

## Comparison between ISO 19110 Feature Catalogs and IFC Property Sets

Analysis based on ISO/FDIS 19110:2003(E) and the IFC 2x2 Addendum 1 Release (June 2004).

### **Definition of Feature Catalog**

A feature catalogue is defined as a catalogue containing definitions and descriptions of the feature types, feature attributes, and feature associations occurring in one or more sets of geographic data, together with any feature operations that may be applied

### **Definition of Property Set**

The *IfcPropertySet* defines all dynamically extensible properties. The property set is a container class that holds properties within a property tree. These properties are interpreted according to their name attribute.

Property sets, defining a particular type of object, can be assigned an object type (*IfcTypeObject*). Property sets are assigned to objects (*IfcObject*) through an objectified relationship (*IfcRelDefinedByProperties*). If the same set of properties applies to more than one object, it should be assigned by a single instance of *IfcRelDefinedByProperties* to a set of related objects. Those property sets are referred to as shared property sets.

ISO 19110	IFC 2x2
<p>Geographic features are real world phenomena associated with a location relative to the Earth, about which data are collected, maintained, and disseminated. Feature catalogues define the types of features, their operations, attributes, and relationships represented in geographic data.</p> <p>Geographic features occur at two levels: instances and types. At the instance level, a geographic feature is represented as a discrete phenomenon that is associated with its geographic and temporal coordinates and may be portrayed by a particular graphic symbol. These individual feature instances are grouped into classes with common characteristics — feature types.</p>	<p>The entities in IFC that are subtypes of <i>IfcProduct</i> effectively represent the equivalent of a feature is ISO 19110 (in that they represent real world phenomena).</p> <p>There is substantial semantic decomposition of 'products' within the IFC model.</p> <p>IFC distinguishes between type and occurrence level entities. Entities can be further qualified by property sets that are declared according to a meta-model defined within the IFC model.</p> <p>Types are defined as subtypes of <i>IfcTypeProduct</i> whilst occurrences are defined as subtypes of <i>IfcProduct</i>. A definition relationship allows an occurrence to be specified as being of a type.</p>

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<p><b>6.1 Feature catalogue</b></p> <p>A feature catalogue shall present the abstraction of reality represented in one or more sets of geographic data as a defined classification of phenomena. The basic level of classification in a feature catalogue shall be the feature type. A feature catalogue shall be available in electronic form for any set of geographic data that contains features. A feature catalogue may also comply with the specifications of this International Standard independently of any existing set of geographic data.</p>	<p>IFC has a library reference entity which is proposed to stand as a catalogue entity although it is rarely used for this purpose at present. External libraries are generally collections of property sets where a property set provides for extension of the IFC model using a meta-schema for user defined properties.</p>
<p><b>6.2.3.1 Form of names</b></p> <p>All feature types, feature attributes, feature associations, association roles, and feature operations included in a feature catalogue shall be identified by a name that is unique within that feature catalogue. If the name of a feature type, feature attribute, feature association, association role, or feature operation appears more than once in that feature catalogue, the definition shall be the same for all occurrences.</p>	<p>Property sets and properties have names that are intended to be unique and consistent. For property sets/properties that form part of the IFC model distribution, uniqueness and consistency are enforced. User defined property sets/properties outside of mainstream development cannot be enforced to the same extent but documentation encourages it.</p>
<p><b>6.2.3.2 Form of definitions</b></p> <p>Definitions of feature types, feature attributes, feature attribute listed values, feature associations, association roles, and feature operations shall be given in a natural language. These definitions shall be included in the catalogue, unless the catalogue specifies a separate definition source. If the same term appears in both the definition source and the feature catalogue, the definition in the feature catalogue shall apply.</p>	<p>Every property set/property is required to have a published definition.</p>
<p><b>6.2.4 Requirements for feature types</b></p> <p>Each feature type shall be identified by a name and defined in a natural language. Each feature type may also be identified by an alphanumeric code that is unique within the catalogue and may have a list of aliases. The feature catalogue shall also include, for each feature type, its feature operations and associated feature attributes, feature associations and association roles, if any. The use of functional language specifications to help define feature types is recommended.</p>	<p>All entities are named.</p> <p>IFC contains a classification model that allows any (and many) classifications to be associated with an entity.</p>
<p><b>6.2.5 Requirements for feature operations</b></p> <p>Feature operations, if any, shall be identified and defined for each feature type. Feature attributes shall be specified for each feature operation as well as any feature types affected by the operation. The definition shall include a natural language definition and may be formally specified in a functional</p>	<p>Operations are not supported in the IFC model</p>

