DGIWG 206

Defence Geospatial Feature Concept Dictionary (DGFCD) Description and Content

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Abstract:	This standard provides information on the purpose and structure for the registration of geospatial phenomena within the Defence Geospatial Feature Concept Dictionary (DGFCD), part of the Defence Geospatial Information Framework (DGIF).
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i. Submitting organizations

Nation	Organisation
Germany	Bundeswehr Geoinformation Centre (BGIC)
The Netherlands	Netherlands Defence Geographic Agency
France	Institut National de l'Information Géographique et Forestière (IGN)

ii. Document point of contact

All inquiries are to be sent to secretariat@dgiwg.org.

iii. Revision history

Date	Release	Editors	Primary clauses modified	Description
2014-12-27	0.1	DEU	All	Initial version
2014-12-28	0.2	DEU	Annex A and B	Finished annex A and B
2014-12-28	0.3	DEU	All	
2014-12-29	0.3.1	DEU	5.2	Moved "source" to management information
2015-01-01	0.3.2	DEU	Annex D	Added metamodel overview diagram
2015-02-22	0.3.3	NLD	All	Editorial changes
2015-09-07	0.4	DEU	All	Changed TV-datatype from date to string Added new concept "roleConcept" updated metamodel diagram
2015-09-17	0.4.1	DEU	5.2 and D.1.5	Added 531-Code Definition for RoleConcepts
2015-12-08	0.4.2	FRA	All	Editorial changes
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2017-02-17	0.6	FRA	All	General rework
2017-06-12	0.7	FRA	All	Final draft

iv. Future work

As the DGIF programme of work continues and business and technical process mature it is expected that the DGFCD will evolve and this specification reviewed and updated accordingly.

Introduction

This Standard has been developed as part of the Defence Geospatial Information Framework (DGIF) suite of standards. All parts (artifacts) of the DGIF are maintained in the DGIF collaborative modelling environment (DCE).

The DGIM is a DGIF-wide logical model for geospatial vector data that is technology neutral. This Platform Independent Model (PIM) determines the syntactic structure.

The Defence Geospatial Feature Concept Dictionary (DGFCD) contains only those Concepts that are required by the Defence Geospatial Information Model (DGIM) and is the authoritative source for this model. It is accompanied by the Defence Geospatial Real World Object Index (DGRWI) which provides a Real World Index for the DGIM.

The DGFCD provides Feature Concepts, Attributes Concepts, Datatypes, Unit of Measures and Concepts for Enumeration Values.

1 Scope

The Defence Geospatial Feature Concept Dictionary (DGFCD) specifies a concept dictionary for geospatial phenomena in support of the Defence Geospatial Information Model (DGIM). This dictionary includes feature concepts, attribute concepts with their domain types, datatypes, units of measure, and accompanying metadata.

The DGFCD conforms to a subset of ISO 19126:2009, Geographic information – Feature concept dictionaries and registers, and its information schema. The DGFCD draws upon multiple community dictionaries (e.g., Aeronautical Information Exchange Model (AIXM), IHO S-100, NATO Additional Military Layers (AML), and others) to specify an integrated feature data dictionary tailored to the requirements of Defence organisations of nations and NATO.

ISO 19101, *Geographic information – Reference model*, defines a feature as an abstraction of real world phenomena. Such abstractions may be represented in information systems using a variety of spatial modelling methods, including representations such as vectors, grids and images. The DGFCD currently covers the representation as vectors. The DGFCD also supports modelling entities that may represent other geospatially-located information that does not correspond to “real world phenomena” e.g. Religious Information.

Information traceability is established from concepts in the DGFCD to appropriate authoritative concept sources, where possible, to maximize semantic integrity when geospatial data is exchanged between national, NATO-based and other systems.

DGFCD draws upon recognized content standards, specifications and profiles from both the military (e.g., DGIWG) and civilian sectors (e.g., IHO, ICAO/EUROCONTROL, WMO).

2 Conformance

This specification specifies a geospatial concept dictionary with a structure following ISO 19126. Additions have been introduced to cover specific DGIWG needs and to make the DGFCD fit within the DCE architecture.

3 Normative references

The documents listed in Table 1 are indispensable to understand and use this standard. For dated references, only the cited edition or version applies. For undated references, the latest edition or version of the referenced document (including any amendments) applies.

Table 1: Normative References

Standard or Specification
DGIWG - 206 - Defence Geospatial Feature Concept Dictionary (DGFCD) - Normative Content https://portal.dgiwg.org/files/?artifact_id=8629
ISO/TS 19103:2005, Geographic information – Conceptual schema language
ISO 19126:2009, Geographic information – Feature concept dictionaries and registers
HBK-DP-10-001- Implementation Guide to the DFDD 2.2.8 https://portal.dgiwg.org/files/?artifact_id=7148

4 Terms, definitions, and abbreviations

4.1 Definitions

The terms and definitions specific to this standard are given in Table 2.

Table 2: Definitions Applicable to this Standard

Term	Definition
Attribute	A characteristic of a feature.
Attribute Datatype	Specifies how the value of an Attribute shall be abstractly represented and consists of one or more fields (elements). Each field captures an aspect of information required to completely specify a value in the domain of the datatype. A simple datatype consists of a single field containing a primitive data value (e.g., a real number); a complex datatype consists of multiple fields, at least one of which contains a data value. Others may contain metadata.
Datatype Element	An element (a field) of a complex datatype.
Datatype Listed Values	Values that are members of the domain of a specific enumerated datatype. These listed values are often referred to simply as "enumerants".
Feature	An abstraction of real world phenomena.
Defence Geospatial Feature Concept Dictionary	A structured collection of feature information (feature concepts, attribute concepts, and ancillary data) whose schema conforms to the conceptual model of a feature concept dictionary as specified in ISO 19126:2009.
Physical Quantities	A set of physical quantities that characterize the properties of a phenomenon, body, or substance, where the property has a magnitude that can be expressed as a number (physical value) and a reference quantity - referred to as a "unit of measure".
Units of Measure	A set of units of measure, organized by physical quantity, where a unit of measure is a predefined amount of the concerned physical quantity (for example: a metre "of length" or kilogram "of mass").

4.2 Abbreviations

The acronyms that are used in this standard are specified in the following list.

AIXM	Aeronautical Information Exchange Model
AML	Additional Military Layers
DCE	DGIF Collaborative Environment
DFDD	DGIWG Feature and Attribute Data Dictionary
DGIWG	Defence Geospatial Information Working Group
FDD	Feature Data Dictionary
ICAO	International Civil Aviation Organization
IHO	International Hydrographic Organization
ISO	International Organization for Standardization
JGSWG	Joint Geospatial Standards Working Group
METOC	Meteorology and Oceanographic
MGID	Military Geographic Information & Documentation
NATO	North Atlantic Treaty Organization
NGIF	NATO Geospatial Information Framework
NGEC	NATO Geospatial Entity Catalogue
DGFCD	Defence Geospatial Feature Concept Dictionary
DGIF	Defence Geospatial Information Framework
DGIM	Defence Geospatial Information Model
DGRWI	Defence Geospatial Real World Object Index
SI	International System of Units
TS	Technical Specification
UML	Unified Modeling Language
URI	Uniform Resource Identifier

5 Logical Structure

5.1 Conceptual Metamodel

The Defence Geospatial Feature Concept Dictionary (DGFCD) specifies a concept dictionary for geospatial data. This dictionary includes feature concepts, attribute concepts with their domain types, units of measure, and accompanying metadata.

The DGFCD is maintained in the DGIF collaborative modelling environment (DCE) as a collection of concept information whose conceptual metamodel conforms to the conceptual model of a feature concept dictionary as specified in ISO 19126:2009, *Geographic information – Feature concept dictionaries and registers*. As necessary, the metamodel specified in ISO 19126 has been extended based on the object modelling component of *OMG Unified Modeling Language (OMG UML), Superstructure*, Version 2.2, September 2009, and ISO 19103:2005 , *Geographic information – Conceptual schema language*.

The ISO 19126:2009 metamodel has also been simplified in some regards where the functionality is not applicable to the DGFCD.

5.2 Logical Metamodel

The DGFCD is maintained in a team-based approach using the DCE. The DGFCD metamodel is implemented in the DCE in the Unified Modeling Language (UML).

The definition of this metamodel (e.g. all used stereotypes and taggedValues) is provided in Annex B - .

