12-1.1.1 Title: S-100 Proposal Form - Appendix 2a-A-update complex attributes example

S-100 Maintenance - Change Proposal Form

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Change Proposal Type *(Select only one option)*

1.Clarification	2.Correction	3.Extension
X		

Location (*Identify all change proposal locations)*

S-100 Version No.	Part No.	Section No.	Proposal Summary
4.0.0	2a	Appendix 2a-A Example of a complex attribute	The example no longer equals the definitions in S-101 1.0.0 DCEG. Consider changing example with existing definition.

Change Proposal

The change proposal suggests changing the complex attribute example in 2a-A with existing definitions in S-101 1.0.0 DCEG.

The current example used is this:

Appendix 2a – A
Example of a complex attribute
(informative)

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	A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).	
Remarks	n/a	
CamelCase	lightSector	
AlphaCode	LITSEC	
Sub Attributes	**Attribute Binding**	
CamelCode Identifier	**multiplicity**	**sequential**
sectorLimit1	1	n/a
sectorLimit2	1	n/a
colour	1	n/a
valueOfNominalRange	0..1	n/a

Note: The multiplicity and sequence are carried in the attribute between the complex and sub-attribute.

The "Rhythm of light" consists of:

- lightCharacteristic
- signalPeriod
- signalGroup

Characteristic	**Value**
Name	Rhythm of light
Definition	
Remarks	n/a
CamelCase	rhythmOfLight
AlphaCode	RHYLGT

Sub Attributes	Attribute Binding	
CamelCode Identifer	**multiplicity**	**sequential**
lightCharacteristic	1	n/a
signalPeriod	0..1	n/a
signalGroup	0..1	n/a

A second way of describing the rhythm of light is the "signal sequence" as it is done with the S-57 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	
Sub Attributes	**Attribute Binding**	
CamelCode Identifer	**multiplicity**	**sequential**
signalStatus	1	n/a
duration	1	n/a

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

Characteristic	Value	
Name	Signal sequence	
Definition	The sequence of times occupied by intervals of light and eclipse for all "light characteristics". (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.191, November 2000).	
Remarks	n/a	
CamelCase	signalSequence	
AlphaCode	SIGSEQ	
Sub Attribute	**Attribute Binding**	
CamelCode Identifier	**multiplicity**	**sequential**
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.

Existing situation:

1.According to S-101 1.0.0 DCEG the complex attribute **light sector** carries more sub-attributes then stated in the S-100 example. The sub-attributes **directional character**, **light visibility**, **sector information** and **sector extension** are not referred to in the example. The definition of **light sector** in S-101 DCEG:

Light sector: IHO Definition: A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

Indication:

Sub-attributes:		
	colour	see clause 27.72
	directional character	see clause 29.1
	light visibility	see clause 27.116
	sector limit	see clause 29.21
	value of nominal range	see clause 27.183
	sector information	see clause 29.20
	sector extension	see clause 30.4

Remarks:
- No remarks.

Further on, the complex attribute **sector limit** carries the two sub-attributes **sector limit one** and **sector limit two**. The definition of sector limit in S-101 DCEG:

Sector limit: IHO Definition: A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

The sector limit specifies the limits of the sector in a clockwise direction around the central feature (for example a light). (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.184, November 2000).

Indication: The complex attribute describes the angle of a light sector as defined by the sub-attributes.

Sub-attributes:		
	sector limit one	see clause 29.22
	sector limit two	see clause 29.23

Remarks:
- No remarks.

The two sub-attributes **sector limit one** and **sector limit two** are not defined as simple attributes but are also complex attributes. The definition of **sector limit one** in S-101 DCEG (also equal to **sector limit two** definition):

Sector limit one: IHO Definition: A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

sector limit one specifies the first limit of the sector. The order of **sector limit one** and **sector limit two** is clockwise around the central feature (for example a light). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.184, November 2000).

Indication: The complex attribute describes the line or bearing of a light where the character changes or the light is obscured.

