Title: Portrayal of Discrete Coverages

S-100 Maintenance - Change Proposal Form

Organisation	Portolan Sciences LLC	**Date**	22-Oct-2021
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Change Proposal Type *(Select only one option)*

1.Clarification	2.Correction	3.Extension
		X

Location (*Identify all change proposal locations)*

No.	S-100 Version No.	Part No.	Section No.	Proposal Summary
1	4.0.0	9	11.1.11 Coverage Instruction	Add "Overview" subhead to structure this clause like the similar 9-x.x.x clauses. Insert paragraphs describing how discrete and continuous coverages are portrayed. (5.0 redline: 9-11.1.12?)
2		9	11.1.11 Coverage Instruction	Sub-head **Numeric and Symbol Annotations**: Add sentence for discrete coverages (5.0 redline: 9-11.1.12?)
3		9	12.7.4.1 Coverage Fill	Add an *placement* (enum.) parameter to *CoverageFill*. (5.0 redline: 9-12.7.4.1?)
4		9	12.7.4.6 (new)	Add clause defining new enumeration *CoveragePlacement*, members: "centre", "directPosition" (5.0 redline: 9-12.7.4.6?)
5		9	12.7.4.7 (new)	Add table prescribing the symbol/text placement for combinations of coverage spatial type, the interpolation type specified in the HDF5 file, and the *placement* attribute in the *CoverageFill* instruction in the portrayal catalogue. (5.0 redline: 9-12.7.4.7?)
6		9a	11.2.1	Revisions to Table 9a-3 and the CoverageFill paragraph to conform to revisions described in previous items.

Change Proposal

The proposed revised text for all items is provided below. Text in italics is explanatory and not intended to become part of S-100, except where noted. New or modified material is in red font.

Item 1 - New paragraphs in 9-11.1.11 [9-11.1.12(?) in 5.0 redline]

Add text to distinguish discrete and continuous coverages. S-100 Edition 4.0.0 mixes them up in different places and ways. (The ISO 12123 quote is in italics in S-100.)

9-11.1.11 Coverage Instruction

Overview

An instruction to portray data coverages like gridded bathymetry, satellite images, etc.

"A coverage is a feature that has multiple values for each attribute type, where each direct position within the geometric representation of the feature has a single value for each attribute type." [ISO 19123:2005, Introduction]

In this document coverage attributes used for portrayal are expected to have numeric values.

The assignment of Portrayal for a Coverage starts with a Coverage Feature. Like other Feature types a rule is used to match the Feature to Drawing instructions.

A first match lookup table is used to assign portrayal based on a specified coverage attribute.

There are three options for coverage portrayal, filling with colour, annotating with numeric text or annotating with symbols.

Discrete coverages

Discrete coverages are portrayed by applying a symbol and/or numeric annotation to the direct position associated with each value of an attribute of the coverage.

Continuous coverages

Continuous coverages are portrayed by filling the cells that have actual data associated, as opposed to no data (termed "fill values" in HDF5, not to be confused with colour or symbol fills as the terms are used in portrayal). The fills used in portrayal may be solid fills, patterns of symbols, pixmaps, or gradients. Fill transparency may also be specified by the applicable portrayal rule. Interpolation methods, if defined in the coverage type (see clause 10c-10.3) may be applied to depict variations in data values in each grid cell. The anchor point for text or symbol placement is dependent on the coverage's spatial type and the placement attribute in the portrayal catalogue.

Irregular shape grids, ungeorectified grids, variable cell size grids (see Table 10c-15) are all treated similarly to regular grids as far as portrayal is concerned. For variable cell size grids, unit cells must be used for symbol fills (i.e., in an expanded cell that covers more than one unit cell, the symbol must be depicted at the centre of each unit cell included in the expanded cell).

Item 2

The sub-head "Numeric and Symbol Annotations" in Ed. 4.0.0 9-11.1.11 mentions only continuous coverages. Contrast to the previous sub-head "Colour Assignments" which addresses both continuous and discrete coverages. Proposed addition:

Numeric and Symbol Annotations - Insert new paragraph after paragraph 1 (new text in red font):

For a continuous coverage the centre of each cell (for example rectangle, tile, triangle) is used as the anchor point of the text or symbol.

For discrete coverages, the anchor point for annotations is the direct position associated with each value of the attribute designated by the attributeCode parameter of the CoverageFill (clause 9-12.7.4.1).

Item 3

Add parameter to indicate where symbols and text for coverage objects should be placed. Add enumeration defining the value of the parameter. NB: The attributeCode is not in Ed. 4.0.0; it was added to Edition 5.0.0 by an earlier maintenance proposal (from NIWC). Highlighted references are to clauses added or modified by this or other Ed. 5.0 proposals.

