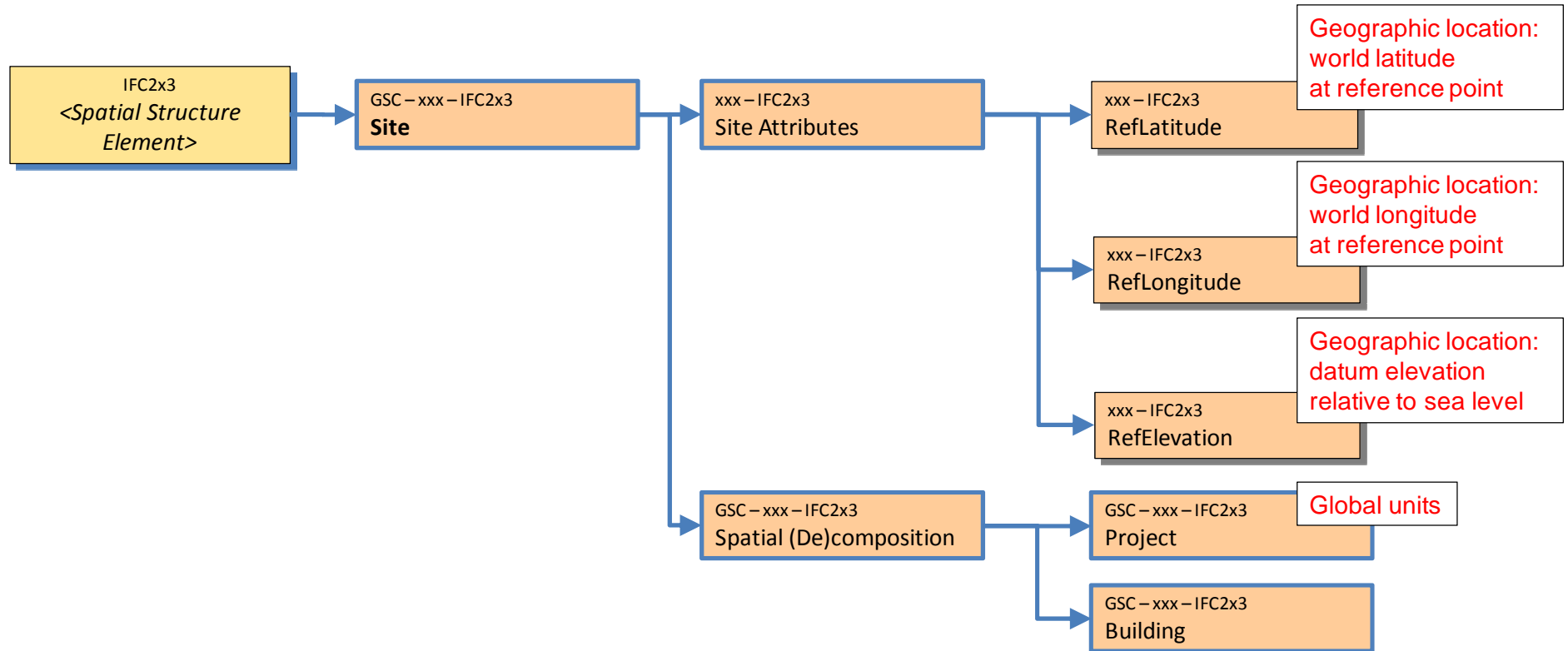


IFC Model View Definition Diagram: **Site**

VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx - Site	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)

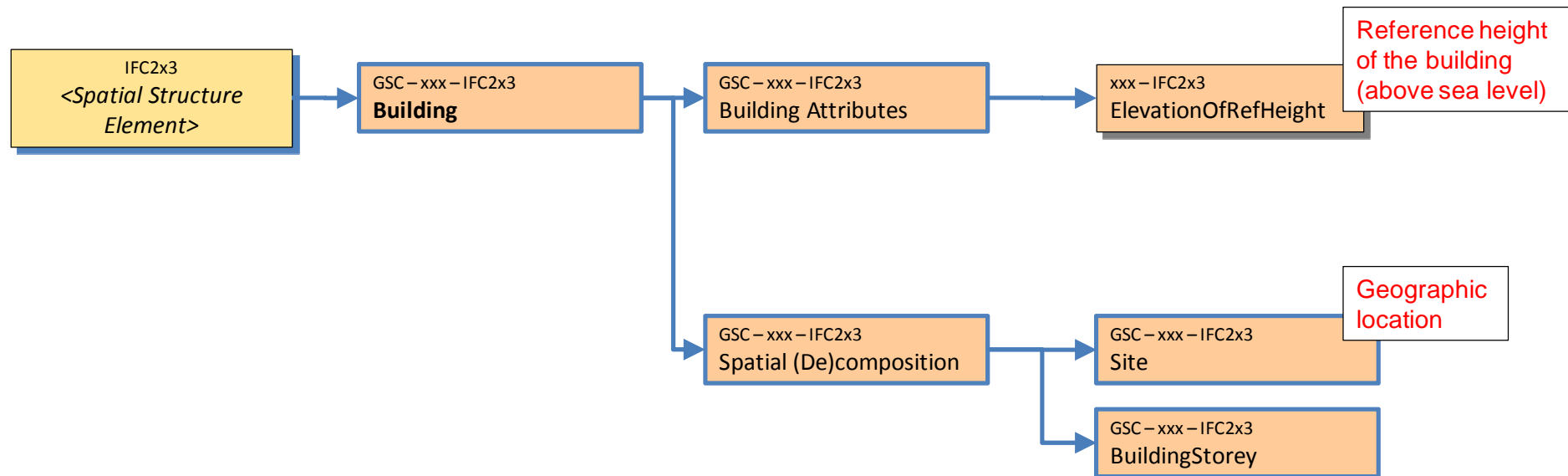


Issued requirements

This document uses the MVD Format of the IAI (www.iai-international.org). The content has to be certified by the IAI before becoming part of an official IFC view.

IFC Model View Definition Diagram: **Building**

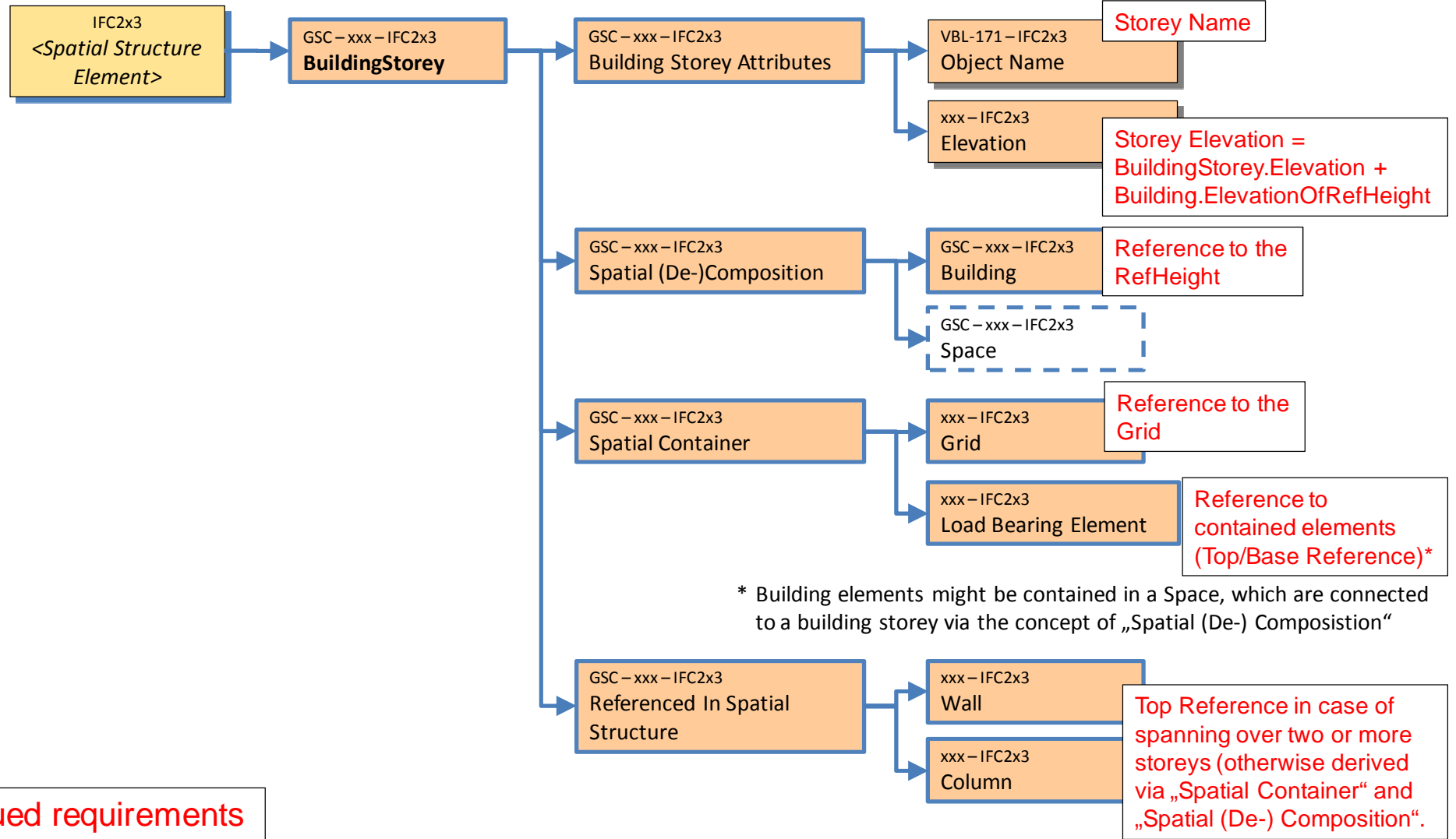
VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx - Building	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)



Issued requirements

IFC Model View Definition Diagram: **BuildingStorey**

VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx - BuildingStory	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)

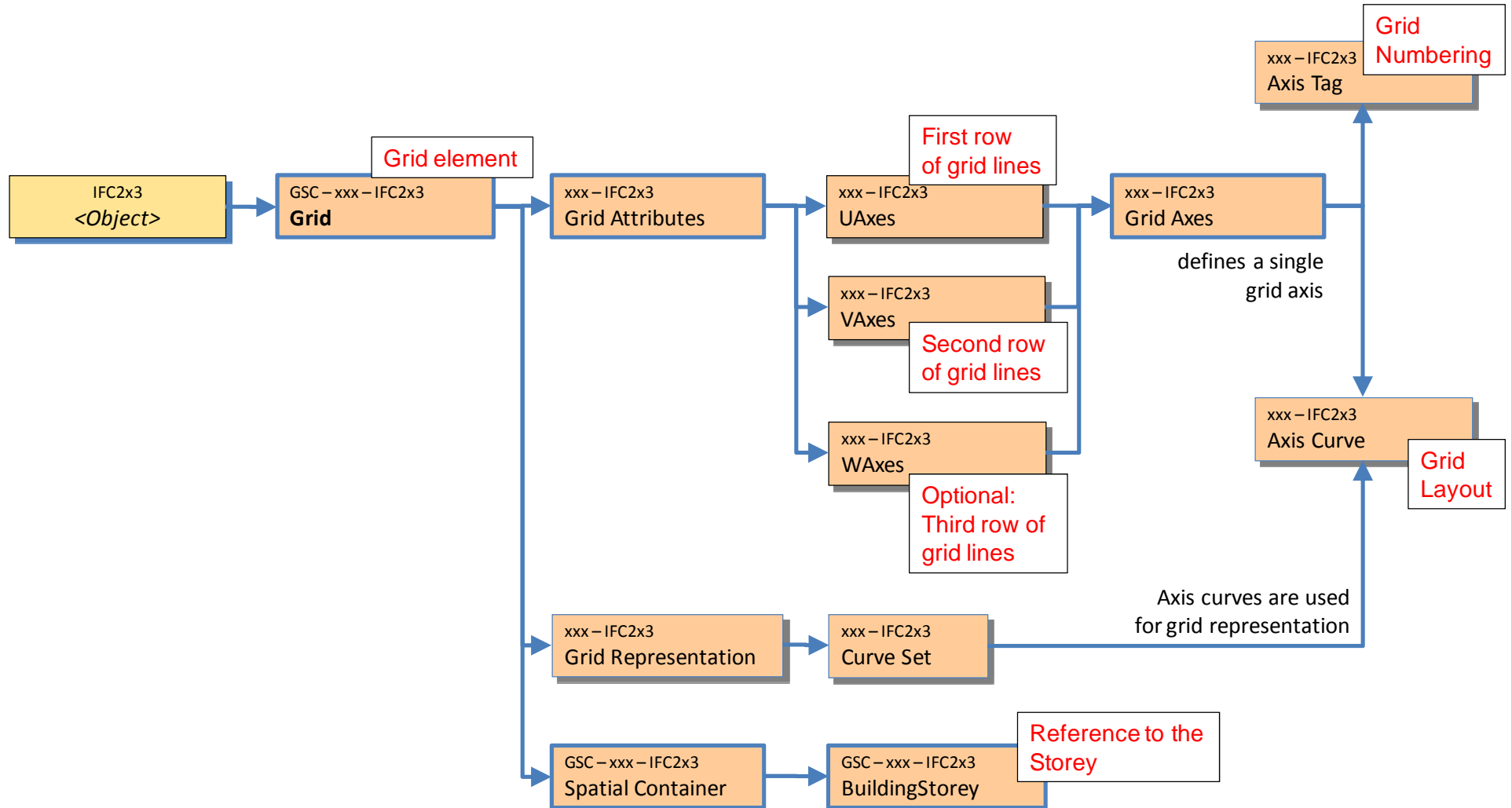


* Building elements might be contained in a Space, which are connected to a building storey via the concept of „Spatial (De-) Composition“

Issued requirements

IFC Model View Definition Diagram: Grid

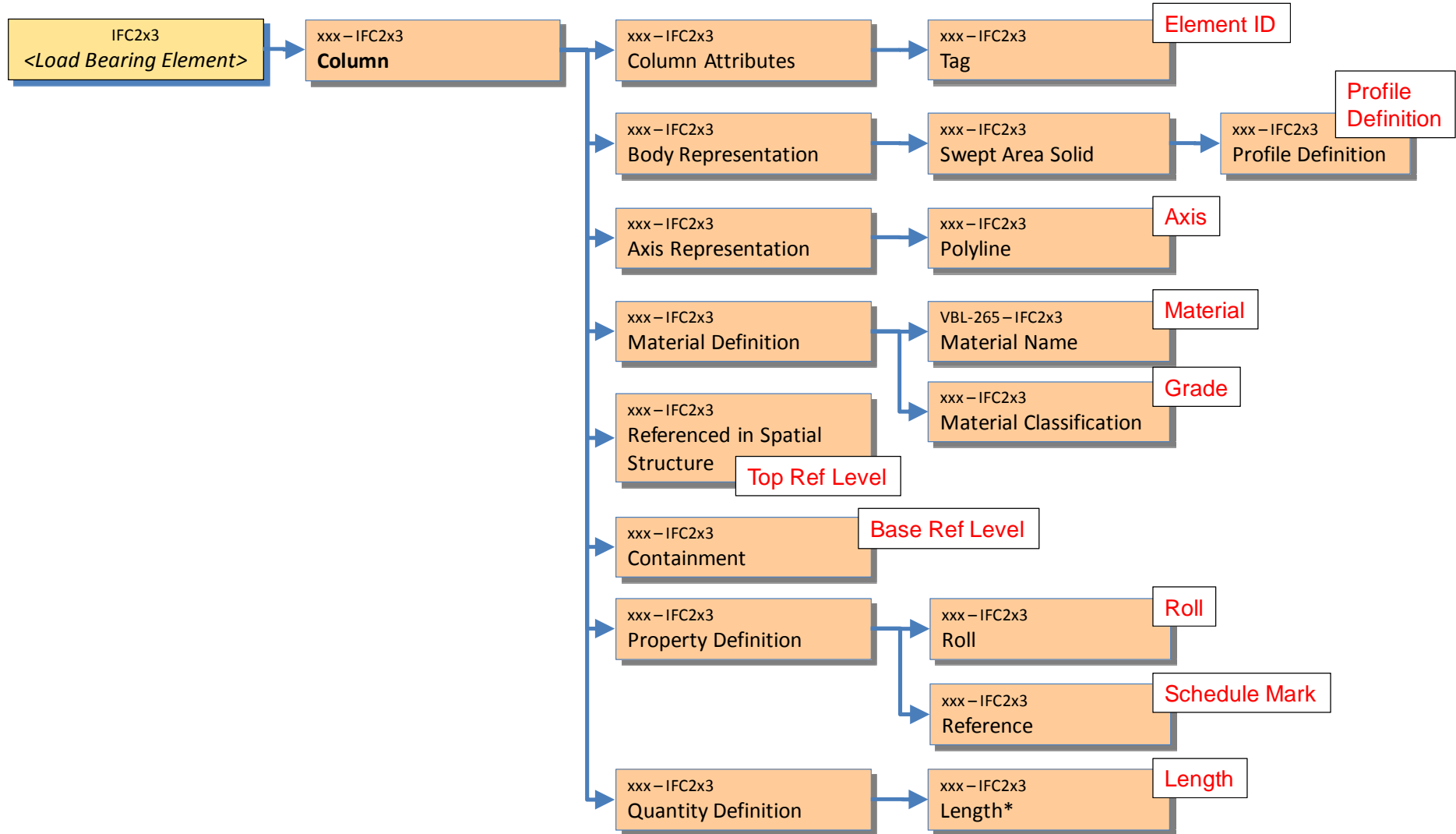
VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx - Grid	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)