Sub-attributes:		
	sector bearing	see clause 27.151
	sector line length	see clause 27.152

Remarks:
- The values given to the common limits of adjacent sectors should be identical.
- The orientation of the bearing is from seaward to the central feature. This conforms with the method used in "List of Lights" publications.
- A generic term such as "to shore" cannot be used; a specific bearing must be encoded. Where a light sector limit is defined as "to the shore", it should be encoded using a value that ensures that, when the limit is drawn, it will fall entirely on land.

A demonstrated above, the definitions of **light sector** and **sector limit** attributes do not align with the example used in S-100 2a-A.

2. According to S-101 1.0.0 DCEG the complex attribute **rhythm of light** carries more sub-attributes then stated in the S-100 example. The sub-attribute **signal sequence** is not referred to in the example. The definition of **signal sequence** in S-101 DCEG:

Rhythm of light: IHO Definition:

Indication: The complex attribute describes the rhythm of a light (or a light sector).

Sub-attributes:		
	light characteristic	see clause 27.115
	signal group	see clause 27.156
	signal period	see clause 27.157
	signal sequence	see clause 29.25

Remarks:
- No remarks.

As demonstrated above, the definition of **rhythm of light** attribute does not longer align with the example used in S-100 2a-A.

3.With reference to the examples presented above it is proposed to update the complex attribute example in S-100 2a-A to align with current situation in S-101 1.0.0 DCEG. As the difference between existing example in DCEG and S-101 1.0.0 is significant, the example is remodeled focusing on how complex attributes can be used to build extended hierarchies. **Rhythm of light** is not an attribute defined used for the feature **Sector lights**, and therefore not part of proposed solution.

The example is proposed amended accordingly:

Appendix 2a – A **Example of complex attributes** (informative)

In S-101 1.0.0, lights are represented using four different features: **Light all around, Sector lights, Fog detector lights** and **Air obstruction lights**. This example focusses on **Sector lights**.
The definition of a **sector light** (S-101.1.0.0 Data Classification and Encoding Guide (DCEG):

IHO Definition: **LIGHT**. A light is a luminous or lighted aid to navigation. (IHO Dictionary – S-32).

A sectored light is a light having one or more sectors, which have different characteristics across, and sometimes within, each sector.

A Sector lights feature can carry the following attributes:

- category of light S (EN)
- exhibition condition of light S (EN)
- feature name C
- fixed date range C
- height S (RE)
- periodic date range C
- sector characteristics C
- signal generation S (EN)
- status S (EN)
- vertical datum S (EN)

The enumeration (EN) and real (RE) type attributes are simple (S), and the remaining are complex (C). More details on the complex attribute **sector characteristics**:

Sector characteristics: IHO Definition:

Indication: The complex attribute describes the characteristics of a light sector.

Sub-attributes:		
	light characteristic	see clause 27.115
	light sector	see clause 29.10
	signal group	see clause 27.156
	signal period	see clause 27.157
	signal sequence	see clause 29.25

Remarks:
- No remarks.

The sub attributes **light characteristics**, **light sector** and **signal sequence** are complex attributes.
More details on the complex attribute **light sector**:

Light sector: IHO Definition: A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

Indication:

Sub-attributes:		
	colour	see clause 27.72
	directional character	see clause 29.1
	light visibility	see clause 27.116
	sector limit	see clause 29.21
	value of nominal range	see clause 27.183
	sector information	see clause 29.20
	sector extension	see clause 30.4

Remarks:
- No remarks.

The sub attributes **directional character**, **sector limit** and **sector information** are complex attributes. More information on the complex attribute **sector limit**:

Sector limit: IHO Definition: A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

The sector limit specifies the limits of the sector in a clockwise direction around the central feature (for example a light). (Adapted from S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.184, November 2000).

Indication: The complex attribute describes the angle of a light sector as defined by the sub-attributes.

Sub-attributes:		
	sector limit one	see clause 29.22
	sector limit two	see clause 29.23

Remarks:
- No remarks.

