name="NAME" type="dedsl:A_DATA_ENTITY_NAME"
      use="required">
        <xsd:annotation>
          <xsd:documentation>Single- or multi-word other name</xsd:documentation>
```

```
        </xsd:annotation>
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="AN_ALIAS_TEXT">
  <xsd:annotation>
    <xsd:documentation>Context in which an alias is applicable</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="400"/>
  </xsd:restriction>
</xsd:simpleType>
```

5.3.2.3 XML EXAMPLE

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

5.4 DEFINITIONAL ATTRIBUTES

5.4.1 DEFINITION

5.4.1.1 General

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_Value_Type : **Text**

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.

Interoperability Constraints : DEDSL Abstract Syntax constraints

5.4.1.2 XML SCHEMA DEFINITION

```
<xsd:element name="DEFINITION" type="dedsl:A_DEFINITION"/>
```

With its type defined as:

```
<xsd:simpleType name="A_DEFINITION">
  <xsd:annotation>
    <xsd:documentation>Statement that expresses the essential nature of a data entity and
permits its differentiation from all the other data entities</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>
```

5.4.1.3 XML EXAMPLE

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

5.4.2 SHORT_DEFINITION

5.4.2.1 General

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_Value_Type : **Text**
 Attribute_Maximum_Occurrence : 1
 Interoperability Constraints : DEDSL Abstract Syntax constraints

5.4.2.2 XML SCHEMA DEFINITION

```
<xsd:element name="SHORT_DEFINITION" type="dedsl:A_SHORT_DEFINITION" minOccurs="0"/>
```

With its type defined as:

```
<xsd:simpleType name="A_SHORT_DEFINITION">
  <xsd:annotation>
    <xsd:documentation>Statement that expresses the essential nature of a data entity in a
shorter and more concise manner than the statement of the Definition</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="80"/>
  </xsd:restriction>
</xsd:simpleType>
```

5.4.2.3 XML EXAMPLE

<SHORT_DEFINITION>Product Identification</SHORT_DEFINITION>

5.4.3 COMMENT

5.4.3.1 General

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'
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

5.4.3.2 XML SCHEMA DEFINITION

```
<xsd:element name="COMMENT" type="dedsl:A_COMMENT" minOccurs="0"
maxOccurs="unbounded"/>
```

With its type defined as:

```
<xsd:simpleType name="A_COMMENT">
  <xsd:annotation>
    <xsd:documentation>Additional information which does not correspond to definition
information</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>
```

5.4.3.3 XML EXAMPLE

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

5.4.4 UNITS

5.4.4.1 General

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.

Interoperability Constraints : DEDSL Abstract Syntax constraints

5.4.4.2 XML SCHEMA DEFINITION

```
<xsd:element name="UNITS" type="dedsl:A_UNITS" minOccurs="0" maxOccurs="unbounded"/>
```

With its type defined as:

```
<xsd:simpleType name="A_UNITS">
  <xsd:annotation>
    <xsd:documentation>Scientific units that should be associated with the value of the data
    entity so as to make the value meaningful to applications</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="80"/>
  </xsd:restriction>
</xsd:simpleType>
```

5.4.4.3 XML EXAMPLE

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

5.4.5 SPECIFIC_INSTANCE

5.4.5.1 General

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.
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

5.4.5.2 XML SCHEMA DEFINITION

```
<xsd:element name="SPECIFIC_INSTANCE" type="dedsl:A_SPECIFIC_INSTANCE" minOccurs="0"
maxOccurs="unbounded"/>
```

With its type defined as:

```
<xsd:complexType name="A_SPECIFIC_INSTANCE">
  <xsd:annotation>
    <xsd:documentation>Attribute that provides a real-world meaning for a specific
instance (value) of the data entity being described</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:A_SPECIFIC_INSTANCE_TEXT">
```



```

        <xsd:attribute name="VALUE" type="dedsl:A_SPECIFIC_INSTANCE_VALUE"
            use="required"/>
    </xsd:extension>
</xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="A_SPECIFIC_INSTANCE_TEXT">
    <xsd:annotation>
        <xsd:documentation>Specific meaning definition associated to a specific instance value
        </xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="400"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_SPECIFIC_INSTANCE_VALUE">
    <xsd:annotation>
        <xsd:documentation>Union of possible types for a specific instance (value); composite and
        texts containing white spaces are excluded </xsd:documentation>
    </xsd:annotation>
    <xsd:union memberTypes="xsd:double xsd:long dedsl:AN_ENUMERATION_VALUE"/>
</xsd:simpleType>

<xsd:simpleType name="AN_ENUMERATION_VALUE">
    <xsd:annotation>
        <xsd:documentation>An enumeration value excluding white space</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="dedsl:AN_IDENTIFIER">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="40"/>
    </xsd:restriction>
</xsd:simpleType>

```

5.4.5.3 XML EXAMPLES

```

<SPECIFIC_INSTANCE VALUE="+00.00">Equator</SPECIFIC_INSTANCE>
<SPECIFIC_INSTANCE VALUE="MICRO_SECOND">most frequently used for defining a date time
format</SPECIFIC_INSTANCE>
<SPECIFIC_INSTANCE VALUE="50">50 meters</SPECIFIC_INSTANCE>

```

5.5 RELATIONAL ATTRIBUTES

5.5.1 INHERITS_FROM

5.5.1.1 General

- 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 the **DICTIONARY_ID** 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.
- Interoperability Constraints : DEDSL Abstract Syntax constraints

5.5.1.2 XML SCHEMA DEFINITION

```
<xsd:element name="INHERITS_FROM" type="dedsl:AN_INHERITS_FROM" minOccurs="0"/>
```

With its type defined as:

```
<xsd:complexType name="AN_INHERITS_FROM">
  <xsd:annotation>
    <xsd:documentation>provides the name of a model or data field from which the current entity
description inherits attributes</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:A_DATA_ENTITY_NAME">
      <xsd:attribute name="EXTERNAL_DICTIONARY"
        type="dedsl:A_DICTIONARY_ID">
        <xsd:annotation>
          <xsd:documentation>Dictionary Identifier of the external Data Entity
Dictionary where the referred entity description is defined</xsd:documentation>
        </xsd:annotation>
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

```

        </xsd:extension>
    </xsd:simpleContent>
</xsd:complexType>

```

5.5.1.3 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>
```

5.5.2 KEYWORD

5.5.2.1 General

Attribute_Definition	:	One or several significant words used for retrieving data entities
Attribute_Obligation	:	Optional
Attribute_Value_Type	:	Text
Attribute_Maximum_Occurrence	:	'n'
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

5.5.2.2 XML SCHEMA DEFINITION

```
<xsd:element name="KEYWORD" type="dedsl:A_KEYWORD" minOccurs="0"
maxOccurs="unbounded"/>
```

With its type defined as:

```
<xsd:simpleType name="A_KEYWORD">
    <xsd:annotation>
        <xsd:documentation>A significant word used for retrieving data entities</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="80"/>
    </xsd:restriction>
</xsd:simpleType>
```

5.5.2.3 XML EXAMPLE

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

5.5.3 RELATION

5.5.3.1 General

- 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 the **DICTIONARY_ID** in one of the EXTERNAL_DICTIONARY_REFERENCE statements.
- Attribute_Obligation : Optional
- Attribute_Maximum_Occurrence : 'n'
- Attribute_Comment :
 - The attribute value provides the reader with the kind of relation that links the two related entities.
 - The name of the entity in relation with the one being defined is provided by the XML attribute WITH.
 - An external Data Entity Dictionary Identifier may be provided by the optional XML attribute EXTERNAL_DICTIONARY.
- Interoperability Constraints : DEDSL Abstract Syntax constraints

5.5.3.2 XML SCHEMA DEFINITION

```
<xsd:element name="RELATION" type="dedsl:A_RELATION" minOccurs="0"
maxOccurs="unbounded"/>
```

With its type defined as:

```
<xsd:complexType name="A_RELATION">
  <xsd:annotation>
    <xsd:documentation>Used to express a relationship between two entity definitions
  </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:A_RELATION_TEXT">
      <xsd:attribute name="WITH" type="dedsl:A_DATA_ENTITY_NAME" use="required">
        <xsd:annotation>
          <xsd:documentation>Identifier of the entity in relation with the one being defined
        </xsd:documentation>
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

```

    </xsd:documentation>
    </xsd:annotation>
    </xsd:attribute>
    <xsd:attribute name="EXTERNAL_DICTIONARY"
type="dedsl:A_DICTIONARY_ID">
        <xsd:annotation>
        <xsd:documentation>Dictionary Identifier of the dictionary when this entity is
described in an external Data Entity Dictionary</xsd:documentation>
        </xsd:annotation>
        </xsd:attribute>
    </xsd:extension>
</xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="A_RELATION_TEXT">
    <xsd:annotation>
    <xsd:documentation>Text providing the reader with the kind of relation that links the two
related entities</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="8000"/>
    </xsd:restriction>
</xsd:simpleType>

```

5.5.3.3 XML EXAMPLES

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

```
<RELATION WITH="LATITUDE_MODEL" EXTERNAL_DICTIONARY="FCST0172"> Semantic link
</RELATION>
```

5.6 REPRESENTATIONAL ATTRIBUTES

5.6.1 INTEGER_TYPE, INTEGER_RANGE, CONSTANT_VALUE

5.6.1.1 General

The attributes `INTEGER_RANGE` and `CONSTANT_VALUE` are combined as two XML children elements of the DEDSL attribute `INTEGER_TYPE`.

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
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

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

5.6.1.2 XML SCHEMA DEFINITION

```
<xsd:element name="INTEGER_TYPE" type="dedsl:AN_INTEGER_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="AN_INTEGER_TYPE">
  <xsd:annotation>
    <xsd:documentation>It specifies an Integer data entity</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="INTEGER_RANGE" type="dedsl:AN_INTEGER_RANGE" />
  </xsd:sequence>
</xsd:complexType>
```

```

        minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
    <xsd:attribute name="CONSTANT_VALUE"
        type="dedsl:AN_INTEGER_CONSTANT_VALUE" use="optional"/>
</xsd:complexType>

<xsd:complexType name="AN_INTEGER_RANGE">
    <xsd:annotation>
    <xsd:documentation>It specifies the minimum and maximum bounds of an Integer data
    entity.</xsd:documentation>
    </xsd:annotation>
    <xsd:attribute name="MIN" type="dedsl:AN_INTEGER_CONSTANT_VALUE"
        use="required">
    <xsd:annotation>
    <xsd:documentation>Minimum bound</xsd:documentation>
    </xsd:annotation>
    </xsd:attribute>
    <xsd:attribute name="MAX" type="dedsl:AN_INTEGER_CONSTANT_VALUE"
        use="required">
    <xsd:annotation>
    <xsd:documentation>Maximum bound</xsd:documentation>
    </xsd:annotation>
    </xsd:attribute>
</xsd:complexType>

<xsd:simpleType name="AN_INTEGER_CONSTANT_VALUE">
    <xsd:annotation>
    <xsd:documentation>It specifies an integer value: literal or constant name
    </xsd:documentation>
    </xsd:annotation>
    <xsd:union memberTypes="xsd:long dedsl:AN_INTEGER_VALUE"/>
</xsd:simpleType>

```

Used common types:

```

<xsd:simpleType name="AN_INTEGER_VALUE">
    <xsd:restriction base="xsd:string">
        <xsd:pattern value="[-]*2[*]{2}[0-9]+[-1]*"/>
    </xsd:restriction>
</xsd:simpleType>

```

NOTE – This definition enables to express integer numbers that are powers of 2 whereas xsd:long does not enables it; it is particularly necessary when numbers are very big.

5.6.1.3 XML EXAMPLE

```

<INTEGER_TYPE><INTEGER_RANGE MIN="0" MAX="10"/></INTEGER_TYPE>
<INTEGER_TYPE CONSTANT_VALUE="12"/>

```

5.6.2 REAL_TYPE, REAL_RANGE, CONSTANT_VALUE

5.6.2.1 General

The attributes REAL_RANGE and CONSTANT_VALUE are combined as two XML children elements of the DEDSL attribute REAL_TYPE.

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
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

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

5.6.2.2 XML SCHEMA DEFINITION

```
<xsd:element name="REAL_TYPE" type="dedsl:A_REAL_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="A_REAL_TYPE">
  <xsd:annotation>
    <xsd:documentation>It specifies a REAL data entity</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="REAL_RANGE" type="dedsl:A_REAL_RANGE"
minOccurs="0"
maxOccurs="1"/>
  </xsd:sequence>
</xsd:complexType>
```



```

    </xsd:sequence>
    <xsd:attribute name="CONSTANT_VALUE" type="xsd:double" use="optional"/>
</xsd:complexType>

<xsd:complexType name="A_REAL_RANGE">
  <xsd:annotation>
    <xsd:documentation>It specifies the minimum and maximum bounds of a REAL data
    entity</xsd:documentation>
  </xsd:annotation>
  <xsd:attribute name="MIN" type="xsd:double" use="required"/>
  <xsd:attribute name="MAX" type="xsd:double" use="required"/>
</xsd:complexType>

```

5.6.2.3 XML EXAMPLE

```

<REAL_TYPE><REAL_RANGE MIN="0.0" MAX="10.2"/></REAL_TYPE>
<REAL_TYPE CONSTANT_VALUE="3.14"/>

```

5.6.3 TEXT_TYPE, TEXT_SIZE, LANGUAGE

5.6.3.1 General

The attributes TEXT_SIZE and LANGUAGE are combined as two XML children elements of the DEDSL attribute TEXT_TYPE.