In general, the metamodel is organized as follows.

There are six basic categories of concepts: **Feature Concepts**, **Attribute Concepts**, **Attribute Value Concepts**, **Attribute Datatypes**, **Units of Measure and Role Concepts**.

Additional elements as **Groups**, **Subgroups** and **Attribute Value Concept Lists** support the management of the DGFCD.

These elements are linked and organised using connectors such as **Definition**, **Type Definition**, and **Value List Content**.

Each Concept owns basic information needed for maintenance and management following the principles of item registration by ISO 19135 – Geographic information - Procedures for item registration:

- **AlphaCode (Class Name)**: A unique alphanumeric value is used to designate this concept for the purposes of data interchange between nations, organisations and within NATO. If an information system uses other codes to denote the concept within its boundaries, data sets used in information exchange shall only use either the DGFCD-specified or (in technology-specific limited circumstances) either the 531-conformant alphanumeric code.

The following rules restrict alphaCodes and therefore also the names of concepts. They are valid for both.

  - Numeric relation symbols (for example: “>”) shall be expressed by "lt", "gt", "lte", "gte", "eq" or "neq":

Table 3: Numeric symbols and their terms and expressions

Numeric symbol	Term	Expression
<	less than	Lt
<=	less than or equal	Lte
=	Equal	Eq
>=	greater than or equal	Gte
>	greater than	Gt
<>	not equal	Neq

- A range shall be expressed with the term "to".
- A hyphen (“-”) shall be removed or replaced by an underscore.
- A sign (“+” or “-”) shall be replaced by either "plus" / "pos" or “minus” / “neg”

Numeric symbol	Term	Expression
+	plus / positive	“plus” or “pos”
-	minus / negative	“minus” or “neg”

- A dot (“.”) or comma (“,”) as radix markers shall be replaced with "r" or treated as a space and be removed.
- It is possible to use the "e" in base-10 exponent notation.
- For concepts which names are naturally numeric adding a prefix should be considered.
- There shall be no diacritics in alphaCodes
- There shall be no alphaCode beginning with a non-alphabetic character.

Specific rules are applied to Concepts:

- **Feature Concept**: CamelCase denotation starting with an Upper-case letter and reflecting the name of the concept, for example, *Bridge*, *InlandWater*, or *FloodControlStructure*.
- **Attribute Concept**: CamelCase denotation starting with a lower-case letter and reflecting the name of the concept, for example, *length*, *structMatType*, or *accessRestriction*.
- **Attribute Value Concept**: CamelCase denotation starting with a lower-case letter and reflecting the name of the concept, for example, *steel*, *blue*, or *mobileBridge*.

  - **Attribute Datatype**: Basic datatypes as full name starting with an upper-case letter and reflecting the name of the datatype, for example, *Real*, *Text*, *Enumeration*, structured text datatypes as combination of the Attribute Concept's alphaCode and the term "StrucText", for example, *highWaterMonthIntervalStrucText*.
  - **Unit of Measure**: CamelCase denotation starting with a lower-case character and reflecting the name of the unit (symbol), for example, *kilometre*, *volt*, or *cubicMetre*.
  - **Role Concept**: CamelCase denotation starting with a lower-case character and reflecting the name of the role concept, for example, *isDesignatedBy*, or *waterPropertiesDescribedBy*.

- **531 Code**: A unique alphanumeric value that conforms to the DGIWG-developed FDD and may be used to designate this concept in technology-specific limited circumstances for the purposes of data interchange in conformance with DGIWG standards. This code is the legacy FACC and DFDD 5-3-1 Code.
  - **Feature Concept**: The 531 Code consists of two letters and three digits, for example, *AQ040*, *BH000*, or *ZI999*.
  - **Attribute Concept**: The 531 Code consists of three characters starting with a letter, for example, *LZN*, *B09*, or *SMC*.
  - **Attribute Value Concept**: The 531 Code consists of an integer, for example 1, 37, 86.
  - **Unit of Measure**: The 531 Code consists of an integer, for example 1, 22, 31.
  - **Role Concept**: The 531 Code consists of five characters, starting with a letter, for example *TRENG*, or *Z86ZL*

- **Name**: A compact and human-readable designator that is used to denote the concept. Aliases may be defined for use within the scope of an information system, but data sets used in information exchange shall only use the DGFCD-specified name.
  - **Unique Names**: Names of the same type shall be unique. No Element shall be permitted to have the same name at a point in time (Attribute Value Concepts belonging to different attributes are allowed). Multiple items related to the same Concepts may use the same value for name but only one such item may have a status of 'valid'. Items related to different Concepts may use the same value for name.
  - **Unambiguous Names**: Concept names shall be concise, unambiguous and provide the most widely understood English name for the Concept.
  - **No Slash**: Use of the slash character to describe an "either / or" situation in Concept name is not allowed.
- **Definition**: A precise statement of the nature, properties, scope, or essential qualities of the concept. Information systems and data sets shall preserve this meaning, neither narrowing, broadening, nor otherwise altering the specified semantic.

- There shall be no examples for the concept itself in the definition (can be placed in the description).
  Correct:
  Access Zone: A terrain region between a contact zone and the first passable land transportation route.
  Incorrect:
  Cane: A tract covered mainly by large treelike grasses (for example: bamboo and sugarcane).
- A Concept definition shall be concise and unambiguous.
- **Definition style**: A proper definition should follow the following pattern:
  <defined term> : <broader term> <condition>
  EXAMPLES:
  church: House of worship within the Christian religion
  mosque: House of worship within the Islamic religion

- **Description**: An optional statement of the nature, properties, scope, or non-essential qualities of the concept that are not specified by the definition. Information systems and data sets should consider this information in their design, implementation, and operations, but explicitly honouring this additional information is optional.

Management Information:

- **Source**: Indication of the source for name, definition and or description to allow additional research in the management process.
- **Status**: The Concept's status as defined in ISO 19135. Only Concepts designated as "valid" are published for use.
- **Used By**: Information on the usage of the concept by other DGIWG acknowledged clients outside the DGIM, hence any change proposed on this concept should be communicated to the using client. This property is optional, and is not present on every concept in the current baseline.
- **Date Accepted**: The date the Concept was accepted for DGFCD after an official voting process.
- **Date Retired**: The date the Concept was retired from DGFCD after an official voting process.

Depending on the type of concept, additional information may be specified. This additional information is specified in the following subsections of this standard.

5.3 Content Rules

Spelling conventions in the DGFCD are generally those internationally agreed and adopted by the Defence Geospatial Information Working Group (DGIWG). The DGFCD uses the most recent version of the *Oxford English Dictionary*, as the basis for all spelling. The preferred units of measure are in accordance with ISO 31 *Quantities and units* (multiple parts). The presentation of numbers follow the convention in which the period ('.') is used as the radix marker (the decimal point"), and the comma (',') is used to delimit groups of three digits to the left of the radix marker.

Additional rules apply to specific types of information for each concept. These are specified in Section 5.4.

5.4 Content Definition

Following sections list specific information attached by each part of the DGFCD. Only information is described that is required for the usage and the compliance testing of DGFCD. Additional information for management and maintenance can be found in the description of the metamodel in 0.

5.4.1 Feature Concepts

No additional information is defined.

5.4.2 Attribute Concepts

Additional information includes:

- **Collection**: Specifies the Unified Modelling Language (UML) stereotype in the case of a «Collection» datatype; one of {'Set', 'Bag', or 'Sequence'} from ISO/TS 19103.
- **Physical Quantity**: A character string specifying a reference physical quantity for allowed values that may be assigned to the attribute concept if its datatype is based on a numeric representation.
- **Recommended Unit of Measure**: Specification of a recommended unit of measure for the reference physical quantity for allowed values that may be assigned to the attribute concept if its datatype is based on a numeric representation.
- **Non-comparable Unit of Measure**: Specification of a non-comparable unit of measure that is related to the reference physical quantity for allowed values that may be assigned to the attribute concept if its datatype is based on a numeric representation. A non-comparable unit of measure is one that is not a strict member of the specified physical quantity, but is related to that physical quantity through a complex context-sensitive computation.

5.4.3 Attribute Value Concepts

Additional information includes:

- **Attribute Concept**: Specifies the alphaCode of the Attribute Concept the value belongs to.

