

TSMAD27-4.3.1C

## **S-100 – Part 2a**

### **Feature Concept Dictionary Registers**

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## 2a-1 Scope

The IHO registry will contain a number of registers, many of which will be Feature Concept Dictionaries (FCD). A feature concept dictionary specifies hydrographic definitions that may be used to describe geographic information. The use of a register to store hydrographic definitions will significantly improve the IHO's ability to manage and extend multiple products based on S-100 which can be made available for use in a relatively short timescale. This register will support wider use of registered items by making them publicly available and increase their visibility to potential users. This Part describes the content of the register and specifies procedures to be followed in establishing, maintaining, and publishing registers of unique, unambiguous and permanent identifiers that are assigned to items of geographic, hydrographic and metadata information. In order to accomplish this purpose, this Part specifies elements of information that are necessary to provide identification and definitions to the registered items.

### 2a-1.1 Conformance

This profile conforms to level 2 of ISO 19106:2004. The following is a brief description of the specializations and generalizations where the profile differs from ISO 19126:2008.

- 1) A new class, S100\_CD\_InformationConcept is introduced.
- 2) New classes, S100\_CD\_FeatureBinding, S100\_CD\_InformationBinding and S100\_FC\_AttributeBinding are introduced.
- 3) A new class, S100\_CD\_AttributeConstraints is introduced.
- 4) The class FC\_FeatureAttribute is specialized to be the abstract class S100\_CD\_Attribute.
- 5) New classes, S100\_CD\_SimpleAttributeConcept and S100\_CD\_ComplexAttributeConcept are introduced.
- 6) A new class, S100\_CD\_InformationRole is introduced.
- 7) The classes CD\_InheritanceRelation, CD\_FeatureOperation CD\_Binding, CD\_Constraint and CD\_BoundFeatureAttribute are not used.

### 2a-2 Normative references

ISO 19135:2005, Geographic Information – Procedures for registration of items of geographic information

ISO/DIS 19126:2008, Geographic Information – Feature concept dictionaries and registers

ISO 8601:2004, Data elements and interchange formats - Information interchange - Representation of dates and times

RFC 3986, *Uniform Resource Identifier (URI): Generic Syntax*. T. Berners-Lee, R. Fielding, L. Masinter. Internet Standard 66, IETF. URL: <http://www.ietf.org/rfc/rfc3986.txt> or <http://www.rfc-editor.org/info/std66>

RFC 2141, *URN Syntax*. R. Moats. IETF RFC 2141, May 1997. URL: <http://www.rfc-editor.org/info/rfc2141>

## **2a-3 General concepts**

### **2a-3.1 Register**

As described in Part 2, a register is simply a managed list. It is easier to maintain than a fixed document, because new items can be added as needed to the register, and existing items in the register can be clarified, superseded or retired. Each register item has one or more dates associated with it that indicate when changes in its status occurred. This means that a product specification, defined at a given date, may reference an item in the register at that specific point in time.

### **2a-3.2 Feature concept dictionary**

A feature concept dictionary specifies independent sets of definitions of features, attributes, enumerated values, and information types that may be used to describe geographic, hydrographic, and metadata information. A feature concept dictionary may be used to develop a feature catalogue. Unlike a feature catalogue, a feature concept dictionary does not make associations or bind attributes to features.

Registers of feature information may serve as sources of reference for similar registers established by other geographic information communities as part of a system of cross-referencing.

### **2a-3.3 Feature catalogue**

A feature catalogue is a document that describes the content of a data product. It uses item types, for example, features and attributes, from one or more feature concept dictionaries and binds them together. In addition, constraints, units of measurement and format description of attributes can be specified. Feature Catalogues are described in detail in S-100 Part 5.