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
Interoperability Constraints	: DEDSL Abstract Syntax constraints

5.6.3.2 XML SCHEMA DEFINITION

```
<xsd:element name="TEXT_TYPE" type="dedsl:A_TEXT_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="A_TEXT_TYPE">
  <xsd:annotation>
    <xsd:documentation>It specifies a Text data entity</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="TEXT_SIZE" type="dedsl:A_TEXT_SIZE" minOccurs="1"/>
    <xsd:element name="LANGUAGE" type="dedsl:A_DICTIONARY_LANGUAGE"
      minOccurs="0"/>
  </xsd:sequence>
```

```
</xsd:complexType>
```

```
<xsd:complexType name="A_TEXT_SIZE">
  <xsd:annotation>
    <xsd:documentation>Limitation on the size of the values of a Text data entity
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute name="MIN" type="xsd:unsignedInt">
        <xsd:annotation>
          <xsd:documentation>Minimum length of the Text value
          </xsd:documentation>
        </xsd:annotation>
      </xsd:attribute>
      <xsd:attribute name="MAX" type="xsd:unsignedInt">
        <xsd:annotation>
          <xsd:documentation>Maximum length of the Text value; if equal to MIN, it
            provides the exact length of the Text value</xsd:documentation>
        </xsd:annotation>
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

5.6.3.3 XML EXAMPLE

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

5.6.4 ENUMERATED_TYPE, ENUMERATION_VALUE, ENUMERATION_MEANING, ENUMERATION_CONVENTION

5.6.4.1 General

The attributes ENUMERATION_MEANING and ENUMERATION_CONVENTION are combined as two XML children elements of the DEDSL attribute ENUMERATION, while the attribute VALUE is an attribute of ENUMERATION. An ENUMERATED_TYPE is defined as an unbounded sequence of ENUMERATION.

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
Interoperability Constraints		DEDSL Abstract Syntax constraints

5.6.4.2 XML SCHEMA DEFINITION

```
<xsd:element name="ENUMERATED_TYPE" type="dedsl:AN_ENUMERATED_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ENUMERATED_TYPE">
  <xsd:annotation>
    <xsd:documentation>It specifies an Enumerated data entity</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="ENUMERATION" type="dedsl:AN_ENUMERATION"
      minOccurs="1" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="AN_ENUMERATION">
  <xsd:annotation>
    <xsd:documentation>One enumeration used for defining an Enumerated data entity
  </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="ENUMERATION_MEANING"
      type="dedsl:AN_ENUMERATION_MEANING" minOccurs="0"/>
    <xsd:element name="ENUMERATION_CONVENTION"
      type="dedsl:AN_ENUMERATION_CONVENTION" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="VALUE" type="dedsl:AN_ENUMERATION_VALUE" use="required">
    <xsd:annotation>
      <xsd:documentation>Permitted value of the Enumerated data entity</xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
</xsd:complexType>

<xsd:simpleType name="AN_ENUMERATION_MEANING">
  <xsd:annotation>
    <xsd:documentation>Specifies the meaning of an enumeration value</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="400"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ASCII_ENUMERATION_VALUE">
  <xsd:annotation>
    <xsd:documentation>Specifies an enumeration value of ascii type</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="80"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ENUMERATION_CONVENTION">
```

```

<xsd:annotation>
  <xsd:documentation>It specifies the type of the encoding of an enumeration value: numeric
or ascii</xsd:documentation>
</xsd:annotation>
  <xsd:union memberTypes="xsd:int dedsl:AN_ASCII_ENUMERATION_VALUE"/>
</xsd:simpleType>

```

5.6.4.3 XML EXAMPLES

```

<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>

```

```

<ENUMERATED_TYPE>
  <ENUMERATION VALUE="ON">
    <ENUMERATION_MEANING>Equipment on</ENUMERATION_MEANING>
    <ENUMERATION_CONVENTION>1</ENUMERATION_CONVENTION>
  </ENUMERATION>
  <ENUMERATION VALUE="OFF">
    <ENUMERATION_MEANING>Equipment off</ENUMERATION_MEANING>
    <ENUMERATION_CONVENTION>0</ENUMERATION_CONVENTION>
  </ENUMERATION>
</ENUMERATED_TYPE>

```

5.6.5 COMPOSITE_TYPE, COMPONENT

5.6.5.1 General

A COMPOSITE_TYPE is defined as an unbounded sequence of COMPONENT.

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 MIN and MAX.
Attribute_Obligation	:	Optional
Attribute_Maximum_Occurrence	:	'n'
Interoperability Constraints	:	DEDSL Abstract Syntax constraints

5.6.5.2 XML SCHEMA DEFINITION

```
<xsd:element name="COMPOSITE_TYPE" type="dedsl:A_COMPOSITE_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="A_COMPOSITE_TYPE">
  <xsd:annotation>
    <xsd:documentation>It specifies a composite data entity</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="COMPONENT" type="dedsl:A_COMPONENT" minOccurs="0"
      maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="A_COMPONENT">
  <xsd:annotation>
    <xsd:documentation>Name of a component with the number of times (expressed as a range)
it occurs in the composite data entity.</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
```

```

<xsd:extension base="dedsl:A_DATA_ENTITY_NAME">
  <xsd:attribute name="MIN" type="dedsl:A_COMPONENT_OCCURRENCE"
    default="1">
    <xsd:annotation>
      <xsd:documentation>Minimum number of times the component
        occurs </xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
  <xsd:attribute name="MAX" type="dedsl:A_COMPONENT_OCCURRENCE"
    default="1">
    <xsd:annotation>
      <xsd:documentation>Maximum number of times the component occurs
        </xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
</xsd:extension>
</xsd:simpleContent>
</xsd:complexType>

```

```

<xsd:simpleType name="A_COMPONENT_OCCURRENCE">
  <xsd:annotation>
    <xsd:documentation>It specifies the type used for providing the number of occurrences:
      numeric or constant name or 'n' for indicating that there is no upper limit.</xsd:documentation>
  </xsd:annotation>
  <xsd:union memberTypes="xsd:unsignedLong dedsl:AN_UNBOUNDED_TIMES"/>
</xsd:simpleType>

```

```

<xsd:simpleType name="AN_UNBOUNDED_TIMES">
  <xsd:annotation>
    <xsd:documentation>String that indicates the unlimited number of occurrences of a user-
      defined attribute</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="dedsl:AN_IDENTIFIER">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="400"/>
  </xsd:restriction>
</xsd:simpleType>

```

5.6.5.3 XML EXAMPLE

```

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

```

An array of W_IMAGE_SIZE DATA_PIXELs:

```

<COMPOSITE_TYPE>
  <COMPONENT MAX="W_IMAGE_SIZE">DATA_PIXEL</COMPONENT>
</COMPOSITE_TYPE>

```


5.7 DATA ENTITY USER_DEFINED_ATTRIBUTES_PART

5.7.1 GENERAL

Users can freely add new attributes to the data entity description part. All of the users' defined attributes relative to the data entity must be grouped under the USER_DEFINED_ATTRIBUTES_PART element. In all cases, the original DEDSL XSD 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.

Each new attribute must be syntactically defined in the XML schema in order to be validated but it must also be semantically defined so as to be correctly understood by various organizations. Current section addresses syntactic description whereas section 6 addresses semantic description.

5.7.2 XML SCHEMA DEFINITION

This line in the default XSD:

```
<xsd:element name="USER_DEFINED_ATTRIBUTES_PART" type="dedsl:any" minOccurs="0"/>
```

must be replaced by the following ones in order to have a validating XSD, otherwise no control is performed on the values of the different user-defined attributes:

```
<xsd:element name="USER_DEFINED_ATTRIBUTES_PART"
type="dedsl:AUTHORIZED_DATA_ENTITY_USER_DEFINED_ATTRIBUTES" minOccurs="0"/>
```

With its type defined as a complex type (sequence or choice) containing as many elements as there are specific user-defined attributes.

In the example, two new user attributes are added to a data entity definition as follows:

- DATA_FORTRAN_FORMAT defined as string,
- DATA_ENTITY_MANAGEMENT_INFO defined as xsd:anyType in order to allow complex contents (not planned in Abstract Syntax (see reference [1]) but widely used now).

```
<xsd:complexType name=" AUTHORIZED_DATA_ENTITY_USER_DEFINED_ATTRIBUTES >
  <xsd:annotation>
    <xsd:documentation>Set of user-defined attributes specific to a project or community and
authorized within a dictionary definition</xsd:documentation>
  </xsd:annotation>
  <xsd:choice minOccurs="0" maxOccurs="1">
    <xsd:element name="DATA_FORTRAN_FORMAT" type="xsd:string"/ >
    <xsd:element name="DATA_ENTITY_MANAGEMENT_INFO" type="xsd:anyType"
minOccurs="0" maxOccurs="unbounded"/>
  </xsd:choice>
```

`</xsd:complexType>`

Convention: specific types can be defined for each element of simple type, after the type AUTHORIZED_DATA_ENTITY_USER_DEFINED_ATTRIBUTES.

5.7.3 XML EXAMPLE

In the example below, DATA_ENTITY_MANAGEMENT_INFO is defined as a complex type made up of three elements defined as strings: PRODUCED_BY, MODIFIED_BY, and VALIDATED_BY.

```

<USER_DEFINED_ATTRIBUTES_PART>
  <DATA_FORTRAN_FORMAT>I3</DATA_FORTRAN_FORMAT>
  <DICO_MANAGEMENT_INFO>
    <PRODUCED_BY>Mrs JONES</PRODUCED_BY>
    <MODIFIED_BY>Mr SMITH</MODIFIED_BY>
    <VALIDATED_BY>Mr TAYLOR</VALIDATED_BY>
  </DICO_MANAGEMENT_INFO>
</USER_DEFINED_ATTRIBUTES_PART>

```

6 USER_DEFINED_ATTRIBUTE_DEFINITION

6.1 OVERVIEW

This section implements the DEDSL Abstract Syntax concepts presented in subsection 4.5 of reference [1]) in accordance with the CCSDS DEDSL-XML(DTD) Recommended Standard.

6.2 GENERAL

The set of general descriptors for the User-Defined Attribute Definition Structure shall be that defined in table 6-1. The obligation column indicates whether a descriptor is mandatory (M), conditional (C), optional (O), or defaulted (D).

Table 6-1: User-Defined Attribute Definition Structure

Name of Element	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

The semantic description of a user-defined attribute is provided via an annotation added to the xsd attribute description. This annotation is formally defined using the following xsd types.

```

<xsd:complexType name="AN_USER_DEFINED_ATTRIBUTE_DEFINITION">
  <xsd:annotation>
    xsd:documentation>Set of descriptors enabling the specification of a user-defined attribute
  </xsd:documentation>
</xsd:annotation>
  <xsd:sequence>
    <xsd:element name="ATTRIBUTE_NAME" type="dedsl:AN_ATTRIBUTE_NAME"/>
    <xsd:element name="ATTRIBUTE_DEFINITION"
      type="dedsl:AN_ATTRIBUTE_DEFINITION"/>
    <xsd:element name="ATTRIBUTE_CONDITION"
      type="dedsl:AN_ATTRIBUTE_CONDITION" minOccurs="0"/>
    <xsd:element name="ATTRIBUTE_MAXIMUM_OCCURRENCE"
      type="dedsl:AN_ATTRIBUTE_MAXIMUM_OCCURRENCE"/>
    <xsd:choice>
      <xsd:element name="ATTRIBUTE_INTEGER_TYPE"
        type="dedsl:AN_ATTRIBUTE_INTEGER_TYPE"/>
      <xsd:element name="ATTRIBUTE_REAL_TYPE"
        type="dedsl:AN_ATTRIBUTE_REAL_TYPE"/>
      <xsd:element name="ATTRIBUTE_ENUMERATED_TYPE"
        type="dedsl:AN_ATTRIBUTE_ENUMERATED_TYPE"/>
      <xsd:element name="ATTRIBUTE_IDENTIFIER_TYPE"
        type="dedsl:AN_ATTRIBUTE_IDENTIFIER_TYPE"/>
      <xsd:element name="ATTRIBUTE_TEXT_TYPE"
        type="dedsl:AN_ATTRIBUTE_TEXT_TYPE"/>
      <xsd:element name="ATTRIBUTE_ENTITY_TYPE"
        type="dedsl:AN_ATTRIBUTE_ENTITY_TYPE"/>
    </xsd:choice>
    <xsd:element name="ATTRIBUTE_COMMENT"
      type="dedsl:AN_ATTRIBUTE_COMMENT" minOccurs="0"
      maxOccurs="unbounded"/>
    <xsd:element name="ATTRIBUTE_INHERITANCE"
      type="dedsl:AN_ATTRIBUTE_INHERITANCE" minOccurs="0"/>
    <xsd:element name="ATTRIBUTE_DEFAULT_VALUE"
      type="dedsl:AN_ATTRIBUTE_DEFAULT_VALUE" minOccurs="0"/>
    <xsd:element name="ATTRIBUTE_VALUE_EXAMPLE"
      type="dedsl:AN_ATTRIBUTE_VALUE_EXAMPLE" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>

```

6.3 ATTRIBUTE_NAME, OBLIGATION, SCOPE

6.3.1 GENERAL

Attribute_Name implementation is combined with Obligation and Scope implementation, Obligation and Scope being two XML attributes of the Attribute_Name XML element.

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.

Interoperability Constraint DEDSL Abstract Syntax constraints except that the **ATTRIBUTE_NAME** is case sensitive (because XML tag names are case sensitive).

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.

Interoperability Constraint DEDSL Abstract Syntax constraints are not supported: Coding values are case sensitive and limited to the four above values.

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.

Interoperability Constraints DEDSL Abstract Syntax constraints except that coding values are case sensitive and limited to the three above values.

6.3.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_NAME" type="dedsl:AN_ATTRIBUTE_NAME"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ATTRIBUTE_NAME">
  <xsd:annotation>
    <xsd:documentation>Label assigned to an attribute</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:AN_ATTRIBUTE_IDENTIFIER">
      <xsd:attribute name="OBLIGATION" type="dedsl:AN_ATTRIBUTE_OBLIGATION"/>
      <xsd:attribute name="SCOPE" type="dedsl:AN_ATTRIBUTE_SCOPE"
        default="DATA"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

```
<xsd:simpleType name="AN_ATTRIBUTE_IDENTIFIER">
  <xsd:annotation>
    <xsd:documentation>Definition of an attribute Identifier</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="40"/>
    <xsd:pattern value="[a-zA-Z]([a-zA-Z0-9_])*[a-zA-Z0-9]"/>
  </xsd:restriction>
</xsd:simpleType>
```

```

    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ATTRIBUTE_SCOPE">
  <xsd:annotation>
    <xsd:documentation>Descriptor specifying the category of entities in which the attribute may
    appear: dictionary, data entity or all</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="DATA"/>
    <xsd:enumeration value="DICTIONARY"/>
    <xsd:enumeration value="ALL"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ATTRIBUTE_OBLIGATION">
  <xsd:annotation>
    <xsd:documentation>Descriptor indicating whether the attribute shall always or only
    sometimes be present according to specified conditions</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="MANDATORY"/>
    <xsd:enumeration value="CONDITIONAL"/>
    <xsd:enumeration value="OPTIONAL"/>
    <xsd:enumeration value="DEFAULTED"/>
  </xsd:restriction>
</xsd:simpleType>

```

6.4 ATTRIBUTE_DEFINITION

6.4.1 GENERAL

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.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.4.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_DEFINITION" type="dedsl:AN_ATTRIBUTE_DEFINITION"/>
```

With its type defined as:

```
<xsd:simpleType name="AN_ATTRIBUTE_DEFINITION">
  <xsd:annotation>
    <xsd:documentation>Descriptor providing a human readable definition of the user-defined
    attribute</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>
```


6.5 ATTRIBUTE_CONDITION

6.5.1 GENERAL

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’.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.5.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_CONDITION" type="dedsl:AN_ATTRIBUTE_CONDITION"
minOccurs="0"/>
```

With its type defined as:

```
<xsd:simpleType name="AN_ATTRIBUTE_CONDITION">
  <xsd:annotation>
    <xsd:documentation>Descriptor indicating the circumstances under which the attribute shall
    be present</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>
```

6.6 ATTRIBUTE_MAXIMUM_OCCURRENCE

6.6.1 GENERAL

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.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.6.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_MAXIMUM_OCCURRENCE"
  type="dedsl:AN_ATTRIBUTE_MAXIMUM_OCCURRENCE"/>
```

With its type defined as:

```
<xsd:simpleType name="AN_ATTRIBUTE_MAXIMUM_OCCURRENCE">
  <xsd:annotation>
    <xsd:documentation>Descriptor specifying the maximum number of instances of the attribute
    </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="([0-9])*|'n'|'N'"/>
  </xsd:restriction>
</xsd:simpleType>
```

6.7 ATTRIBUTE_INTEGER_TYPE

6.7.1 GENERAL

Purpose Descriptor specifying the attribute with the type **Integer**

Obligation This descriptor is optional.