5.4.4 Attribute Datatypes

Additional information includes:

- **Datatype Collection**: A textual value indicating the type of collection that is used if this datatype field stores collections of the specified datatype.
- **Length**: A positive integer (i.e., greater than zero) that specify symbols the maximum length of character string values that may be assigned to the Datatype if it is based on the Text, Key, or Structured Text representations.
- **Lexical**: A Boolean value indicating the range of character values that may be used in character string values that may be assigned to the Datatype if it is based on the Text or Structured Text representations.
- **Structure Specification**: A character string that specifies a scheme of one or more constraints on the structure of the text values that may be assigned to the Datatype if it is based on the Structured Text representation.
- **Structure Specification (Regular Expression)**: A character string encoding the structure specification in formal regular expression (if possible).
- **Range Minimum**: A value that specifies the minimum end of the range of allowed values that may be assigned to the Datatype if it is based on the Count, Integer or Real representations.
- **Range Maximum**: A value that specifies the maximum end of the range of allowed values that may be assigned to the Datatype if it is based on the Count, Integer or Real representations.

5.4.5 Units of Measure

Additional information includes:

- **Conversion Factor for Unit of Measure:** A character string that identifies in the case of a conventional unit the base or derived unit of measure.
- **Rough Conversion:** A Boolean value indicating, in the case of a ‘conventional’ Unit of Measure, whether the factor or formula is rough (as opposed to ‘precise’).
- **Factor Value:** A numeric value that specifies, in the case of a ‘conventional’ Unit of Measure, the linear factor ‘m’ to be used in the formula y = mx, where x is a value using this Unit of Measure, and y is the corresponding value using the base Unit of Measure.
- **Formula Constant (A to D)**: A numeric value that specifies, in the case of a ‘conventional’ Unit of Measure, the value of the ‘a’ (or ‘b’, ‘c’ or ‘d’) element to be used in the formula y = (a + bx) / (c + dx), where x is a value using this Unit of Measure, and y is the corresponding value using the base Unit of Measure.
- **Self-Defined Units System**: A Boolean value indicating, in the case of a ‘base’ Unit of Measure, that the system of units to which this Unit of Measure belongs is not a recognized system (for example: the SI system of units).
- **Symbol**: A character string that specifies the standard symbol used for the Unit of Measure in mathematical formulas.

- **Symbol Code Space**: A character string that specifies the system of units within which this Unit of Measure symbol is specified.
- **Symbol Reference**: A link to the Unified Code for Units of Measure (UCUM)[1].
- **Type**: A character string that specifies the type of the Unit of Measure as distinguished in the SI system of units. One of: { 'base', 'derived', 'conventional' }.
- **Units System**: A character string that specifies, in the case of a 'base' Unit of Measure, the system of units to which this base Unit of Measure is asserted to belong

5.5 Feature Dictionary Metadata

The Feature Dictionary has the following information specified:

- **Name**: A compact and human-readable designator that is used to denote the Feature Dictionary.
- **Content Summary**: A general statement of the purpose for which items in the Entity Dictionary are made available to potential users.
- **Version Number**: Specifies a unique state in the life of the Entity Dictionary.
- **Version Date**: Specifies a unique state in the life of the Entity Dictionary, using a date
- **Date of Last Change**: The (full precision) date of the most recent change to the status of an item in the Entity Dictionary was made.

[1] http://unitsofmeasure.org/ucum.html

Annex A - Compliance Criteria

The DGFCD specifies a concept dictionary for geospatial data. Conformance to this dictionary requires that when a concept from the DGFCD is employed within an information system or data set that the meaning of the concept be preserved and that information regarding the concept that is specified in the DGFCD be honoured.

Section 5.2 identifies the basic concepts: **Feature Concepts**, **Attribute Concepts**, **Attribute Value Concepts**, **Attribute Datatypes**, **Units of Measure and Role Concepts**.

The following two types of information are (together with a date (of baseline)) alternative means to denote the concept (conformance to each of these may be determined from the definitions in 5.2):

- **AlphaCode**
- **531 Code**

The remaining four types of information are primary means of specifying the concept (see 5.2). Conformance to each of these can only be determined by inspection and subjective judgment.

- **Name**
- **Definition**
- **Description**
- **Source**

Depending on the type of concept the DGFCD may specify additional information. This additional information is presented in Section 5.4 and each item of additional information for a concept shall be honoured.

Annex B - Metamodel for the Defence Geospatial Feature Concept Dictionary (DGFCD)

The following chapters are not necessary for the usage of the DGFCD. It is not required to understand these concepts to guarantee compliance. The chapter briefly describes the metamodel as it is used in the DCE. For more detailed information, the DCE handbook is recommended.

The DGIF metamodel consists of many **stereotypes** and their associated **properties**. These stereotypes were created to cover specific requirements for ISO compliance, for example, to follow the defined ISO stereotypes of TC 211 and more important to represent all specific items in the artifacts of DGIF, the Defence Geospatial Information Model (DGIM), the Defence Geospatial Feature Concept Dictionary (DGFCD), and the Defence Geospatial Real World Object Index (DGRWI). Additional stereotypes have been introduced to cover the GIRD. The following paragraphs describe the metamodel of the DGFCD.