Issued requirements

IFC Model View Definition Diagram: Column

VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx - Column	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)

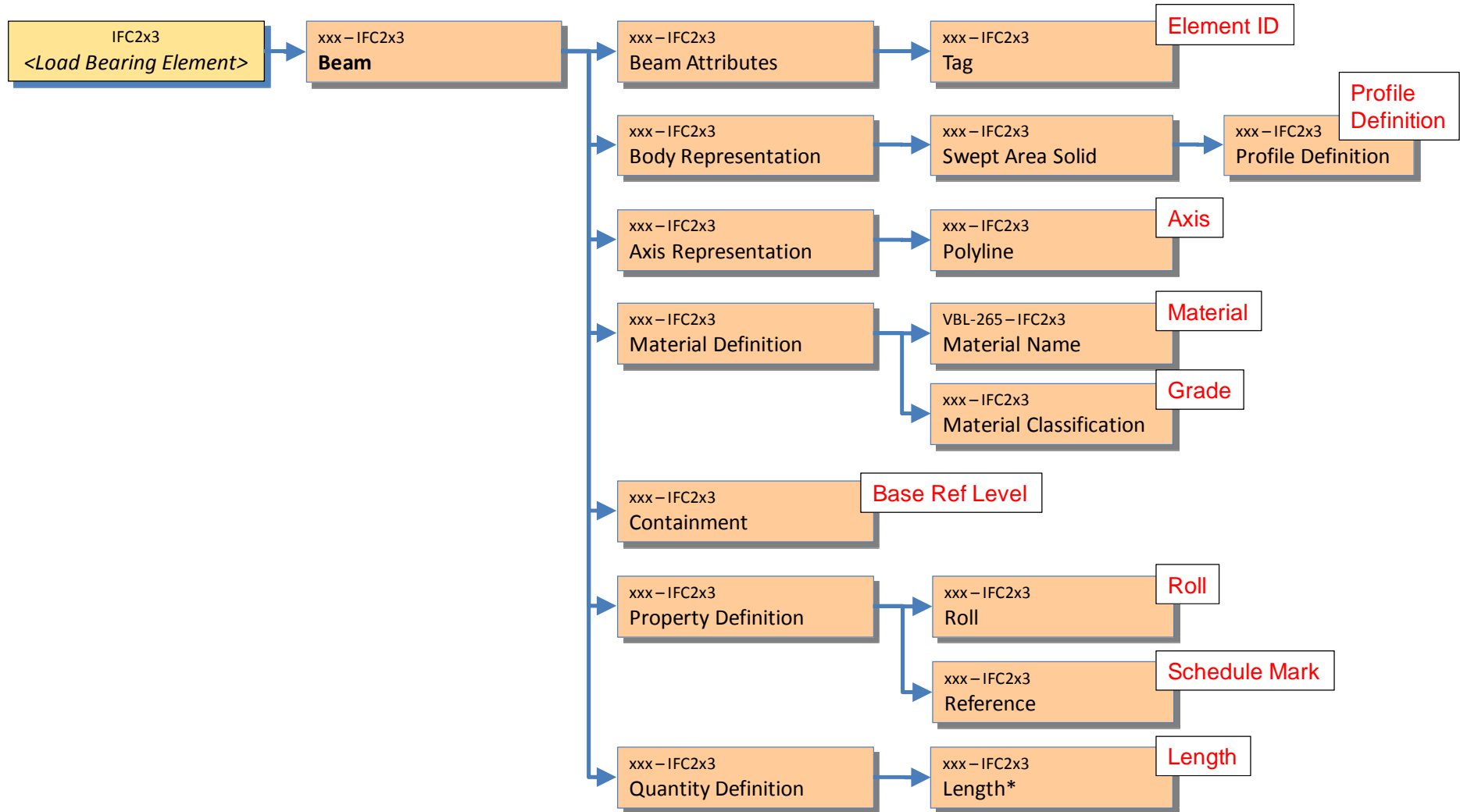


Issued requirements

* „NominalLength“in IFC2x3;
changed to „Length“in IFC2x4

IFC Model View Definition Diagram: **Beam**

VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx - Beam	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)

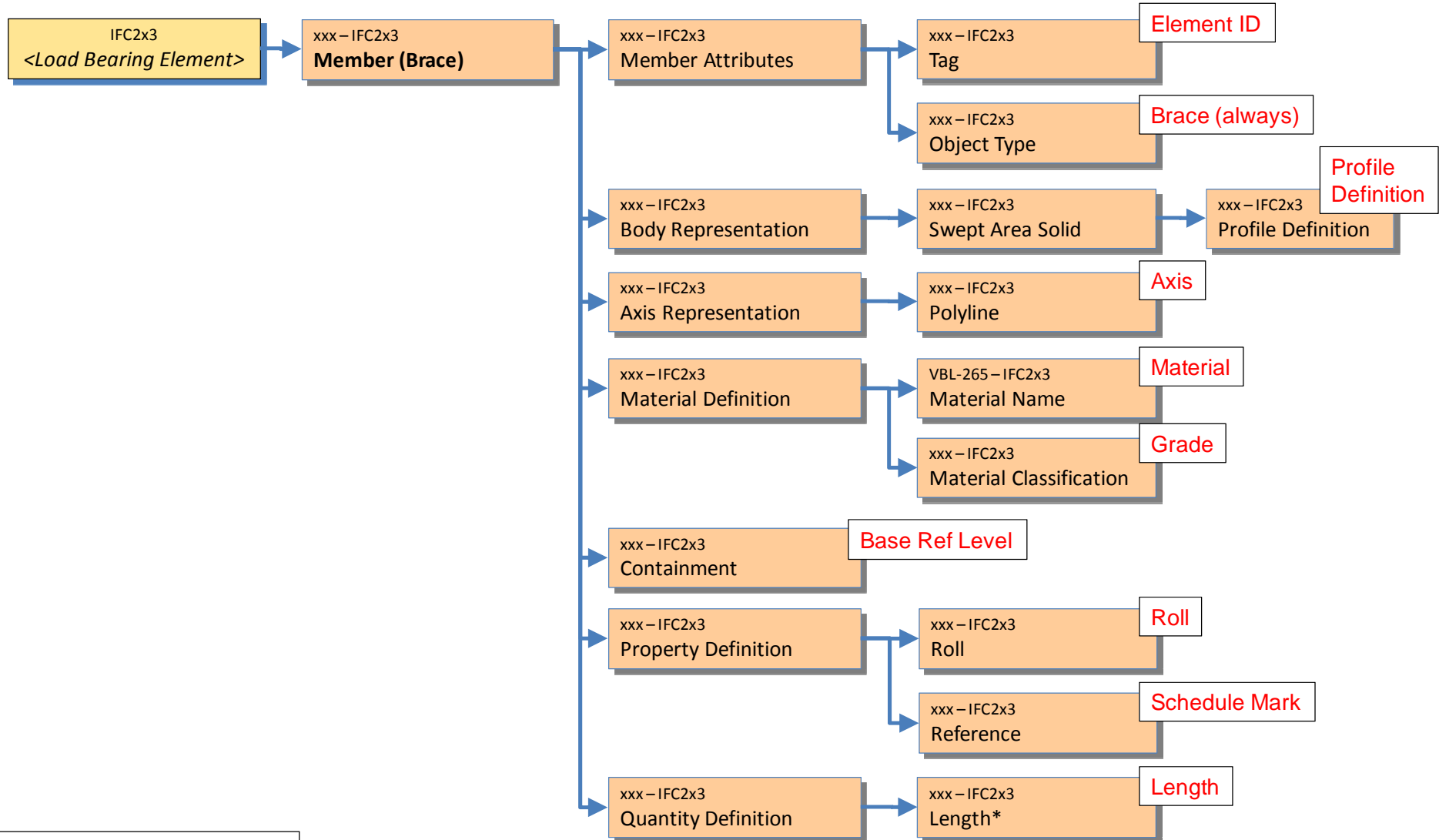


Issued requirements

* „NominalLength“in IFC2x3;
changed to „Length“in IFC2x4

IFC Model View Definition Diagram: **Brace**

VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx - Brace	Structural engineering – physical model	IFC2x3	Draft	1.0	4th August, 2008	Matthias Weise (mw@aec3.de)

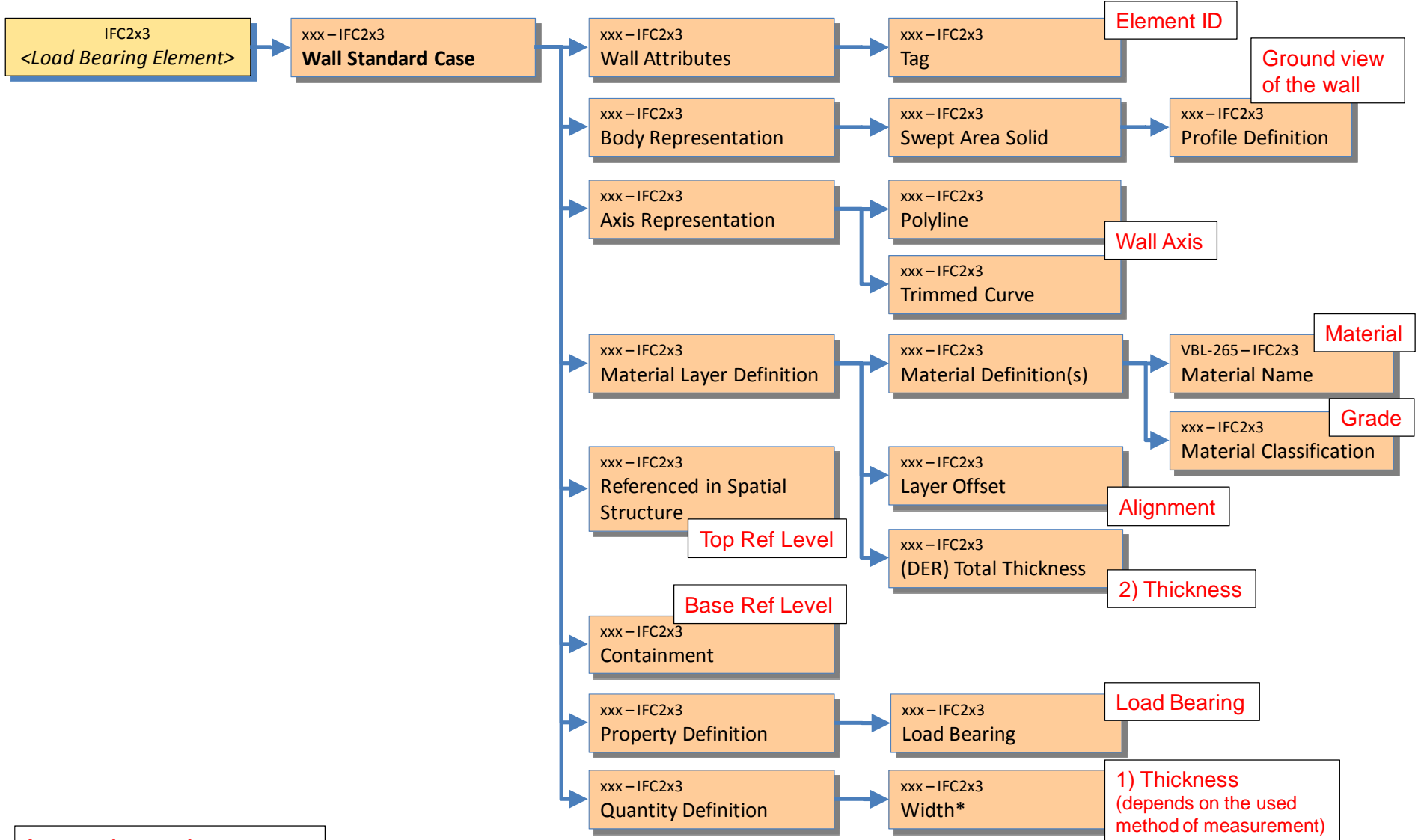


Issued requirements

* „NominalLength“in IFC2x3;
changed to „Length“in IFC2x4

IFC Model View Definition Diagram: Wall Standard Case

VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx – Wall Standard Case	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)

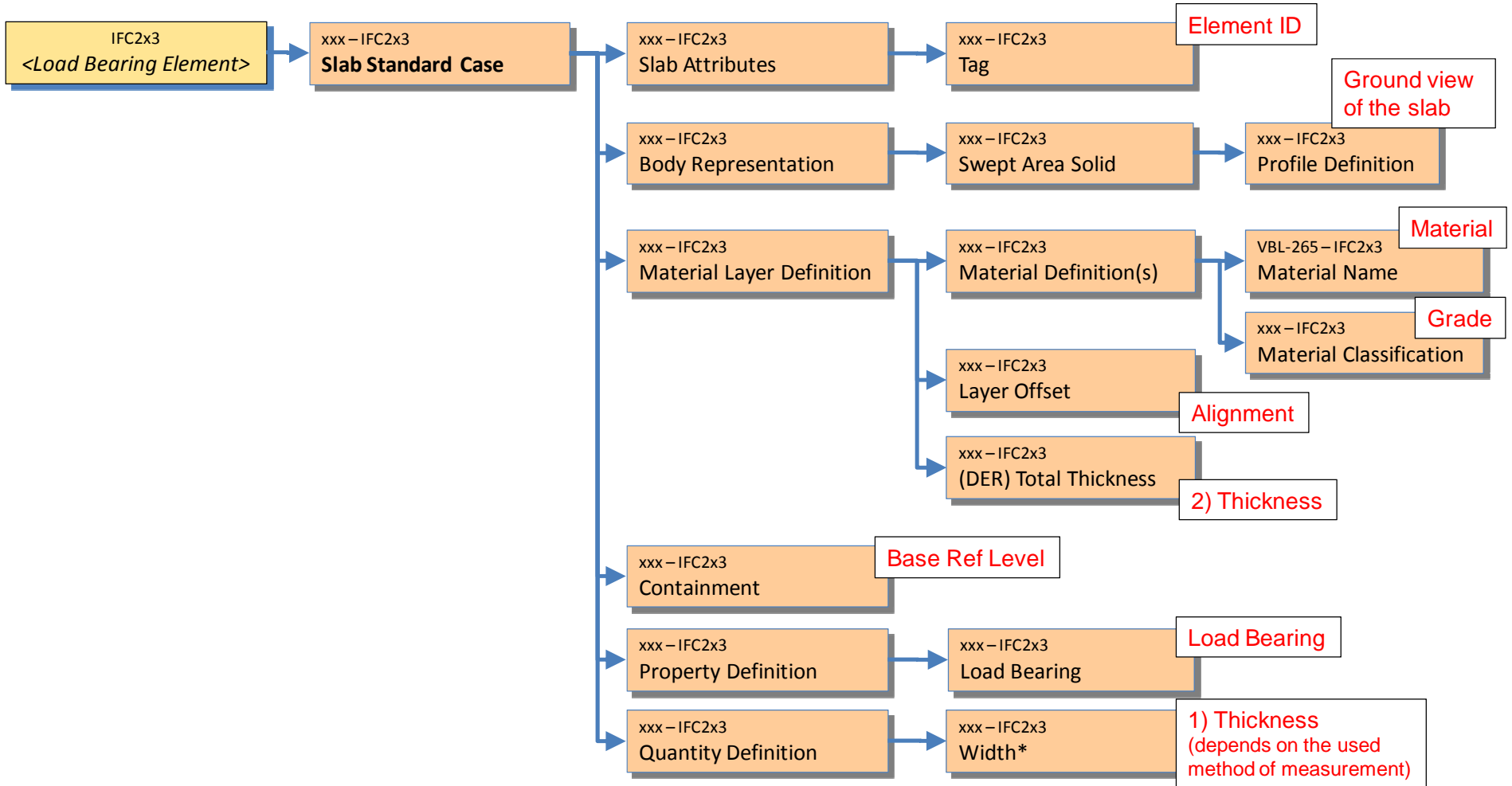


Issued requirements

* „NominalWidth“in IFC2x3;
changed to „Width“in IFC2x4

IFC Model View Definition Diagram: Slab Standard Case

VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx – Slab Standard Case	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)