Interoperability : DEDSL Abstract Syntax constraints

Constraints

6.7.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_INTEGER_TYPE"  
            type="dedsl:AN_ATTRIBUTE_INTEGER_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ATTRIBUTE_INTEGER_TYPE"/>
```

6.8 ATTRIBUTE_REAL_TYPE

6.8.1 GENERAL

Purpose Descriptor specifying the attribute with the type **Real**

Obligation This descriptor is optional.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.8.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_REAL_TYPE" type="dedsl:AN_ATTRIBUTE_REAL_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ATTRIBUTE_REAL_TYPE"/>
```

6.9 ATTRIBUTE_IDENTIFIER_TYPE

6.9.1 GENERAL

Attribute_Identifier_Type implementation is combined with Max_Size implementation, Max_Size being an XML attribute of the Attribute_Identifier_Type XML element.

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**.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.9.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_IDENTIFIER_TYPE"
             type="dedsl:AN_ATTRIBUTE_IDENTIFIER_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ATTRIBUTE_IDENTIFIER_TYPE">
  <xsd:attribute name="MAX_SIZE" type="xsd:unsignedInt"/>
</xsd:complexType>
```

6.10 ATTRIBUTE_TEXT_TYPE

6.10.1 GENERAL

Attribute_Text_Type implementation is combined with Max_Size implementation, Max_Size being an XML attribute of the Attribute_Text_Type XML element.

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**.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.10.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_IDENTIFIER_TYPE"
  type="dedsl:AN_ATTRIBUTE_TEXT_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ATTRIBUTE_TEXT_TYPE">
  <xsd:attribute name="MAX_SIZE" type="xsd:unsignedInt"/>
</xsd:complexType>
```

6.11 ATTRIBUTE_ENUMERATED_TYPE, ATTRIBUTE_ENUMERATION_VALUE

6.11.1 GENERAL

Attribute_Enumerated_Type implementation is combined with Attribute_Enumeration_Value implementation, Attribute_Enumeration_Value being an XML child element of the Attribute_Enumerated_Type XML element.

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**.

Interoperability Constraints : DEDSL Abstract Syntax constraints except that enumeration values are case sensitive.

6.11.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_ENUMERATED_TYPE"
  type="dedsl:AN_ATTRIBUTE_ENUMERATED_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ATTRIBUTE_ENUMERATED_TYPE">
<xsd:sequence>
  <xsd:element name="ATTRIBUTE_ENUMERATION_VALUE"
    type="dedsl:AN_ENUMERATION_VALUE" minOccurs="1" maxOccurs="unbounded"/>
</xsd:sequence>
</xsd:complexType>
```

6.12 ATTRIBUTE_ENTITY_TYPE

6.12.1 GENERAL

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

Obligation This descriptor is optional.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.12.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_ENTITY_TYPE"
             type="dedsl:AN_ATTRIBUTE_ENTITY_TYPE"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ATTRIBUTE_ENTITY_TYPE"/>
```


6.13 ATTRIBUTE_COMMENT

6.13.1 GENERAL

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.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.13.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_COMMENT" type="dedsl:AN_ATTRIBUTE_COMMENT"
minOccurs="0" maxOccurs="unbounded"/>
```

With its type defined as:

```
<xsd:simpleType name="AN_ATTRIBUTE_COMMENT">
  <xsd:annotation>
    <xsd:documentation>Descriptor providing information not directly required to understand the
    meaning but yet useful for the user</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>
```

6.14 ATTRIBUTE_INHERITANCE

6.14.1 GENERAL

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].

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.14.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_INHERITANCE"
type="dedsl:AN_ATTRIBUTE_INHERITANCE" minOccurs="0"/>
```

With its type defined as:

```
<xsd:complexType name="AN_ATTRIBUTE_INHERITANCE">
  <xsd:annotation>
    <xsd:documentation>Descriptor providing information about the inheritance rules for the
attribute in a context of data entity modeling</xsd:documentation>
  </xsd:annotation>
  <xsd:attribute name="OPTION" type="dedsl:AN_INHERITANCE_OPTION_TYPE"
    default="INHERITABLE">
    <xsd:annotation>
      <xsd:documentation>Inheritance option</xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
</xsd:complexType>

<xsd:simpleType name="AN_INHERITANCE_OPTION_TYPE">
```

```
<xsd:annotation>  
<xsd:documentation>It defines the two inheritance possibilities.</xsd:documentation>  
</xsd:annotation>  
<xsd:restriction base="xsd:string">  
  <xsd:enumeration value="INHERITABLE"/>  
  <xsd:enumeration value="NOT_INHERITABLE"/>  
</xsd:restriction>  
</xsd:simpleType>
```

6.15 ATTRIBUTE_DEFAULT_VALUE

6.15.1 GENERAL

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.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.15.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_DEFAULT_VALUE"
  type="dedsl:AN_ATTRIBUTE_DEFAULT_VALUE" minOccurs="0"/>
```

With its type defined as:

```
<xsd:simpleType name="AN_ATTRIBUTE_DEFAULT_VALUE">
  <xsd:annotation>
    <xsd:documentation>Union of possible types for the default value of the attribute; composite
    and texts containing white spaces are excluded </xsd:documentation>
  </xsd:annotation>
  <xsd:union memberTypes="xsd:double xsd:long dedsl:AN_ENUMERATION_VALUE"/>
</xsd:simpleType>
```

6.16 ATTRIBUTE_VALUE_EXAMPLE

6.16.1 GENERAL

Purpose Descriptor providing examples for the value of the attribute.

Obligation This descriptor is optional.

Interoperability Constraints : DEDSL Abstract Syntax constraints

6.16.2 XML SCHEMA DEFINITION

```
<xsd:element name="ATTRIBUTE_VALUE_EXAMPLE"
  type="dedsl:AN_ATTRIBUTE_VALUE_EXAMPLE" minOccurs="0"/>
```

With its type defined as:

```
<xsd:simpleType name="AN_ATTRIBUTE_VALUE_EXAMPLE">
  <xsd:annotation>
    <xsd:documentation>Descriptor providing examples for the value of the attribute
  </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>
```

6.17 XML EXAMPLE

For example a project can define the current status of the Data Entity Dictionary as an enumeration with two authorized values: DRAFT and RELEASE.

```

<xsd:simpleType name="A_DICTIONARY_STATUS">
  <xsd:annotation>
    <xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
    DICTIONARY_STATUS</xsd:documentation>
  <xsd:appinfo>
    <USER_DEFINED_ATTRIBUTE_DEFINITION>
      <ATTRIBUTE_NAME OBLIGATION="OPTIONAL"
      SCOPE="DICTIONARY">DICTIONARY_STATUS
      </ATTRIBUTE_NAME>
      <ATTRIBUTE_DEFINITION>Represents the Data Entity Dictionary
      generation status. The RELEASE status means the dictionary is fully compatible with the DEDSL-
      PVL CCSDS norm. The DRAFT status is for temporary dictionaries.</ATTRIBUTE_DEFINITION>
      <ATTRIBUTE_MAXIMUM_OCCURRENCE>1
      </ATTRIBUTE_MAXIMUM_OCCURRENCE>
      <ATTRIBUTE_ENUMERATED_TYPE>
        <ATTRIBUTE_ENUMERATION_VALUE>DRAFT
        </ATTRIBUTE_ENUMERATION_VALUE>
        <ATTRIBUTE_ENUMERATION_VALUE>RELEASE
        </ATTRIBUTE_ENUMERATION_VALUE>
      </ATTRIBUTE_ENUMERATED_TYPE>
      <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
      </ATTRIBUTE_COMMENT>
      <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
      <ATTRIBUTE_VALUE_EXAMPLE>DICTIONARY_STATUS=DRAFT;
      </ATTRIBUTE_VALUE_EXAMPLE>
    </USER_DEFINED_ATTRIBUTE_DEFINITION>
  </xsd:appinfo>
</xsd:annotation>
<xsd:restriction base="xsd:string">
  <xsd:enumeration value="DRAFT"/>
  <xsd:enumeration value="RELEASE"/>
</xsd:restriction>
</xsd:simpleType>

```

7 DEDSL CONFORMANCE

7.1 OVERVIEW

This DEDSL/XML Schema specification is version 1.0 of the specification and provides an XML Schema implementation for the DEDSL Abstract Syntax Recommended Standard (reference [1]) in conformance with the XML/DTD implementation (reference [8]).

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.

7.2 CONFORMANCE LEVEL 1: NOTATION COMPLIANCE

Implementations which conform to all of sections 3, 4, 5, and 6 (without taking into account the restrictions in the XML Schema Definitions or defining their own constraints [lengths or patterns]) will be notation-compliant with this specification.

7.3 CONFORMANCE LEVEL 2: INTEROPERABILITY COMPLIANCE

Implementations which conform to all of sections 3, 4, 5, and 6 and the interoperability constraints from the Abstract Specification (implemented as restrictions in the XML Schema Definitions provided in this specification) will be interoperable-compliant with this specification.

8 XSD

```

<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:deds1="urn:ccsds:schema:deds1:1" targetNamespace="urn:ccsds:schema:deds1:1"
elementFormDefault="qualified" attributeFormDefault="unqualified">
<xsd:complexType name="any" mixed="true">
  <xsd:complexContent>
    <xsd:restriction base="xsd:anyType">
      <xsd:sequence>
        <xsd:any processContents="lax" maxOccurs="unbounded"/>
      </xsd:sequence>
    </xsd:restriction>
  </xsd:complexContent>
</xsd:complexType>

<xsd:simpleType name="AN_IDENTIFIER">
  <xsd:annotation>
    <xsd:documentation>A sequence of characters that designates something without any white
spaces (e.g., one or more space characters, carriage returns, line feeds, form feeds or
tabs).</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[a-zA-Z]([a-zA-Z0-9_])*[:]?([a-zA-Z0-9_])*"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_UNBOUNDED_TIMES">
  <xsd:annotation>
    <xsd:documentation>String that indicates the unlimited number of occurrences of a user-
defined attribute</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="n"/>
  </xsd:restriction>
</xsd:simpleType>

<!-- Dictionary associated types -->
<xsd:simpleType name="A_DICTIONARY_IDENTIFIER">
  <xsd:annotation>
    <xsd:documentation>Identifier of a dictionary with length constraints</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="deds1:AN_IDENTIFIER">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="400"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_CASE_SENSITIVITY">
  <xsd:annotation>
    <xsd:documentation>Specifies the case sensitivity for the Identifiers used as values for the
attributes.</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="CASE_SENSITIVE"/>
  </xsd:restriction>
</xsd:simpleType>

```



```

        <xsd:enumeration value="NOT_CASE_SENSITIVE"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="A_DICTIONARY_NAME">
    <xsd:annotation>
        <xsd:documentation>Human readable name for the Data Entity
Dictionary</xsd:documentation>
    </xsd:annotation>
    <xsd:simpleContent>
        <xsd:extension base="dedsl:A_DICTIONARY_IDENTIFIER">
            <xsd:attribute name="CASE_SENSITIVITY"
type="dedsl:A_CASE_SENSITIVITY" default="NOT_CASE_SENSITIVE"/>
        </xsd:extension>
    </xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="A_DICTIONARY_DEFINITION">
    <xsd:annotation>
        <xsd:documentation>Human readable definition for the Data Entity Dictionary with length
constraints</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="8000"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_DICTIONARY_LOCAL_NAME">
    <xsd:annotation>
        <xsd:documentation>The local name to use to refer to the referenced external Data Entity
Dictionary - unique within this dictionary.</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="dedsl:AN_IDENTIFIER">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="400"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_DICTIONARY_ID">
    <xsd:annotation>
        <xsd:documentation>The dictionary Identifier within a registration authority, e.g., an official
reference registration (ADID) by a CCSDS Control Authority, or the prefix of the target namespace of
the referred external dictionary (if xsd/xml)</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="dedsl:AN_IDENTIFIER">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="400"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_REGISTRATION_AUTHORITY">
    <xsd:annotation>
        <xsd:documentation>Text which identifies the registration authority.</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">

```

```

        <xsd:minLength value="1"/>
        <xsd:maxLength value="400"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="AN_EXTERNAL_DICTIONARY_REFERENCE">
    <xsd:annotation>
        <xsd:documentation>A reference to another Data Entity Dictionary whose models are reused
in the current one.</xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
        <xsd:element name="LOCAL_NAME" type="dedsl:A_DICTIONARY_LOCAL_NAME"/>
        <xsd:element name="DICTIONARY_ID" type="dedsl:A_DICTIONARY_ID" minOccurs="0"/>
        <xsd:element name="REGISTRATION_AUTHORITY"
            type="dedsl:A_REGISTRATION_AUTHORITY" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>

<xsd:simpleType name="AN_IN_ENGLISH">
    <xsd:annotation>
        <xsd:documentation>The English name of the language as specified in ISO 639-2
</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="40"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ISO_CODE">
    <xsd:annotation>
        <xsd:documentation>The ISO_CODE refers to a 2 or 3 letter country code as specified in
ISO 639-2</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:minLength value="2"/>
        <xsd:maxLength value="3"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="A_DICTIONARY_LANGUAGE">
    <xsd:annotation>
        <xsd:documentation>Main natural language valid for any value of TEXT type given to the
attributes. The IN_ENGLISH attribute corresponds to the English name of the language as specified
in ISO 639-2 and the ISO_CODE refers to a 2 or 3 letter country code as specified in ISO 639-2.
</xsd:documentation>
    </xsd:annotation>
    <xsd:attribute name="IN_ENGLISH" type="dedsl:AN_IN_ENGLISH" use="required"/>
    <xsd:attribute name="ISO_CODE" type="dedsl:AN_ISO_CODE" use="required"/>
</xsd:complexType>

<xsd:simpleType name="A_DICTIONARY_VERSION">
    <xsd:annotation>
        <xsd:documentation> Version of the Data Entity Dictionary.</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">

```