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language.	
<p><b>6.2.6 Requirements for feature attributes</b></p> <p>Feature attributes, if any, shall be identified and defined for each feature type. The definition shall include a natural language definition and a specified data type for values of the attribute. Each feature attribute may also be identified by an alphanumeric code that is unique within the catalogue.</p>	<p>The basic attribute of a property set is that it should have a set of properties, the number of such properties being unconstrained. Within a particular property set, the properties represent the attributes.</p>
<p><b>6.2.7 Requirements for feature attribute listed values</b></p> <p>Feature attribute listed values, if any, shall be labeled for each feature attribute. The label shall be unique within the feature attribute of which it is a listed value. Each listed value may also be identified by an alphanumeric code that is unique within the feature attribute of which it is a listed value.</p>	<p>IFC supports several property types, the property type being determined by the datatype of the property value (single value, bounded value, list value etc.)</p> <p>Presently, properties within a property set are not uniquely identified so that they can be referenced from a standard catalogue. The facility to allow this will however be provided within the next IFC release in accordance with requirements of the IFG and XM7 projects.</p>
<p><b>6.2.8 Requirements for feature associations</b></p> <p>Feature associations, if any, shall be named and defined for each feature type. Each feature association may also be identified by an alphanumeric code that is unique within the catalogue. The names and roles of the feature types that participate in the association shall be provided.</p>	<p>Associations in this case are considered to be the equivalent of the relationship entities within IFC. There are two specific relationships allowed on individual properties namely a dependency (where the value of one property is dependant upon the value of another property) and constraint (limiting constraint value on a property; note that constraints may be simple or complex).</p>
<p><b>6.2.9 Requirements for association roles</b></p> <p>Association roles, if any, shall be named and defined. The names of the feature type that holds the role and the association in which it participates shall be provided.</p>	<p>All relationship attributes are defined as relating or related. There is no further qualification of role.</p>