Figure 1: Basic idea of the hierarchy of metamodels

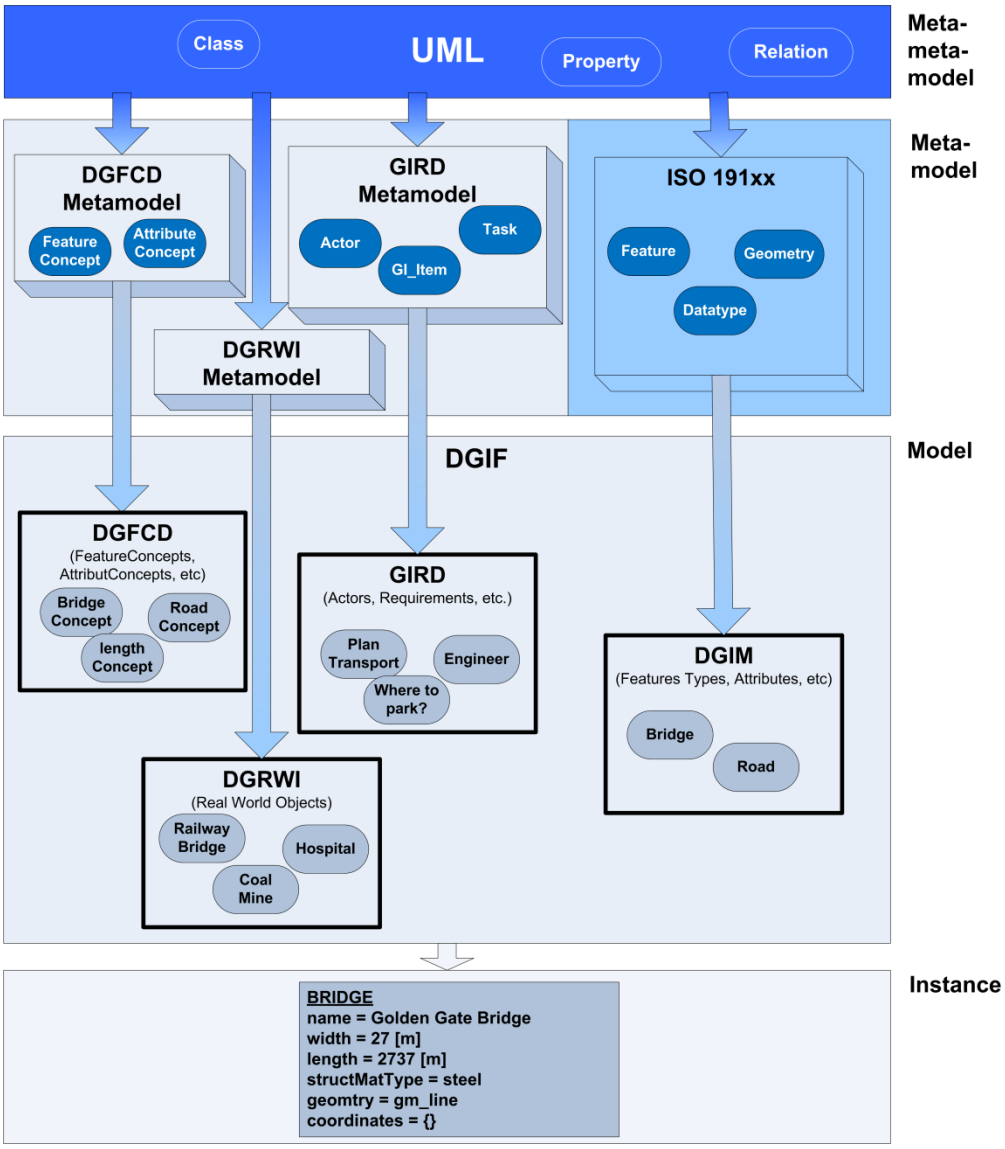
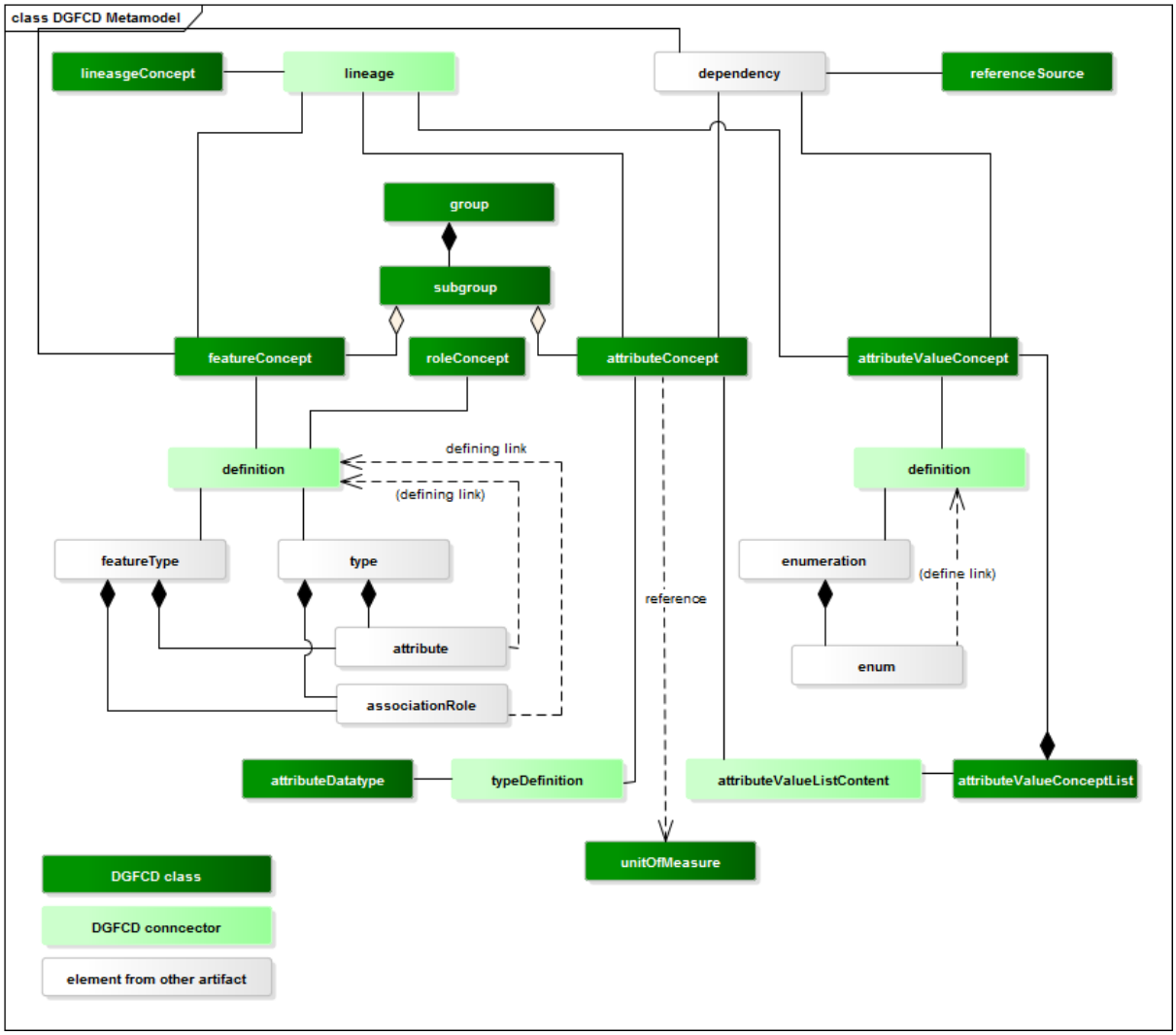


Figure 2: General view of DGFCD metamodel



B.1 DGFCD stereotypes for classes

The Defence Geospatial Feature Concept Dictionary (DGFCD) consists of following stereotypes.

Each stereotype description consists of information about the Meta Class it extends, the properties it owns, the links to other stereotypes that may exist, and an example.

The properties are described using following terms:

- **Item**: The name of the stereotype's property (either a standard UML property or a specially created property for this stereotype)
- **Definition/Content**: The description of the property
- **Datatype**: The name of a general datatype (e.g., Text or Real)
- **Multiplicity**: Defines the allowed number how often a property can be used.
- **Norm**ative: A Boolean field defining if a property is mandatory to be populated.
- **Generation**: A note about the source of property content if it is not mandatory. Usually properties that have information about generation are populated automatically from other properties.
- **DCE Data type**: The datatype that is used in the DCE. In case of big text fields (>255 characters) a specific datatype called "Memo" is used.

B.1.1 Group

Meta Class: Class

This stereotype represents a **group** as it is used in the DGFCD.

B.1.1.1 Properties

The following information is attached to a **group**.

Table 4: Information attached to a group

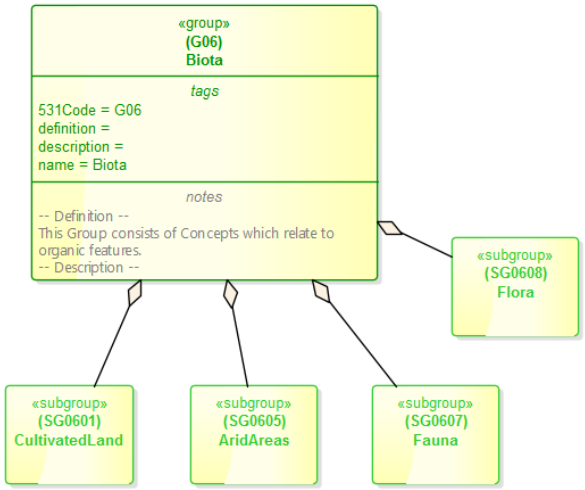
Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The alphaCode as defined in the DGFCD.	Text	1	YES		String
Alias	The 531-Code as defined in the DGFCD	Text	1	NO	from 531Code	String
Notes	The combination of definition and description in a structured way.	Text	1	NO	from definition and description	Memo
Stereotype properties (tagged values)						
531Code	The 531-Code as defined in the DGFCD	Text	1	YES		String
Name	A compact and human-readable designator that is used to denote the group	Text	1	YES		String
Definition	A precise statement of the nature, properties, scope, or essential qualities of the group.	Text	1	YES		Memo

Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Description	Enables a better understanding of the meaning and scope of the group, often an example is quoted	Text	0..1	NO		Memo
Status	The status of the item as defined in ISO 19135 ('valid', 'notValid', 'retired', 'superseded')	RE_ItemStatus	1	YES		RE_ItemStatus
dateAccepted	The date the item was accepted and became valid.	Date	1	YES		String
dateRetired	The date the item was retired.	Date	1	YES		String

B.1.1.2 Links

A **group** is connected from its **subgroups** by a **composition**. Each **group** can have zero to many **subgroups**.

B.1.1.3 Example



B.1.2 Subgroup

Meta Class: Class

This stereotype represents a **subgroup** as it is used in the DGFCD.

B.1.2.1 Properties

The following information is attached to a **subgroup**.