```

        <xsd:minLength value="3"/>
        <xsd:maxLength value="40"/>
        <xsd:pattern value="([0-9])+.[a-z0-9]([0-9])*"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_DEDSL_VERSION">
    <xsd:annotation>
        <xsd:documentation> Version of the Data Entity Dictionary of the document corresponding to
the implementation of the Abstract Syntax (CCSDS reference).</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="CCSDS 647.4-O-1"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="A_DICTIONARY_IDENTIFICATION">
    <xsd:annotation>
        <xsd:documentation>Set of DEDSL standard attributes characterizing the current dictionary
with identifying, definitional, relational, representational and administrative information with additional
user-defined attributes if necessary</xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
        <xsd:element name="DICTIONARY_NAME" type="dedsl:A_DICTIONARY_NAME"/>
        <xsd:element name="DICTIONARY_DEFINITION"
            type="dedsl:A_DICTIONARY_DEFINITION" minOccurs="0"/>
        <xsd:element name="EXTERNAL_DICTIONARY_REFERENCE"
            type="dedsl:AN_EXTERNAL_DICTIONARY_REFERENCE" minOccurs="0"
            maxOccurs="unbounded"/>
        <xsd:element name="DICTIONARY_LANGUAGE"
            type="dedsl:A_DICTIONARY_LANGUAGE"/>
        <xsd:element name="DICTIONARY_VERSION"
            type="dedsl:A_DICTIONARY_VERSION" minOccurs="0"/>
        <xsd:element name="DICTIONARY_IDENTIFIER" type="dedsl:A_DICTIONARY_ID"
            minOccurs="0"/>
        <xsd:element name="DEDSL_VERSION" type="dedsl:A_DEDSL_VERSION"/>
    </xsd:sequence>
    <!-- ***** -->
    <!-- Replace here the definition with the expected user-defined dictionary attributes -->
    <!-- ***** -->
    <xsd:element name="DICTIONARY_USER_DEFINED_ATTRIBUTES"
        type="dedsl:any" minOccurs="0"/>
</xsd:sequence>
</xsd:complexType>

<!-- data entity associated types -->
<xsd:simpleType name="A_DATA_ENTITY_NAME">
    <xsd:annotation>
        <xsd:documentation>Identifier of a data entity - unique within a Data Entity Dictionary
</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="dedsl:AN_IDENTIFIER">
        <xsd:minLength value="1"/>
        <xsd:maxLength value="400"/>
    </xsd:restriction>

```

```

</xsd:simpleType>

<xsd:simpleType name="AN_ALIAS_TEXT">
  <xsd:annotation>
    <xsd:documentation>Context in which an alias is applicable</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="400"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="AN_ALIAS">
  <xsd:annotation>
    <xsd:documentation>Single- or multi-word designation that differs from the given name but
represents the same data entity concept</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:AN_ALIAS_TEXT">
      <xsd:attribute name="NAME" type="dedsl:A_DATA_ENTITY_NAME"
use="required">
        <xsd:annotation>
          <xsd:documentation>Single- or multi-word other name</xsd:documentation>
        </xsd:annotation>
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="A_DEFINITION">
  <xsd:annotation>
    <xsd:documentation>Statement that expresses the essential nature of a data entity and
permits its differentiation from all the other data entities</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_SHORT_DEFINITION">
  <xsd:annotation>
    <xsd:documentation>Statement that expresses the essential nature of a data entity in a
shorter and more concise manner than the statement of the Definition</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="80"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_COMMENT">
  <xsd:annotation>
    <xsd:documentation>Additional information which does not correspond to definition
information</xsd:documentation>
  </xsd:annotation>

```

```

    <xsd:restriction base="xsd:string">
      <xsd:minLength value="1"/>
      <xsd:maxLength value="8000"/>
    </xsd:restriction>
  </xsd:simpleType>

  <xsd:simpleType name="A_UNITS">
    <xsd:annotation>
      <xsd:documentation>Scientific units that should be associated with the value of the data
entity so as to make the value meaningful to applications</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
      <xsd:minLength value="1"/>
      <xsd:maxLength value="80"/>
    </xsd:restriction>
  </xsd:simpleType>

  <xsd:simpleType name="A_SPECIFIC_INSTANCE_TEXT">
    <xsd:annotation>
      <xsd:documentation>Specific meaning definition associated to a specific instance value
</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="xsd:string">
      <xsd:minLength value="1"/>
      <xsd:maxLength value="400"/>
    </xsd:restriction>
  </xsd:simpleType>

  <xsd:simpleType name="AN_ENUMERATION_VALUE">
    <xsd:annotation>
      <xsd:documentation>An enumeration value excluding white space</xsd:documentation>
    </xsd:annotation>
    <xsd:restriction base="dedsl:AN_IDENTIFIER">
      <xsd:minLength value="1"/>
      <xsd:maxLength value="40"/>
    </xsd:restriction>
  </xsd:simpleType>

  <xsd:simpleType name="A_SPECIFIC_INSTANCE_VALUE">
    <xsd:annotation>
      <xsd:documentation>Union of possible types for a specific instance (value); composite and
texts containing white spaces are excluded </xsd:documentation>
    </xsd:annotation>
    <xsd:union memberTypes="xsd:double xsd:long dedsl:AN_ENUMERATION_VALUE"/>
  </xsd:simpleType>

  <xsd:complexType name="A_SPECIFIC_INSTANCE">
    <xsd:annotation>
      <xsd:documentation>Attribute that provides a real-world meaning for a specific
instance (value) of the data entity being described</xsd:documentation>
    </xsd:annotation>
    <xsd:simpleContent>
      <xsd:extension base="dedsl:A_SPECIFIC_INSTANCE_TEXT">
        <xsd:attribute name="VALUE" type="dedsl:A_SPECIFIC_INSTANCE_VALUE"
use="required"/>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>

```

```

    </xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="A_DEFINITIONAL_PART">
  <xsd:annotation>
    <xsd:documentation>Set of attributes describing core semantic aspects of a data entity
  </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="DEFINITION" type="dedsl:A_DEFINITION"/>
    <xsd:element name="SHORT_DEFINITION" type="dedsl:A_SHORT_DEFINITION"
      minOccurs="0"/>
    <xsd:element name="COMMENT" type="dedsl:A_COMMENT" minOccurs="0"
      maxOccurs="unbounded"/>
    <xsd:element name="UNITS" type="dedsl:A_UNITS" minOccurs="0"
      maxOccurs="unbounded"/>
    <xsd:element name="SPECIFIC_INSTANCE"
type="dedsl:A_SPECIFIC_INSTANCE"
      minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="AN_INHERITS_FROM">
  <xsd:annotation>
    <xsd:documentation>provides the name of a model or data field from which the current entity
description inherits attributes</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:A_DATA_ENTITY_NAME">
      <xsd:attribute name="EXTERNAL_DICTIONARY"
        type="dedsl:A_DICTIONARY_ID">
        <xsd:annotation>
          <xsd:documentation>Dictionary Identifier of the external Data Entity
Dictionary where the referred entity description is defined</xsd:documentation>
        </xsd:annotation>
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="A_RELATION_TEXT">
  <xsd:annotation>
    <xsd:documentation>Text providing the reader with the kind of relation that links the two
related entities</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="A_RELATION">
  <xsd:annotation>
    <xsd:documentation>Used to express a relationship between two entity definitions
  </xsd:documentation>
  </xsd:annotation>

```

```

<xsd:simpleContent>
  <xsd:extension base="dedsl:A_RELATION_TEXT">
    <xsd:attribute name="WITH" type="dedsl:A_DATA_ENTITY_NAME" use="required">
      <xsd:annotation>
        <xsd:documentation>Identifier of the entity in relation with the one being defined
        </xsd:documentation>
      </xsd:annotation>
    </xsd:attribute>
    <xsd:attribute name="EXTERNAL_DICTIONARY" type="dedsl:A_DICTIONARY_ID">
      <xsd:annotation>
        <xsd:documentation>Dictionary Identifier of the dictionary when this entity is
        described in an external Data Entity Dictionary</xsd:documentation>
      </xsd:annotation>
    </xsd:attribute>
  </xsd:extension>
</xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="A_KEYWORD">
  <xsd:annotation>
    <xsd:documentation>A significant word used for retrieving data entities</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="80"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="A_RELATIONAL_PART">
  <xsd:annotation>
    <xsd:documentation>Set of attributes describing associations among data entities
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="INHERITS_FROM" type="dedsl:AN_INHERITS_FROM"
      minOccurs="0"/>
    <xsd:element name="RELATION" type="dedsl:A_RELATION" minOccurs="0"
      maxOccurs="unbounded"/>
    <xsd:element name="KEYWORD" type="dedsl:A_KEYWORD" minOccurs="0"
      maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="A_TEXT_SIZE">
  <xsd:annotation>
    <xsd:documentation>Limitation on the size of the values of a TEXT data entity
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attribute name="MIN" type="xsd:unsignedInt">
        <xsd:annotation>
          <xsd:documentation>Minimum length of the TEXT value
          </xsd:documentation>
        </xsd:annotation>
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

```

```

    <xsd:attribute name="MAX" type="xsd:unsignedInt">
      <xsd:annotation>
        <xsd:documentation>Maximum length of the TEXT value; if equal to MIN, it
          provides the exact length of the TEXT value</xsd:documentation>
        </xsd:annotation>
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="A_TEXT_TYPE">
  <xsd:annotation>
    <xsd:documentation>It specifies a Text data entity</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="TEXT_SIZE" type="dedsl:A_TEXT_SIZE" minOccurs="1"/>
    <xsd:element name="LANGUAGE" type="dedsl:A_DICTIONARY_LANGUAGE"
      minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="AN_ENUMERATED_TYPE">
  <xsd:annotation>
    <xsd:documentation>It specifies an Enumerated data entity</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="ENUMERATION" type="dedsl:AN_ENUMERATION"
      minOccurs="1" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:simpleType name="AN_ENUMERATION_MEANING">
  <xsd:annotation>
    <xsd:documentation>Specifies the meaning of an enumeration value</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="400"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ASCII_ENUMERATION_VALUE">
  <xsd:annotation>
    <xsd:documentation>Specifies an enumeration value of ascii type</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="80"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ENUMERATION_CONVENTION">
  <xsd:annotation>
    <xsd:documentation>It specifies the type of the encoding of an enumeration value: numeric
    or ascii</xsd:documentation>
  </xsd:annotation>

```



```

    <xsd:union memberTypes="xsd:int dedsl:AN_ASCII_ENUMERATION_VALUE"/>
</xsd:simpleType>

<xsd:complexType name="AN_ENUMERATION">
  <xsd:annotation>
    <xsd:documentation>One enumeration used for defining an Enumerated data entity
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="ENUMERATION_MEANING"
      type="dedsl:AN_ENUMERATION_MEANING" minOccurs="0"/>
    <xsd:element name="ENUMERATION_CONVENTION"
      type="dedsl:AN_ENUMERATION_CONVENTION" minOccurs="0"/>
  </xsd:sequence>
  <xsd:attribute name="VALUE" type="dedsl:AN_ENUMERATION_VALUE" use="required">
    <xsd:annotation>
      <xsd:documentation>Permitted value of the Enumerated data entity</xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
</xsd:complexType>

<xsd:simpleType name="A_COMPONENT_OCCURRENCE">
  <xsd:annotation>
    <xsd:documentation>It specifies the type used for providing the number of occurrences:
    numeric or constant name or 'n' for indicating that there is no upper limit.</xsd:documentation>
  </xsd:annotation>
  <xsd:union memberTypes="xsd:unsignedLong dedsl:AN_UNBOUNDED_TIMES"/>
</xsd:simpleType>

<xsd:complexType name="A_COMPONENT">
  <xsd:annotation>
    <xsd:documentation>Name of a component with the number of times (expressed as a range)
    it occurs in the composite data entity.</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:A_DATA_ENTITY_NAME">
      <xsd:attribute name="MIN" type="dedsl:A_COMPONENT_OCCURRENCE"
        default="1">
        <xsd:annotation>
          <xsd:documentation>Minimum number of times the component
          occurs </xsd:documentation>
        </xsd:annotation>
      </xsd:attribute>
      <xsd:attribute name="MAX" type="dedsl:A_COMPONENT_OCCURRENCE"
        default="1">
        <xsd:annotation>
          <xsd:documentation>Maximum number of times the component occurs
          </xsd:documentation>
        </xsd:annotation>
      </xsd:attribute>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="A_COMPOSITE_TYPE">
  <xsd:annotation>

```

```

<xsd:documentation>It specifies a composite data entity</xsd:documentation>
</xsd:annotation>
<xsd:sequence>
  <xsd:element name="COMPONENT" type="dedsl:A_COMPONENT" minOccurs="0"
    maxOccurs="unbounded"/>
</xsd:sequence>
</xsd:complexType>

<xsd:simpleType name="AN_INTEGER_VALUE">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[-]*2[*]{2}[0-9]+[-1]*"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_INTEGER_CONSTANT_VALUE">
  <xsd:annotation>
    <xsd:documentation>It specifies an integer value: literal or constant name
  </xsd:documentation>
  </xsd:annotation>
  <xsd:union memberTypes="xsd:long dedsl:AN_INTEGER_VALUE"/>
</xsd:simpleType>

<xsd:complexType name="AN_INTEGER_RANGE">
  <xsd:annotation>
    <xsd:documentation>It specifies the minimum and maximum bounds of an Integer data
    entity.</xsd:documentation>
  </xsd:annotation>
  <xsd:attribute name="MIN" type="dedsl:AN_INTEGER_CONSTANT_VALUE"
    use="required">
    <xsd:annotation>
      <xsd:documentation>Minimum bound</xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
  <xsd:attribute name="MAX" type="dedsl:AN_INTEGER_CONSTANT_VALUE"
    use="required">
    <xsd:annotation>
      <xsd:documentation>Maximum bound</xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
</xsd:complexType>

<xsd:complexType name="AN_INTEGER_TYPE">
  <xsd:annotation>
    <xsd:documentation>It specifies an Integer data entity</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="INTEGER_RANGE" type="dedsl:AN_INTEGER_RANGE"
      minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
  <xsd:attribute name="CONSTANT_VALUE"
    type="dedsl:AN_INTEGER_CONSTANT_VALUE" use="optional"/>
</xsd:complexType>

<xsd:complexType name="A_REAL_RANGE">
  <xsd:annotation>
    <xsd:documentation>It specifies the minimum and maximum bounds of a Real data

```

```

entity</xsd:documentation>
</xsd:annotation>
<xsd:attribute name="MIN" type="xsd:double" use="required"/>
<xsd:attribute name="MAX" type="xsd:double" use="required"/>
</xsd:complexType>

<xsd:complexType name="A_REAL_TYPE">
  <xsd:annotation>
    <xsd:documentation>It specifies a Real data entity</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="REAL_RANGE" type="dedsl:A_REAL_RANGE"
minOccurs="0"
      maxOccurs="1"/>
  </xsd:sequence>
  <xsd:attribute name="CONSTANT_VALUE" type="xsd:double" use="optional"/>
</xsd:complexType>