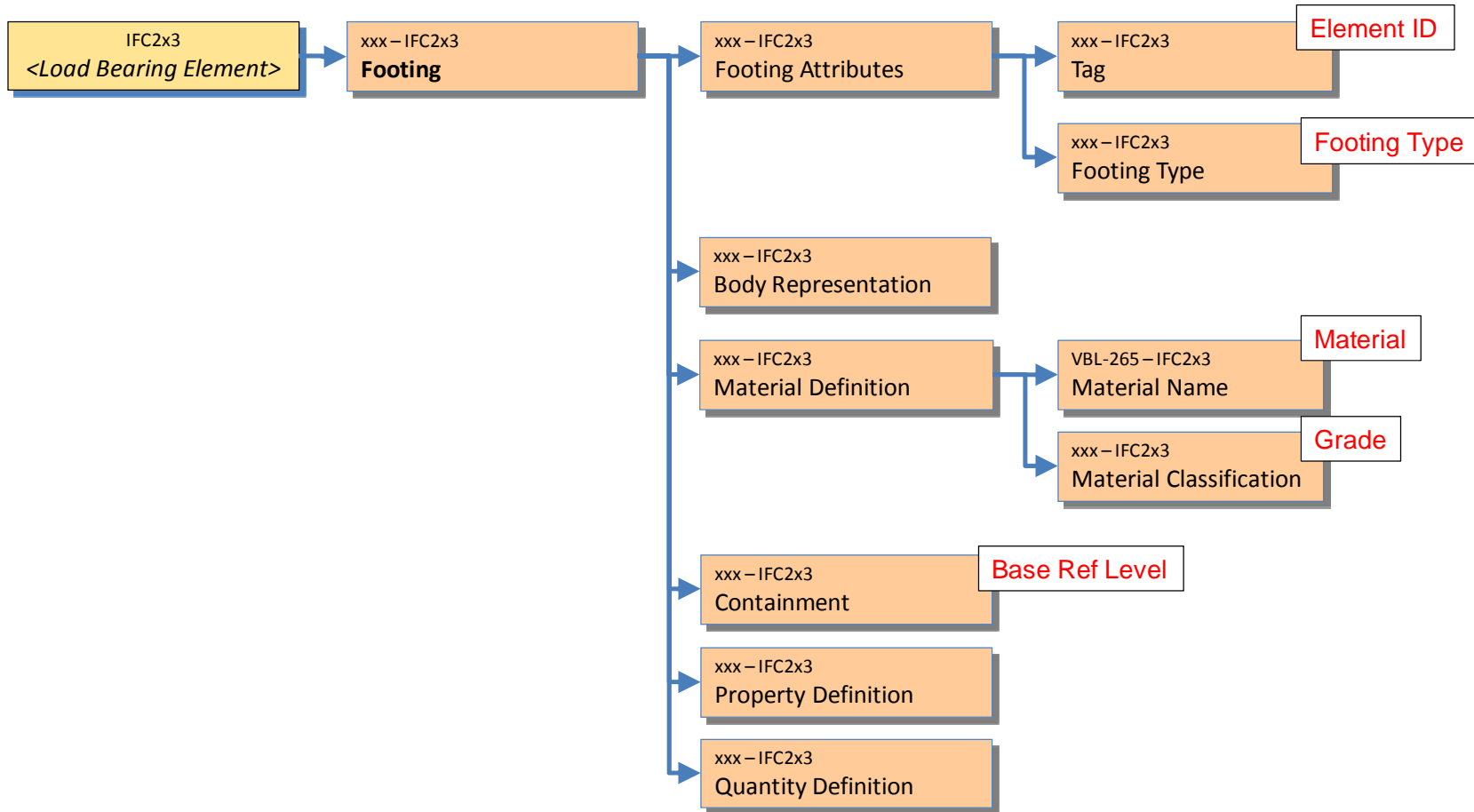


* „NominalWidth“in IFC2x3;
changed to „Width“in IFC2x4

Issued requirements

IFC Model View Definition Diagram: Footing

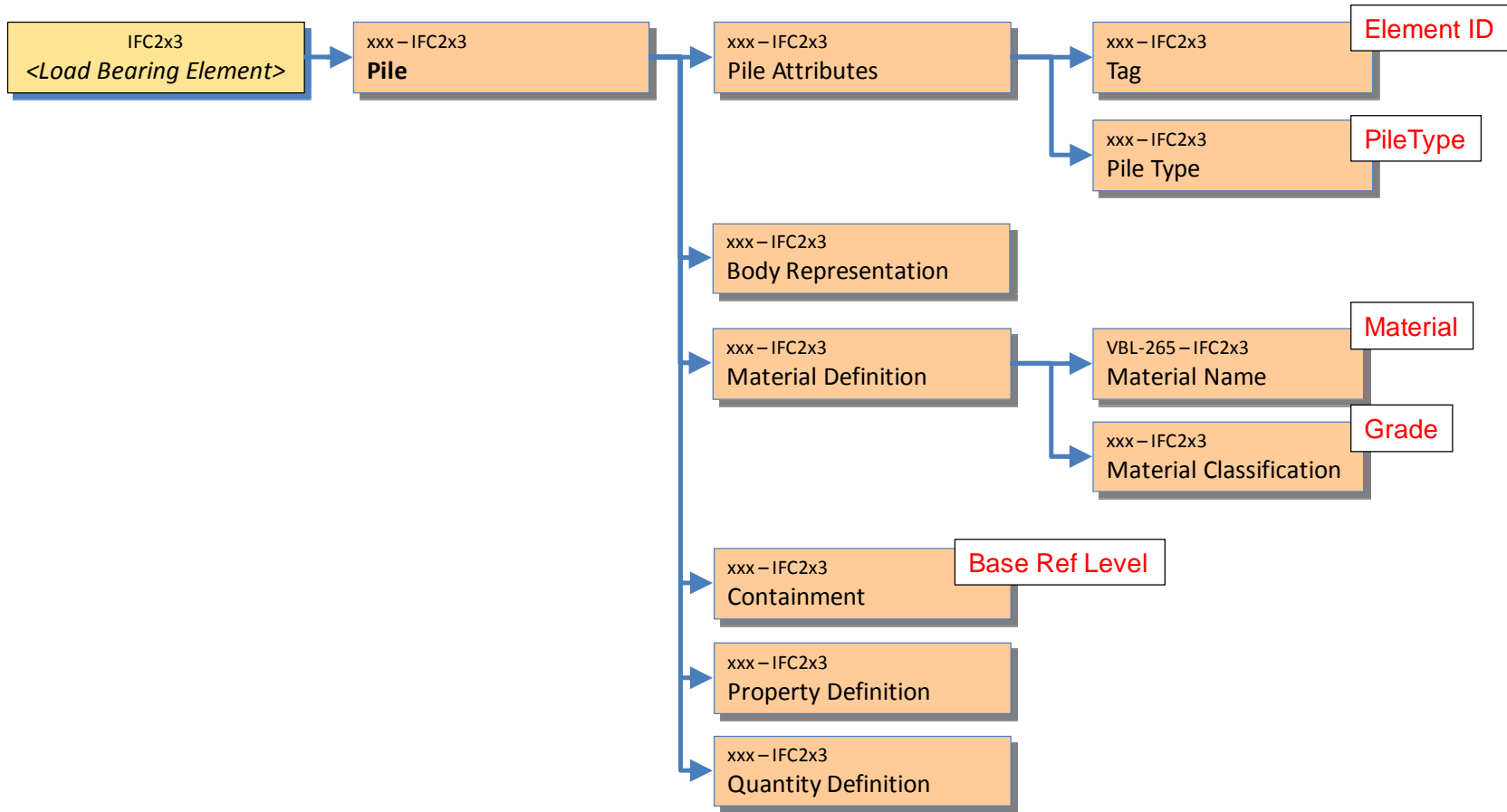
VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx-Footing	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)



Issued requirements

IFC Model View Definition Diagram: **Pile**

VIEW ID	VIEW NAME	IFC RELEASE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
xxx – Pile	Structural engineering – physical model	IFC2x3	Draft	1.0	4 th August, 2008	Matthias Weise (mw@aec3.de)



Issued requirements

IFC Release Specific Concept Description (IFC2x3)

Building

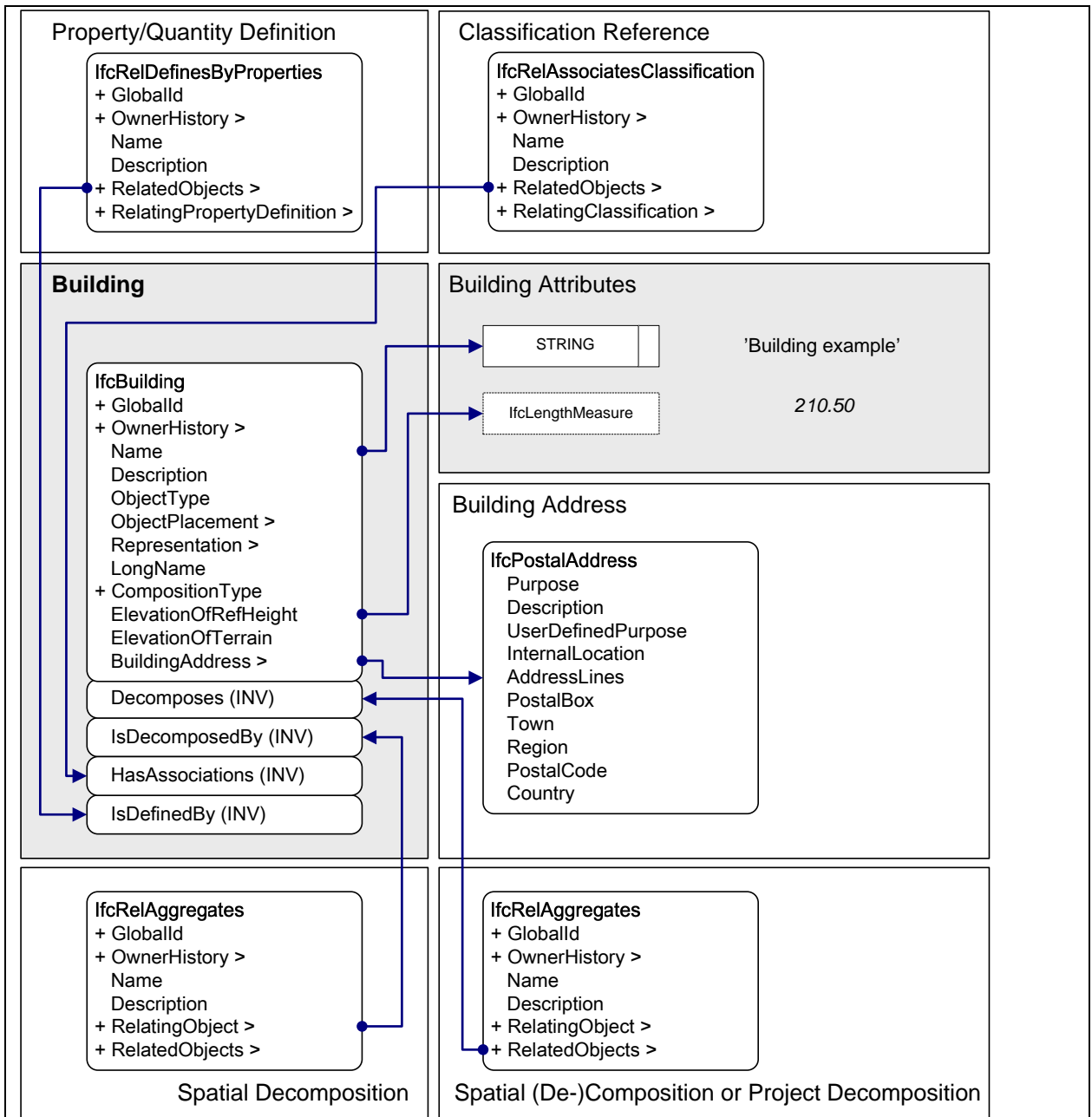
Reference		Version	1.01	Status	Proposal
Relationships					
History	4 th July, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3 (with friendly support by the German research initiative "ZukunftBau")				

Usage in view definition diagram



Please note that there might be further agreements for the "*Building*" concept that are not shown here. In particular, there might be separate concept definitions for specific properties, quantities and classifications.

Instantiation diagram



Implementation agreements

IfcBuilding

Attribute	Implementation agreements
GlobalId	Must be provided
OwnerHistory	Must be provided
Name	Short name of the building (may follows specific coding rules)
Description	Human readable name
Object Type	Reserved
Object Placement	Reserved
Representation	Reserved
LongName	Reserved
Composition Type	Should be <ul style="list-style-type: none"> - COMPLEX, in case of a 'complex building' - ELEMENT, in case of an 'elementary building' - PARTIAL, in case of a 'partial building' Please note that the composition type restricts the spatial decomposition.