## **2a-4 IHO Feature Concept Dictionary**

### **2a-4.1 Types of registered items**

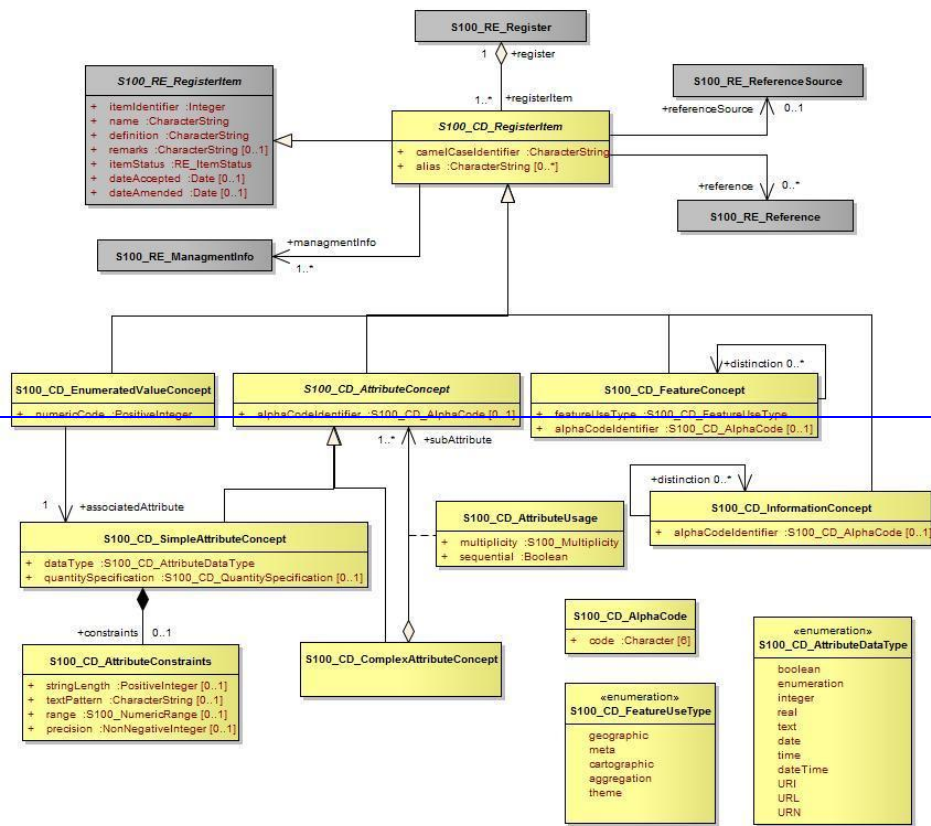
The following are types of items that may be registered.

- 1) Feature Concept – abstraction of real world phenomena.
- 2) Attribute Concept – characteristic of a feature concept.
- 3) Enumerated Value Concept – one of a set of mutually exclusive values constituting the domain of an attribute.
- 4) Information Concept– an identifiable object that contains attributes, associations to other information concepts, but no spatial information.

## **2a-4.2 Data model of a Feature Concept Dictionary**

### **2a-4.2.1 UML Model**

The following figure shows the information model of the hydrographic feature concept dictionary:



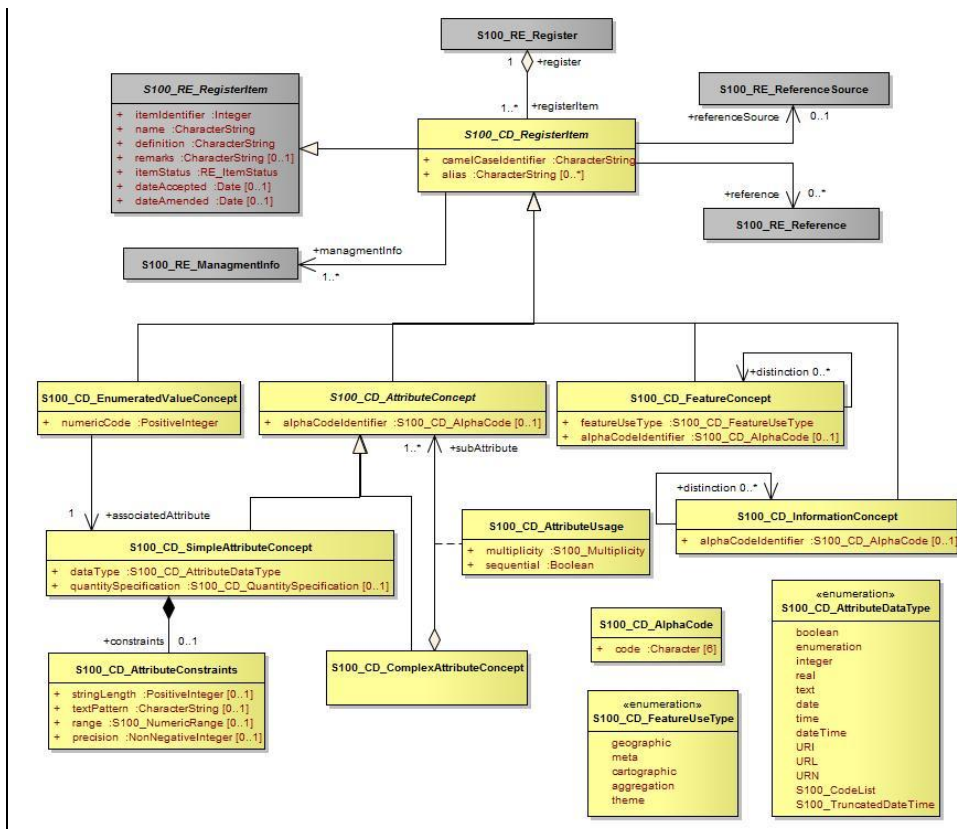


Figure 2-1 – Feature Concept Dictionary



### 2a-4.2.2 S100\_RE\_Register

The class S100\_RE\_Register models a register in a feature concept dictionary. Further details can be found in S-100 Part 2.

### 2a-4.2.3 S100\_CD\_RegisterItem

The class S100\_CD\_RegisterItem is a specialization of the class S100\_RE\_RegisterItem and carries the characteristics that are common to all types of registered items listed in clause 2a-4.1

Role Name	Name	Description	Mult	Data Type	Remarks
Attribute	camelCaseIdentifier	Identifier of the item using camelCase notation.	1	CharacterString	See below
Attribute	alias	Equivalent name(s) used for the item	0..*	CharacterString	

The camelCaseIdentifier must:

- 1) be compound words in which the words are joined without spaces and are capitalized within the compound.
- 2) be unique within the registry.
- 3) conform to ISO 646 with uppercase characters A-Z, 0-9, " \_"; and lowercase characters a-z;
- 4) Features and Information types must begin with uppercase A-Z
- 5) Attributes and enumerated values must begin with lowercase a-z

Example 1 BeaconCardinal is the Camel Case identifier for the feature Beacon Cardinal.

Example 2 categoryOfLandmark is the Camel Case identifier for the attribute Category of Landmark

### 2a-4.2.4 RE\_ItemStatus

The class S100\_RE\_ItemStatus identifies the registration status of the S100\_CD\_RegisterItem. Further details can be found in S-100 Part 2.

#### 2a-4.2.5 S100\_CD\_FeatureConcept

This class is derived from S100\_CD\_RegisterItem. It defines the following additional properties:

Role Name	Name	Description	Mult	Data Type	Remarks
Class	S100_CD_FeatureConcept	A feature type in a feature concept dictionary	-	-	Derived from S100_CD_RegisterItem
Attribute	alphaCodeIdentifier	Abbreviation designating the feature type	0..1	S100_CD_AlphaCode	See below.
Attribute	featureUseType	The intended use of a feature type	1	CI_ResponsibleParty	
Association role	distinction	references to feature types that this feature type is distinct from.	0..*	S100_CD_FeatureConcept	

#### 2a-4.2.6 S100\_CD\_FeatureUseType

Role Name	Name	Description	Remarks
Enumeration	S100_CD_FeatureUseType	Categories of feature types	
Literal	geographic	carries the descriptive characteristics of a real world entity	
Literal	aggregation	a feature which is made up of component features	
Literal	cartographic	carries information about the cartographic representation (including text) of a real world entity	
Literal	meta	Delineates geographic location where meta information is applicable" distinct from an Information Type which carries information related to features which are related.	
Literal	theme	Grouping features thematically.	

#### 2a-4.2.7 S100\_CD\_AttributeConcept

Attributes may either be simple or complex. A simple attribute carries a specific value such as a date. A complex attribute is an aggregation of other attributes either simple or complex. Examples of complex attributes are in Appendix 2A-A. This class is derived from S100\_CD\_RegisterItem and describes the common characteristics of all attribute types.

