

## Comments on S-100WG7-4.20

### (Primary association between feature types)

<b>Submitted by:</b>	Raphael Malyankar
<b>Executive Summary:</b>	This proposed modification to the feature catalogue model entails revisions to several components of the S-100 ecosystem. There are alternative solutions which may be more suitable for S-100 and which are better aligned with the underlying ISO and other standards. Consideration of this paper should be deferred until the next TSM to allow these alternatives to be discussed.
<b>Related Documents:</b>	S-100WG7-4.20 (Primary association between feature types)
<b>Related Projects:</b>	S-100; S-101; other Product Specifications as appropriate

### Introduction / Background

The referenced paper proposes the following modifications to the feature catalogue model in S-100 Part 5:

- Adding the role type and the cardinality for the inverse relation to feature and information bindings.
- An unspecified modification to link spatial types to information types, tentatively described as “specify that an information association can be used by spatial types. In the information association a property must be added for that in the FC model (optional)”; and “The information association should have a Boolean property if it can be used by a spatial type.”

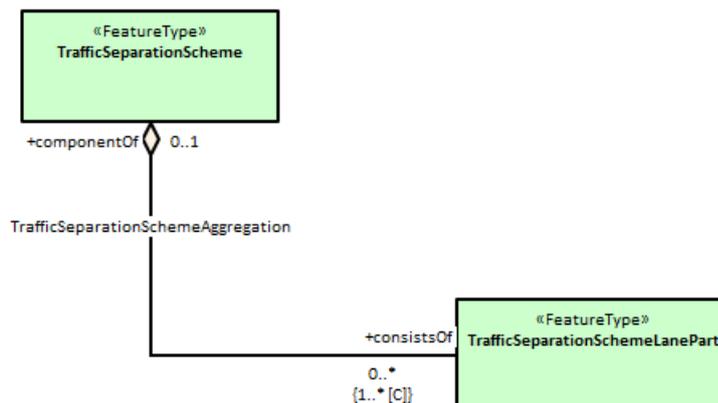
The ‘primary’ attribute mentioned in the paper is apparently not part of the actual proposal.

These revisions would require changes to S-100 Part 5, the S-100 schemas, and the feature catalogue builder. Implementations would also require updates to process the revised feature catalogue model.

### Discussion/Analysis

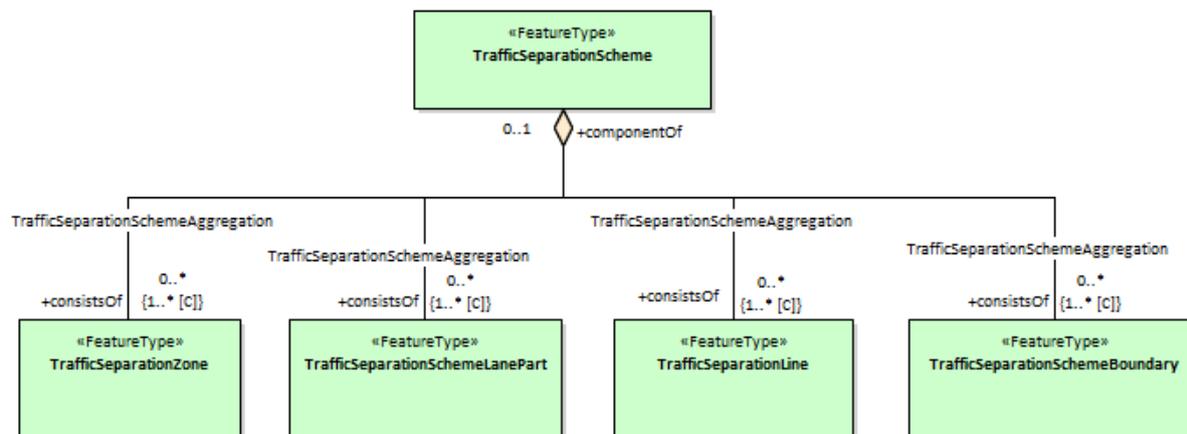
#### Designation of feature type which carries the binding

Given an association between a single pair of features as in the figure below, how do the product specification developers know whether to have a feature binding in one feature type or the other?



#### Handling of ‘overloaded’ associations and roles

S-100 modeling practice does not, strictly speaking, use pure binary associations - rather, it overloads association and role names. TrafficSeparationScheme is linked by the “same” association and role to several features. The following figure illustrates this with a few of the features thus associated:



What blocks feature catalogues from a situation like the following (which would 'work' well enough for production software but a lot less well for applications):

- A feature binding in TrafficSeparationScheme pointing to TrafficSeparationZone and TrafficSeparationSchemeLanePart.
- A feature binding in TrafficSeparationLine pointing to TrafficSeparationScheme.
- A feature binding in TrafficSeparationSchemeBoundary pointing to TrafficSeparationScheme.

### Other questions

Instead of inventing the terminology of a 'primary' binding, would it be better to introduce the concept of navigability of association ends (roles), which is an established concept in UML, into the feature catalogue model?

In ISO 19110, the class **FC\_AssociationRole** has the **isNavigable** Boolean attribute to indicate whether the role is navigable.

Would it be better to explicitly encode the direction of an association (or aggregation, or composition) in S100\_FC\_FeatureAssociation instead of implicitly in S100\_FC\_FeatureBinding (by encoding the binding in only one of the two participating feature types)?

Which method best facilitates the validation of datasets with regard to the multiplicity of bindings to target feature instances? For the TSS examples above, how does the validator check that an instance of TSSLanePart is referenced from at most one TSSScheme? If links are encoded at both ends of the association it is simple, but if it is encoded at only one end, bindings in all TSSScheme instances must be checked.

### Recommendations

The proposed solution in S100WG-4.20 raises several issues which should be addressed before a decision is made. Implementing it will entail changes to multiple parts of S-100 and related infrastructure. Consideration of the proposal should be deferred to the next TSM while the issues raised in this paper are addressed and to allow for consideration of alternative solutions which may be better suited to S-100 data products and better aligned with the ISO and OMG UML standards upon which S-100 is based.

### Actions Requested

The S-100 WG is invited to:

- request an in-depth paper about this issue considering the problem and proposed solution(s) and alternatives, in the light of the questions raised in these comments and others which may arise upon due consideration;
- defer consideration of the problem and proposed solution to the next S-100 WG TSM.