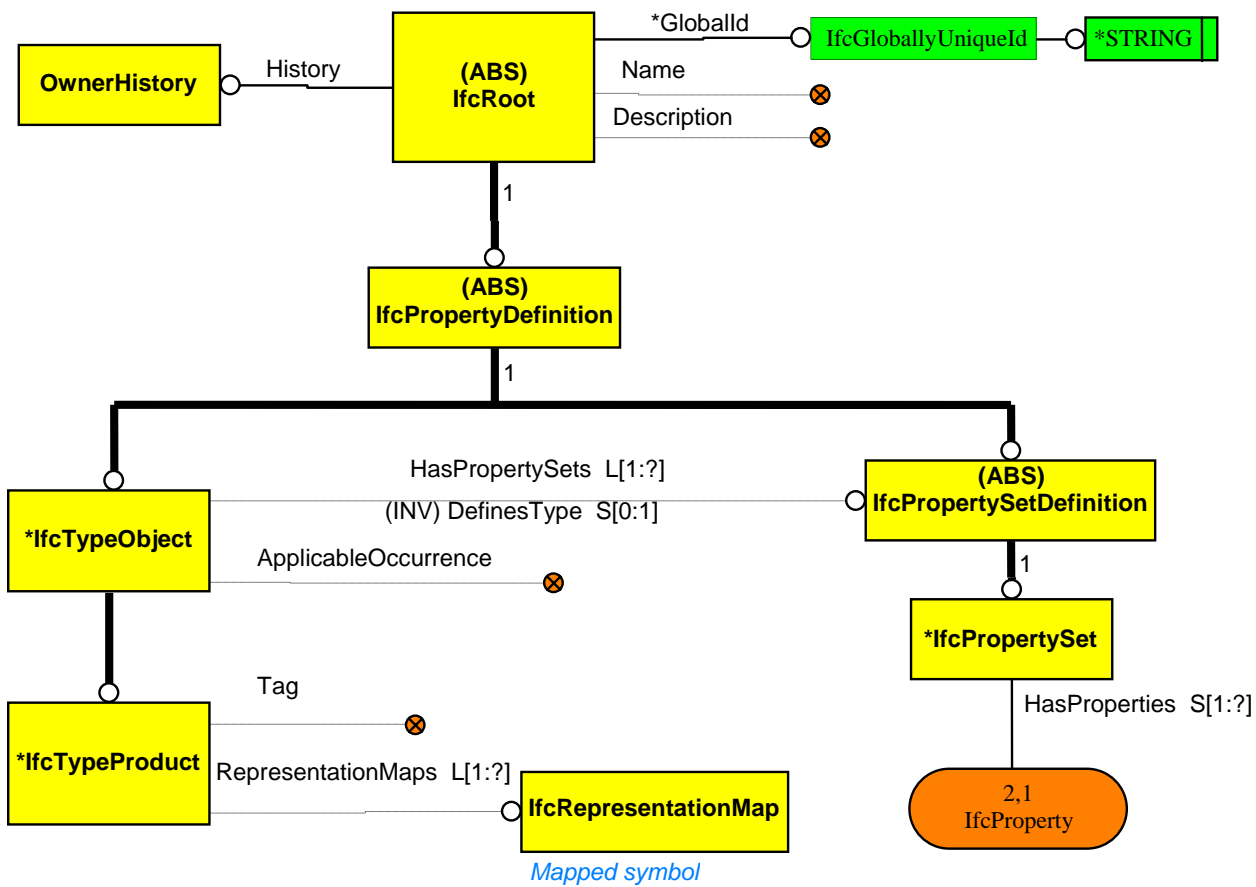


Figure 2: IFC Property Definition Model

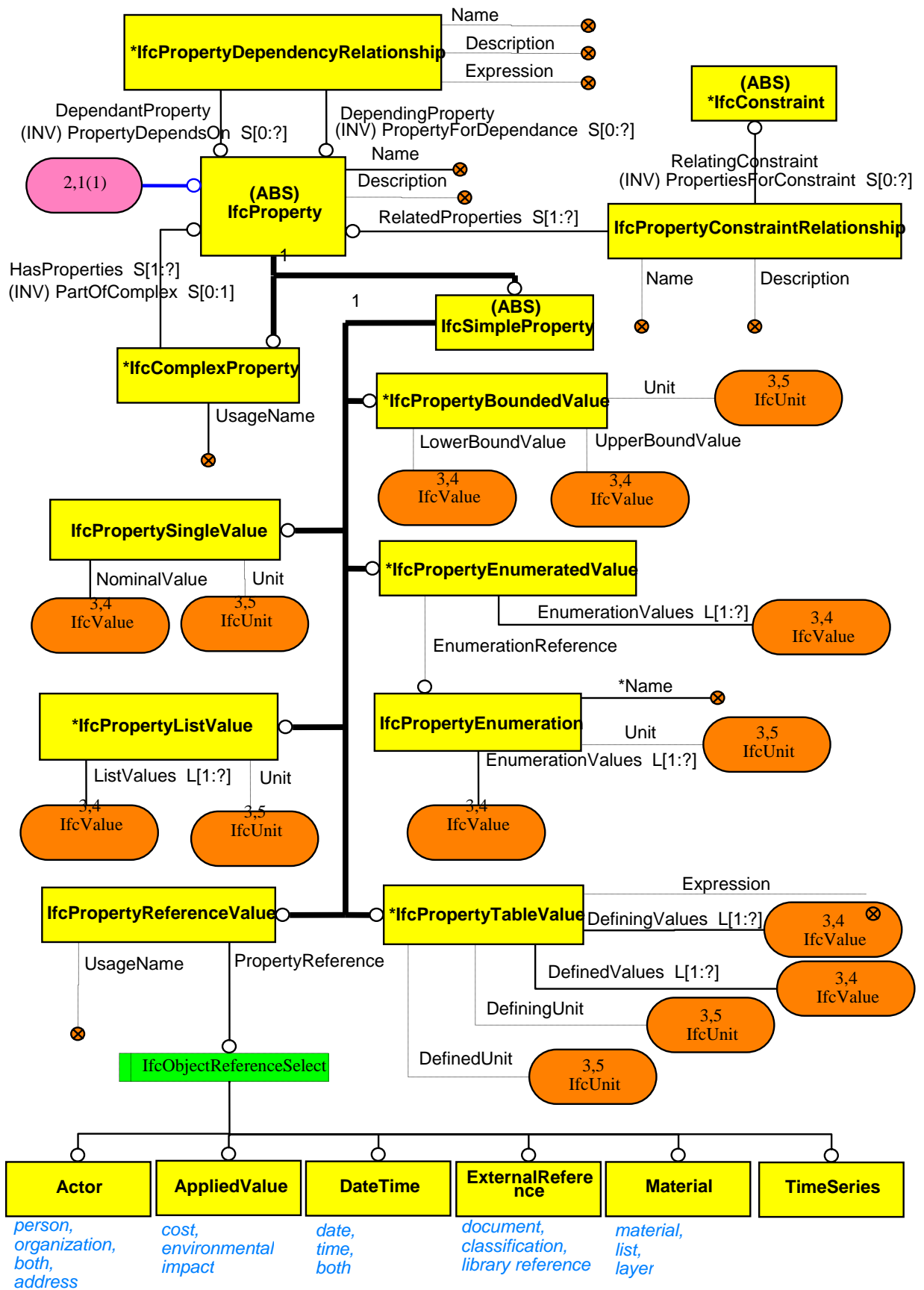


Figure 3: IFC Property Set meta-schema