ElevationOfRefHeight	No agreements needed
ElevationOfTerrain	No agreements needed
BuildingAddress	No agreements needed
Decomposes (INV)	Reference to the parent building, site or the project; Please note that the spatial hierarchy is restricted by the Extended Coordination View (see details below).
IsDecomposedBy (INV)	Reference to the child nodes (building or building storey) of the spatial structure; Please note that the spatial hierarchy is restricted by the Extended Coordination View (see details below).
HasAssociations (INV)	Classification of the building (please see additional implementation agreements)
IsDefinedBy (INV)	Reference to properties or quantities

The Extended Coordination View restricts the depths of the decomposition tree by:

- level of site is optional
- max. of one site (type elementary) is allowed
- level of complex building, complex building storey, complex space is not allowed
- level of partial building, partial storey, partial space is not allowed
- level of building is mandatory
- level of building storey is optional
- level of space is optional

so a maximum decomposition tree in coordination view is:

```

project
- site
  - building
    - building storey
      - space
  
```

and the minimum decomposition tree is:

```

project
- building
  
```

Example (spf)

```

#106= IFCBUILDING('30V5XJ5d5AprzfhsGEj6Q2',#2,'Building example',
$, $, $, $, $, .ELEMENT., 210.50, $, $);
#107= IFCRELAGGREGATES('2kPxR9pkf4IhXHOhzu5khk',#2,'SiteContainer','SiteContainer
For Buildings',#100, (#106));
#100= IFCSITE('1G217EQPv3OASE5ZN1FE5v',#2,'BF-J','Baufeld
J', $, $, $, $, .ELEMENT., (52,31,0), (13,24,0), $, $, $);
#108= IFCRELAGGREGATES('3HOv58cYbDBAu7vMbay3W7',#2,'BuildingContainer',
'BuildingContainer For Buildingstories',#106, (#109, #110, #111));
#109= IFCBUILDINGSTOREY('2mogSTpEvEVQPsrm_t2cN_',#2,
'Basement', $, $, $, $, $, .ELEMENT., -1.25);
#110= IFCBUILDINGSTOREY('3FJiQIfNPFlPIFsXmR3Ptc',#2,
'Ground floor', $, $, $, $, $, .ELEMENT., 0.);
#111= IFCBUILDINGSTOREY('2rAd0PG815zWRG$PbrquLR',#15,
'First floor', $, $, $, $, $, .ELEMENT., 3.1);
#2= IFCOWNERHISTORY(#5, #6, $, .ADDED., 0, $, $, 1207828354);
#3= IFCPERSON('Matthias Weise', '', '', $, $, $, $, $);
#4= IFCORGANIZATION('', '', '', $, $);
#5= IFCPERSONANDORGANIZATION(#3, #4, $);
#6= IFCAPPLICATION(#4, 'IFC-Application X', 'IFC-Exporter V2.3', 'Company Y');
  
```

Example (ifcXML)

```

<IfcOwnerHistory id="ID2">
  <OwningUser>
    <IfcPersonAndOrganization xsi:nil="true" ref="ID5"/>
  
```

```

    </OwningUser>
    <OwningApplication>
      <IfcApplication xsi:nil="true" ref="ID6"/>
    </OwningApplication>
    <ChangeAction>added</ChangeAction>
    <LastModifiedDate>0</LastModifiedDate>
    <CreationDate>1207828354</CreationDate>
  </IfcOwnerHistory>
  <IfcPerson id="ID3">
    <Id>Matthias Weise</Id>
    <FamilyName></FamilyName>
    <GivenName></GivenName>
  </IfcPerson>
  <IfcOrganization id="ID4">
    <Id></Id>
    <Name></Name>
    <Description></Description>
  </IfcOrganization>
  <IfcPersonAndOrganization id="ID5">
    <ThePerson>
      <IfcPerson xsi:nil="true" ref="ID3"/>
    </ThePerson>
    <TheOrganization>
      <IfcOrganization xsi:nil="true" ref="ID4"/>
    </TheOrganization>
  </IfcPersonAndOrganization>
  <IfcApplication id="ID6">
    <ApplicationDeveloper>
      <IfcOrganization xsi:nil="true" ref="ID4"/>
    </ApplicationDeveloper>
    <Version>IFC-Application X</Version>
    <ApplicationFullName>IFC-Exporter V2.3</ApplicationFullName>
    <ApplicationIdentifier>Company Y</ApplicationIdentifier>
  </IfcApplication>
  <IfcSite id="ID100">
    <GlobalId>1G217EQPv30ASE5ZNlFE5v</GlobalId>
    <OwnerHistory>
      <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
    </OwnerHistory>
    <Name>BF-J</Name>
    <Description>Baufeld J</Description>
    <CompositionType>element</CompositionType>
    <RefLatitude ex:cType="list">
      <ex:long-wrapper pos="0">52</ex:long-wrapper>
      <ex:long-wrapper pos="1">31</ex:long-wrapper>
      <ex:long-wrapper pos="2">0</ex:long-wrapper>
    </RefLatitude>
    <RefLongitude ex:cType="list">
      <ex:long-wrapper pos="0">13</ex:long-wrapper>
      <ex:long-wrapper pos="1">24</ex:long-wrapper>
      <ex:long-wrapper pos="2">0</ex:long-wrapper>
    </RefLongitude>
  </IfcSite>
  <IfcBuilding id="ID106">
    <GlobalId>30V5XJ5d5ApRzfhSGEj6Q2</GlobalId>
    <OwnerHistory>
      <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
    </OwnerHistory>
    <Name>Building example</Name>
    <CompositionType>element</CompositionType>
    <ElevationOfRefHeight>210.50</ElevationOfRefHeight>
  </IfcBuilding>
  <IfcRelAggregates id="ID107">
    <GlobalId>2kPxR9pkf4IhXHOhzu5khk</GlobalId>
    <OwnerHistory>
      <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
    </OwnerHistory>
    <Name>SiteContainer</Name>
    <Description>SiteContainer For Buildings</Description>
    <RelatingObject>
      <IfcSite xsi:nil="true" ref="ID100"/>
    </RelatingObject>
  </IfcRelAggregates>

```

```

    </RelatingObject>
    <RelatedObjects ex:cType="set">
      <IfcBuilding pos="0" xsi:nil="true" ref="ID106"/>
    </RelatedObjects>
  </IfcRelAggregates>
<IfcRelAggregates id="ID108">
  <GlobalId>3HOv58cYbDBAu7vMbay3W7</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>BuildingContainer</Name>
  <Description>BuildingContainer For Buildingstories</Description>
  <RelatingObject>
    <IfcBuilding xsi:nil="true" ref="ID106"/>
  </RelatingObject>
  <RelatedObjects ex:cType="set">
    <IfcBuildingStorey pos="0" xsi:nil="true" ref="ID109"/>
    <IfcBuildingStorey pos="1" xsi:nil="true" ref="ID110"/>
    <IfcBuildingStorey pos="2" xsi:nil="true" ref="ID111"/>
  </RelatedObjects>
</IfcRelAggregates>
<IfcBuildingStorey id="ID109">
  <GlobalId>2mogSTpEvEVQPsrM_t2cN_</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>Basement</Name>
  <CompositionType>element</CompositionType>
  <Elevation>-1.25</Elevation>
</IfcBuildingStorey>
<IfcBuildingStorey id="ID110">
  <GlobalId>3FJiQIfNPf1PIF'sXmR3Ptc</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>Ground floor</Name>
  <CompositionType>element</CompositionType>
  <Elevation>0.</Elevation>
</IfcBuildingStorey>
<IfcBuildingStorey id="ID111">
  <GlobalId>2rAd0PG815zwRG$PbRquLR</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>First floor</Name>
  <CompositionType>element</CompositionType>
  <Elevation>3.1</Elevation>
</IfcBuildingStorey>

```

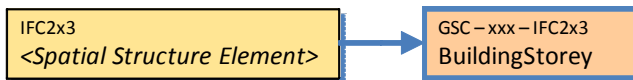
This document uses the official IFC Model View Definition Format version 1.1.0. of the IAI (www.iai-international.org)
The content of this document has to be certified by the IAI before becoming part of an official IFC Model View Definition.

IFC Release Specific Concept Description (IFC2x3)

BuildingStorey

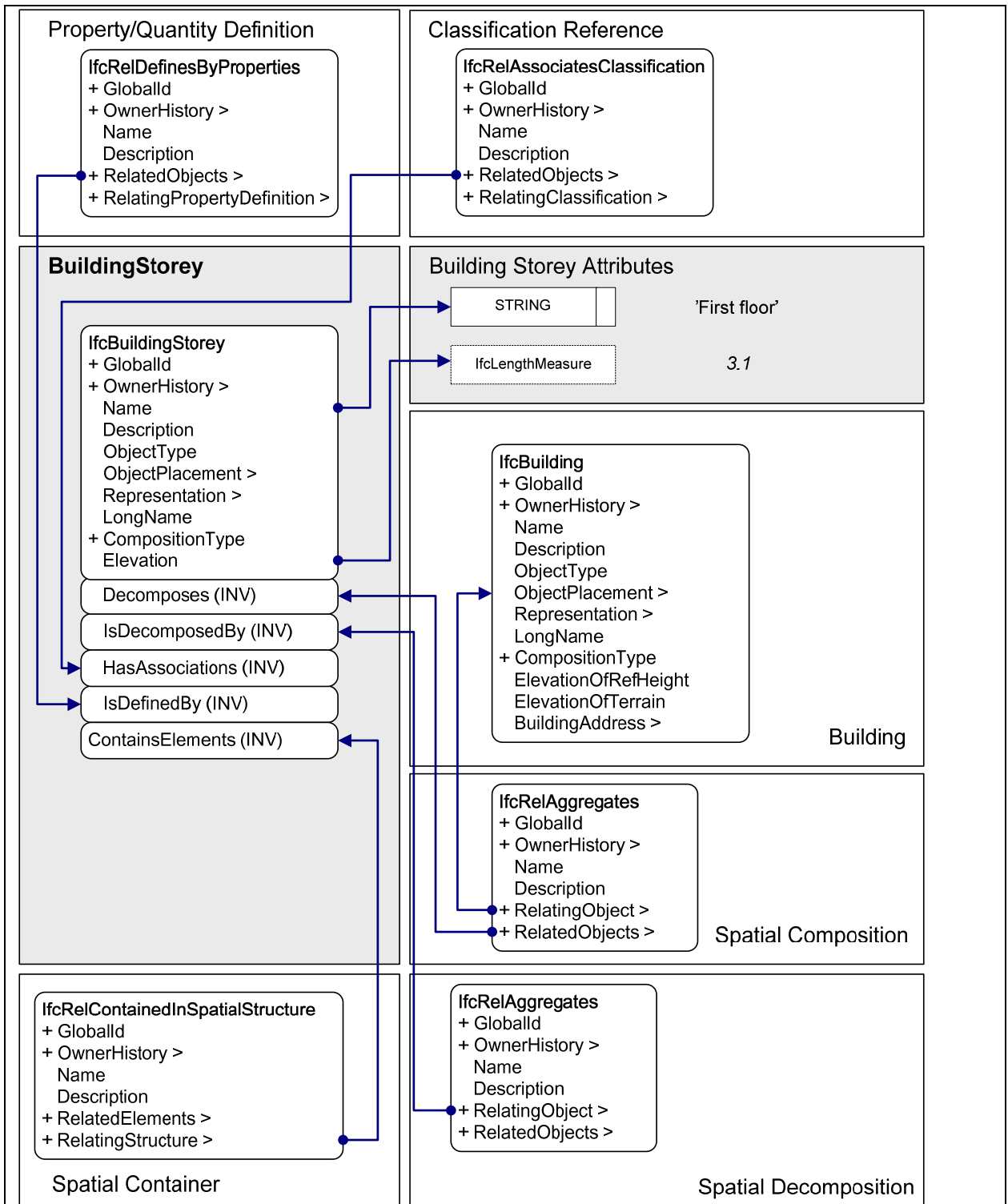
Reference		Version	1.02	Status	Proposal
Relationships					
History	5 th August, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3 (with friendly support by the German research initiative "ZukunftBau")				

Usage in view definition diagram



Please note that there might be further agreements for the “*Building*” concept that are not shown here. In particular, there might be separate concept definitions for specific properties, quantities and classifications.

Instantiation diagram



Implementation agreements

IfcBuildingStorey

Attribute	Implementation agreements
GlobalId	Must be provided
OwnerHistory	Must be provided
Name	Short name of the building storey (may follows specific coding rules)
Description	Human readable name
Object Type	Reserved
Object Placement	Reserved

Representation	Reserved
LongName	Reserved
Composition Type	Should be - COMPLEX, in case of a 'complex building storey' - ELEMENT, in case of an 'elementary building storey' - PARTIAL, in case of a 'partial building storey' Please note that the composition type restricts the spatial decomposition.
Elevation	No agreements needed
Decomposes (INV)	Reference to the parent building storey or building; Please note that the spatial hierarchy is restricted by the Extended Coordination View (see details below).
IsDecomposedBy (INV)	Reference to the child nodes (building storey or space) of the spatial structure; Please note that the spatial hierarchy is restricted by the Extended Coordination View (see details below).
HasAssociations (INV)	No agreements needed
IsDefinedBy (INV)	Reference to properties or quantities (please see additional implementation agreements)
ContainsElements (INV)	Reference to elements that are contained in the building storey (Further information can be found at the elements that might be contained in a spatial structure. Please also note the differences between containment and spatial decomposition.)

The Extended Coordination View restricts the depths of the decomposition tree by:

- level of site is optional
- max. of one site (type elementary) is allowed
- level of complex building, complex building storey, complex space is not allowed
- level of partial building, partial storey, partial space is not allowed
- level of building is mandatory
- level of building storey is optional
- level of space is optional

so a maximum decomposition tree in coordination view is:

```

project
- site
- building
- building storey
- space

```

and the minimum decomposition tree is:

```

project
- building

```

Example (spf)

```

#111= IFCBUILDINGSTOREY('2rAd0PG815zWRG$PbRquLR',#2,
'First floor',$,$,$,$,$,.ELEMENT.,3.1);
#106= IFCBUILDING('30V5XJ5d5ApRzfhsGEj6Q2',#2,'Building example',
,$,$,$,$,$,.ELEMENT.,210.50,$,$);
#108= IFCRELAGGREGATES('3HOv58cYbDBAu7vMbay3W7',#2,'BuildingContainer',
'BuildingContainer For Buildingstories',#106,(#111));
#112= IFCSPACE('3$f2p7VyLB7eox67SA_zKE',#2,'1',$,$,$,$,'Kitchen',
.ELEMENT.,.INTERNAL.,$);
#113= IFCSPACE('4Tf2p7VyLB7eox67SA_zKE',#2,'2',$,$,$,$,'Living room',
.ELEMENT.,.INTERNAL.,$);
#109= IFCRELAGGREGATES('6IOv58cYbDBAu7vMbay3W7',#2,'BuildingStoreyContainer',
'BuildingContainer For Spaces',#111,(#112,#113));
#2= IFCOWNERHISTORY(#5, #6, $, .ADDED., 0, $, $, 1207828354);
#3= IFCPERSON('Matthias Weise', '', '', $, $, $, $, $);

```

```
#4= IFCORGANIZATION(' ', ' ', ' ', $, $);
#5= IFCPERSONANDORGANIZATION(#3, #4, $);
#6= IFCAPPLICATION(#4, 'IFC-Application X', 'IFC-Exporter V2.3', 'Company Y');
```

Example (ifcXML)

```
<IfcBuilding id="ID106">
  <GlobalId>30V5XJ5d5ApRzfhSGEj6Q2</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>Building example</Name>
  <CompositionType>element</CompositionType>
  <ElevationOfRefHeight>210.50</ElevationOfRefHeight>
</IfcBuilding>
<IfcRelAggregates id="ID108">
  <GlobalId>3HOv58cYbDBAu7vMbay3W7</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>BuildingContainer</Name>
  <Description>BuildingContainer For Buildingstories</Description>
  <RelatingObject>
    <IfcBuilding xsi:nil="true" ref="ID106"/>
  </RelatingObject>
  <RelatedObjects ex:cType="set">
    <IfcBuildingStorey pos="0" xsi:nil="true" ref="ID111"/>
  </RelatedObjects>
</IfcRelAggregates>
<IfcRelAggregates id="ID109">
  <GlobalId>6IOv58cYbDBAu7vMbay3W7</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>BuildingStoreyContainer</Name>
  <Description>BuildingContainer For Spaces</Description>
  <RelatingObject>
    <IfcBuildingStorey xsi:nil="true" ref="ID111"/>
  </RelatingObject>
  <RelatedObjects ex:cType="set">
    <IfcSpace pos="0" xsi:nil="true" ref="ID112"/>
    <IfcSpace pos="1" xsi:nil="true" ref="ID113"/>
  </RelatedObjects>
</IfcRelAggregates>
<IfcBuildingStorey id="ID111">
  <GlobalId>2rAd0PG815zwRG$PbRquLR</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>First floor</Name>
  <CompositionType>element</CompositionType>
  <Elevation>3.1</Elevation>
</IfcBuildingStorey>
<IfcSpace id="ID112">
  <GlobalId>3$f2p7VyLB7eox67SA_zKE</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>1</Name>
  <LongName>Kitchen</LongName>
  <CompositionType>element</CompositionType>
  <InteriorOrExteriorSpace>internal</InteriorOrExteriorSpace>
</IfcSpace>
<IfcSpace id="ID113">
  <GlobalId>4Tf2p7VyLB7eox67SA_zKE</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>2</Name>
  <LongName>Living room</LongName>
  <CompositionType>element</CompositionType>
```

```

    <InteriorOrExteriorSpace>internal</InteriorOrExteriorSpace>
  </IfcSpace>
  <IfcOwnerHistory id="ID2">
    <OwningUser>
      <IfcPersonAndOrganization xsi:nil="true" ref="ID5"/>
    </OwningUser>
    <OwningApplication>
      <IfcApplication xsi:nil="true" ref="ID6"/>
    </OwningApplication>
    <ChangeAction>added</ChangeAction>
    <LastModifiedDate>0</LastModifiedDate>
    <CreationDate>1207828354</CreationDate>
  </IfcOwnerHistory>
  <IfcPerson id="ID3">
    <Id>Matthias Weise</Id>
    <FamilyName></FamilyName>
    <GivenName></GivenName>
  </IfcPerson>
  <IfcOrganization id="ID4">
    <Id></Id>
    <Name></Name>
    <Description></Description>
  </IfcOrganization>
  <IfcPersonAndOrganization id="ID5">
    <ThePerson>
      <IfcPerson xsi:nil="true" ref="ID3"/>
    </ThePerson>
    <TheOrganization>
      <IfcOrganization xsi:nil="true" ref="ID4"/>
    </TheOrganization>
  </IfcPersonAndOrganization>
  <IfcApplication id="ID6">
    <ApplicationDeveloper>
      <IfcOrganization xsi:nil="true" ref="ID4"/>
    </ApplicationDeveloper>
    <Version>IFC-Application X</Version>
    <ApplicationFullName>IFC-Exporter V2.3</ApplicationFullName>
    <ApplicationIdentifier>Company Y</ApplicationIdentifier>
  </IfcApplication>

```

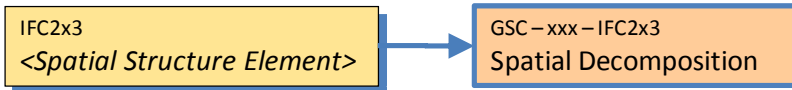
This document uses the official IFC Model View Definition Format version 1.1.0. of the IAI (www.iai-international.org)
 The content of this document has to be certified by the IAI before becoming part of an official IFC Model View Definition.

