

## Paper for Consideration by TSMAD

### Development of a GML Profile for S-100

<b>Submitted by:</b>	UK
<b>Executive Summary:</b>	This paper discusses the options for the inclusion of a GML Profile within S-100 Part 10. It includes a draft GML profile based on work done on behalf of the UKHO. Such a profile would support the route exchange product presented to TSMAD 23 and other product specifications which are in development.
<b>Related Documents:</b>	a) TSMAD24/DIPWG4 11.4A
<b>Related Projects:</b>	1. S-100

#### Introduction / Background

1. The UK submitted a paper to TSMAD 24 on the requirement for a Geography Mark up Language (GML) encoding within S-100. This was supported by TSMAD and resulted in an action to lay out the options. This paper discusses the options and goes on to provide a draft GML profile developed for the UKHO for TSMAD to consider. The schemas for a draft GML profile accompany this paper and documentation will follow in due course.

#### Analysis/Discussion

2. Geography Markup Language is increasingly being used as an implementation exchange model to facilitate open data exchange . It is the default payload of widely used OGC web service specifications (e.g. WMS , WFS, CSW), and is being used in major initiatives such as INSPIRE (Environment) and SESAR (Aviation). It is in line with the goals and objectives of S-100 and the IHO to incorporate a GML profile within the S-100 standard. However a number of different flavors of GML exist and GML profiles are used to constrain GML to the elements required within a specific domain. Then within the domain, application schemas define the data structure and can be considered similar to S-100 feature catalogues. This concept is shown in figure 1 below.

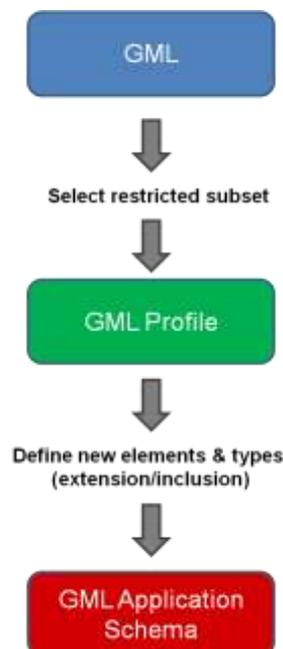


Figure 1 – Use of GML profiles to restrict and extend GML.

3. Because S-100 defines a spatial schema and its own General Feature Model it is proposed that S-100 requires its own GML profile. This ensures that all S-100 constructs are reflected and that they can be maintained as S-100 evolves. A key activity in developing such a profile is to define the requirements for a profile. The following summary lists the basic requirements UKHO identified. This was done with the route exchange product in mind but allowing for other products.

Requirements;

1. Must allow basic updating functionality (insert, modify, delete) to be supported
2. Conform to ISOTC211 standards series, particularly ISO 19136 where feasible
3. Must realise the types in the S-100 General Feature Model (S-100 3-5-2)
4. Must conform to S-100 Geometry Level 3a (S-100 Part 7)
5. Encoding must be XML
6. Encoding must support the inclusion of dataset level metadata and the incorporation of an integrity check

These were developed into more detailed requirements which formed the basis for the development of the S-100 GML profile. These are documented in Annexe A.

4. Based on the requirements identified a version of GML upon which to base the profile was selected. Some of the requirements meant that the GML simple features profile was not an option and it was considered that GML 3.3 which introduces new compact geometric constructs should be used. As this is emerging vendor support is not good but we should be looking to the future. Figure 2 outlines different GML versions although GML 3.3 is not included.

GML Packages	GML 2.1	GML 3.1	GML 3.2	GML Simple Feature Profile
Feature	✓	✓	✓	✓
Feature Collection	✓	✓	✓	✓
Feature Relationships	✓	✓	✓	✓
Basic Geometry	✓	✓	✓	✓
Primitive and Aggregate Geometry		✓	✓	✓
Complex Geometry		✓	✓	
Topology		✓	✓	
Coverages		✓	✓	
Temporal and Dynamic Features		✓	✓	
Coordinate Reference Systems		✓	✓	
Observations, values, units of measure		✓	✓	
Default styling		✓		

Figure 2 – Packages supported by different version of GML.

4. With the requirements defined and the version of GML selected, the GML profile schemas were created and a modified version of the S-106 Route Exchange application schema developed to demonstrate how to use the S-100 GML Profile within S-100 application schema. One of the benefits of using GML is that models can be developed within UML and application schemas can be automatically output. This simplifies maintenance and could support the automatic creation of feature catalogues from UML. The GML profile defines two levels which can be specified within product specifications to allow some products to constrain themselves to simple geometry types as appropriate.

## **Conclusion**

5 This paper outlines the development of an S-100 GML profile which is provided to accompany the paper. As agreed by TSMAD 24 a GML profile should be incorporated in S-100 and the profile provided can be developed further to meet this need. TSMAD should consider the profile and ensure it meets the requirements for S-100.

## **Action Required of TSMAD**

- Consider the proposed S-100 GML profile provided by UKHO for further development and inclusion in S-100