Table 5: Information attached to a subgroup

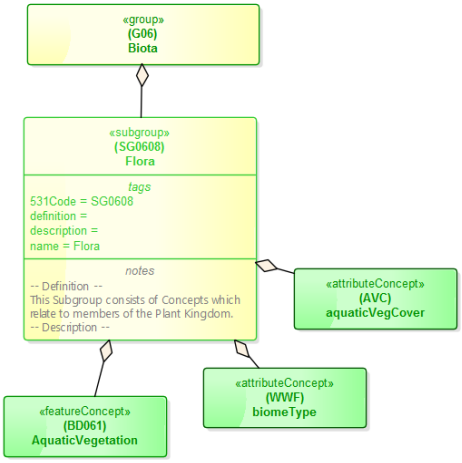
Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The alphaCode as defined in the DGFCD.	Text	1	YES		String
Alias	The 531-Code as defined in the DGFCD	Text	1	NO	from 531Code	String
Notes	The combination of definition and description in a structured way.	Text	1	NO	from definition and description	Memo
Stereotype properties (tagged values)						
531Code	The 531-Code as defined in the DGFCD	Text	1	YES		String
Name	A compact and human-readable designator that is used to denote the subgroup.	Text	1	YES		String
Definition	A precise statement of the nature, properties, scope, or essential qualities of the subgroup.	Text	1	YES		Memo
Description	Enables a better understanding of the meaning and scope of the subgroup, often an example is quoted	Text	0..1	NO		Memo
Status	The status of the item as defined in ISO 19135 ('valid', 'notValid', 'retired', 'superseded')	RE_ItemStatus	1	YES		RE_ItemStatus
dateAccepted	The date the item was accepted and became valid.	Date	1	YES		String
dateRetired	The date the item was retired.	Date	1	YES		String

B.1.2.2 Links

A **subgroup** is connected to its **group** by a **composition**. Each **subgroup** belongs to exactly one **group.**

A **subgroup** is connected to **attributeConcepts** and/or **featureConcepts** via an **aggregation**.

B.1.2.3 Example



B.1.3 FeatureConcept

Meta Class: Class

This stereotype represents a **featureConcept** as defined in the DGFCD specification.

B.1.3.1 Properties

The following information is attached to a **featureConcept**.

Table 6: Information attached to a featureConcept

Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The alphaCode as defined in the DGFCD.	Text	1	YES		String
Alias	The 531-Code as defined in the DGFCD	Text	1	NO	from 531Code	String
Notes	The combination of definition and description in a structured way.	Text	1	NO	from definition and description	Memo
Stereotype properties (tagged values)						
531Code	The 531-Code as defined in the DGFCD	Text	1	YES		String
Name	A compact and human-readable designator that is used to denote the concept	Text	1	YES		String
Definition	A precise statement of the nature, properties, scope, or essential qualities of the Concept. If a definition is taken from an external source, the *lineage* information is used to provide information about that source of reference.	Text	1	YES		Memo

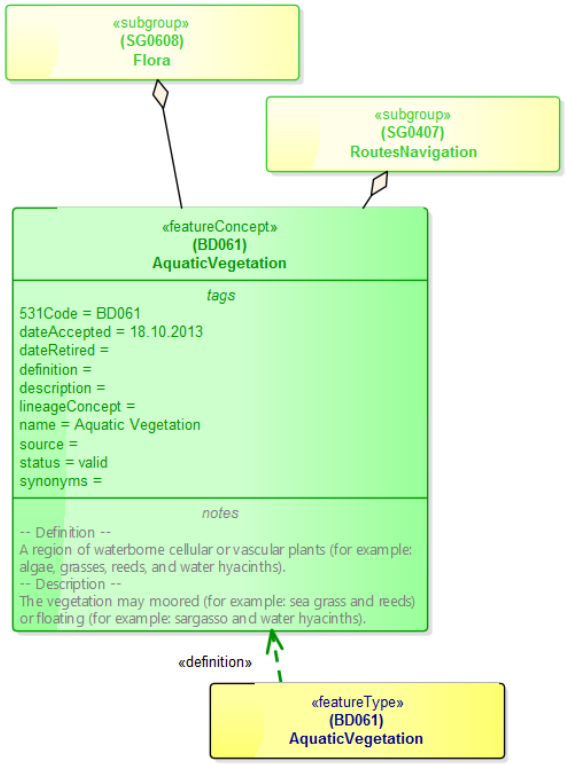
Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Description	Enables a better understanding of the meaning and scope of the Concept, often an example is quoted	Text	0..1	NO		Memo
Source	The source of the concept if no specific lineage exists.	Text	0..1	NO	Only if lineageConcept is not populated	String
Synonyms	Aliases or names that are also used to designate this concept.	Text	0..* (semicolon separated)	NO		String
usedBy	Shows all clients using the concept.	Text	0..*	NO		String
lineageConcept	Connects the Concept to sources from which the Concept has been taken and can be refered to.	LineageConcept	0..*	NO		LineageConcept
Status	The status of the item as defined in ISO 19135 ('valid', 'notValid', 'retired', 'superseded')	RE_ItemStatus	1	YES		RE_ItemStatus
dateAccepted	The date the item was accepted and became valid.	Date	1	YES		String
dateRetired	The date the item was retired.	Date	1	YES		String

B.1.3.2 Links

A **featureConcept** is connected to a **featureType** or **type** via a **definition**. The **definition** as connector is a normative information.

A **featureConcept** is connected to **subgroup**(s) via an **aggregation**.

B.1.3.3 Example



B.1.4 AttributeConcept

Meta Class: Class

This stereotype represents an **attributeConcept** as defined in the DGFCD specification.

B.1.4.1 Properties

The following information is attached to an **attributeConcept**.

Table 7: Information attached to an attributeConcept

Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The alphaCode as defined in the DGFCD.	Text	1	YES		String
Alias	The 531-Code as defined in the DGFCD	Text	1	NO	from 531Code	String
Notes	The combination of definition and description in a structured way.	Text	1	NO	from definition and description	Memo
Stereotype properties (tagged values)						
531Code	The 531-Code as defined in the DGFCD	Text	1	YES		String
Name	A compact and human-readable designator that is used to denote the concept	Text	1	YES		String

Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Definition	A precise statement of the nature, properties, scope, or essential qualities of the Concept. If a definition is taken from an external source, the ***lineage*** information is used to provide information about that source of reference.	Text	1	YES		Memo
Description	Enables a better understanding of the meaning and scope of the Concept, often an example is quoted	Text	0..1	NO		Memo
source	The source of the concept.	Text	1	NO		String
Synonyms	Aliases or names that are also used to designate this concept.	Text	0..* (semicolon separated)	NO		String
usedBy	Shows all clients using the concept.	Text	0..* (comma separated)	NO		String
lineageConcept	Connects the Concept to sources from which the Concept has been taken.	LineageConcept	0..*	NO		LineageConcept
physicalQuantity	A character string specifying a reference physical quantity for allowed values that may be assigned to the attributeConcept if its datatype is based on a numeric representation	Text	0..*	YES		String
recommendedMeasure	Conncets the attributeConcept to attributeConcept.	unitOfMeasure	0..1	YES		unitOfMeasure
nonComparableMeasure	A link to a non-comparable unit of measure that is related to the reference physical quantity for allowed values that may be assigned to the attributeConcept if its datatype is based on a numeric representation. A non-comparable unit of measure is one that is not a strict member of the specified physical quantity, but is related to that physical quantity through a complex context-sensitive computation.	unitOfMeasure	0..1	YES		unitOfMeasure
status	The status of the item as defined in ISO 19135 ('valid', 'notValid', 'retired', 'superseded')	RE_ItemStatus	1	YES		RE_ItemStatus
dateAccepted	The date the item was accepted and became valid.	Date	1	YES		String
dateRetired	The date the item was retired.	Date	1	YES		String

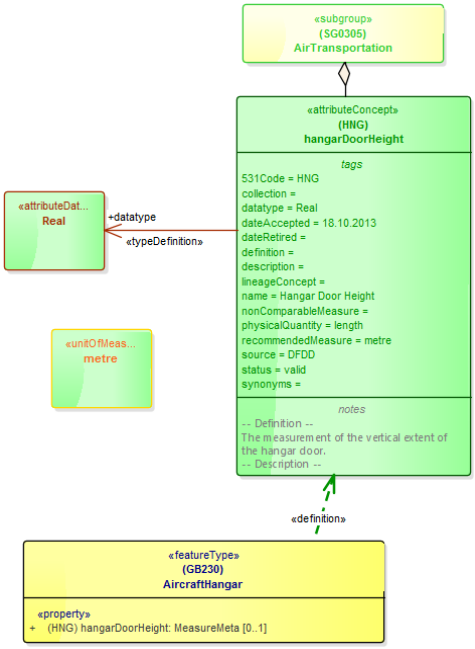
B.1.4.2 Links

An **attributeConcept** is connected via a **definition** to a **featureType** or **type** that is using a **property** that is defined by this **attributeConcept**. The **definition** as connector is a normative information.