IFC Release Specific Concept Description (IFC2x3)

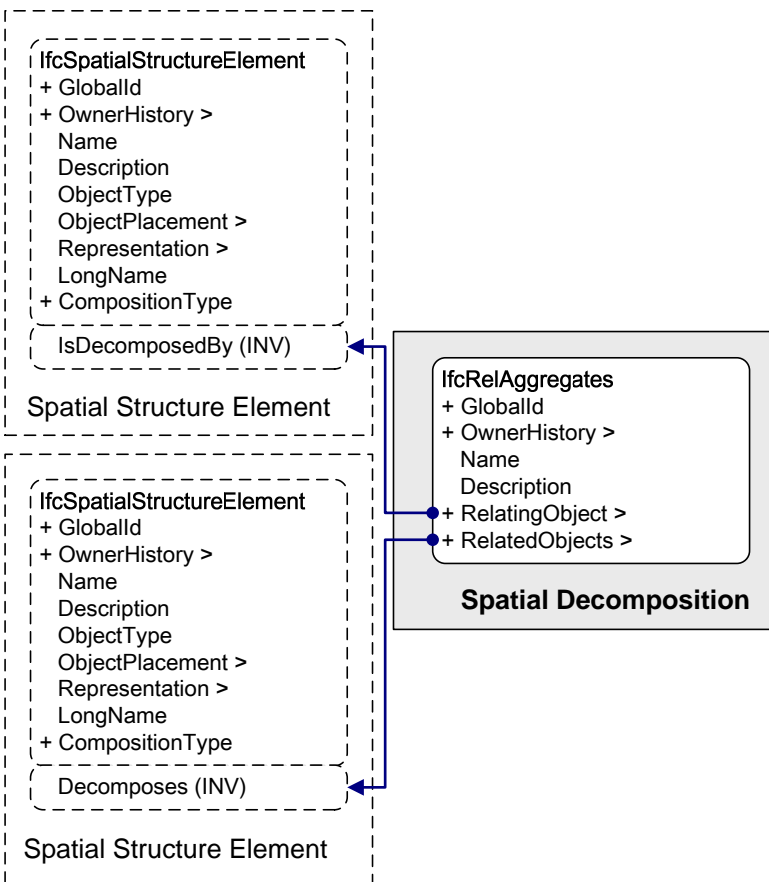
Spatial Decomposition

Reference		Version	1.0	Status	Proposal
Relationships					
History	5 th August, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3 (with friendly support by the German research initiative "ZukunftBau")				

Usage in view definition diagram



Instantiation diagram



Please note that *IfcSpatialStructureElement* is an abstract supertype of the concepts "Site", "Building", "BuildingStorey" and "Space". Thus, it cannot be instantiated as suggested in the instantiation diagram.

Implementation agreements

IfcRelAggregates

Attribute	Implementation agreements
GlobalId	Must be provided, but is allowed to change
OwnerHistory	Must be provided, but may contain (reusable) dummy value
Name	Reserved
Description	Reserved
RelatingObject	Must be provided – reference to the parent node of the spatial structure
RelatedObjects	Must be provided – reference to the child node of the spatial structure

There are 4 types of spatial structure elements, namely site, building, building storey and space. Additionally, each of these types can be classified as complex, element or partial. Thus, there are 12 types of spatial structure elements that can be used to define a spatial structure. Figure 1 (12 levels of spatial structure) represent the "theoretical deepest" decomposition structure. However, the Extended Coordination View restricts the depths of the decomposition tree by:

- level of site is optional
- max. of one site (type elementary) is allowed
- level of complex building, complex building storey, complex space is not allowed
- level of partial building, partial storey, partial space is not allowed
- level of building is mandatory
- level of building storey is optional
- level of space is optional

so a maximum decomposition tree in coordination view is

project

- *site*
- *building*
- *building storey*
- *space*

and the minimum decomposition tree is

- project*
- *building*

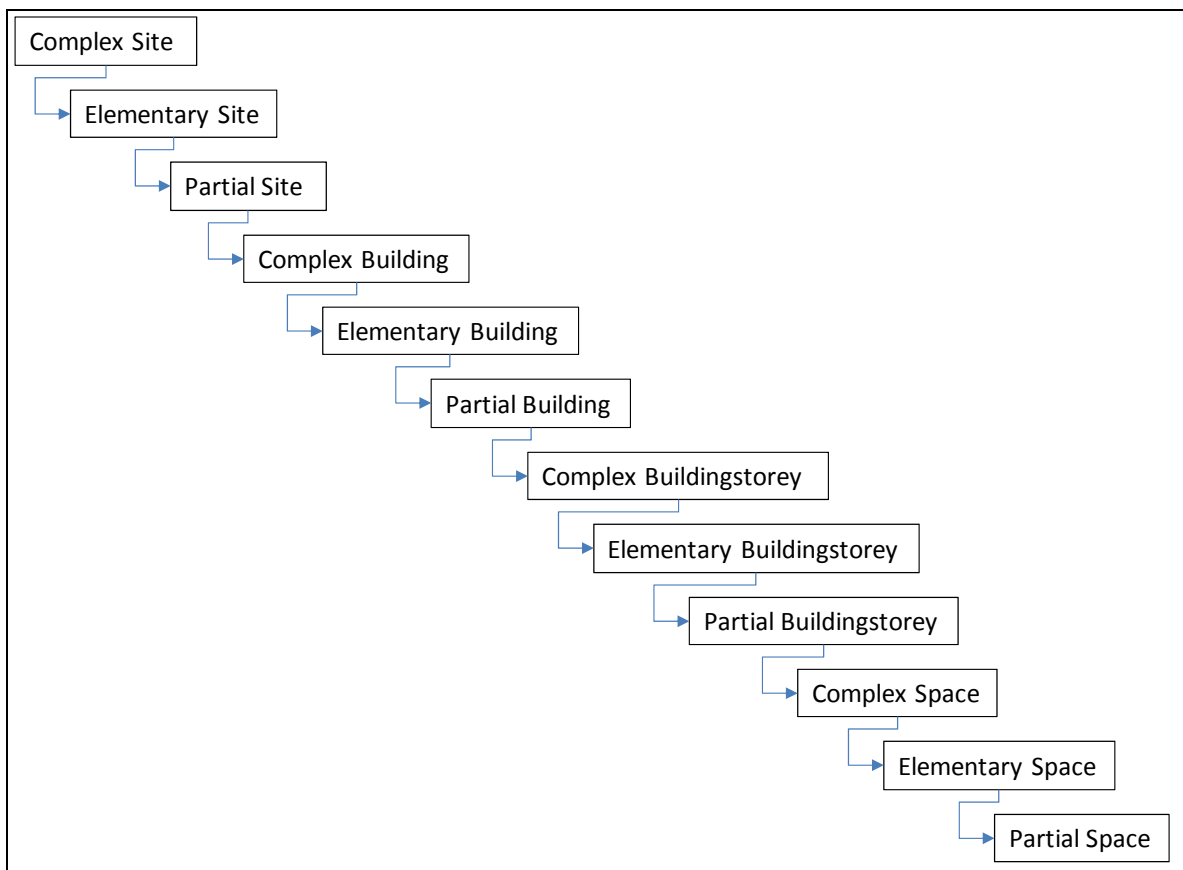


Figure 1: 12 levels of "theoretical deepest" decomposition structure of spatial elements

Example

```
#10= IFCRELAGGREGATES('cwgUeGRq4TsV1W5nm0d8F0', #2, $, $, #11, (#12));
#11= IFCSITE('0KMpiAlnb52RgQuM1CwVfd', #2, 'Site', 'Plane
    site', 'LandUse', $, $, $, .ELEMENT., (52,31,0), (13,24,0), $, $, $);
#12= IFCBUILDING('sISCCgKx4TkF9N05m0d8oG', #2, '1056', $, $, $, $, 'Building',
    .ELEMENT., $, $, $);
#20= IFCRELAGGREGATES('cwk90GRq4TsV1W5nm0d8F0', #2, $, $, #12, (#21));
#21= IFCBUILDINGSTOREY('sIYIqAKx4TkF9N05m0d8oG', #2, 'EG', $, $, $, $, 'First
    floor', .ELEMENT., $);
#31= IFCRELAGGREGATES('cwnpOmRq4TsV1W5nm0d8F0', #2, $, $, #21, (#32, #33));
#32= IFCSPACE('weYIqQKx4TkF9N05m0d8oG', #2, 'EG.001', $, 'Raum', $, $, 'Raum 001',
    .ELEMENT., .INTERNAL., 0.0);
#33= IFCSPACE('sIYIqQKx4TkF9N05m0d8oG', #2, 'EG.002', $, 'Raum', $, $, 'Raum 002',
    .ELEMENT., .INTERNAL., 0.0);
#2= IFCOWNERHISTORY(#5, #6, $, .ADDED., 0, $, $, 1207828354);
#3= IFCPERSON('Matthias Weise', '', '$, $, $, $, $);
#4= IFCORGANIZATION('', '$, $);
#5= IFCPERSONANDORGANIZATION(#3, #4, $);
#6= IFCAPPLICATION(#4, 'IFC-Application X', 'IFC-Exporter V2.3', 'Company Y');
```

All values that are needed to define the spatial structure are marked with bold letters.

The example shows a site (#11) that is decomposed by a building (#12), which itself is decomposed by a building storey (#21). The building storey is finally decomposed by two rooms (#32, #33). All elements are classified as “element” and are an example for the concept “*Spatial Structure Element*”. They are connected by relationships of the type *IfcRelAggregates* (#10, #20, #31).

Example (ifcXML)

```
<IfcRelAggregates id="ID10">
  <GlobalId>cwgUeGRq4TsV1W5nm0d8F0</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <RelatingObject>
    <IfcSite xsi:nil="true" ref="ID11"/>
  </RelatingObject>
  <RelatedObjects ex:cType="set">
    <IfcBuilding pos="0" xsi:nil="true" ref="ID12"/>
  </RelatedObjects>
</IfcRelAggregates>
<IfcSite id="ID11">
  <GlobalId>0KMpiAlnb52RgQuM1CwVfd</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>Site</Name>
  <Description>Plane site</Description>
  <ObjectType>LandUse</ObjectType>
  <CompositionType>element</CompositionType>
  <RefLatitude ex:cType="list">
    <ex:long-wrapper pos="0">52</ex:long-wrapper>
    <ex:long-wrapper pos="1">31</ex:long-wrapper>
    <ex:long-wrapper pos="2">0</ex:long-wrapper>
  </RefLatitude>
  <RefLongitude ex:cType="list">
    <ex:long-wrapper pos="0">13</ex:long-wrapper>
    <ex:long-wrapper pos="1">24</ex:long-wrapper>
    <ex:long-wrapper pos="2">0</ex:long-wrapper>
  </RefLongitude>
</IfcSite>
<IfcBuilding id="ID12">
  <GlobalId>sISCCgKx4TkF9N05m0d8oG</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>1056</Name>
  <LongName>Building</LongName>
```



```

    <CompositionType>element</CompositionType>
</IfcBuilding>
<IfcRelAggregates id="ID20">
  <GlobalId>cwk90GRq4TsV1W5nm0d8F0</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <RelatingObject>
    <IfcBuilding xsi:nil="true" ref="ID12"/>
  </RelatingObject>
  <RelatedObjects ex:cType="set">
    <IfcBuildingStorey pos="0" xsi:nil="true" ref="ID21"/>
  </RelatedObjects>
</IfcRelAggregates>
<IfcBuildingStorey id="ID21">
  <GlobalId>sIYIqAKx4TkF9N05m0d8oG</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>EG</Name>
  <LongName>First floor</LongName>
  <CompositionType>element</CompositionType>
</IfcBuildingStorey>
<IfcRelAggregates id="ID31">
  <GlobalId>cwnpOmRq4TsV1W5nm0d8F0</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <RelatingObject>
    <IfcBuildingStorey xsi:nil="true" ref="ID21"/>
  </RelatingObject>
  <RelatedObjects ex:cType="set">
    <IfcSpace pos="0" xsi:nil="true" ref="ID32"/>
    <IfcSpace pos="1" xsi:nil="true" ref="ID33"/>
  </RelatedObjects>
</IfcRelAggregates>
<IfcSpace id="ID32">
  <GlobalId>weYIqQKx4TkF9N05m0d8oG</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>EG.001</Name>
  <ObjectType>Raum</ObjectType>
  <LongName>Raum 001</LongName>
  <CompositionType>element</CompositionType>
  <InteriorOrExteriorSpace>internal</InteriorOrExteriorSpace>
  <ElevationWithFlooring>0.</ElevationWithFlooring>
</IfcSpace>
<IfcSpace id="ID33">
  <GlobalId>sIYIqQKx4TkF9N05m0d8oG</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>EG.002</Name>
  <ObjectType>Raum</ObjectType>
  <LongName>Raum 002</LongName>
  <CompositionType>element</CompositionType>
  <InteriorOrExteriorSpace>internal</InteriorOrExteriorSpace>
  <ElevationWithFlooring>0.</ElevationWithFlooring>
</IfcSpace>
<IfcOwnerHistory id="ID2">
  <OwningUser>
    <IfcPersonAndOrganization xsi:nil="true" ref="ID5"/>
  </OwningUser>
  <OwningApplication>
    <IfcApplication xsi:nil="true" ref="ID6"/>
  </OwningApplication>
  <ChangeAction>added</ChangeAction>
  <LastModifiedDate>0</LastModifiedDate>
  <CreationDate>1207828354</CreationDate>
</IfcOwnerHistory>

```

```
<IfcPerson id="ID3">
  <Id>Matthias Weise</Id>
  <FamilyName></FamilyName>
  <GivenName></GivenName>
</IfcPerson>
<IfcOrganization id="ID4">
  <Id></Id>
  <Name></Name>
  <Description></Description>
</IfcOrganization>
<IfcPersonAndOrganization id="ID5">
  <ThePerson>
    <IfcPerson xsi:nil="true" ref="ID3"/>
  </ThePerson>
  <TheOrganization>
    <IfcOrganization xsi:nil="true" ref="ID4"/>
  </TheOrganization>
</IfcPersonAndOrganization>
<IfcApplication id="ID6">
  <ApplicationDeveloper>
    <IfcOrganization xsi:nil="true" ref="ID4"/>
  </ApplicationDeveloper>
  <Version>IFC-Application X</Version>
  <ApplicationFullName>IFC-Exporter V2.3</ApplicationFullName>
  <ApplicationIdentifier>Company Y</ApplicationIdentifier>
</IfcApplication>
```

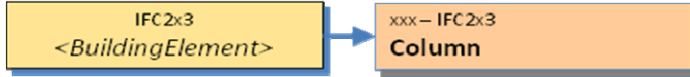
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IFC Release Specific Concept Description (IFC2x3)

Column

Reference		Version	1.0	Status	Draft
Relationships					
History	4 th August, 2008				
Authors	Thomas Liebich (tl@aec3.de)				
Document Owner	AEC3				

