Paper for Consideration by the S-100 Working Group

Proposed Change to Support Portrayal of Soundings

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Executive Summary:	Allow for portrayal of features associated with pointSet geometries
Related Documents:	S-100 Part 9
Related Projects:	IHO S-100/S-101 Test Bed Project

Introduction / Background

For encoding efficiency, S-101 encodes Sounding features by grouping soundings that have common attribution into a single feature instance. The geometry associated with this feature instance is encoded using a collection of coordinates, each coordinate containing latitude, longitude and depth.

Analysis / Discussion

The currently defined Presentation Schema (S-100 9-A-3) is incapable of portraying features whose spatial association is to a pointSet / MultiPoint. Soundings as encoded in S-101 are an example of a feature type subject to this limitation.

The current Presentation Schema does not provide a mechanism to distinguish between the individual points within a coordinate collection. For instance, while the portrayal of Sounding features can emit the proper symbols, it cannot reference or specify the geographic location where the symbols should be displayed. The available featureReference and spatialReference elements can only reference the entire MultiPoint (pointSet) geometry, not each individual point. This is due to the fact that the MultiPoint contains a single "id" attribute for the entire set of sounding values.

For example, if the safety depth is 6, then the first and second coordinates in the MultiPoint shown below should produce different drawInstructions, but currently each drawInstruction can only reference both coordinates:

INPUT XML:

```
<MultiPoint id="1"> <!-- Note: single identifier for the entire collection of points -->
  <Coordinate3D>
   <x>2.0</x>
   <y>3.0</y>
   <z>5.3</z> <!-- Unsafe, shallower than safety depth -->
  </Coordinate3D>
  <Coordinate3D>
   <x>5</x>
   <y>6</y>
   <z>7</z> <!-- Safe, deeper than safety depth -->
  </Coordinate3D>
</MultiPoint>
```

OUTPUT DRAW INSTRUCTIONS:
```
     <!-- Draw unsafe sounding(s) -->
     <drawInstruction>
      <featureReference id="57"/>
      <spatialReference id="1"/> <!-- Can't refer to unsafe point, only to entire multipoint  -->
      ...
     </drawInstruction>
     <!-- Draw safe sounding(s) -->
     <drawInstruction>
      <featureReference id="57"/>
      <spatialReference id="1"/> <!-- Can't refer to safe point, only to entire multipoint -->
      …
     </drawInstruction>
```

Recommendations

We propose modifying 9.8.7.3 so that each point within a MultiPoint has a unique identifier. Currently, 9.8.7.3 defines a MultiPoint as:

```
<xs:complexType name="MultiPoint" abstract="true">
  <xs:complexContent>
    <xs:extension base="Object">
      <xs:sequence>
        <xs:group ref="Coordinate" minOccurs="1" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

We recommend defining MultiPoint so that it is composed of Point objects:

```
<xs:complexType name="MultiPoint">
  <xs:complexContent>
    <xs:extension base="Object">
      <xs:sequence>
        <xs:element name="Point" type="Point" minOccurs="1" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

This change additionally requires that 9.8.7.2 be modified so that Point is not abstract, and requires an update to Figure 9-8 – Input Schema Objects. These changes allow the previous example to output correct draw instructions as follows:

INPUT XML:

```
<MultiPoint id="1">
  <Point id="2"> <!-- Note: each point within the multipoint now has its own id -->
    <Coordinate3D>
      <x>2.0</x>
      <y>3.0</y>
      <z>5.3</z> <!-- Unsafe, shallower than safety depth -->
    </Coordinate3D>
  </Point>
  <Point id="3"> <!-- Another point with id within the multipoint -->
    <Coordinate3D>
      <x>5</x>
      <y>6</y>
      <z>7</z> <!-- Safe, deeper than safety depth -->
    </Coordinate3D>
  </Point>
</MultiPoint>
```

OUTPUT DRAW INSTRUCTION:

```
<!-- Draw unsafe sounding(s) -->
<drawInstruction>
  <featureReference id="57"/>
  <!-- Can now reference each point within the multipoint to be drawn by this instruction -->
  <spatialReference id="2"/> <!-- Point 2 is unsafe -->
  ...
</drawInstruction>
<!-- Draw safe sounding(s) -->
<drawInstruction>
  <featureReference id="57"/>
  <spatialReference id="3"/> <!-- Point 3 is safe -->
  ...
</drawInstruction>
```

Action Required of S-100 WG

The S-100 working group is invited to:

      a.   note the paper

      b.   agree with the recommendation