An **attributeConcept** is connected to an **attributeDatatype** by a **typeDefinition**. In the case that the **attributeConcept** is of type enumeration, it is also connected to the appropriate **attributeValueConceptList** that stores all **attributeValueConcepts** related to the **attributeConcept** by a **valueListContent**.

An **attributeConcept** is connected to its **subgroup**(s) via an **aggregation**.

B.1.4.3 Example



B.1.5 RoleConcept

Meta Class: Class

This stereotype represents a **roleConcept** as defined in the DGFCD specification.

B.1.5.1 Properties

The following information is attached to a **roleConcept**.

Table 8: Information attached to a roleConcept

Item	Definition/Content	Data type	Multi-plicity	Norm.	Generation	EA Datatype
Standard UML properties and other fields						
(class) name	The alphaCode as defined in the DGFCD.	String	1	YES		String
alias	The 531-Code as defined in the DGFCD	String	1	NO	from 531Code	String
notes	The combination of definition and description in a structured way.	Memo	1	NO	from definition and description	Memo
Stereotype properties (tagged values)						
531Code	The 531-Code as defined in the DGFCD: 5 characters, e.g. "TGBER", starting with a letter.	String	1	YES		String
name	A compact and human-readable designator that is used to denote the concept	String	1	YES		String
definition	A precise statement of the nature, properties, scope, or essential qualities of the Concept. If a definition is taken from an external source, the ***lineage*** information is used to provide information about that source of reference.	String	1	YES		Memo
description	Enables a better understanding of the meaning and scope of the Concept, often an example is quoted	String	0..1	NO		Memo
source	The source of the concept.	String	1	NO		String
synonyms	Aliases or names that are also used to designate this concept.	String	0..* (semicolon separated)	NO		String
usedBy	Shows all customers using the concept.	String	0..*	NO		String
lineageConcept	Connects the Concept to sources from which the Concept has been taken.	LineageConcept	0..*	NO		LineageConcept
status	The status of the item as defined in ISO 19135 ('valid', 'notValid', 'retired', 'superseded')	RE_ItemStatus	1	YES		RE_ItemStatus
dateAccepted	The date the item was accepted and became valid.	Date	1	YES		String
dateRetired	The date the item was retired.	Date	1	YES		String

B.1.5.2 Links

A **roleConcept** is connected to a **featureType** or **type** that is using an **associationEnd** that is defined by this **roleConcept** via a **definition**. The **definition** as connector is a normative information.

A **roleConcept** may be connected to its **subgroup**(s) via an **aggregation**.

B.1.6 attributeValueConcept

Meta Class: Class

This stereotype represents an **attributeValueConcept** as defined in the DGFCD specification.

B.1.6.1 Properties

The following information is attached to an **attributeValueConcept**.

Table 9: Information attached to an attributeValueConcept

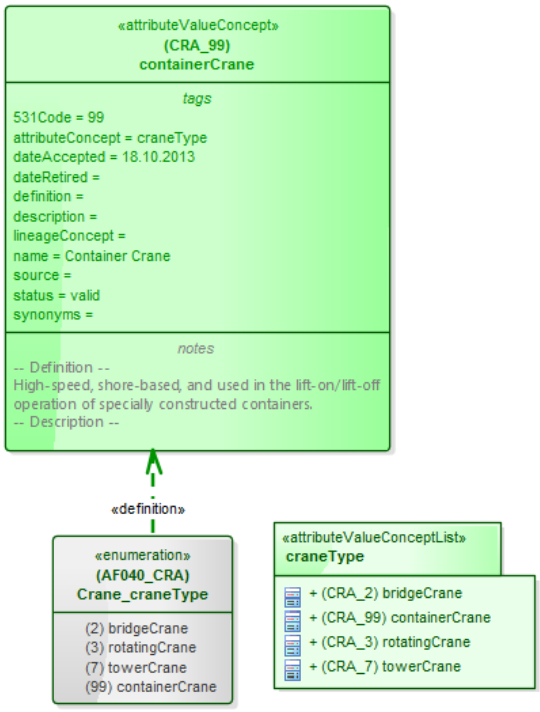
Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The alphaCode as defined in the DGFCD.	Text	1	YES		String
Alias	The combination of 531-Codes of attributeConcept and attributeValueConcept as defined in the DGFCD.	Text	1	NO	from 531Code	String
Notes	The combination of definition and description in a structured way.	Text	1	NO	from definition and description	Memo
Stereotype properties (tagged values)						
531Code	The 531-Code as defined in the DGFCD	Text	1	YES		String
Name	A compact and human-readable designator that is used to denote the concept	Text	1	YES		String
Definition	A precise statement of the nature, properties, scope, or essential qualities of the Concept. If a definition is taken from an external source, the ***lineage*** information is used to provide information about that source of reference.	Text	1	YES		Memo
Description	Enables a better understanding of the meaning and scope of the Concept, often an example is quoted	Text	0..1	NO		Memo
Source	The source of the concept.	Text	1	NO		String
Synonyms	Aliases or names that are also used to designate this concept.	Text	0..* (semicolon separated)	NO		String
usedBy	Shows all clients using the concept.	Text	0..* (comma separated)	NO		String
lineageConcept	Connects the Concept to sources from which the Concept has been taken.	Lineage Concept	0..1	NO		LineageConcept

Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
attributeConcept	The alphaCode of which the AttributeConcept the Value Concept belongs	Text	1	YES		String
Status	The status of the item as defined in ISO 19135 ('valid', 'notValid', 'retired', 'superseded')	RE_Item Status	1	YES		RE_ItemStatus
dateAccepted	The date the item was accepted and became valid.	Date	1	YES		String
dateRetired	The date the item was retired.	Date	1	YES		String

B.1.6.2 Links

An **attributeValueConcept** belongs to exactly one **attributeValueConceptList**. An **attributeValueConcept** is connected via a **definition** to the **enumeration** in which the concept is used.

B.1.6.3 Example



attributeValueConceptList

Meta Class: Package

The **attributeValueConceptList** stores all **attributeValueConcept** for a specific **attributeConcept**.

Its main purpose is to facilitate the management of the DGFCD.

B.1.6.4 Properties

The following information is attached to an **attributeValueConceptList**.

Table 10 : Information attached to an attributeValueConceptList

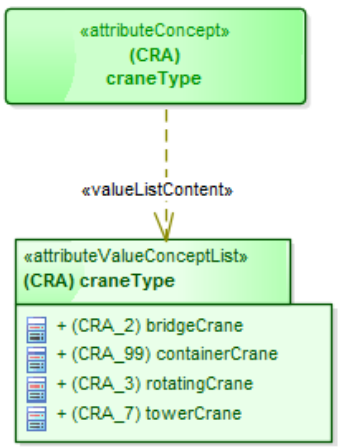
Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The attributeConcept alphaCode as defined in the DGFCD.	Text	1	YES		String
Alias	The attributeConcept 531-Code of the attributeConcept.	Text	1	YES		String
Stereotype properties (tagged values)						
Status	The status of the item as defined in ISO 19135 ('valid', 'notValid', 'retired', 'superseded')	RE_ItemStatus	1	YES		RE_ItemStatus
dateAccepted	The date the item was accepted and became valid.	Date	1	YES		String
dateRetired	The date the item was retired.	Date	1	YES		String

B.1.6.5 Links

An **attributeValueConceptList** stores **attributeValueConcepts**.

An **attributeValueConceptList** is connected from its **attributeConcept** by the connector **valueListContent**.

B.1.6.6 Example



B.1.7 attributeDatatype

Meta Class: Class

The **attributeDatatype** represents the conceptual Data Type defined in the DGFCD.

B.1.7.1 Properties

The following information is attached to an **attributeDatatype**.

