Drafting the Part10b GML Data Format Implementation Guidance

IHO S-100WG8-6.18

by

Shwu-Jing Chang (NTOU)

Introduction / Background

- A paper entitled "Detected GML Issues Related to Spatial Reference Systems" was presented (S100WG6_2022_4.3B)
  - Action Item: add an implementation guidance to S-100 Part10b.
- This paper reports the progress drafting the implementation guidance.
  - Items to be included are to be further identified
  - Contents depend very much on the standard documents which keep evolving and the decisions on remaining issues
- Some parts have been prepared, based on
  - experience gained in IHO-SG Lab. S-131 database project
  - recent findings in sample/test dataset of some S-100 based data product specifications, e.g. S-128 & S-421

1. GML format dataset structure

| Elements	Remarks
S1xx:Dataset	The root element of the dataset. S1xx:DatasetType extends S100: DatasetType
gml:boundedBy	inherited by S100:DatasetType from gml:AbstractFeatureType; use gml:Envelope element to encode the coordinates of the lowerCorner and upperCorner of the extent.
S100:DatasetIdentification	a mandatory element defined in S100:DatasetType. (Which elements to be included is inconsistent across documents. It is also noted that several S-1xx sample datasets use the tag S100:DatasetIdentificationInformation instead of S100:DatasetIdentification)
S100:Geometry	allows spatial objects to be located outside feature objects. Group of allowed S-100 geometries, i.e. choice of Point, MultiPoint, curves (Curve, CompositeCurve, OrientableCurve), Surface, Polygon. For example, S100:Point
S1xx:members	group of information, feature and meta objects, all S1xx:Member Objects; S1xx:members extends gml:AbstractFeatureMemberType.

2. Coordinate Reference System (CRS)

- The CRS of the geometry is specified in the srsName attribute and URI convention should be used

- The axis order in the formal definition of EPSG4326 is Lat/Long.
  - When CRS is identified using OGC URI or URN form, Lat/Long axis order is respected.
    - URI form http://www.opengis.net/def/crs/EPSG/0/4326
    - URN form "urn:ogc:def:crs:EPSG::4326"
  - If the srsName attribute is set to "EPSG:4326", the coordinates are mostly treated as in Long/Lat axis order in GIS.

- srsDimension attribute is not required and not recommended
  - implicit from CRS identified by srsName. EPSG4326
    - WGS84 is a geographic 2D type by definition.

The risk of not using the standard form to encode CRS
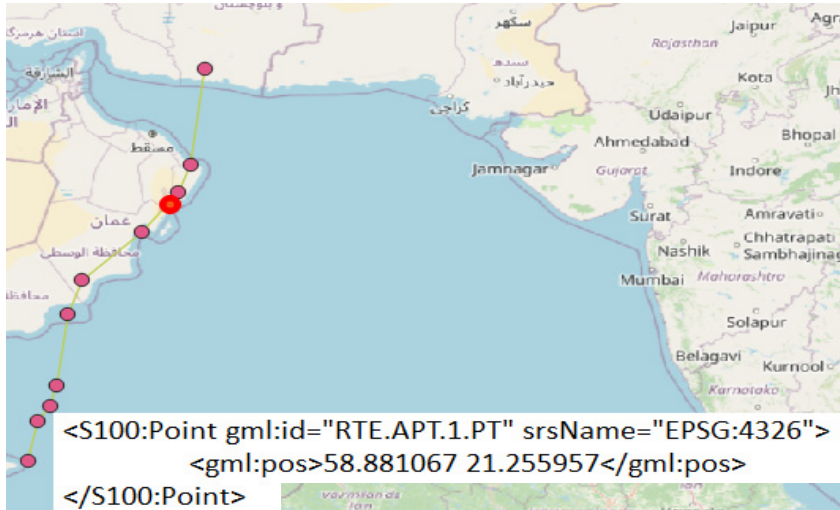
Test dataset (CIRM's website) referred to in IEC 63173-1: S-421 route plan based on S-100, Edition 1.0, June 2021.

```
<S100:Point gml:id="RTE.APT.1.PT" srsName="EPSG:4326">
        <gml:pos>58.881067 21.255957</gml:pos>
</S100:Point>
```