Role Name	Name	Description	Mult	Data Type	Remarks
Class	S100_CD_AttributeConcept	Base class of all attribute types in a feature concept dictionary	-	-	Derived from S100_CD_RegisterItem Class is abstract
Attribute	alphaCodeIdentifier	Abbreviation designating the attribute type	0..1	S100_CD_AlphaCode	See below

#### 2a-4.2.8 S100\_CD\_SimpleAttributeConcept

Role Name	Name	Description	Mult.	Data Type	Remarks
Class	S100_CD_SimpleAttributeConcept	A simple attribute type in a feature concept dictionary	-	-	Derived from S100_CD_AttributeConcept
Attribute	dataType	Describes representation, interpretation and structure of values	1	S100_CD_AttributeDataType	
Association	constraints	Constraints of the attribute type	0..1	S100_CD_AttributeConstraints	

#### 2a-4.2.9 S100\_CD\_AttributeDataType

Role Name	Name	Description	Remarks
Enumeration	S100_CD_AttributeDataType	Data types of simple attributes	
Literal	boolean	True or False	
Literal	enumeration	List of predetermined values that can be expanded and contracted.	
Literal	integer	numeric value with defined range, units and format.	
Literal	real	floating point number	
Literal	text	a sequence of characters	
Literal	date	character encoding shall follow the format for date as specified by ISO 8601	
Literal	time	character encoding shall follow the format for time as specified by ISO 8601	

Literal	URI	character encoding shall follow the format for URI as specified by RFC 3986	
Literal	URL	character encoding shall follow the format for URL as specified by RFC 3986	
Literal	URN	character encoding shall follow the format for URN as defined by RFC 2141	
<a href="#">Literal</a>	<a href="#">S100_CodeList</a>	<a href="#">Open enumeration or identifier of entry in a vocabulary</a>	
<a href="#">Literal</a>	<a href="#">S100_TruncatedDateTime</a>	<a href="#">truncated format for date / time</a>	

**Commentaire [rmm1]:** for temporal model

#### 2a-4.2.10 S100\_CD\_AttributeConstraints

Role Name	Name	Description	Mult.	Data Type	Remarks
Class	S100_CD_AttributeConstraints	Constraints of a simple attribute	-	-	
Attribute	stringLength	Shall be represented as a positive integer (i.e., greater than zero) that specifies the maximum number of characters that may be assigned to the text attribute type. If not specified, then the text length shall be unconstrained.	0..1	PositiveInteger	
Attribute	textPattern	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 attribute. This shall be achieved by using a regular expression. W3C XML Standard Part 2 Appendix F (Regular Expressions) shall be used to define text patterns in this standard.	0..1	CharacterString	

Attribute	range	Specifies the range of allowed numeric values.	0..1	S100_NumericRange	
Attribute	precision	Specifies the precision of a real number.	0..1	NonNegativeInteger	

#### 2a-4.2.11 S100\_CD\_ComplexAttributeConcept

Role Name	Name	Description	Mult	Data Type	Remarks
Class	S100_CD_ComplexAttributeConcept	A complex attribute type in a feature concept dictionary	-	-	Derived from S100_FD_AttributeConcept
Association	subAttribute	References the sub attribute	1..*	S100_CD_AttributeConcept	Characteristics defined by S100_CD_AttributeUsage

**2a-4.2.12 S100\_CD\_AttributeUsage**

This class specifies the characteristics of the association between a complex attribute type and its sub attributes.

Role Name	Name	Description	Mult	Data Type	Remarks
Class	S100_CD_AttributeUsage	Characteristics of the association between a complex attribute and its sub attributes.	-	-	
Attribute	multiplicity	Number of occurrences of the sub attribute	1	S100_Multiplicity	
Attribute	sequential	Boolean value that indicates if the sub attributes of a complex attribute are in a particular order.		Boolean	It is only applicable if a sub attribute has multiplicity > 1.

**2a-4.2.13 S100\_CD\_EnumeratedValueConcept**

This class is derived from S100\_CD\_RegisterItem and describes the characteristics of an enumerated value type.