<xsd:complexType name="A_REPRESENTATIONAL_PART">
  <xsd:annotation>
    <xsd:documentation>Set of attributes that describe interpretational aspects of a data
entity</xsd:documentation>
  </xsd:annotation>
  <xsd:choice minOccurs="0">
    <xsd:element name="INTEGER_TYPE" type="dedsl:AN_INTEGER_TYPE"/>
    <xsd:element name="REAL_TYPE" type="dedsl:A_REAL_TYPE"/>
    <xsd:element name="TEXT_TYPE" type="dedsl:A_TEXT_TYPE"/>
    <xsd:element name="ENUMERATED_TYPE"
      type="dedsl:AN_ENUMERATED_TYPE"/>
    <xsd:element name="COMPOSITE_TYPE" type="dedsl:A_COMPOSITE_TYPE"/>
  </xsd:choice>
</xsd:complexType>

<xsd:simpleType name="A_DATA_ENTITY_CLASS">
  <xsd:annotation>
    <xsd:documentation>Indicates what kind of entity is defined: a model or a data field or a
constant definition</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="MODEL"/>
    <xsd:enumeration value="DATA_FIELD"/>
    <xsd:enumeration value="CONSTANT"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="A_DATA_ENTITY_DEFINITION">
  <xsd:annotation>
    <xsd:documentation>Set of DEDSL standard attributes characterizing the current data entity
with identifying, definitional, relational and representational information, and additional user-
defined attributes if necessary.</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="ALIAS" type="dedsl:AN_ALIAS" minOccurs="0"
      maxOccurs="unbounded"/>
    <xsd:element name="DEFINITIONAL_PART"
      type="dedsl:A_DEFINITIONAL_PART"/>
  </xsd:sequence>

```

```

        <xsd:element name="RELATIONAL_PART" type="dedsl:A_RELATIONAL_PART"
            minOccurs="0"/>
        <xsd:element name="REPRESENTATIONAL_PART"
            type="dedsl:A_REPRESENTATIONAL_PART" minOccurs="0"/>

<!-- *****-->
<!-- Replace here the definition with the expected user-defined data entity attributes -->
<!-- *****-->

        <xsd:element name="USER_DEFINED_ATTRIBUTES_PART" type="dedsl:any"
            minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="NAME" type="dedsl:A_DATA_ENTITY_NAME" use="required">
    <xsd:annotation>
    <xsd:documentation>Unique Identifier of the current data entity</xsd:documentation>
    </xsd:annotation>
    </xsd:attribute>
    <xsd:attribute name="CLASS" type="dedsl:A_DATA_ENTITY_CLASS"
        default="DATA_FIELD">
    <xsd:annotation>
    <xsd:documentation>Kind of entity being defined: a model or a data field or a constant
    definition</xsd:documentation>
    </xsd:annotation>
    </xsd:attribute>
    <xsd:attribute name="CASE_SENSITIVITY" type="dedsl:A_CASE_SENSITIVITY"
        use="optional"/>
</xsd:complexType>

<!-- user-defined attribute associated types -->
<xsd:complexType name="AN_ATTRIBUTE_REAL_TYPE">
    <xsd:annotation>
    <xsd:documentation>It indicates that the attribute is of Real type.</xsd:documentation>
    </xsd:annotation>
</xsd:complexType>

<xsd:complexType name="AN_ATTRIBUTE_INTEGER_TYPE">
    <xsd:annotation>
    <xsd:documentation>It indicates that the attribute is of Integer type.</xsd:documentation>
    </xsd:annotation>
</xsd:complexType>

<xsd:complexType name="AN_ATTRIBUTE_ENTITY_TYPE">
    <xsd:annotation>
    <xsd:documentation>It indicates that the attribute is of the type of the data entity.
    </xsd:documentation>
    </xsd:annotation>
</xsd:complexType>

<xsd:complexType name="AN_ATTRIBUTE_ENUMERATED_TYPE">
    <xsd:annotation>
    <xsd:documentation>It indicates that the attribute is of ENUMERATED type.
    </xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
    <xsd:element name="ATTRIBUTE_ENUMERATION_VALUE"
        type="dedsl:AN_ENUMERATION_VALUE" minOccurs="0" maxOccurs="unbounded"/>

```

```

    </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="AN_ATTRIBUTE_IDENTIFIER_TYPE">
  <xsd:annotation>
    <xsd:documentation>It indicates that the attribute is of Identifier type.</xsd:documentation>
  </xsd:annotation>
  <xsd:attribute name="MAX_SIZE" type="xsd:unsignedInt"/>
</xsd:complexType>

<xsd:simpleType name="AN_INHERITANCE_OPTION_TYPE">
  <xsd:annotation>
    <xsd:documentation>It defines the two inheritance possibilities.</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="INHERITABLE"/>
    <xsd:enumeration value="NOT_INHERITABLE"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="AN_ATTRIBUTE_INHERITANCE">
  <xsd:annotation>
    <xsd:documentation>Descriptor providing information about the inheritance rules for the
    attribute in a context of data entity modeling</xsd:documentation>
  </xsd:annotation>
  <xsd:attribute name="OPTION" type="dedsl:AN_INHERITANCE_OPTION_TYPE"
    default="INHERITABLE">
    <xsd:annotation>
      <xsd:documentation>Inheritance option</xsd:documentation>
    </xsd:annotation>
  </xsd:attribute>
</xsd:complexType>

<xsd:simpleType name="AN_ATTRIBUTE_MAXIMUM_OCCURRENCE">
  <xsd:annotation>
    <xsd:documentation>Descriptor specifying the maximum number of instances of the attribute
  </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="([0-9])*'n'|'N'"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ATTRIBUTE_CONDITION">
  <xsd:annotation>
    <xsd:documentation>Descriptor indicating the circumstances under which the attribute shall
    be present</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ATTRIBUTE_DEFINITION">
  <xsd:annotation>

```

```

<xsd:documentation>Descriptor providing a human readable definition of the user-defined
attribute</xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string">
  <xsd:minLength value="1"/>
  <xsd:maxLength value="8000"/>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ATTRIBUTE_COMMENT">
  <xsd:annotation>
    <xsd:documentation>Descriptor providing information not directly required to understand the
    meaning but yet useful for the user</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ATTRIBUTE_VALUE_EXAMPLE">
  <xsd:annotation>
    <xsd:documentation>Descriptor providing examples for the value of the attribute
  </xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ATTRIBUTE_IDENTIFIER">
  <xsd:annotation>
    <xsd:documentation>Definition of an attribute Identifier</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="40"/>
    <xsd:pattern value="[a-zA-Z]([a-zA-Z0-9_])*[a-zA-Z0-9]"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ATTRIBUTE_SCOPE">
  <xsd:annotation>
    <xsd:documentation>Descriptor specifying the category of entities in which the attribute may
    appear: dictionary, data entity or all</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="DATA"/>
    <xsd:enumeration value="DICTIONARY"/>
    <xsd:enumeration value="ALL"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_ATTRIBUTE_OBLIGATION">
  <xsd:annotation>

```

```

<xsd:documentation>Descriptor indicating whether the attribute shall always or only
sometimes be present according to specified conditions</xsd:documentation>
</xsd:annotation>
<xsd:restriction base="xsd:string">
  <xsd:enumeration value="MANDATORY"/>
  <xsd:enumeration value="CONDITIONAL"/>
  <xsd:enumeration value="OPTIONAL"/>
  <xsd:enumeration value="DEFAULTED"/>
</xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="AN_ATTRIBUTE_NAME">
  <xsd:annotation>
    <xsd:documentation>Label assigned to an attribute</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="dedsl:AN_ATTRIBUTE_IDENTIFIER">
      <xsd:attribute name="OBLIGATION" type="dedsl:AN_ATTRIBUTE_OBLIGATION"/>
      <xsd:attribute name="SCOPE" type="dedsl:AN_ATTRIBUTE_SCOPE"
        default="DATA"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="AN_ATTRIBUTE_TEXT_TYPE">
  <xsd:annotation>
    <xsd:documentation>It indicates that the attribute is of TEXT type with length constraints
  </xsd:documentation>
  </xsd:annotation>
  <xsd:attribute name="MAX_SIZE" type="xsd:unsignedInt"/>
</xsd:complexType>

<xsd:simpleType name="AN_ATTRIBUTE_DEFAULT_VALUE">
  <xsd:annotation>
    <xsd:documentation>Union of possible types for the default value of the attribute; composite
and texts containing white spaces are excluded </xsd:documentation>
  </xsd:annotation>
  <xsd:union memberTypes="xsd:double xsd:long dedsl:AN_ENUMERATION_VALUE"/>
</xsd:simpleType>

<xsd:complexType name="AN_USER_DEFINED_ATTRIBUTE_DEFINITION">
  <xsd:annotation>
    <xsd:documentation>Set of descriptors enabling the specification of a user-defined attribute
  </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="ATTRIBUTE_NAME" type="dedsl:AN_ATTRIBUTE_NAME"/>
    <xsd:element name="ATTRIBUTE_DEFINITION"
      type="dedsl:AN_ATTRIBUTE_DEFINITION"/>
    <xsd:element name="ATTRIBUTE_CONDITION"
      type="dedsl:AN_ATTRIBUTE_CONDITION" minOccurs="0"/>
    <xsd:element name="ATTRIBUTE_MAXIMUM_OCCURRENCE"
      type="dedsl:AN_ATTRIBUTE_MAXIMUM_OCCURRENCE"/>
    <xsd:choice>
      <xsd:element name="ATTRIBUTE_INTEGER_TYPE"
        type="dedsl:AN_ATTRIBUTE_INTEGER_TYPE"/>

```

```

        <xsd:element name="ATTRIBUTE_REAL_TYPE"
            type="dedsl:AN_ATTRIBUTE_REAL_TYPE"/>
        <xsd:element name="ATTRIBUTE_ENUMERATED_TYPE"
            type="dedsl:AN_ATTRIBUTE_ENUMERATED_TYPE"/>
        <xsd:element name="ATTRIBUTE_IDENTIFIER_TYPE"
            type="dedsl:AN_ATTRIBUTE_IDENTIFIER_TYPE"/>
        <xsd:element name="ATTRIBUTE_TEXT_TYPE"
            type="dedsl:AN_ATTRIBUTE_TEXT_TYPE"/>
        <xsd:element name="ATTRIBUTE_ENTITY_TYPE"
            type="dedsl:AN_ATTRIBUTE_ENTITY_TYPE"/>
    </xsd:choice>
    <xsd:element name="ATTRIBUTE_COMMENT"
        type="dedsl:AN_ATTRIBUTE_COMMENT" minOccurs="0"
        maxOccurs="unbounded"/>
    <xsd:element name="ATTRIBUTE_INHERITANCE"
        type="dedsl:AN_ATTRIBUTE_INHERITANCE" minOccurs="0"/>
    <xsd:element name="ATTRIBUTE_DEFAULT_VALUE"
        type="dedsl:AN_ATTRIBUTE_DEFAULT_VALUE" minOccurs="0"/>
    <xsd:element name="ATTRIBUTE_VALUE_EXAMPLE"
        type="dedsl:AN_ATTRIBUTE_VALUE_EXAMPLE" minOccurs="0"/>
</xsd:sequence>
</xsd:complexType>

<!-- dictionary type -->
<xsd:complexType name="A_DATA_ENTITY_DICTIONARY">
    <xsd:sequence>
        <xsd:element name="DICTIONARY_IDENTIFICATION"
            type="dedsl:A_DICTIONARY_IDENTIFICATION"/>
        <xsd:element name="DATA_ENTITY_DEFINITION"
            type="dedsl:A_DATA_ENTITY_DEFINITION" maxOccurs="unbounded">
            <xsd:annotation>
                <xsd:documentation>Collection of data entities making up the dictionary
            </xsd:documentation>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="USER_DEFINED_ATTRIBUTE_DEFINITION"
            type="dedsl:AN_USER_DEFINED_ATTRIBUTE_DEFINITION" minOccurs="0"
            maxOccurs="unbounded">
            <xsd:annotation>
                <xsd:documentation>Set of definitions of user-defined attributes: kept for backward
                compatibility with CCSDS DEDSL/XML(DTD)</xsd:documentation>
            </xsd:annotation>
        </xsd:element>
    </xsd:sequence>
</xsd:complexType>

<!-- dictionary element: root -->
<xsd:element name="DATA_ENTITY_DICTIONARY"
    type="dedsl:A_DATA_ENTITY_DICTIONARY">
    <xsd:annotation>
        <xsd:documentation>The DEDSL Data Entity Dictionary
    </xsd:documentation>
    </xsd:annotation>
    <xsd:key name="dataEntityNameKey">
        <xsd:annotation>
            <xsd:documentation>This key ensures a unique data entity name within the current

```



```

        dictionary being defined.</xsd:documentation>
        </xsd:annotation>
        <xsd:selector xpath="dedsl:DATA_ENTITY_DEFINITION"/>
        <xsd:field xpath="@NAME"/>
    </xsd:key>
</xsd:element>
<!-- *****-->
<!-- Place here the syntactic and semantic definitions of the expected user-defined attributes -->
<!-- *****-->
</xsd:schema>

```

ANNEX A

SECURITY, SANA, AND PATENT CONSIDERATIONS

(INFORMATIVE)

A1 SECURITY CONSIDERATIONS

A1.1 OVERVIEW

The CCSDS requires that there to be an informative annex that points out security considerations for implementations of its standards. This annex presents the results of an analysis of security considerations applied to the technologies specified in this specification.

General guidance on security issues may be found in the Informational Report CCSDS 350.0-G-2, *The Application of CCSDS Protocols to Secure Systems* (Green Book, Issue 2, January 2006), and references therein.

Security services may need to be applied during the storage and transfer of the Data Entity Dictionaries. However, the scope of this specification is specifically the content of a DEDSL Data Entity Dictionary. Therefore the specification of such security services is outside the scope of this document.

If there is a reason to believe that non-authorized entities might be able to view or obtain the Data Entity Dictionaries, and if there is a need to ensure that non-authorized entities not be able to view or obtain these Data Entity Dictionaries, then confidentiality, integrity and/or authentication mechanisms need to be applied.

A1.2 SECURITY CONCERNS WITH RESPECT TO THE CCSDS DOCUMENT

A1.2.1 Data Privacy

Data Privacy should be provided by the systems on which this specification is implemented. For example, the XFDU standard data structure could be used to package the Data Entity Dictionaries and specify the encryption of any or all of the data contained within the XFDU package.

A1.2.2 Data Integrity

Data Integrity should be provided by the systems on which this specification is implemented. For example, the XFDU standard data structure could be used to package the Data Entity Dictionaries and specify the checksums. Other software providing data integrity solutions may be used.

A1.2.3 Authentication of Communicating Entities

Authentication of communicating entities involved in the transport of Data Entity Dictionaries compliant with this specification should be provided by the systems on which this specification is implemented. The consequences of failing to properly authenticate the communicating entities involved in the transport of data that complies with this specification could include potential loss, corruption, and theft of data, and loss of data privacy.

A1.2.4 Data transfer between communicating entities

The transfer of Data Entity Dictionaries formatted in compliance with this specification between communicating entities should be accomplished via secure mechanisms approved by the IT Security functionalities of exchange participants.

A1.2.5 Control of Access to Resources

This specification is not directly involved in the control of access to resources. It assumes that control of access to resources will be managed by the systems upon which Data Entity Dictionaries compliant with the specification are defined.

A1.2.6 Availability of Resources

This specification assumes that the management of systems upon which this specification is implemented will handle availability of resource usage.

A1.2.7 Auditing of Resource Usage

This specification assumes that the management of systems upon which this specification is implemented will handle auditing of resource usage.

A1.3 POTENTIAL THREATS AND ATTACK SCENARIOS

There are no unique threats or attack scenarios that apply specifically to the technologies specified in this specification.

A1.4 CONSEQUENCES OF NOT APPLYING SECURITY TO THE TECHNOLOGY

The consequences of not applying security to the systems and networks on which this specification is implemented could include potential loss, corruption, and theft of data, and loss of data privacy.

A2 SANA CONSIDERATIONS

The recommendations of this document request SANA to make the DEDSL XML Schema available on a CCSDS resource that is Internet accessible.

NOTE – The DEDSL XML Schema is currently available at:

<https://sanaregistry.org/files/daixml/ccsds-dedsl-O1.xsd>

A3 PATENT CONSIDERATIONS

There are no known patent issues related to this specification.

ANNEX B

SIMPLE EXAMPLES

(INFORMATIVE)

B1 OVERVIEW

The following examples show how data entity definitions would appear in a single file.

B2 REAL DATA ENTITY EXAMPLE