(a) original srsName encoding in the S-421 dataset

```
<S100:Point gml:id="RTE.APT.1.PT" srsName="http://www.opengis.net/def/crs/EPSG/0/4326">
        <gml:pos>58.881067 21.255957</gml:pos>
</S100:Point>
```
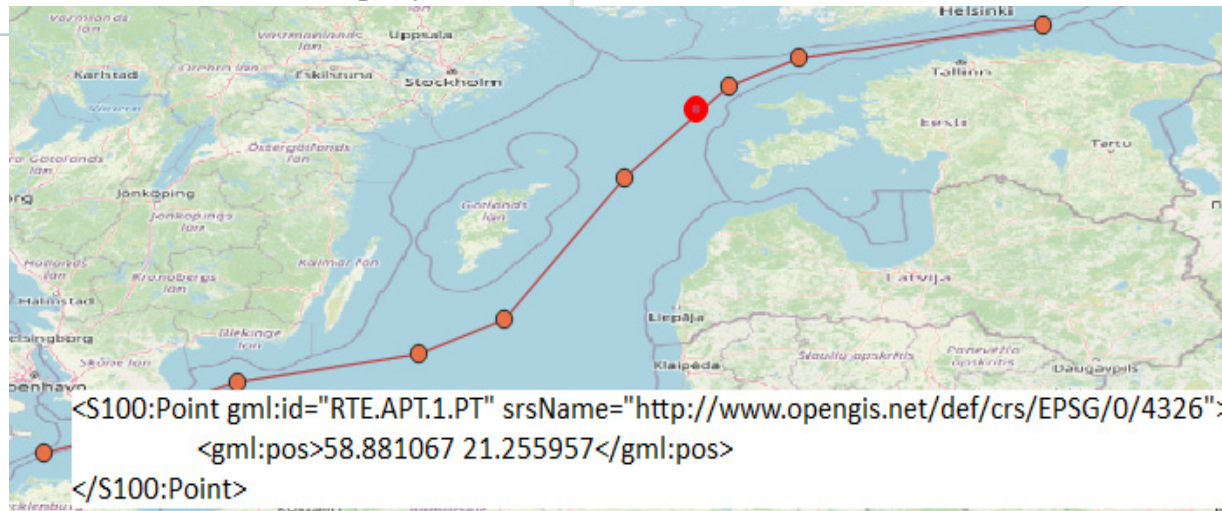
(b) corrected encoding

3. Enumerations

- For S-100 enumeration or S-100 codelist attributes, datasets must use the code and label of the listed value as encoded in the Feature Catalogue.

- The enumeration attribute type is defined as a complex type extending from the label type and including the code type as an xml attribute. For example:

Listed value of the enumeration attribute type membership in S-1xx Feature Catalogue	Sample encoding in the S-1xx GML dataset
<S100FC:code>membership</S100FC:code> .... <S100FC:label>Included</S100FC:label> <S100FC:code>1</S100FC:code> .. <S100FC:label>Excluded</S100FC:label> <S100FC:code>2</S100FC:code>	<S1xx:membership code="1">Included</S1xx:membership> <S1xx:membership code="2">Excluded</S1xx:membership>

Conclusions and Suggestions

- GML data format is being used by many S-100 based data product specifications
  - including those drafted and published by organizations other than IHO.

- Changes introduced during the revision of S-100 standard documents might not be easily noticed and reflected into the respective product specification.

- In addition to the implementation guidance, **specifying corresponding validation check items** might help to highlight changes and assure conformity.

Action required of S-100WG

- The S-100WG is invited to:
  - Note this paper;
  - Take actions as appropriate.