Role Name	Name	Description	Mult	Data Type	Remarks
Class	S100_CD_EnumeratedValueConcept	Characteristics of an enumerated value type in a feature concept dictionary	-	-	
Attribute	numericCode	A positive integer designating the unique value in the domain	1	PositiveInteger	
Association	associatedAttribute	specifies the attribute type item for which this is a domain value.		Boolean	

**2a-4.2.14 S100\_CD\_InformationConcept**

Role Name	Name	Description	Mult	Data Type	Remarks
Class	S100_CD_InformationConcept	Characteristics of an information type in a feature concept dictionary	-	-	
Attribute	alphaCodeIdentifier	abbreviation designating the information type item	0..1	S100_CD_AlphaCode	See below
Association	distinction	similar information types that this is distinct from	0..1	S100_CD_InformationConcept	

**2a-4.2.15 S100\_CD\_AlphaCode**

Role Name	Name	Description	Mult	Data Type	Remarks
Class	S100_CD_AlphaCode	Abbreviation designating the item	-	-	
Attribute	code	The code	6	Character	See below

The code must:

- 1) be unique within the registry for all registered items that have an alpha code characteristic;
- 2) be exactly six characters;
- 3) conform to ISO 646 with uppercase characters A-Z, 0-9, "\_", "\$"; and lowercase characters a-z;
- 4) begin with uppercase A-Z, lowercase a-z, or "\$."

Example "PUBREF" is the Alpha Code designating a feature type item named "Publication Reference."

**2a-4.2.16 S100\_RE\_ReferenceSource**

Each item in a feature concept dictionary has a definition. If the definition is taken from an external source, this class describes the reference to the source document. Further details can be found in S-100 Part 2.

**2a-4.2.17 S100\_RE\_Reference**

This class defines the references to other documents where additional information regarding a registered item can be found. Further details can be found in S-100 Part 2.

**2a-4.2.18 S100\_CD\_ManagmentInfo**

This class contains the management information of a register item. Further details can be found in S-100 Part 2.

**2a-4.2.19 S100\_FD\_DecisionStatus**

This class specifies the status of proposal to add or modify a register item. Further details can be found in S-100 Part 2



## Appendix 2A - A (informative)

### A.1 Example of a complex attribute

A light may have several sectors. All of them share the same light characteristic and sequence. Other common attributes are the height and the name.

All attributes describing one sector in a complex attribute are structured "Light sector".

A complex attribute for the "Rhythm of light" is also defined.

The simple attributes used in "lightSector" are:

- sectorLimit1 (type Real)
- sectorLimit2 (type Real)
- colour (type Enumeration)
- valueOfNominalRange (type Real)

Therefore the complex attribute is:

Characteristic	Value		
Name	Light sector		
Definition			
Remarks	n/a		
CamelCase	lightSector		
AlphaCode	LITSEC		
DataType	Complex		
	<b>CamelCode Identifier</b>	<b>multiplicity</b>	<b>sequential</b>
SubAttribute	sectorLimit1	1	n/a
SubAttribute	sectorLimit2	1	n/a
SubAttribute	colour	1	n/a
SubAttribute	valueOfNominalRange	0..1	n/a

The "Rhythm of light" consists of:

- lightCharacteristic
- signalPeriod
- signalGroup

Characteristic	Value		
Name	Rhythm of light		
Definition			
Remarks	n/a		
CamelCase	rhythmOfLight		
AlphaCode	RHYLGT		
DataType	Complex		
	<b>CamelCode Identifier</b>	<b>multiplicity</b>	<b>sequential</b>
SubAttribute	lightCharacteristic	1	n/a
SubAttribute	signalPeriod	0..1	n/a
SubAttribute	signalGroup	0..1	n/a

A second way of describing the rhythm of light is the “signal sequence” as it is currently done with the SIGSEQ attribute. A signal sequence consists of intervals where the signal is either on or off (here light or eclipse)

Characteristic	Value		
Name	Signal sequence interval		
Definition	tbd.		
Remarks	n/a		
CamelCase	signalSequenceInterval		
AlphaCode	SGSQIN		
DataType	Complex		
	CamelCode Identifier	multiplicity	sequential
SubAttribute	signalStatus	1	n/a
SubAttribute	duration	1	n/a

A Signal sequence is then just an ordered list of those intervals.

Characteristic	Value		
Name	Signal sequence		
Definition	tbd.		
Remarks	n/a		
CamelCase	signalSequence		
AlphaCode	SIGSEQ		
DataType	Complex		
	CamelCode Identifier	multiplicity	sequential
SubAttribute	signalSequenceInterval	1..*	True

A light object would now consist of:

light:

- rhythmOfLight [1..\*]
- lightSector [1..\*]
- signalSequence [0..1]
- objectName[0..1]
- height[0..1]

This definition would be in the feature catalogue, although the definition of the attributes is in the data dictionary.