Usage in view definition diagram



Instantiation diagram

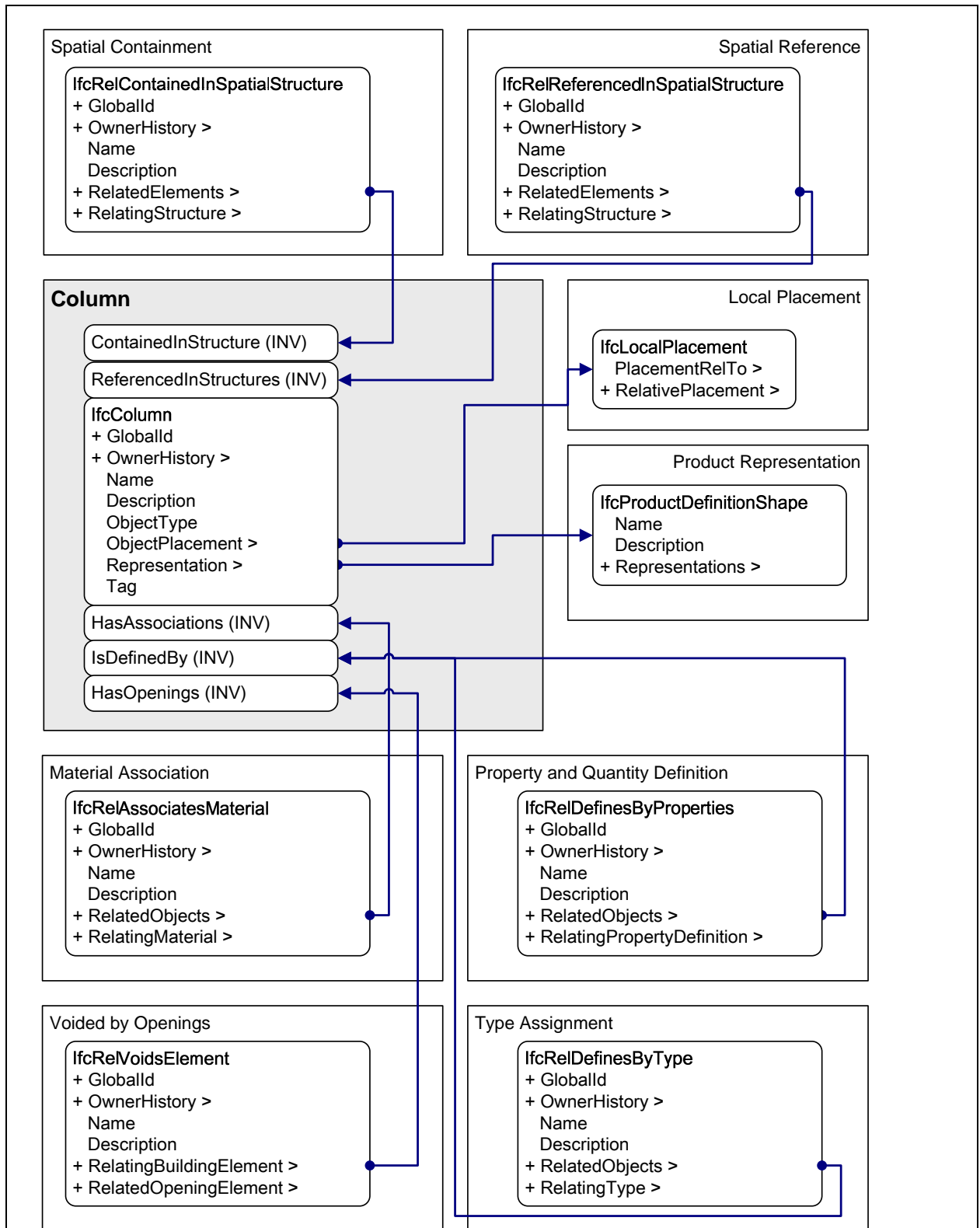


Figure 1: Column concept instantiation diagram – overview

Referenced Concepts within the column concept

- Spatial containment → see IFC2x3 Binding "[Spatial Containment](#)"
- Spatial reference → see IFC2x3 Binding "[Spatial Reference](#)"
- Local Placement → see
- Product Representation → see Figure 2: Column product representation concept

- Material Association → see
- Property and Quantity Definition → see
- Voided by Openings → see
- Type assignment → see

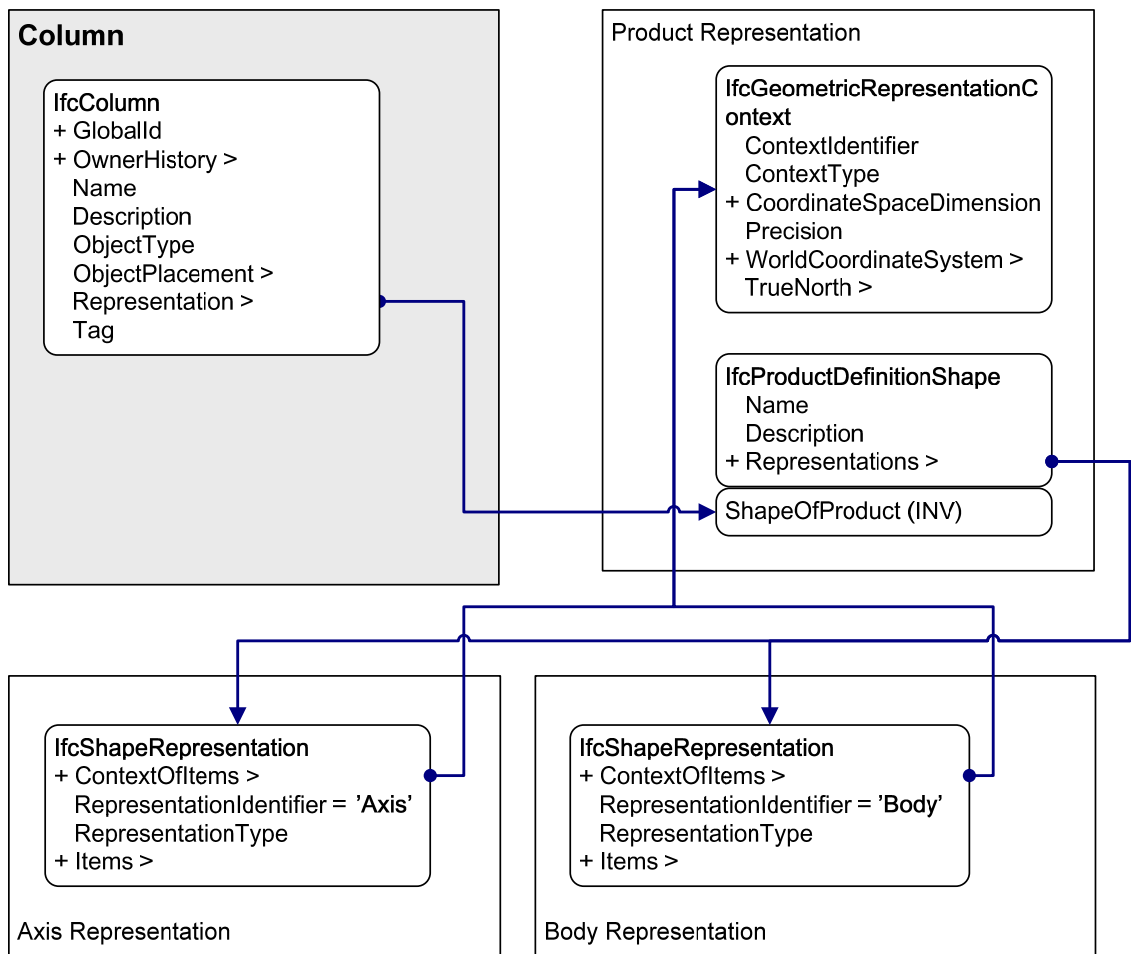


Figure 2: Column product representation concept

Referenced Concepts within the column product representation concept

- Axis Representation → see IFC2x3 Binding "[Axis Representation](#)"
- Body Representation →

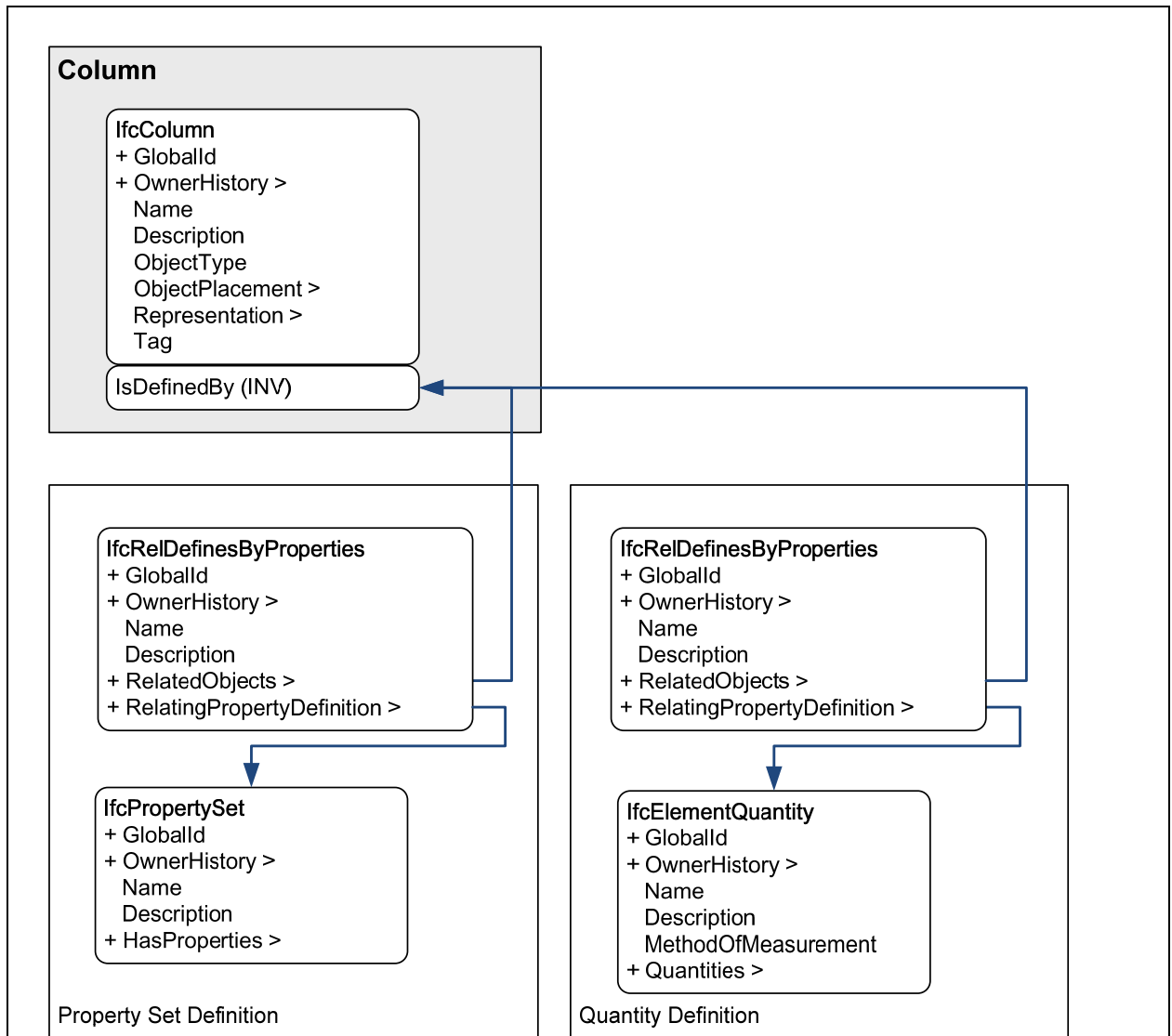


Figure 3: Column Property and Quantity Definition concept

Referenced Concepts within the column product representation concept

- Property Set Definition → see IFC2x3 Binding "[Single Value Property Definition](#)"
- Body Representation → see IFC2x3 Binding "[Simple Quantity](#)"

Implementation agreements

IfcColumn

Attribute	Implementation agreements
GlobalId	Must be provided
OwnerHistory	Must be provided, but may contain (reusable) dummy value
Name	Optional, is not required to be unique for the column occurrence
Description	Optional
Object Type	Reserved, should be omitted for now, i.e. \$
Object Placement	Must be provided, relative local placement shall be used
Representation	Must be provided.

Tag Reserved, if provided it should be a unique id for the column occurrence, e.g. the unique id of the element within the project data set.

IfcColumn.Representation

Attribute	Implementation agreements
Name	Reserved, should be omitted for now, i.e. \$
Description	Optional
Representations	Must be provided [1] as Axis Representation [2] as Body Representation

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IFC Release Specific Concept Description (IFC2x3)

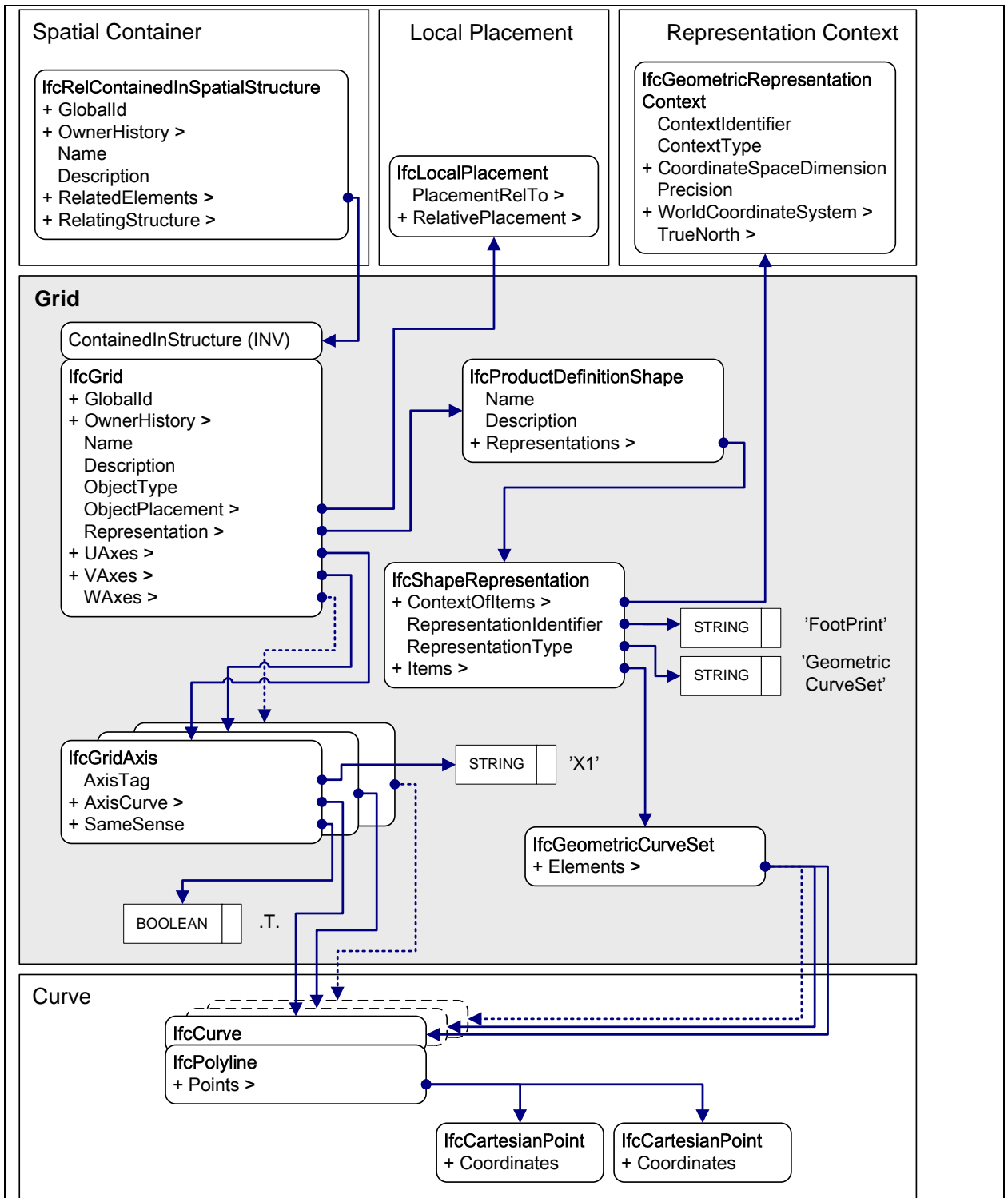
Grid

Reference		Version	1.0	Status	Draft
Relationships					
History	4 th August, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3				

Usage in view definition diagram



Instantiation diagram



Implementation agreements

IfcGrid

Attribute	Implementation agreements
GlobalId	Must be provided
OwnerHistory	Must be provided, but may contain (reusable) dummy value
Name	Reserved
Description	Reserved
Object Type	Reserved
Object Placement	Must be provided
Representation	Must be provided (shall reuse the curves defined by the grid axes)

UAxes	Must be provided
VAxes	Must be provided
WAxes	Optional
(INV)	Optional, e.g. reference to a building storey
ContainedInStructure	If provided it shall be used for the definition of relative placement.