9-12.7.4.1 CoverageFill

Role Name	Name	Description	Mult	Type	Remarks
Class	CoverageFill	*(no change)*	-	-	Class
Attribute	attributeCode	*(no change*	1	CharacterString	
Attribute	uom	*(no change)*	0..1	S100_UnitOfMeasure	

Role Name	Name	Description	Mult	Type	Remarks
Attribute	placement	Designation of anchor point for placement of text or symbol annotation	0..1	CoveragePlacement	Mandatory if and only if portrayal requires text or symbol annotation; otherwise omitted. This attribute is valid only for continuous coverages (for discrete coverages, the anchor point is the direct position). See 9-12.7.4.7 (Coverages and placement)
Role	lookup	*(no change*	1..*	LookupEntry	

Item 4

New clause defining the CoveragePlacement enumeration.

9-12.7.4.6 CoveragePlacement

Role Name	Name	Description
Type	CoveragePlacement	Defines the type of placement of a symbol or text annotations for a coverage
Enumeration	centre	The anchor point for annotations is the centre of the cell.
Enumeration	directPosition	The anchor point for annotations is the direct position associated with each value of the attribute designated by the attributeCode parameter of the CoverageFill in which the placement is encoded.

Item 5

Table prescribing the symbol/text placement for combinations of coverage spatial type, the interpolationType encoded in the HDF5 dataset for the coverage feature, and the placement attribute in the CoverageFill instruction in the portrayal catalogue.

9-12.7.4.7 Coverages and placement

Coverage spatial type (attribute dataCodingFormat) See 10c-10.4 Data coding format	Interpolation (attribute interpolationType). See 10c-10.3 S100_CV_Interpolation Method	placement See 9-12.7.4.1 CoverageFill & 9-12.7.4.6 CoveragePlacement	Resulting symbol/text placement
fixedStations movingPlatform stationwiseFixed (DCF 1, 4, 8)	(not allowed)	(Not used. Ignore if encoded.)	each direct position
regularGrid ungeorectifiedGrid irregularGrid (DCF 2, 3, 5)	discrete	directPosition OR (not present)	each direct position
		centre	ERROR - ignore placement attribute and portray at each direct position
	(other)	directPosition	each direct position
		centre OR (not present)	centre of each cell
variableCellSize (DCF 6)	discrete	directPosition OR (not present)	each direct position for each unit grid cell
		centre	ERROR - ignore placement attribute and portray at centre of each unit grid cell
	(other)	directPostion	each direct position for each unit grid cell

		centre OR (not present)	centre of each unit grid cell
TIN (DCF 7)	discrete	directPosition OR (not present)	each direct position (triangle vertex)
		centre	ERROR - ignore placement attribute and portray at each direct position (triangle vertex)
	(other)	directPosition	each direct position (triangle vertex)
		centre OR (not present)	barycentre (centroid) of each triangle

Item 6

Update the coverage fill command in 9a-11.2.1 to conform to other revisions..

Update to CoverageFill rows in Table 9a-3:

Table 9a-3 Drawing Commands

Command	Parameters	Parameter Type	Part 9 Reference
CoverageFill	attributeCode	String	9-11.1.12 9-11.2.11 9-12.7.4.7
	uom	String	
	placement	String	

Update to paragraph describing the CoverageFill command, later in the same clause:

CoverageFill:*attributeCode[,uom[,placement]]*

Instructs the host to fill a coverage using the lookup table entries created via the *LookupEntry* state command. The host must clear the coverage lookup list upon completion.

attributeCode Specifies which of the features attributes to use for the lookup.

uom If present, specifies the unit of measure for the range values in the lookup table. If not present, the range values and attribute value share the same unit of measure as defined in the Feature Catalogue.

placement If present, specifies the placement of symbol/text annotations.

NOTE: When associating alerts with coverage values there may or may not be portrayal elements present in the coverage lookup list.

Change Proposal Justification

Some coverage data products, notably S-111 (Surface Currents), define discrete coverages, in which there is no interpolation possible and anchoring a symbol anywhere other than the precise data location would be misleading. S-100 portrayal in Edition 4.0.0 does not address portrayal of such discrete coverages. Using displaced grids to mimic the effect of discrete coverages leads to potentially misleading and error-prone complexities in data production and datasets; noting in addition that coverage information can use spatial representations other than regular grids.

What parts of the S-100 Infrastructure will this proposal affect?

☐ S-100 Feature Concept Dictionary Interface or Database
☐ S-100 Portrayal Register
☐ S-100 Feature Catalogue Builder
☒ S-100 Portrayal Catalogue Builder
☒ S-100 UML Models
☒ S-100 GitHub Schemas

Please send completed forms and supporting documentation to the secretary S-100WG.