```
<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="Measurement_Date">
<ALIAS NAME="Elapsed_Time">elapsed time since mission start</ALIAS>
<DEFINITIONAL_PART>
  <DEFINITION>This field contains the date of the instrument measurement delivering,
expressed as the elapsed time since the start of the mission</DEFINITION>
  <SHORT_DEFINITION>Elapsed time since the mission start</SHORT_DEFINITION>
  <UNITS>s</UNITS>
  <SPECIFIC_INSTANCE VALUE="0.0">Start of mission: 2nd of July 1999 at 3h45mn PM
  </SPECIFIC_INSTANCE>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <REAL_TYPE/>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>
```

B3 REAL DATA ENTITY EXAMPLE

```
<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="RMS">
<DEFINITIONAL_PART>
  <DEFINITION>Components of B in GSE coordinates obtained by taking the root mean-
square of the values in the observing intervals.</DEFINITION>
  <SHORT_DEFINITION>Components of RMS of B (GSE)</SHORT_DEFINITION>
  <COMMENT>This is an example entity to demonstrate the DEDSL</COMMENT>
  <UNITS>deg</UNITS>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <REAL_TYPE><REAL_RANGE MAX="99.0" MIN="1.0"/></REAL_TYPE>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>
```

B4 ENUMERATED DATA ENTITY EXAMPLE

The following example shows the ENTITY_DEFINITION associated with a data entity of type Enumerated (numeric values):

```

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="EQUIPMENT_MODE1">
<DEFINITIONAL_PART>
  <DEFINITION>Mode of the equipment used for taking measures</DEFINITION>
  <SHORT_DEFINITION>Equipment Mode</SHORT_DEFINITION>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <ENUMERATED_TYPE>
    <ENUMERATION VALUE="NOMINAL">
      <ENUMERATION_CONVENTION>0</ENUMERATION_CONVENTION>
    </ENUMERATION>
    <ENUMERATION VALUE="CALIBRATION">
      <ENUMERATION_CONVENTION>1</ENUMERATION_CONVENTION>
    </ENUMERATION>
    <ENUMERATION VALUE="OFF">
      <ENUMERATION_CONVENTION>2</ENUMERATION_CONVENTION>
    </ENUMERATION>
  </ENUMERATED_TYPE>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>

```

B5 ENUMERATED DATA ENTITY EXAMPLE

The following example shows the ENTITY_DEFINITION associated with a data entity of type Enumerated (ascii values):

```

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="EQUIPMENT_MODE2">
<DEFINITIONAL_PART>
  <DEFINITION>Mode of the equipment used for taking measures</DEFINITION>
  <SHORT_DEFINITION>Equipment Mode</SHORT_DEFINITION>
  <COMMENT>The values of the data entity named MISSION are ASCII encoded enumerated
values corresponding to strings of fixed length (6 characters)</COMMENT>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <ENUMERATED_TYPE>
    <ENUMERATION VALUE="MARS">
      <ENUMERATION_CONVENTION>'MARS'</ENUMERATION_CONVENTION>
    </ENUMERATION>
    <ENUMERATION VALUE="HELIOS">
      <ENUMERATION_CONVENTION>'HELIOS'</ENUMERATION_CONVENTION>
    </ENUMERATION>
    <ENUMERATION VALUE="MOON">
      <ENUMERATION_CONVENTION>'MOON'</ENUMERATION_CONVENTION>
    </ENUMERATION>
  </ENUMERATED_TYPE>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>

```

B6 COMPOSITE DATA ENTITY EXAMPLE

The following example shows the ENTITY_DEFINITION associated with a data entity of type composite:

```

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="DATE_TIME">
<DEFINITIONAL_PART>
  <DEFINITION>Definition of the kind of date used to date telemetry frames</DEFINITION>
  <SHORT_DEFINITION>Telemetry frame date</SHORT_DEFINITION>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <COMPOSITE_TYPE>
    <COMPONENT>YEAR</COMPONENT>
    <COMPONENT>MONTH</COMPONENT>
    <COMPONENT>DAY</COMPONENT>
    <COMPONENT>HOUR</COMPONENT>
    <COMPONENT>MINUTE</COMPONENT>
    <COMPONENT>SECOND</COMPONENT>
  </COMPOSITE_TYPE>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>

```

B7 USE OF A USER-DEFINED ATTRIBUTE EXAMPLE

The following example shows a data entity description using a user-defined attribute AUDIO_EXAMPLE.

```
<xsd:simpleType name="AN_AUDIO_EXAMPLE">
  <xsd:annotation>
    <xsd:documentation> It represents a pointer to a sound file in .wav format providing an
example to be heard. The value is expressed as a path.</xsd:documentation>
    <xsd:documentation> Here is an example (embedded text being delimited by simple quotes):
'/home/MUSIC/INSTRUMENT/SOUND/Piano.wav'</xsd:documentation >
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
<xsd:maxLength value="1024"/>
</xsd:restriction>
</xsd:simpleType>
```

The following example shows a data entity description using a user-defined attribute:

```
<DATA_ENTITY_DEFINITION CLASS="MODEL" NAME="Music_Instrument">
<DEFINITIONAL_PART>
  <DEFINITION>It corresponds to an instrument</DEFINITION>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <ENUMERATED_TYPE>
    <ENUMERATION VALUE="Piano">
      <ENUMERATION_CONVENTION>1</ENUMERATION_CONVENTION>
    </ENUMERATION>
    <ENUMERATION VALUE="Guitar">
      <ENUMERATION_CONVENTION>2</ENUMERATION_CONVENTION>
    </ENUMERATION>
    <ENUMERATION VALUE="Violin">
      <ENUMERATION_CONVENTION>3</ENUMERATION_CONVENTION>
    </ENUMERATION>
    <ENUMERATION VALUE="Saxophone">
      <ENUMERATION_CONVENTION>4</ENUMERATION_CONVENTION>
    </ENUMERATION>
  </ENUMERATED_TYPE>
</REPRESENTATIONAL_PART>
<AUDIO_EXAMPLE>/home/MUSIC/INSTRUMENTS/SOUND/Piano.wav</AUDIO_EXAMPLE>
</DATA_ENTITY_DEFINITION>
```


B8 INHERITANCE BETWEEN TWO ENUMERATED DATA ENTITIES EXAMPLE

The following example shows a case of inheritance between two data entity definitions (a MODEL entity and a DATA FIELD entity). In this example, the model entity is an Enumerated giving different second formats, and the data field entity has less allowed formats as a result of the possibility of specialization. The list of allowed enumeration values has to be explicitly stated.

```
<DATA_ENTITY_DEFINITION CLASS="MODEL" NAME="CURRENT_SECOND_FORMATS">
<DEFINITIONAL_PART>
<DEFINITION>Set of the second formats applicable in the project context.</DEFINITION>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <ENUMERATED_TYPE>
    <ENUMERATION VALUE="SECOND"/>
    <ENUMERATION VALUE="SECOND_E_2"/>
    <ENUMERATION VALUE="SECOND_E_4"/>
    <ENUMERATION VALUE="MICRO_SECOND"/>
    <ENUMERATION VALUE="SECOND_E_8"/>
    <ENUMERATION VALUE="SECOND_E_10"/>
  </ENUMERATED_TYPE>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>
```

```
<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="ALLOWED_SECOND_FORMATS">
<DEFINITIONAL_PART>
<DEFINITION>Set of the current second formats applicable in the project context. Less
formats are allowed.</DEFINITION>
<SPECIFIC_INSTANCE VALUE="MICRO_SECOND">'most frequently used for defining a date time
format'</SPECIFIC_INSTANCE>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
<INHERITS_FROM>CURRENT_SECOND_FORMATS</INHERITS_FROM>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <ENUMERATED_TYPE>
    <ENUMERATION VALUE="SECOND"/>
    <ENUMERATION VALUE="SECOND_E_2"/>
    <ENUMERATION VALUE="SECOND_E_4"/>
    <ENUMERATION VALUE="MICRO_SECOND"/>
  </ENUMERATED_TYPE>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>
```

B9 INHERITANCE BETWEEN TWO INTEGER DATA ENTITIES EXAMPLE

The following example shows a case of inheritance between two data entity definitions (a MODEL entity and a DATA FIELD entity). In this example, the model entity is an Integer offering a choice of different distance units, and the data field entity has only one unit as a result of the possibility of specialization. Several meaningful specific instances can also be defined as a possible result of specialization.

```

<DATA_ENTITY_DEFINITION CLASS="MODEL" NAME="DISTANCE">
<DEFINITIONAL_PART>
  <DEFINITION>Distance generally speaking</DEFINITION>
  <UNITS>mm</UNITS>
  <UNITS>cm</UNITS>
  <UNITS>dm</UNITS>
  <UNITS>m</UNITS>
  <UNITS>km</UNITS>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <INTEGER_TYPE><INTEGER_RANGE MIN="0" MAX="36000"/></INTEGER_TYPE>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="COVERED_DISTANCE">
<DEFINITIONAL_PART>
<DEFINITION>Distance covered during athletic competitions</DEFINITION>
  <UNITS>m</UNITS>
  <SPECIFIC_INSTANCE VALUE="50">50 meters</SPECIFIC_INSTANCE>
  <SPECIFIC_INSTANCE VALUE="5000">5000 meters</SPECIFIC_INSTANCE>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
<INHERITS_FROM>DISTANCE</INHERITS_FROM>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <INTEGER_TYPE><INTEGER_RANGE MIN="0" MAX="36000"/></INTEGER_TYPE>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>

```

ANNEX C

CONCRETE EXAMPLES OF USER CUSTOMIZED DEDSL.XSD

(INFORMATIVE)

C1 OVERVIEW

This annex presents a projectCustomizedDedsl.xsd containing the XML Schema Definitions of some major attributes used by a set of projects, as well as an implemented corresponding XML dictionary definition.

C2 USER-CUSTOMIZED DEDSL.XSD

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:dedsl="urn:ccsds:schema:dedsl:1" targetNamespace="urn:ccsds:schema:dedsl:1"
elementFormDefault="qualified" attributeFormDefault="unqualified">
...
Previous definitions related to the dictionary have been removed for brevity to focus on the specific
parts added by the project
...

<xsd:complexType name="A_DICTIONARY_IDENTIFICATION">
  <xsd:annotation>
    <xsd:documentation>Set of DEDSL standard attributes characterizing the current dictionary
with identifying, definitional, relational, representational and administrative information with additional
user-defined attributes if necessary</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="DICTIONARY_NAME" type="dedsl:A_DICTIONARY_NAME"/>
    <xsd:element name="DICTIONARY_DEFINITION"
type="dedsl:A_DICTIONARY_DEFINITION" minOccurs="0"/>
    <xsd:element name="EXTERNAL_DICTIONARY_REFERENCE"
type="dedsl:AN_EXTERNAL_DICTIONARY_REFERENCE" minOccurs="0"
maxOccurs="unbounded"/>
    <xsd:element name="DICTIONARY_LANGUAGE"
type="dedsl:A_DICTIONARY_LANGUAGE"/>
    <xsd:element name="DICTIONARY_VERSION"
type="dedsl:A_DICTIONARY_VERSION" minOccurs="0"/>
    <xsd:element name="DICTIONARY_IDENTIFIER" type="dedsl:A_DICTIONARY_ID"
minOccurs="0"/>
    <xsd:element name="DEDSL_VERSION" type="dedsl:A_DEDSL_VERSION"/>
  </xsd:sequence>
</complexType>

<!-- *****-->
<!--This definition replaces the default DEDSL definition in order to add the project attributes -->
<!-- *****-->
```

```

        <xsd:element name="DICTIONARY_USER_DEFINED_ATTRIBUTES"
type="dedsl:AUTHORIZED_DICTIONARY_USER_DEFINED_ATTRIBUTES" minOccurs="0"/>
    </xsd:sequence>
</xsd:complexType>

<!-- *****-->
<!-- Set of types used for defining DICTIONARY attributes -->
<!-- *****-->

<xsd:complexType name="AUTHORIZED_DICTIONARY_USER_DEFINED_ATTRIBUTES">
<xsd:annotation>
<xsd:documentation>Set of user-defined attributes specific to a project or community and authorized
within a dictionary definition</xsd:documentation>
</xsd:annotation>
    <xsd:choice minOccurs="0" maxOccurs="4">
        <xsd:element name="CREATION_DATE" type="dedsl:A_CREATION_DATE"
minOccurs="1" maxOccurs="1"/>
        <xsd:element name="MODELLER_VERSION"
type="dedsl:A_MODELLER_VERSION" minOccurs="1" maxOccurs="1"/>
        <xsd:element name="DICTIONARY_STATUS"
type="dedsl:A_DICTIONARY_STATUS" minOccurs="1" maxOccurs="1"/>
        <xsd:element name="BIT_ORDER" type="dedsl:A_BIT_ORDER" minOccurs="1"
maxOccurs="1"/>
    </xsd:choice>
</xsd:complexType>

<!-- Set of types used for defining DICTIONARY attributes -->
<xsd:simpleType name="A_CREATION_DATE">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
CREATION_DATE</xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
    <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DICTIONARY">
CREATION_DATE</ATTRIBUTE_NAME>
    <ATTRIBUTE_DEFINITION>Represents the creation date of the Data Entity Dictionary.
</ATTRIBUTE_DEFINITION>
    <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
    <ATTRIBUTE_TEXT_TYPE MAX_SIZE="8000"/>
    <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
</ATTRIBUTE_COMMENT>
    <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
    <ATTRIBUTE_VALUE_EXAMPLE>CREATION_DATE = Thu Aug 19 14:38:04 2001 ;
</ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:maxLength value="24"/>
    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_MODELLER_VERSION">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
MODELLER_VERSION</xsd:documentation>