IfcGridAxis

Attribute	Implementation agreements
AxisTag	Shall be provided
AxisCurve	Must be provided - applicable subtypes of IfcCurve are: (1) IfcPolyline (2) IfcCircle (3) IfcTrimmedCurve (based on BaseCurve referencing IfcLine or IfcCircle)
SameSense	Must be provided

IfcProductDefinitionShape

Attribute	Implementation agreements
Name	Optional
Description	Optional
Representations	Must be provided

IfcShapeRepresentation

Attribute	Implementation agreements
ContextOfItems	Must be provided
RepresentationIdentifier	Must be provided – shall be 'FootPrint'
RepresentationType	Must be provided – shall be 'GeometricCurveSet'
Items	Must be provided – shall contain exactly one IfcGeometricCurveSet

IfcGeometricCurveSet

Attribute	Implementation agreements
Elements	Must be provided – shall contain the representations (curves) of all grid axes (U, V, W) that are associated with the grid

Example (spf)

```

/*grid definition*/
#30010= IFCGRID('1tTSgyyDb2j8r9EiHHGhi$',#4,$,$,$,#30020,#30030,
  (#30089,#30096,#30103,#30110,#30117),
  (#30124,#30131,#30138,#30145,#30152,#30159),$);
#30020= IFCLocalPlacement(#20201,#30021);
#30030= IFCPRODUCTDEFINITIONSHAPE($,$,(#30031));
#30031= IFCSHAPEREPRESENTATION(#111,'FootPrint','GeometricCurveSet',(#30032));
#30032= IFCGEOMETRICCURVESET((#30087,#30094,#30101,#30108,#30115,#30122,#30129,
  #30136,#30143,#30150,#30157));
#30021= IFCAxis2Placement3D(#20,#10,#12);

/*grid axes (U direction)*/
#30083= IFCCARTESIANPOINT((-4000.,0.));
#30085= IFCCARTESIANPOINT((28000.,0.));
#30087= IFCPOLYLINE((#30083,#30085));
#30089= IFCGRIDAXIS('X1',#30087,.T.);
#30090= IFCCARTESIANPOINT((-4000.,4800.));
#30092= IFCCARTESIANPOINT((28000.,4800.));
#30094= IFCPOLYLINE((#30090,#30092));
#30096= IFCGRIDAXIS('X2',#30094,.T.);
#30097= IFCCARTESIANPOINT((-4000.,9600.));
#30099= IFCCARTESIANPOINT((28000.,9600.));
#30101= IFCPOLYLINE((#30097,#30099));
#30103= IFCGRIDAXIS('X3',#30101,.T.);
#30104= IFCCARTESIANPOINT((-4000.,14400.));

```

```

#30106= IFCCARTESIANPOINT((28000.,14400.));
#30108= IFCPOLYLINE((#30104,#30106));
#30110= IFCGRIDAXIS('X4',#30108,.T.);
#30111= IFCCARTESIANPOINT((-4000.,19200.));
#30113= IFCCARTESIANPOINT((28000.,19200.));
#30115= IFCPOLYLINE((#30111,#30113));
#30117= IFCGRIDAXIS('X5',#30115,.T.);

/*grid axes (V direction)*/
#30118= IFCCARTESIANPOINT((0.,-4000.));
#30120= IFCCARTESIANPOINT((1.1756221E-12,23200.));
#30122= IFCPOLYLINE((#30118,#30120));
#30124= IFCGRIDAXIS('Y6',#30122,.T.);
#30125= IFCCARTESIANPOINT((4800.,-4000.));
#30127= IFCCARTESIANPOINT((4800.,23200.));
#30129= IFCPOLYLINE((#30125,#30127));
#30131= IFCGRIDAXIS('Y5',#30129,.T.);
#30132= IFCCARTESIANPOINT((9600.,-4000.));
#30134= IFCCARTESIANPOINT((9600.,23200.));
#30136= IFCPOLYLINE((#30132,#30134));
#30138= IFCGRIDAXIS('Y4',#30136,.T.);
#30139= IFCCARTESIANPOINT((14400.,-4000.));
#30141= IFCCARTESIANPOINT((14400.,23200.));
#30143= IFCPOLYLINE((#30139,#30141));
#30145= IFCGRIDAXIS('Y3',#30143,.T.);
#30146= IFCCARTESIANPOINT((19200.,-4000.));
#30148= IFCCARTESIANPOINT((19200.,23200.));
#30150= IFCPOLYLINE((#30146,#30148));
#30152= IFCGRIDAXIS('Y2',#30150,.T.);
#30153= IFCCARTESIANPOINT((24000.,-4000.));
#30155= IFCCARTESIANPOINT((24000.,23200.));
#30157= IFCPOLYLINE((#30153,#30155));
#30159= IFCGRIDAXIS('Y1',#30157,.T.);

/*containment in spatial structure*/
#20500= IFCRELCONTAINEDINSPATIALSTRUCTURE('3_yYAG3h1CS9hMALjK7MGR',#4,$,$,
(#30010),#20200);
#20200= IFCBUILDINGSTOREY('0h$kssovXH3Jeg0w$H7yFJf',#4,'Storey EG',$,$,#20201,$,$,
.ELEMENT.,0.);
#20201= IFCLocalPLACEMENT(#11001,#20210);
#20210= IFCAxis2PLACEMENT3D(#20211,#10,#12);
#20211= IFCCARTESIANPOINT((0.,0.,0.));

/*shared coordinates*/
#10= IFCDIRECTION((0.,0.,1.));
#11= IFCDIRECTION((0.,1.,0.));
#12= IFCDIRECTION((1.,0.,0.));
#20= IFCCARTESIANPOINT((0.,0.,0.));

/*shared owner history*/
#4= IFCOWNERHISTORY(#40,#41,$,.ADDED.,,$,$,1179073813);
#40= IFCPersonANDORGANIZATION(#42,#43,$);
#41= IFCAPLICATION(#43,'V1','unknown','unknown');
#42= IFCPerson($,'unknown','user',$,$,$,$,$);
#43= IFCORGANIZATION($,'IAI',$,$,$);

```

All values that are needed for the classification of a concept are marked with bold letters.

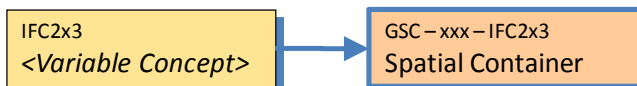
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The content of this document has to be certified by the IAI before becoming part of an official IFC Model View Definition.

IFC Release Specific Concept Description (IFC2x3)

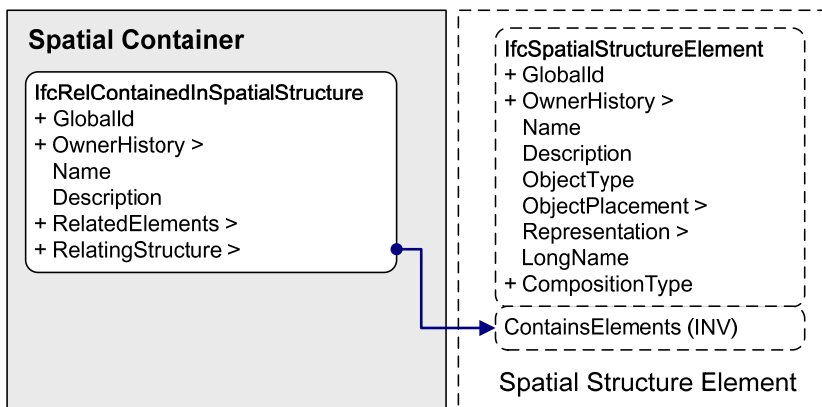
Spatial Containment

Reference		Version	1.0	Status	Proposal
Relationships					
History	9 th June, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3 (with support by the German research initiative "ZukunftBau")				

Usage in view definition diagram



Instantiation diagram



Please note that *IfcSpatialStructureElement* is an abstract supertype of the concepts "Site", "Building", "BuildingStorey" and "Space". Thus, it cannot be instantiated as suggested in the instantiation diagram.

Implementation agreements

IfcRelContainedInSpatialStructure

Attribute	Implementation agreements
GlobalId	Must be provided, but is allowed to change
OwnerHistory	Must be provided, but may contain (reusable) dummy value
Name	Reserved
Description	Reserved
RelatedElements	Must be provided - set of products (subtype of <i>IfcProduct</i>) that are contained in the relating structure
RelatingStructure	Must be provided – the spatial structure element that contains the elements

Example (spf)

```
#10=IFCSPACE('sIYIqQKx4TkF9N05m0d8oG', #2, 'EG.001', $, 'Room', $, $, 'Room 001',
.ELEMENT., .INTERNAL., 0.0);
#11=IFCBUILDINGELEMENTPROXY('Afv1GFoY4ToAltBzm0d8Fm', #2, 'Sun protection', $, $,
$, $, $, $);
#12=IFCRELCONTAINEDINSPATIALSTRUCTURE('cwpeaWRq4TsV1W5nm0d8F0', #2, $, $,
(#11), #10);
#2=IFCOWNERHISTORY(#5, #6, $, .ADDED., 0, $, $, 1207828354);
#3=IFCPERSON('Matthias Weise', '', '', $, $, $, $, $);
#4=IFCORGANIZATION('', '', '', $, $);
#5=IFCPERSONANDORGANIZATION(#3, #4, $);
#6=IFCAPPLICATION(#4, 'IFC-Application X', 'IFC-Exporter V2.3', 'Company Y');
```

All values that are needed to define a spatial container are marked with bold letters.

The example shows a proxy element (#11) that is contained in a room (#10), whereas the proxy element is an example for the “*Variable Concept*” and the room is an example for the “*Spatial Structure Element*”. Both elements are connected by the relationship *IfcRelContainedInSpatialStructure* (#12).

Example (ifcXML)

```
<IfcSpace id="ID10">
  <GlobalId>sIYIqQKx4TkF9N05m0d8oG</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>EG.001</Name>
  <ObjectType>Room</ObjectType>
  <LongName>Room 001</LongName>
  <CompositionType>element</CompositionType>
  <InteriorOrExteriorSpace>internal</InteriorOrExteriorSpace>
  <ElevationWithFlooring>0.</ElevationWithFlooring>
</IfcSpace>
<IfcBuildingElementProxy id="ID11">
  <GlobalId>AfvlGFoY4ToALtbzm0d8Fm</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>Sun protection</Name>
</IfcBuildingElementProxy>
<IfcRelContainedInSpatialStructure id="ID12">
  <GlobalId>cwpeaWRq4TsV1W5nm0d8F0</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <RelatedElements ex:cType="set">
    <IfcBuildingElementProxy pos="0" xsi:nil="true" ref="ID11"/>
  </RelatedElements>
  <RelatingStructure>
    <IfcSpace xsi:nil="true" ref="ID10"/>
  </RelatingStructure>
</IfcRelContainedInSpatialStructure>
<IfcOwnerHistory id="ID2">
  <OwningUser>
    <IfcPersonAndOrganization xsi:nil="true" ref="ID5"/>
  </OwningUser>
  <OwningApplication>
    <IfcApplication xsi:nil="true" ref="ID6"/>
  </OwningApplication>
  <ChangeAction>added</ChangeAction>
  <LastModifiedDate>0</LastModifiedDate>
  <CreationDate>1207828354</CreationDate>
</IfcOwnerHistory>
<IfcPerson id="ID3">
  <Id>Matthias Weise</Id>
  <FamilyName></FamilyName>
  <GivenName></GivenName>
</IfcPerson>
<IfcOrganization id="ID4">
  <Id></Id>
  <Name></Name>
  <Description></Description>
</IfcOrganization>
<IfcPersonAndOrganization id="ID5">
  <ThePerson>
    <IfcPerson xsi:nil="true" ref="ID3"/>
  </ThePerson>
  <TheOrganization>
    <IfcOrganization xsi:nil="true" ref="ID4"/>
  </TheOrganization>
</IfcPersonAndOrganization>
<IfcApplication id="ID6">
  <ApplicationDeveloper>
    <IfcOrganization xsi:nil="true" ref="ID4"/>
  </ApplicationDeveloper>
</IfcApplication>
```

```
<Version>IFC-Application X</Version>  
<ApplicationFullName>IFC-Exporter V2.3</ApplicationFullName>  
<ApplicationIdentifier>Company Y</ApplicationIdentifier>  
</IfcApplication>
```

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The content of this document has to be certified by the IAI before becoming part of an official IFC Model View Definition.

IFC Release Specific Concept Description (IFC2x3)

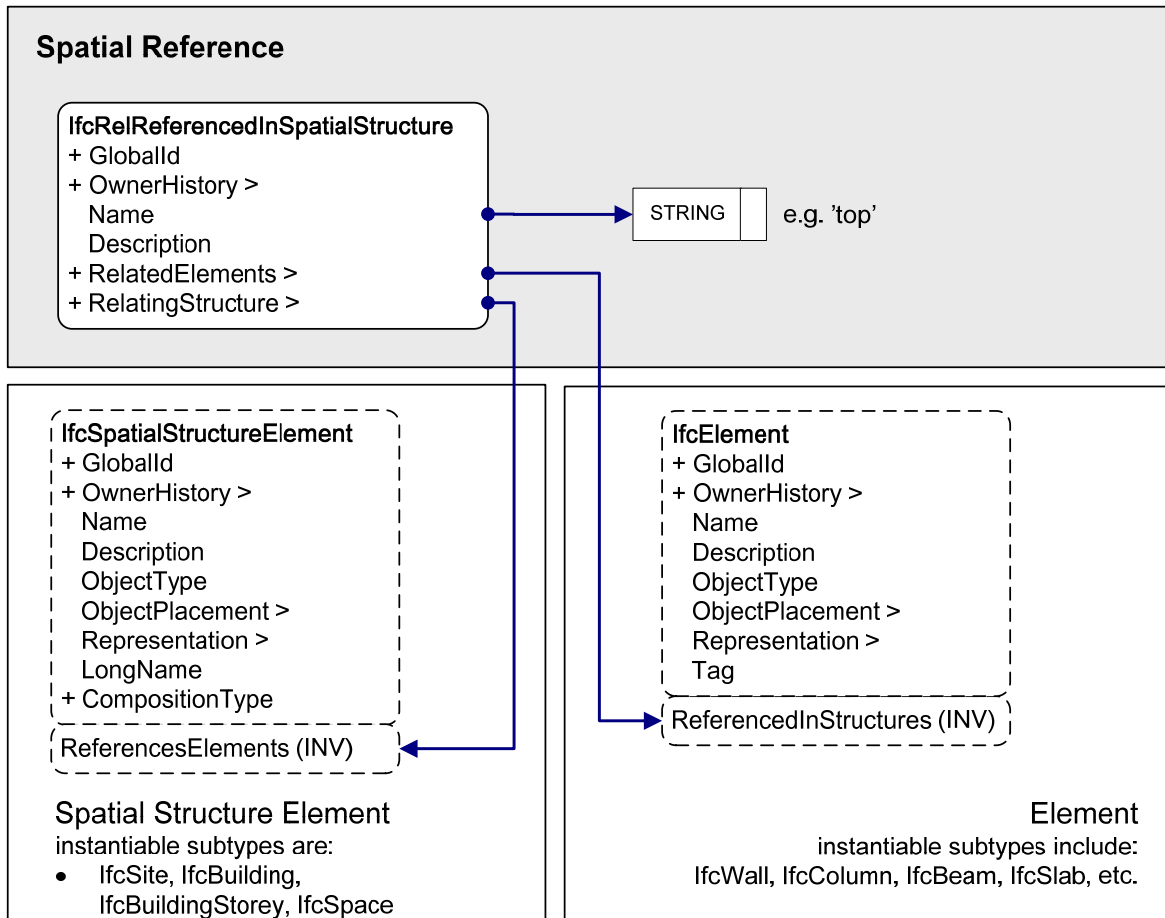
Spatial Reference

Reference		Version	1.0	Status	Proposal
Relationships					
History	5 th August, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3 (with support by the German research initiative "ZukunftBau")				

Usage in view definition diagram



Instantiation diagram



Please note that *IfcSpatialStructureElement* and *IfcElement* are abstract supertypes and thus cannot be instantiated. Instead none-abstract subtypes such as *IfcSite*, *IfcBuilding*, *IfcBuildingStorey* or *IfcSpace* (for *IfcSpatialStructureElement*) or *IfcWallStandardCase*, *IfcColumn*, ... (for *IfcElement*) have to be used.