Table 11: Information attached to an attributeDatatype

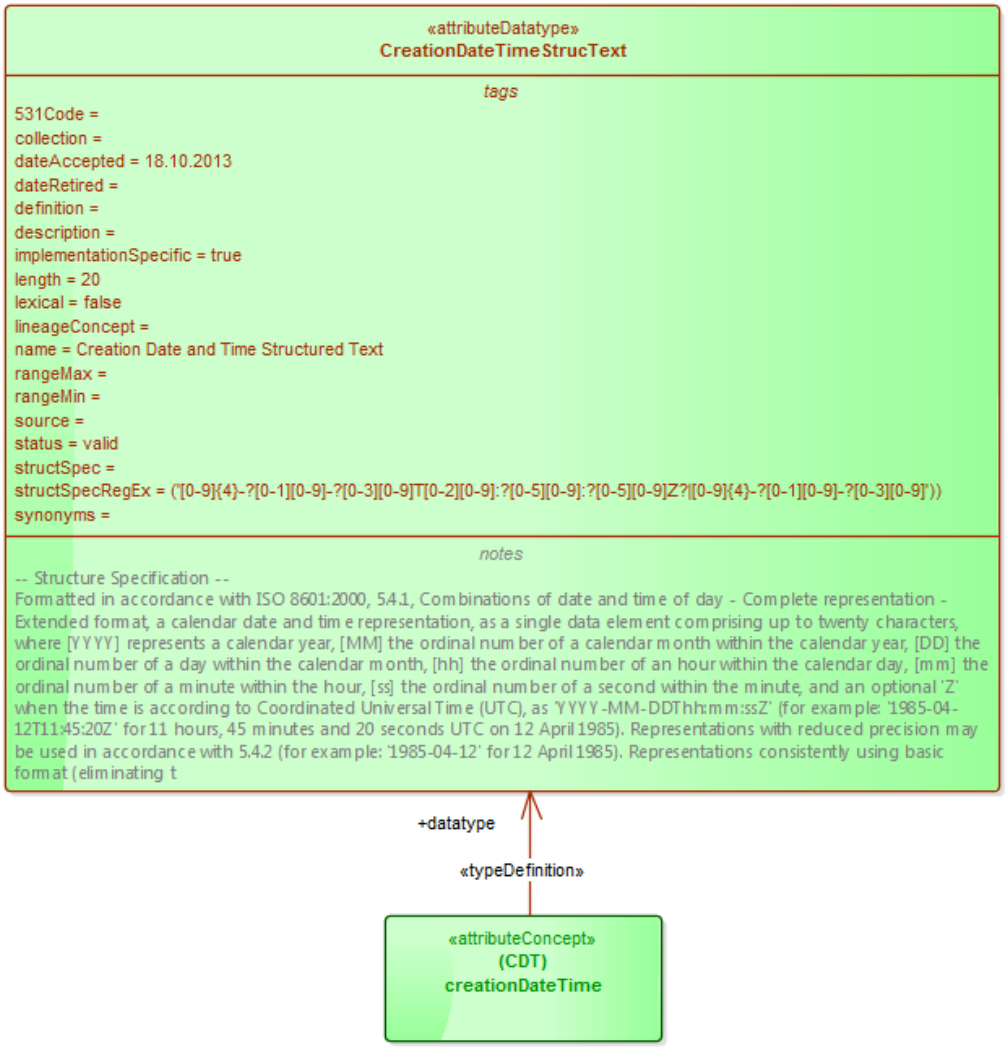
Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The alphaCode as defined in the DGFCD.	Text	1	YES		String
Alias	The 531-Codes as defined in the DGFCD.	Text	1	NO	from 531Code	String
Notes	The structure specification of the Data Type	Text	1	NO	from structSpec	Memo
Stereotype properties (tagged values)						
Name	A compact and human-readable designator that is used to denote the concept	Text	1	YES		String
Definition	A precise statement of the nature, properties, scope, or essential qualities of the Concept. If a definition is taken from an external source, the lineage information is used to provide information about that source of reference.	Text	1	YES		Memo
Description	Enables a better understanding of the meaning and scope of the Concept, often an example is quoted	Text	0..1	NO		Memo
Source	The source of the concept.	Text	1	NO		String
Synonyms	Aliases or names that are also used to designate this concept.	Text	0..* (semicolon separated)	NO		String
Collection	*(not used yet)*					
implementationSpecific	An indication that the realisation of an attributeDataType is implementation specific and may vary from system to system.	Boolean	0..1	NO		Boolean
Length	A positive integer (i.e., greater than zero) that specify symbols the maximum length of character string values that may be assigned to the Data Type if it is based on the Text, Key, or Structured Text representations.	Integer	0..1	NO		Integer

Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Lexical	A Boolean value indicating the range of character values that may be used in character string values that may be assigned to the Data Type if it is based on the Text or Structured Text representations.	Boolean	1	NO		Boolean
rangeMin	A value that specifies the minimum end of the range of allowed values that may be assigned to the Data Type if it is based on the Count, Integer or Real representations.	Real	0..1	NO		Real
rangeMax	A value that specifies the maximum end of the range of allowed values that may be assigned to the Data Type if it is based on the Count, Integer or Real representations.	Real	0..1	NO		Real
structSpec	A character string that specifies a scheme of one or more constraints on the structure of the text values that may be assigned to the Data Type if it is based on the Structured Text representation	Text	0..1	NO		Memo
structSpecRegEx	A character string expressed in Regular Expressions to describe the structure specification in a formal way.	Text	0..1	NO		String
usedBy	Shows all clients using the concept.	Text	0..* (comma separated)	NO		String
lineageConcept	Connects the Concept to sources from which the Concept has been taken.	LineageConcept	0..1	NO		LineageConcept
Status	The status of the item as defined in ISO 19135 ('valid', 'notValid', 'retired', 'superseded')	RE_ItemStatus	1	YES		RE_ItemStatus
dateAccepted	The date the item was accepted and became valid.	Date	1	YES		String
dateRetired	The date the item was retired.	Date	1	YES		String

B.1.7.2 Links

An **attributeDatatype** is connected via **typeDefinition** to an **attributeConcept**.

B.1.7.3 Example



B.1.8 unitOfMeasure

Meta Class: Class

The **unitOfMeasure** represents the conceptual unit of measure defined in the DGFCD.

B.1.8.1 Properties

The following information and properties are attached to a **unitOfMeasure**.

Table 12: Information and properties attached to a unitOfMeasure

Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The alphaCode as defined in the DGFCD.	Text	1	YES		String
Alias	The 531-Codes as defined in the DGFCD.	Text	1	NO	from 531Code	String
Notes	The structure specification of the Data Type	Text	1	NO	from structSpec	Memo
Stereotype properties (tagged values)						
531Code	The 531-Code as defined in the DGFCD	Text	1	YES		String
Name	A compact and human-readable designator that is used to denote the concept	Text	1	YES		String
Definition	A precise statement of the nature, properties, scope, or essential qualities of the Concept. If a definition is taken from an external source, the lineage information is used to provide information about that source of reference.	Text	1	YES		Memo
Description	Enables a better understanding of the meaning and scope of the Concept, often an example is quoted	Text	0..1	NO		Memo
Source	The source of the concept.	Text	1	NO		String
Synonyms	Aliases or names that are also used to designate this concept.	Text	0..* (semicolon separated)	NO		String
Code	(not used)					
conversionFactorUom	Identifies, in the case of a 'conventional' Unit of Measure, the preferred (base or derived) Unit of Measure.	Text	0..1	NO		String
conversionRough	A Boolean value indicating, in the case of a 'conventional' Unit of Measure, whether the factor or formula is rough (as opposed to 'precise').	Boolean	1	NO		Boolean
factorValue	A numeric value that specifies, in the case of a 'conventional' Unit of Measure, the linear factor 'm' to be used in the formula y = mx, where x is a value using this Unit of Measure, and y is the corresponding value using the base Unit of Measure.	Real	0..1	NO		Real