```

```

<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DICTIONARY">
    MODELLER_VERSION</ATTRIBUTE_NAME>
    <ATTRIBUTE_DEFINITION>Represents the version of MODELLER whereby the Data Entity
Dictionary was generated.</ATTRIBUTE_DEFINITION>

    <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
    <ATTRIBUTE_TEXT_TYPE MAX_SIZE="8000"/>
    <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
</ATTRIBUTE_COMMENT>
    <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
    <ATTRIBUTE_VALUE_EXAMPLE>MODELLER_VERSION = MODELLER V3.0 (2001)
;</ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="[0-9]([0-9])*.[a-z0-9]([0-9])*([a-z0-9])*/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_DICTIONARY_STATUS">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
DICTIONARY_STATUS</xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL"
SCOPE="DICTIONARY">DICTIONARY_STATUS</ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents the Data Entity Dictionary generation status. The
RELEASE status means the dictionary is fully compatible with the DEDSL-PVL CCSDS norm. The
DRAFT status is for temporary dictionaries.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_ENUMERATED_TYPE>
  <ATTRIBUTE_ENUMERATION_VALUE>DRAFT</ATTRIBUTE_ENUMERATION_VALUE>

<ATTRIBUTE_ENUMERATION_VALUE>RELEASE</ATTRIBUTE_ENUMERATION_VALUE>
</ATTRIBUTE_ENUMERATED_TYPE>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
</ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>DICTIONARY_STATUS = DRAFT ;
</ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="DRAFT"/>
    <xsd:enumeration value="RELEASE"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_BIT_ORDER">
<xsd:annotation>

```

```

<xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
BIT_ORDER </xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DICTIONARY"> BIT_ORDER
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents the bit order system used by the computer that will
  generate data.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="80"/>
  <ATTRIBUTE_COMMENT>This is the order bit attribute.</ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>BIT_ORDER = HIGH_ORDER_FIRST
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
<xsd:restriction base="xsd:string">
  <xsd:enumeration value="HIGH_ORDER_FIRST"/>
  <xsd:enumeration value="LOW_ORDER_FIRST"/>
  <xsd:enumeration value="Not_Completed"/>
</xsd:restriction>
</xsd:simpleType>

```

Previous definitions related to a data entity have been removed for brevity to focus on the specific parts added by the project

...

```

<xsd:complexType name="A_DATA_ENTITY_DEFINITION">
<xsd:annotation>
<xsd:documentation>Set of DEDSL standard attributes characterizing the current data entity with
identifying, definitional, relational and representational information, and additional user-defined
attributes if necessary.</xsd:documentation>
</xsd:annotation>
<xsd:sequence>
  <xsd:element name="ALIAS" type="dedsl:AN_ALIAS" minOccurs="0"
maxOccurs="unbounded"/>
  <xsd:element name="DEFINITIONAL_PART" type="dedsl:A_DEFINITIONAL_PART"/>
  <xsd:element name="RELATIONAL_PART" type="dedsl:A_RELATIONAL_PART"
minOccurs="0"/>
  <xsd:element name="REPRESENTATIONAL_PART"
type="dedsl:A_REPRESENTATIONAL_PART" minOccurs="0"/>
<!-- *****-->
<!-- This definition replaces the default DEDSL definition in order to add the project attributes -->
<!-- *****-->
  <xsd:element name="USER_DEFINED_ATTRIBUTES_PART"
type="dedsl:AUTHORIZED_DATA_ENTITY_USER_DEFINED_ATTRIBUTES" minOccurs="0"/>
</xsd:sequence>
<xsd:attribute name="NAME" type="dedsl:A_DATA_ENTITY_NAME" use="required">
  <xsd:annotation>
  <xsd:documentation>Unique Identifier of the current data entity</xsd:documentation>
  </xsd:annotation>
</xsd:attribute>
<xsd:attribute name="CLASS" type="dedsl:A_DATA_ENTITY_CLASS" default="DATA_FIELD">

```

```

        <xsd:annotation>
        <xsd:documentation>Kind of entity being defined: a model or a data field or a constant
definition</xsd:documentation>
        </xsd:annotation>
</xsd:attribute>
<xsd:attribute name="CASE_SENSITIVITY" type="dedsl:A_CASE_SENSITIVITY" use="optional"/>
</xsd:complexType>

<!-- *****-->
<!-- syntactic definitions of user-defined attributes for data entities -->
<!-- *****-->

<xsd:complexType name="AUTHORIZED_DATA_ENTITY_USER_DEFINED_ATTRIBUTES">
<xsd:annotation>
<xsd:documentation>Set of user-defined attributes specific to a project or community and authorized
within a data entity definition</xsd:documentation>
</xsd:annotation>
<xsd:choice minOccurs="0" maxOccurs="9">
    <xsd:element name="CHARACTER_RANGE" type="dedsl:A_CHARACTER_RANGE"
        minOccurs="0" maxOccurs="1"/>
    <xsd:element name="CHARACTER_CONSTANT_VALUE"
type="dedsl:A_CHARACTER_CONSTANT_VALUE" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="EAST_PATH" type="dedsl:AN_EAST_PATH" minOccurs="0"
        maxOccurs="1"/>
    <xsd:element name="LENGTH" type="dedsl:A_LENGTH" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="NUMBER" type="dedsl:A_NUMBER" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="EXISTS_IF" type="dedsl:AN_EXISTS_IF" minOccurs="0"
maxOccurs="1"/>
    <xsd:element name="NATURE" type="dedsl:A_NATURE" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="INDEX" type="dedsl:AN_INDEX" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="FIELD_LOCATION" type="dedsl:A_FIELD_LOCATION" minOccurs="0"
maxOccurs="1"/>
</xsd:choice>
</xsd:complexType>

<!-- Set of types used for defining data entity attributes -->
<xsd:simpleType name="A_CHARACTER_RANGE">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
CHARACTER_RANGE</xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
    <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> CHARACTER_RANGE
    </ATTRIBUTE_NAME>
    <ATTRIBUTE_DEFINITION>Range of a character.</ATTRIBUTE_DEFINITION>
    <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
    <ATTRIBUTE_TEXT_TYPE MAX_SIZE="80"/>
    <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
    <ATTRIBUTE_VALUE_EXAMPLE>CHARACTER_RANGE = ['A..'Z'];
    </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
    <xsd:restriction base="xsd:string">
        <xsd:minLength value="0"/>
        <xsd:maxLength value="80"/>

```

```

    </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_EAST_PATH">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
EAST_PATH </xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> EAST_PATH
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents the absolute path of a data entity in a data model.
This information is used by EAST tools to process data.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_IDENTIFIER_TYPE MAX_SIZE="80"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>EAST_PATH = "DATA_MODEL.RECORD.EL1"
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
    <xsd:pattern value="[a-zA-Z]([a-zA-Z0-9_])*[a-zA-Z0-9]"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_FIELD_LOCATION">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
FIELD_LOCATION</xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="CONDITIONAL" SCOPE="DATA"> FIELD_LOCATION
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>It 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 MAX_SIZE="1024"/>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>date.year</ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="0"/>
    <xsd:maxLength value="1024"/>
  </xsd:restriction>
</xsd:simpleType>

```



```

<xsd:simpleType name="A_VARIABLE_LENGTH_KEYWORD">
  <xsd:annotation>
    <xsd:documentation>variable length</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="&quot;variable&quot;"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_FIXED_LENGTH">
  <xsd:annotation>
    <xsd:documentation>Length expressed in bits</xsd:documentation>
  </xsd:annotation>
  <xsd:restriction base="xsd:unsignedLong"/>
</xsd:simpleType>

<xsd:simpleType name="A_LENGTH">
  <xsd:annotation>
    <xsd:documentation>Represents the XSD definition of the default MODELLER attribute: LENGTH
  </xsd:documentation>
  <xsd:appinfo>
    <USER_DEFINED_ATTRIBUTE_DEFINITION>
      <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> LENGTH
      </ATTRIBUTE_NAME>
      <ATTRIBUTE_DEFINITION>This attribute represents the storage size of the entity in bytes.
      </ATTRIBUTE_DEFINITION>
      <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
      <ATTRIBUTE_INTEGER_TYPE/>
      <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
      </ATTRIBUTE_COMMENT>
      <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
      <ATTRIBUTE_VALUE_EXAMPLE>LENGTH = 12 ;</ATTRIBUTE_VALUE_EXAMPLE>
    </USER_DEFINED_ATTRIBUTE_DEFINITION>
  </xsd:appinfo>
  <xsd:annotation>
    <xsd:union memberTypes="dedsl:A_FIXED_LENGTH
      dedsl:A_VARIABLE_LENGTH_KEYWORD"/>
  </xsd:annotation>
</xsd:simpleType>

<xsd:simpleType name="A_NUMBER">
  <xsd:annotation>
    <xsd:documentation>Represents the XSD definition of the default MODELLER attribute: NUMBER
  </xsd:documentation>
  <xsd:appinfo>
    <USER_DEFINED_ATTRIBUTE_DEFINITION>
      <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> NUMBER
      </ATTRIBUTE_NAME>
      <ATTRIBUTE_DEFINITION>This attribute represents the position of the entity in a record
      entity. </ATTRIBUTE_DEFINITION>
      <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
      <ATTRIBUTE_INTEGER_TYPE/>
      <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
      </ATTRIBUTE_COMMENT>
      <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
      <ATTRIBUTE_VALUE_EXAMPLE>NUMBER = 1 ;</ATTRIBUTE_VALUE_EXAMPLE>
    </USER_DEFINED_ATTRIBUTE_DEFINITION>
  </xsd:appinfo>
  <xsd:annotation>
    <xsd:union memberTypes="dedsl:A_FIXED_LENGTH
      dedsl:A_VARIABLE_LENGTH_KEYWORD"/>
  </xsd:annotation>
</xsd:simpleType>

```

```

</xsd:appinfo>
</xsd:annotation>
  <xsd:restriction base="xsd:unsignedLong"/>
</xsd:simpleType>

<xsd:simpleType name="AN_EXISTS_IF">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute: EXISTS_IF
</xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> EXISTS_IF
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents the existence condition for the data entity.
  </ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="8000"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute. MODELLER use a
  particular format for the condition expression.</ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>EXISTS_IF = "DATAMODEL.RECORD.FIELD1[0..0]" ;
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="A_CHARACTER_CONSTANT_VALUE">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
CHARACTER_CONSTANT_VALUE</xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA">
  CHARACTER_CONSTANT_VALUE </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents a constant value of a character.
  </ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="1"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>'A'</ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="1"/>
  </xsd:restriction>
</xsd:simpleType>

```

```

<xsd:simpleType name="A_NATURE">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute: NATURE
</xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> NATURE
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>This attribute extends the DEDSL-PVL concept of type,
  introducing such types as LIST, RECORD or ARRAY.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_IDENTIFIER_TYPE MAX_SIZE="80"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>NATURE = ARRAY ;</ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="INTEGER"/>
    <xsd:enumeration value="REAL"/>
    <xsd:enumeration value="CHARACTER_STRING"/>
    <xsd:enumeration value="RECORD"/>
    <xsd:enumeration value="CHARACTER"/>
    <xsd:enumeration value="ARRAY"/>
    <xsd:enumeration value="LIST"/>
    <xsd:enumeration value="ENUMERATED"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="AN_INDEX">
<xsd:annotation>
<xsd:documentation>Represents the XSD definition of the default MODELLER attribute:
INDEX</xsd:documentation>
<xsd:appinfo>
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> INDEX
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents either the range values of the index or the name of
  the entity used as an index for a composite entity.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="8000"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>INDEX = ("1..13") ;</ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</xsd:appinfo>
</xsd:annotation>
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="8000"/>
  </xsd:restriction>
</xsd:simpleType>
</xsd:schema>

```

C3 XML COMPLIANT DICTIONARY

This is an example of a dictionary instance using the user-defined attributes of the previous dictionary xsd definition. They appear in italics.

```

<?xml version="1.0" encoding="UTF-8"?>
<DATA_ENTITY_DICTIONARY xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:ccsds:schema:deds1:1" xsi:schemaLocation="urn:ccsds:schema:deds1:1
projectCustomizedDeds1.xsd">

<!--Data Entity Dictionary attributes-->
<DICTIONARY_IDENTIFICATION>
  <DICTIONARY_NAME CASE_SENSITIVITY="CASE_SENSITIVE">
    MISSION_NATIVE_DATA </DICTIONARY_NAME>
  <DICTIONARY_DEFINITION>Description of a native datafile.</DICTIONARY_DEFINITION>
  <DICTIONARY_LANGUAGE ISO_CODE="en" IN_ENGLISH="English"/>
  <DEDSL_VERSION>CCSDS 647.4-O-1</DEDSL_VERSION>
  <DICTIONARY_USER_DEFINED_ATTRIBUTES>
    <CREATION_DATE>Tue May 31 10:22:13 2011</CREATION_DATE>
    <MODELLER_VERSION>7.4</MODELLER_VERSION>
    <DICTIONARY_STATUS>DRAFT</DICTIONARY_STATUS>
    <BIT_ORDER>LOW_ORDER_FIRST</BIT_ORDER>
  </DICTIONARY_USER_DEFINED_ATTRIBUTES>
</DICTIONARY_IDENTIFICATION>

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="DATA_RECORD">
<DEFINITIONAL_PART>
  <DEFINITION>A record composed of 6 tags. </DEFINITION>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <COMPOSITE_TYPE>
    <COMPONENT>YDH</COMPONENT>
    <COMPONENT>NUM</COMPONENT>
    <COMPONENT>TI</COMPONENT>
    <COMPONENT>FI</COMPONENT>
    <COMPONENT>DT</COMPONENT>
    <COMPONENT>ANT</COMPONENT>
  </COMPOSITE_TYPE>
</REPRESENTATIONAL_PART>
<USER_DEFINED_ATTRIBUTES_PART>
  <EAST_PATH>MISSION.DATA_RECORD</EAST_PATH>
  <LENGTH>152</LENGTH>
  <NUMBER>1</NUMBER>
  <NATURE>RECORD</NATURE>
</USER_DEFINED_ATTRIBUTES_PART>
</DATA_ENTITY_DEFINITION>

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="YDH">
<DEFINITIONAL_PART>
  <DEFINITION>yyyydddhh of current file</DEFINITION>
  <UNITS>"None"</UNITS>
</DEFINITIONAL_PART>