Both attributes, **sector limit one** and **sector limit two**, are complex attributes.
More information on the complex attributes **sector limit one** and **sector limit two**:

Sector limit one: IHO Definition: A sector is the part of a circle between two straight lines drawn from the centre to the circumference. (Advanced Learner's Dictionary, 2nd Edition).

sector limit one specifies the first limit of the sector. The order of **sector limit one** and **sector limit two** is clockwise around the central feature (for example a light). (S-57 Edition 3.1, Appendix A – Chapter 2, Page 2.184, November 2000).

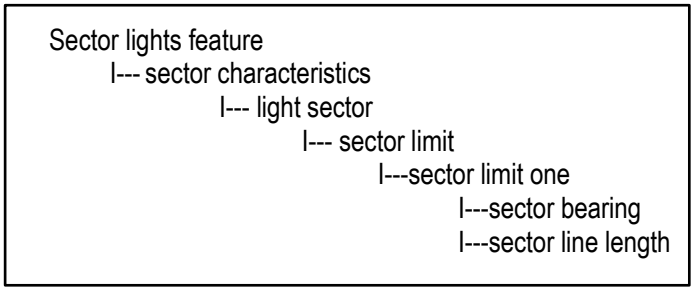
Indication: The complex attribute describes the line or bearing of a light where the character changes or the light is obscured.

Sub-attributes:		
	sector bearing	see clause 27.151
	sector line length	see clause 27.152

Remarks:
- The values given to the common limits of adjacent sectors should be identical.
- The orientation of the bearing is from seaward to the central feature. This conforms with the method used in "List of Lights" publications.
- A generic term such as "to shore" cannot be used; a specific bearing must be encoded. Where a light sector limit is defined as "to the shore", it should be encoded using a value that ensures that, when the limit is drawn, it will fall entirely on land.

Neither the **sector bearing** attribute, nor the **sector line length** attribute are of complex type.

This example has demonstrated how it is possible to build an extended hierarchy using complex attributes. As the below figure illustrates, to build a sector light with sector limits defined it takes four levels of sub attributes of type complex to encode the **sector bearing** and sector line length attributes.



A more detailed example of the complex attribute **light sector** as described in S-101.1.0.0 DCEG is demonstrated below. In this example information on S-101 Attribute, S57 Acronym, Allowable encoding value, Type and Multiplicity is given.

S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
light sector			(S) C	1,*
colour	(COLOUR)	1 : white 3 : red 4 : green 5 : blue 6 : yellow 9 : amber 10 : violet 11 : orange	(S) EN	1,* (ordered)
directional character			(S) C	0,1
moiré effect			(S) BO	0,1
orientation			(S) C	1,1
orientation uncertainty			(S) RE	0,1
orientation value	*(ORIENT)*		(S) RE	1,1
light visibility	(LITVIS)	1 : high intensity 2 : low intensity 3 : faint 4 : intensified 5 : unintensified 6 : visibility deliberately restricted 8 : partially obscured 9 : visible in line of range	(S) EN	0,*
sector limit			(S) C	0,1
sector limit one			(S) C	1,1
sector bearing	*(SECTR1)*	**sector limit one/sector bearing ≠ sector limit two/sector bearing** (*0 = 360*)	(S) RE	1,1
sector line length			(S) IN	0,1
sector limit two			(S) C	1,1
sector bearing	*(SECTR2)*	**sector limit two/sector bearing ≠ sector limit one/sector bearing**; (*0 = 360*)	(S) RE	1,1
sector line length			(S) IN	0,1
value of nominal range	(VALNMR)		(S) RE	0,1
sector information			(S) C	0,*
language		ISO 639-2/T	(S) TE	0,1
text	*(INFORM)* *(NINFOM)*		(S) TE	1,1
sector extension			(S) IN	0,1
signal group	(SIGGRP)		(S) TE	0,* (ordered)
signal period	(SIGPER)		(S) RE	0,1
signal sequence	*(SIGSEQ)*		(S) C	0,* (ordered)
signal duration			(S) RE	1,1
signal status		1 : lit/sound 2 : eclipsed/silent	(S) EN	1,1