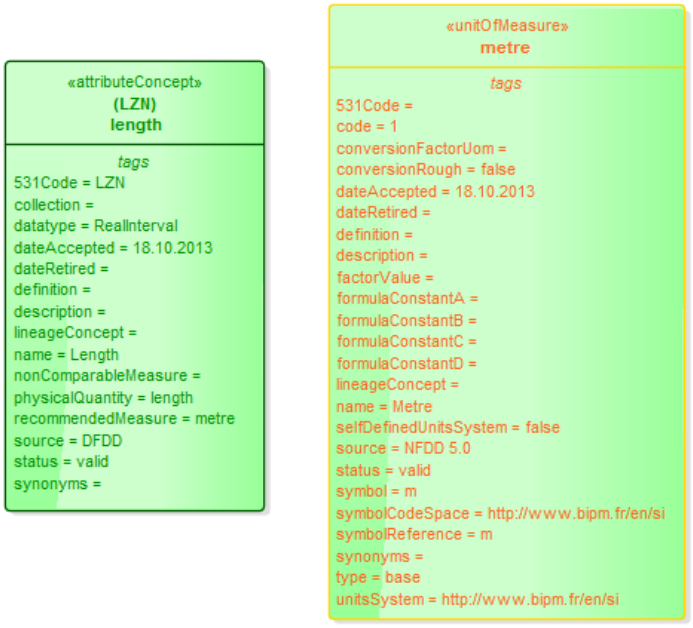
Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
formulaConstantA	A numeric value that specifies, in the case of a 'conventional' Unit of Measure, the value of the 'a' element to be used in the formula y = (a + bx) / (c + dx), where x is a value using this Unit of Measure, and y is the corresponding value using the base Unit of Measure.	Real	0..1	NO		Real
formulaConstantB	A numeric value that specifies, in the case of a 'conventional' Unit of Measure, the value of the 'b' element to be used in the formula y = (a + bx) / (c + dx), where x is a value using this Unit of Measure, and y is the corresponding value using the base Unit of Measure	Real	0..1	NO		Real
formulaConstantC	A numeric value that specifies, in the case of a 'conventional' Unit of Measure, the value of the 'c' element to be used in the formula y = (a + bx) / (c + dx), where x is a value using this Unit of Measure, and y is the corresponding value using the base Unit of Measure	Real	0..1	NO		Real
formulaConstantD	A numeric value that specifies, in the case of a 'conventional' Unit of Measure, the value of the 'd' element to be used in the formula y = (a + bx) / (c + dx), where x is a value using this Unit of Measure, and y is the corresponding value using the base Unit of Measure	Real	0..1	NO		Real
selfDefinedUnitsSystem	A Boolean value indicating, in the case of a 'base' Unit of Measure, that the system of units to which this Unit of Measure belongs is not a recognized system (for example: the SI system of units).	Boolean	1	NO		Boolean
Symbol	A character string that specifies the standard symbol used for the Unit of Measure in mathematical formulas.	Text	1	YES		String
symbolCodeSpace	A character string that specifies the system of units within which this Unit of Measure symbol is specified.	Text	0..1	NO		String
symbolReference	A link to the Unified Code for Units of Measure (UCUM).	URI	0..1	NO		URL
Type	A character string that specifies the type of the Unit of Measure as distinguished in the SI system of units. One of: { 'base', 'derived', 'conventional' }.	uomTypeList	1	YES		uomTypeList

Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
usedBy	Shows all clients using the concept.	String	0..*	NO		String
unitsSystem	A character string that specifies, in the case of a 'base' Unit of Measure, the system of units to which this base Unit of Measure is asserted to belong	String	0..1	NO		String
lineageConcept	Connects the Concept to sources from which the Concept has been taken.	LineageConcept	0..1	NO		LineageConcept
status	The status of the item as defined in ISO 19135 ('valid', 'notValid', 'retired', 'superseded')	RE_ItemStatus	1	YES		RE_ItemStatus
dateAccepted	The date the item was accepted and became valid.	Date	1	YES		String
dateRetired	The date the item was retired.	Date	1	YES		String

B.1.8.2 Links

A **unitOfMeasure** is a data type for the **attributeConcept** properties **nonComparableMeasure** and **recommendedMeasure**.

B.1.8.3 Example



B.1.9 lineageConcept

Meta Class: Class

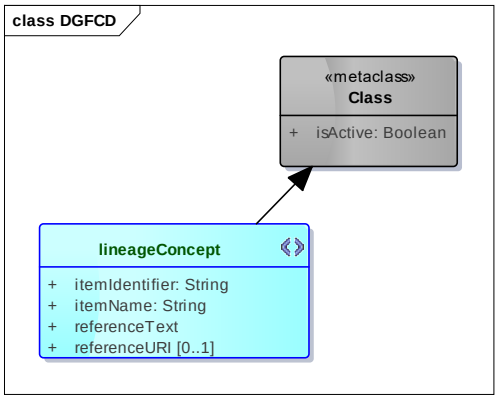
The **lineageConcept** is the original concept where the DGIF Concept is derived from, for example buoy in S-100.

B.1.9.1 Properties

The following information is attached to a **lineageConcept**.

Table 13: Information attached to a lineageConcept

Item	Definition/Content	Datatype	Multi-plicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The alphaCode of the Concept in the source	Text	1	YES		String
Notes	The reference text in the source.	Memo	1	NO	from referenceText	Memo
Stereotype properties (tagged values)						
itemIdentifier	The identification of the Concept in the reference.	Text	1	YES		String
itemName	The official name of the concept or item in the source.	Text	1	YES		String
referenceText	A precise statement of the nature, properties, scope, or essential qualities of the Concept in the reference.	Text	1	YES		Memo
referenceURI	A link to the Concept in the reference.	URI	0..1	NO		URI



B.1.9.2 Links

A LineageConcept is connected to a concept via the connector "lineage".

B.1.10 Reference Source

Class: Information Item

This stereotype represents a reference source, for example a document containing background information or that supports the justification for the existence of a **concept**, for example, a NATO STANAG requiring a precise definition for a **concept**.

B.1.10.1 Properties

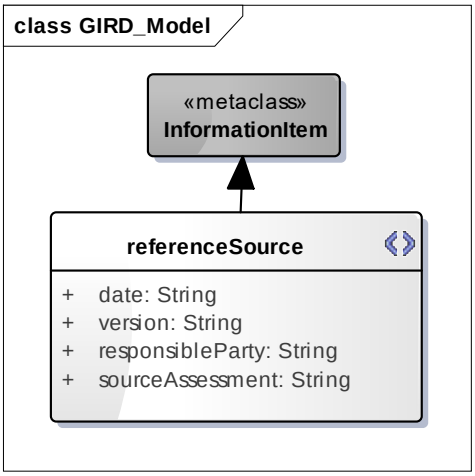
The following information is attached to a **referenceSource**.

Table 14: Information attached to a referenceSource

Item	Definition/Content	Datatype	Multiplicity	Norm.	Generation	DCE Datatype
Standard UML properties and other fields						
(class) name	The name of the document	Text	1	YES		String
Notes	Notes about the document.	Text	0..1	NO		Memo
Stereotype properties (tagged values)						
Date	The date of the publishing or authoring of the document	Date	0..1	YES		String
Version	The version of the source	Text	0..1	YES		String
responsibleParty	The organisation, etc. responsible for the source.	Text	0..1	YES		String
sourceAssessment	An assessment of the source	Text	0..1	YES		String

B.1.10.2 Links

A **referenceSource** can be linked to a concept via a **dependency**.



B.2 DGFCD stereotypes for connectors

The Defence Geospatial Feature Concept Dictionary (DGFCD) consists of following stereotypes for connectors.

Each stereotype description consists of information about the Meta Class it extends, the properties it owns, the links to other stereotypes that may exist, and an example.

B.2.1 definition

Meta Class: Dependency

This stereotype represents the connection between the DGFCD and the DGIM. Each **entity** or **enumeration** using a **concept** from the DGFCD is connected to the specific **concept** via a **definition**.

Source Class	Source Role	Source Mult	Target Class	Target Role	Target Mult	Dir
Entity	Entity	1..*	Concept	Definition	1..*	->

B.2.2 typeDefinition

Meta Class: Association

This stereotype represents the connection between an **attributeConcept** and the **attributeDatatype**.

Source Class	Source Role	Source Mult	Target Class	Target Role	Target Mult	Dir
attributeConcept	attribute	1..*	attributeDatatype	type	0..1	->

B.2.3 lineage

This stereotype represents the connection between a **concept** in the DGFCD and a **lineageConcept** from which the **concept** or parts of it are derived from.

Source Class	Source Role	Source Mult	Target Class	Target Role	Target Mult	Dir
LineageConcept	Origin	1..*	Concept	Concept	1..*	->

Stereotype properties (tagged values)						
similarity	The similarity between the Concept in the reference and in the DGFCD.	Similarity List	1	YES		Similarity List

B.2.4 valueListContent

Meta Class: Dependency

This stereotype represents the connection between an **attributeConcept** and its **attributeValueConceptList**.

Source Class	Source Role	Source Mult	Target Class	Target Role	Target Mult	Dir
attributeConcept		1	attributeValueConceptList		1	->