```

```

<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <INTEGER_TYPE><INTEGER_RANGE MIN="0" MAX="2**32 - 1"/></INTEGER_TYPE>
</REPRESENTATIONAL_PART>
<USER_DEFINED_ATTRIBUTES_PART>
  <EAST_PATH>MISSION.DATA_RECORD.YDH</EAST_PATH>
  <LENGTH>32</LENGTH>
  <NUMBER>1</NUMBER>
  <NATURE>INTEGER</NATURE>
</USER_DEFINED_ATTRIBUTES_PART>
</DATA_ENTITY_DEFINITION>

```

```

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="NUM">
<DEFINITIONAL_PART>
  <DEFINITION>record index</DEFINITION>
  <UNITS>"None"</UNITS>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <INTEGER_TYPE><INTEGER_RANGE MIN="0" MAX="2**32 - 1"/></INTEGER_TYPE>
</REPRESENTATIONAL_PART>
<USER_DEFINED_ATTRIBUTES_PART>
  <EAST_PATH>MISSION.DATA_RECORD.NUM</EAST_PATH>
  <LENGTH>32</LENGTH>
  <NUMBER>2</NUMBER>
  <NATURE>INTEGER</NATURE>
</USER_DEFINED_ATTRIBUTES_PART>
</DATA_ENTITY_DEFINITION>

```

```

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="TI">
<DEFINITIONAL_PART>
  <DEFINITION>time index: yydddsssss with yy = year - 1996 (1997=1, 1998=2, ...) ddd = day
of year (1-366) and sssss = second of day (0-86400) </DEFINITION>
  <UNITS>"None"</UNITS>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <INTEGER_TYPE><INTEGER_RANGE MIN="0" MAX="2**32 - 1"/></INTEGER_TYPE>
</REPRESENTATIONAL_PART>
<USER_DEFINED_ATTRIBUTES_PART>
  <EAST_PATH>MISSION.DATA_RECORD.TI</EAST_PATH>
  <LENGTH>32</LENGTH>
  <NUMBER>3</NUMBER>
  <NATURE>INTEGER</NATURE>
</USER_DEFINED_ATTRIBUTES_PART>
</DATA_ENTITY_DEFINITION>

```

```

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="FI">
<DEFINITIONAL_PART>
  <DEFINITION>frequency index</DEFINITION>
  <UNITS>"None"</UNITS>
</DEFINITIONAL_PART>
<RELATIONAL_PART>

```

```

</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <INTEGER_TYPE><INTEGER_RANGE MIN="0" MAX="2**32 - 1"/></INTEGER_TYPE>
</REPRESENTATIONAL_PART>
<USER_DEFINED_ATTRIBUTES_PART>
  <EAST_PATH>MISSION.DATA.RECORD.FI</EAST_PATH>
  <LENGTH>32</LENGTH>
  <NUMBER>4</NUMBER>
  <NATURE>INTEGER</NATURE>
</USER_DEFINED_ATTRIBUTES_PART>
</DATA_ENTITY_DEFINITION>

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="DT">
<DEFINITIONAL_PART>
  <DEFINITION>integration time (msec)</DEFINITION>
  <UNITS>"msec"</UNITS>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <INTEGER_TYPE><INTEGER_RANGE MIN="0" MAX="2**16 - 1"/></INTEGER_TYPE>
</REPRESENTATIONAL_PART>
<USER_DEFINED_ATTRIBUTES_PART>
  <EAST_PATH>MISSION.DATA.RECORD.DT</EAST_PATH>
  <LENGTH>16</LENGTH>
  <NUMBER>5</NUMBER>
  <NATURE>INTEGER</NATURE>
</USER_DEFINED_ATTRIBUTES_PART>
</DATA_ENTITY_DEFINITION>

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="ANT">
<DEFINITIONAL_PART>
  <DEFINITION>antenna selection</DEFINITION>
  <UNITS>"None"</UNITS>
</DEFINITIONAL_PART>
<RELATIONAL_PART>
</RELATIONAL_PART>
<REPRESENTATIONAL_PART>
  <INTEGER_TYPE><INTEGER_RANGE MIN="0" MAX="2**8 - 1"/></INTEGER_TYPE>
</REPRESENTATIONAL_PART>
<USER_DEFINED_ATTRIBUTES_PART>
  <EAST_PATH>MISSION.DATA.RECORD.ANT</EAST_PATH>
  <LENGTH>8</LENGTH>
  <NUMBER>6</NUMBER>
  <NATURE>INTEGER</NATURE>
</USER_DEFINED_ATTRIBUTES_PART>
</DATA_ENTITY_DEFINITION>

<!-- User attributes definitions -->
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> CHARACTER_RANGE
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Range of a character.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="80"/>

```

```

    <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
    <ATTRIBUTE_VALUE_EXAMPLE>CHARACTER_RANGE = ['A'..'Z'] ;
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>

<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA">
    CHARACTER_CONSTANT_VALUE</ATTRIBUTE_NAME>
    <ATTRIBUTE_DEFINITION>This is a constant value of a character.
  </ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="80"/>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>'A'</ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>

<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA">EAST_PATH
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents the absolute path of a data entity in a data model.
  This information is used by EAST tools to process data.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_IDENTIFIER_TYPE MAX_SIZE="80"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>EAST_PATH = DATA_MODEL.RECORD.EL1
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>

<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DICTIONARY">
    CREATION_DATE</ATTRIBUTE_NAME>
    <ATTRIBUTE_DEFINITION>Represents the creation date of the Data Entity Dictionary.
  </ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="8000"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>CREATION_DATE = Thu Aug 19 14:38:04 2001 ;
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>

<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> LENGTH
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>This attribute represents the storage size of the entity in bytes.
  </ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_INTEGER_TYPE/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>LENGTH = 12 ; </ATTRIBUTE_VALUE_EXAMPLE>

```

```
</USER_DEFINED_ATTRIBUTE_DEFINITION>
```

```
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> NUMBER
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>This attribute represents the position of the entity in a record
  entity.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_INTEGER_TYPE/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>NUMBER = 1 ;
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
```

```
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> EXISTS_IF
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents the existence condition for the data entity.
  </ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="8000"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute. MODELLER use a
  particular format for the condition expression.</ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>EXISTS_IF = "DATAMODEL.RECORD.FIELD1[0..0]" ;
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
```

```
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DICTIONARY">
  MODELLER_VERSION </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents the version of MODELLER whereby the Data Entity
  Dictionary was generated.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="8000"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>MODELLER_VERSION = MODELLER V3.0 (2001) ;
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
```

```
<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> NATURE
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>This attribute extends the DEDSL-PVL concept of type,
  introducing such types as LIST, RECORD or ARRAY.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_IDENTIFIER_TYPE MAX_SIZE="80"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>NATURE = ARRAY ;
  </ATTRIBUTE_VALUE_EXAMPLE>
```



```

</USER_DEFINED_ATTRIBUTE_DEFINITION>

<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DATA"> INDEX
  </ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents either the range values of the index or the name of
  the entity used as an index for a composite entity.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="8000"/>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>INDEX = ("1..13") ;
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>

<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DICTIONARY">
  DICTIONARY_STATUS</ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents the Data Entity Dictionary generation status. The
  norm. The DRAFT status is for temporary dictionaries. The RELEASE status means the dictionary is fully compatible with the DEDSL-PVL CCSDS
  norm.
  </ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_ENUMERATED_TYPE>
  <ATTRIBUTE_ENUMERATION_VALUE>DRAFT</ATTRIBUTE_ENUMERATION_VALUE>

  <ATTRIBUTE_ENUMERATION_VALUE>RELEASE</ATTRIBUTE_ENUMERATION_VALUE>
  </ATTRIBUTE_ENUMERATED_TYPE>
  <ATTRIBUTE_COMMENT>This is a default MODELLER attribute.
  </ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>DICTIONARY_STATUS = DRAFT ;
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>

<USER_DEFINED_ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_NAME OBLIGATION="OPTIONAL" SCOPE="DICTIONARY">
  BIT_ORDER</ATTRIBUTE_NAME>
  <ATTRIBUTE_DEFINITION>Represents the bit order system used by the computer that will
  generate data.</ATTRIBUTE_DEFINITION>
  <ATTRIBUTE_MAXIMUM_OCCURRENCE>1</ATTRIBUTE_MAXIMUM_OCCURRENCE>
  <ATTRIBUTE_TEXT_TYPE MAX_SIZE="80"/>
  <ATTRIBUTE_COMMENT>This is the order bit attribute.</ATTRIBUTE_COMMENT>
  <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
  <ATTRIBUTE_VALUE_EXAMPLE>BIT_ORDER = HIGH_ORDER_FIRST
  </ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>

</DATA_ENTITY_DICTIONARY>

```

ANNEX D

CONCRETE EXAMPLES

(INFORMATIVE)

D1 OVERVIEW

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. This example refers to the examples provided in DEDSL/XML(DTD) implementation so as to show that backward compatibility is respected.

D2 COMMUNITY DED

```
<?xml version="1.0" encoding="UTF-8"?>
<DATA_ENTITY_DICTIONARY xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:ccsds:schema:deds:1" xsi:schemaLocation="urn:ccsds:schema:deds:1
../customized_dedsDTD.xsd">
<!--Data Entity Dictionary attributes-->
<DICTIONARY_IDENTIFICATION>
  <DICTIONARY_NAME
CASE_SENSITIVITY="NOT_CASE_SENSITIVE">Planetary_Science_Data_Dictionary
  </DICTIONARY_NAME>
  <DICTIONARY_DEFINITION>This dictionary contains data entity definitions relative to
planetary science and which may be re-used for defining data products.
  </DICTIONARY_DEFINITION>
  <DICTIONARY_LANGUAGE_IN_ENGLISH="English" ISO_CODE="En"/>
  <DICTIONARY_VERSION>1.0</DICTIONARY_VERSION>
  <DEDSL_VERSION>CCSDS 647.4-O-1</DEDSL_VERSION>
</DICTIONARY_IDENTIFICATION>
<!--Dictionary entities-->

<DATA_ENTITY_DEFINITION CLASS="MODEL" NAME="LATITUDE_MODEL">
<ALIAS NAME="LAT">Used by the historical projects EARTH_PLANET</ALIAS>
<DEFINITIONAL_PART>
  <DEFINITION>Latitudes north of the equator shall be designated by the use of the plus (+) sign,
latitudes south of the equator shall be designated by the use of the minus sign (-). The equator shall be
designated by the use of the plus sign (+).</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>

D3 DATA ENTITY DICTIONARY ASSOCIATED WITH PRODUCT_X

The models of LATITUDE_MODEL, LONGITUDE_MODEL and PRODUCT_ID_MODEL defined in the community DED 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="UTF-8"?>
<DATA_ENTITY_DICTIONARY xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:ccsds:schema:dedsl:1" xsi:schemaLocation="urn:ccsds:schema:dedsl:1
projectCustomizedDedsl.xsd">

<!--Data Entity Dictionary attributes-->

<DICTIONARY_IDENTIFICATION>
  <DICTIONARY_NAME CASE_SENSITIVITY="NOT_CASE_SENSITIVE">
    PRODUCT_X_Dictionary </DICTIONARY_NAME>
  <DICTIONARY_DEFINITION>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"/>
  <DICTIONARY_VERSION>1.a</DICTIONARY_VERSION>
  <DEDSL_VERSION>CCSDS 647.4-O-1</DEDSL_VERSION>
</DICTIONARY_IDENTIFICATION>

<!--Dictionary entities-->
<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="HEADER">
<DEFINITIONAL_PART>
  <DEFINITION>It represents the header of the data product PRODUCT_X. It identifies an
  aggregation 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>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>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>
    <ENUMERATION VALUE="EUROPE"></ENUMERATION>
    <ENUMERATION VALUE="ASIA"></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>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>It 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>It 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>It 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>It represents 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 CONSTANT_VALUE="1440000"/>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="DATA_1">
<DEFINITIONAL_PART>
  <DEFINITION>It represents an image taken from spacecraft W.</DEFINITION>
  <SHORT_DEFINITION>Spacecraft W Image</SHORT_DEFINITION>
  <COMMENT>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>

```

```

        </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>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>it 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 MAX_SIZE="1024"/>
    <ATTRIBUTE_INHERITANCE OPTION="NOT_INHERITABLE"/>
    <ATTRIBUTE_VALUE_EXAMPLE>date.year</ATTRIBUTE_VALUE_EXAMPLE>
</USER_DEFINED_ATTRIBUTE_DEFINITION>
</DATA_ENTITY_DICTIONARY>

```

D4 DATA ENTITY DICTIONARY ASSOCIATED WITH PRODUCT_Y

The models of LATITUDE_MODEL, LONGITUDE_MODEL and PRODUCT_ID_MODEL defined in the community DED 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="UTF-8"?>
<DATA_ENTITY_DICTIONARY xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:ccsds:schema:deds:1" xsi:schemaLocation="urn:ccsds:schema:deds:1
projectCustomizedDeds:1.xsd">

<!--Data Entity Dictionary attributes-->
<DICTIONARY_IDENTIFICATION>
  <DICTIONARY_NAME>PRODUCT_Y_Dictionary</DICTIONARY_NAME>
  <DICTIONARY_DEFINITION>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"/>
  <DICTIONARY_VERSION>1.a</DICTIONARY_VERSION>
  <DEDSL_VERSION>CCSDS 647.4-O-1</DEDSL_VERSION>
</DICTIONARY_IDENTIFICATION>

<!--Dictionary entities-->
<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="PRODUCT_ID">
<DEFINITIONAL_PART>
  <DEFINITION>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>It 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>It 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>It represents 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 CONSTANT_VALUE="1440000"/>
</REPRESENTATIONAL_PART>
</DATA_ENTITY_DEFINITION>

```

```

<DATA_ENTITY_DEFINITION CLASS="DATA_FIELD" NAME="DATA_2">
<DEFINITIONAL_PART>
  <DEFINITION>It represents an image taken from spacecraft W.</DEFINITION>
  <SHORT_DEFINITION>Spacecraft W Image</SHORT_DEFINITION>
  <COMMENT>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>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>It 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 MAX_SIZE="1024"/>
```

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

```
<ATTRIBUTE_VALUE_EXAMPLE>date.year</ATTRIBUTE_VALUE_EXAMPLE>
```

```
</USER_DEFINED_ATTRIBUTE_DEFINITION>
```

```
</DATA_ENTITY_DICTIONARY>
```

ANNEX E

IMPLEMENTATION AVAILABILITY

(INFORMATIVE)

Versions of a CNES Implementation are available at the CNES Web site under ‘Other Thematics/BEST’ item:

<http://logiciels.cnes.fr/>

The prototype implements all the features defined in this Experimental Specification.

A User Manual of the prototype is available at the CNES Web site.

Further questions relating to the contents of this document or the use of the implementation should be addressed to the CNES Team at the following address: east@cnes.fr.

ANNEX F
ABBREVIATIONS
(INFORMATIVE)

<u>Term</u>	<u>Meaning</u>
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 Definition
ID	Identifier
ISO	International Organization for Standardization
PVL	Parameter Value Language
XFDU	XML Standard Formatted Data Unit
XML	Extensible Markup Language
XSD	XML Schema Definition