Implementation agreements

IfcRelReferencedInSpatialStructure

Attribute	Implementation agreements
GlobalId	Must be provided, but is allowed to change

IFC Release Specific Concept Description (IFC2x3)

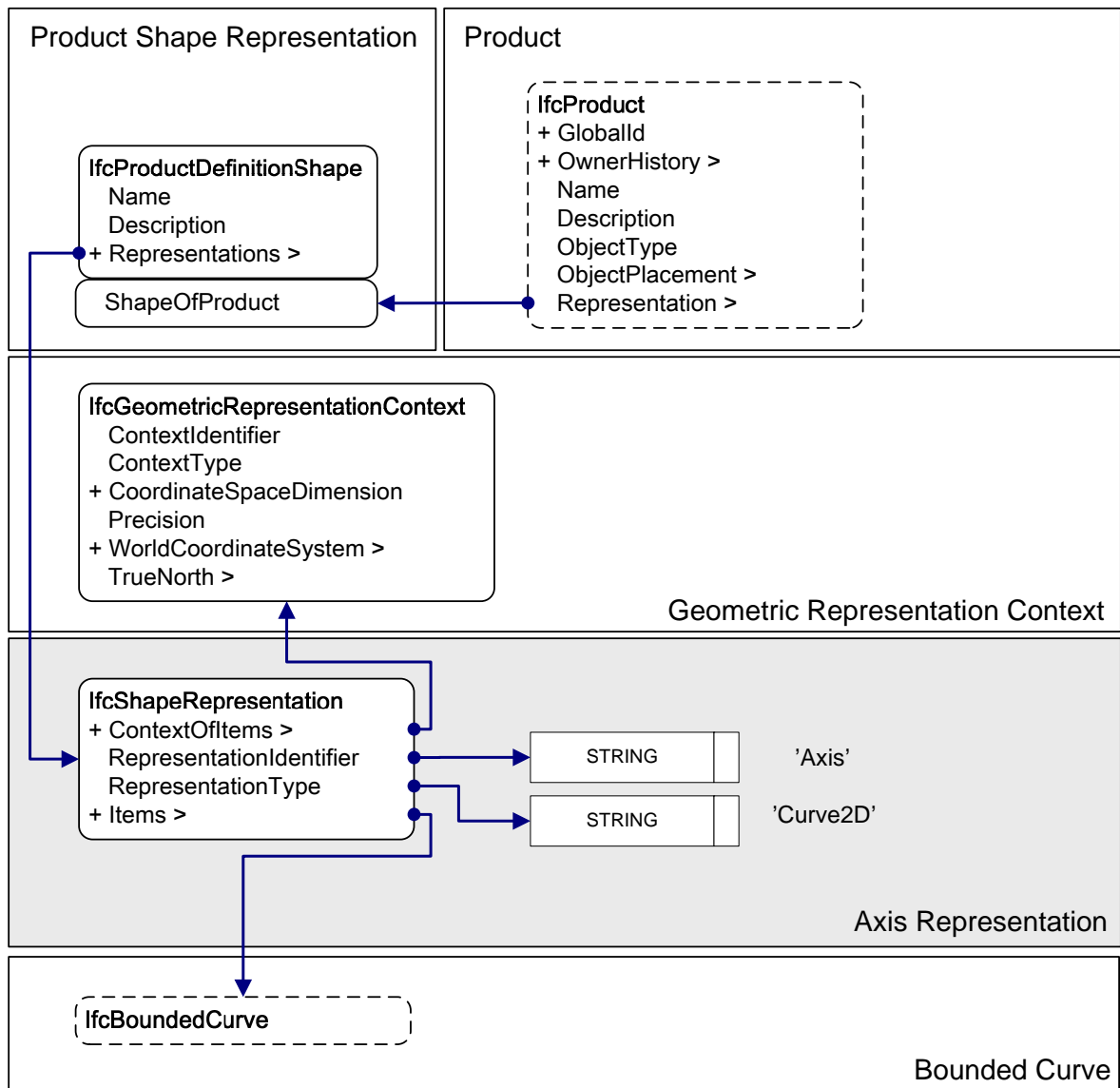
Axis Representation

Reference		Version	1.0	Status	Draft
Relationships					
History	5 th August, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3				

Usage in view definition diagram



Instantiation diagram (example for a 2D axis)



Implementation agreements

IfcShapeRepresentation

Attribute

Implementation agreements

ContextOfItems	Must be provided – no further agreements needed (see IFC documentation)
RepresentationIdentifier	Shall contain “Axis” to identify the axis representation from other representation types, e.g. the body representation
RepresentationType	Shall contain “Curve2D” for a 2 dimensional axis or “GeometricCurveSet” for a 3 dimensional axis. <u>Please note that:</u> (1) an axis within the xy plane of the local object coordinate system is regarded as 2 dimensional (2) the representation type for 3 dimensional axis will be changed from “GeometricCurveSet” to “Curve3D” in later IFC releases.
Items	Must be provided – axis representations are currently restricted to the following subtypes of IfcBoundedCurve: (1) IfcPolyline (having 2 Points) (2) IfcTrimmedCurve (with BasisCurve = IfcLine IfcCircle)

Example (spf)

```

/***** Product *****/
#100= IFCWALLSTANDARDCASE('3rPX_Juz59peXXY6wDJl18',#2,
'Wand-Ext-ERDG-1',$,$,#101,#120,$);
/***** Local Placement (relative to other spatial structure elements) *****/
#101= IFCLOCALPLACEMENT(#102,#105);
#102= IFCLOCALPLACEMENT(#103,#106);
#103= IFCLOCALPLACEMENT(#104,#107);
#104= IFCLOCALPLACEMENT($,#107);
#105= IFCAXIS2PLACEMENT3D(#108,#110,#112);
#106= IFCAXIS2PLACEMENT3D(#109,#110,#111);
#107= IFCAXIS2PLACEMENT3D(#109,#110,#111);
#108= IFCCARTESIANPOINT((1.9397681,-6.0964898,0.));
#109= IFCCARTESIANPOINT((0.,0.,0.));
#110= IFCDIRECTION((0.,0.,1.));
#111= IFCDIRECTION((1.,0.,0.));
#112= IFCDIRECTION((0.,1.,0.));

/***** Product Representation *****/
#120= IFCPRODUCTDEFINITIONSHAPE($,$,(#121,#130));
/***** Axis Representation *****/
#121= IFCSHAPEREPRESENTATION(#125,'Axis','Curve2D',(#122));
#122= IFCPOLYLINE((#123,#124));
#123= IFCCARTESIANPOINT((0.,0.));
#124= IFCCARTESIANPOINT((10.,0.));
#125= IFCGEOMETRICREPRESENTATIONCONTEXT('Plan','Model',3,1.0000000E-5,#107,#126);
#126= IFCDIRECTION((0.,1.));
/***** Body Representation *****/
#130= IFCSHAPEREPRESENTATION(#144,'Body','SweptSolid',(#131));
#131= IFCEXTRUDEDAREASOLID(#132,#133,#110,2.7);
#132= IFCARBITRARYCLOSEDPROFILEDEF(.AREA.,$,#134);
#133= IFCAXIS2PLACEMENT3D(#109,#110,#111);
#134= IFCPOLYLINE((#140,#141,#142,#143,#140));
#140= IFCCARTESIANPOINT((0.3,-0.3));
#141= IFCCARTESIANPOINT((9.7,-0.3));
#142= IFCCARTESIANPOINT((10.,0.));
#143= IFCCARTESIANPOINT((0.,2.2204460E-16));
#144= IFCGEOMETRICREPRESENTATIONCONTEXT('Plan','Design',3,1.0000000E-5,#107,#145);
#145= IFCDIRECTION((0.,1.));

/***** Data Management Information *****/
#2= IFCOWNERHISTORY(#5, #6, $, .ADDED., 0, $, $, 1207828354);
#3= IFCPERSON('Matthias Weise', '', '$, $, $, $, $');
#4= IFCORGANIZATION('', '$, $');
#5= IFCPERSONANDORGANIZATION(#3, #4, $);
#6= IFCAPPLICATION(#4, 'IFC-Application X', 'IFC-Exporter V2.3', 'Company Y');

```

All values needed for axis definition are marked with bold letters.

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IFC Release Specific Concept Description (IFC2x3)

Simple Quantity

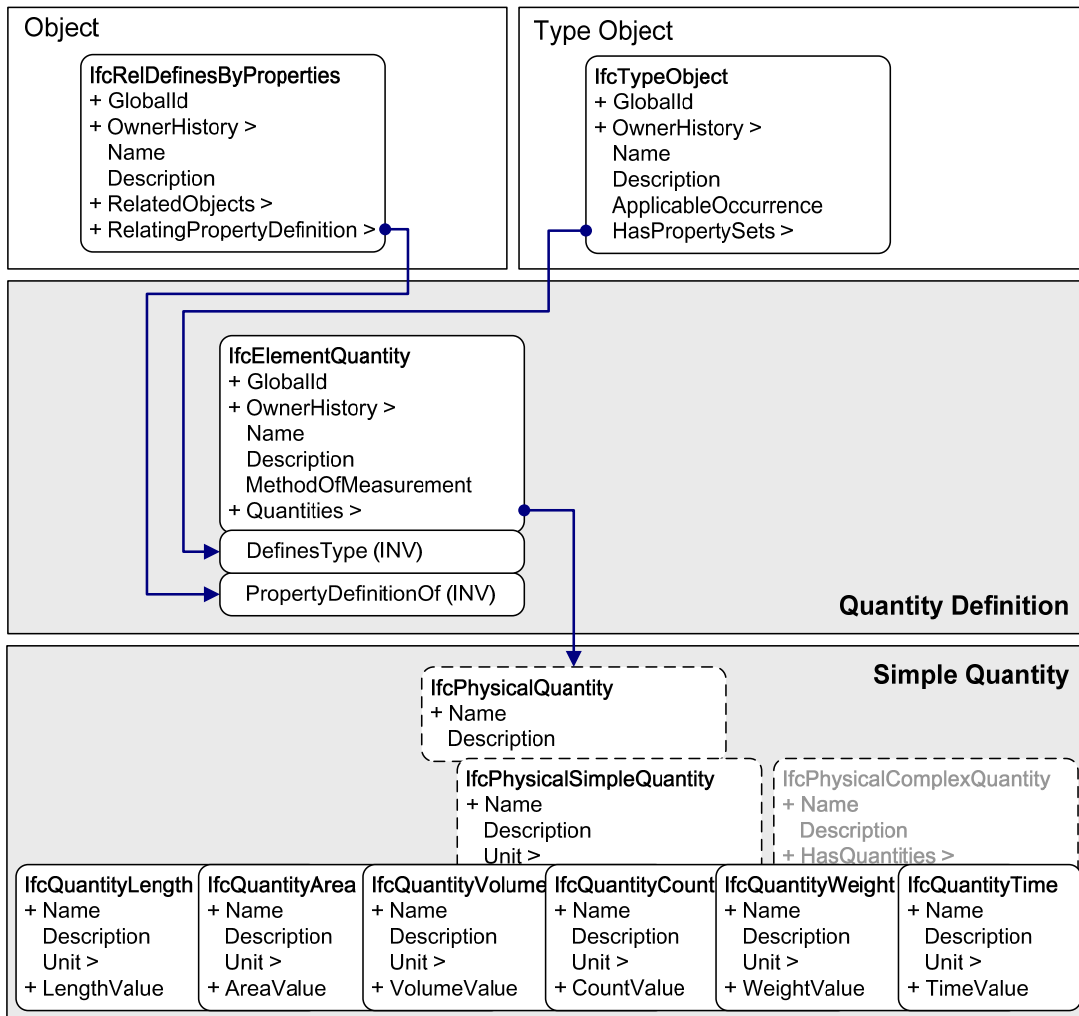
Reference		Version	1.0	Status	Proposal
Relationships					
History	9 th June, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3 (with friendly support by the German research initiative "ZukunftBau")				

Usage in view definition diagram



Please note that the "Simple Quantity" concept is an adapter concept that will be refined by other concept definitions. The purpose of "Simple Quantity" is to specify the definition of simple quantities that can be attached to "Objects" and "Type Objects".

Instantiation diagram



Implementation agreements

IfcElementQuantity

Attribute	Implementation agreements
GlobalId	Must be provided, but is allowed to change
OwnerHistory	Must be provided, but may contain dummy value

Name	Must be provided - in case of base quantities it should be 'BaseQuantities' in any other case it should be a unique name enables to identify the type of quantities, e.g. 'BFRQuantities'
Description	Reserved
MethodOfMeasurement	Reserved
Quantities	Must be provided - set of simple quantities (subtype of IfcPhysicalSimpleQuantities)
DefinesType(INV)	Provided, if it describes element quantities of a "Type Object"
PropertyDefinitionOf (INV)	Provided, if it describes element quantities of an "Object"

IfcPhysicalSimpleQuantity (ABS)

Attribute	Implementation agreements
Name	Must be provided – shall enable to uniquely identify the quantity
Description	Reserved
Unit	Optional – only necessary if the project unit is not suitable

Example (spf)

```
#100= IFCSPACE('1EqtzHFkPC2fAeNGBFZ0_$',#2,'OG1-107',$,$,$,$,'Bath',.ELEMENT.,.INTERNAL.,$);
#101= IFCQUANTITYLENGTH('Height',$,$,2.5);
#102= IFCQUANTITYLENGTH('Perimeter',$,$,35.667246);
#103= IFCQUANTITYVOLUME('GrossVolume',$,$,16.4);
#104= IFCQUANTITYVOLUME('NetVolume',$,$,16.4);
#105= IFCQUANTITYAREA('GrossFloorArea',$,$,6.56);
#106= IFCQUANTITYAREA('NetFloorArea',$,$,6.56);
#107= IFCQUANTITYAREA('GrossWallArea',$,$,28.5);
#108= IFCQUANTITYAREA('NetWallArea',$,$,28.5);
#109= IFCELEMENTQUANTITY('1scWlSxSf3TOXzYi$H3NZC',#2,'BaseQuantities',$,'',(#101,#102,#103,#104,#105,#106,#107,#108));
#110= IFCRELDEFINESBYPROPERTIES('1DDDIoyWl6bfZwIs31XdDs',#2,$,$,($,$,($100),$109));
#2= IFCOWNERHISTORY(#5,#6,$,.ADDED.,0,$,$,1207828354);
#3= IFCPERSON('Matthias Weise','','$,$,$,$,$);
#4= IFCORGANIZATION('','$,$,$);
#5= IFCPERSONANDORGANIZATION(#3,#4,$);
#6= IFCAPPLICATION(#4,'IFC-Application X','IFC-Exporter V2.3','Company Y');
```

All values that are needed to define simple quantities and to attach them to "Objects" are marked with bold letters.

The example shows a set of simple quantities of a room (#100). They are collected by an 'element quantity object' (#109) that is attached to the room by *IfcRelDefinesByProperties* (#110).

Further examples are given in the refined concepts.

Example (ifcXML)

```
<IfcSpace id="ID100">
  <GlobalId>1EqtzHFkPC2fAeNGBFZ0_$</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>OG1-107</Name>
  <LongName>Bath</LongName>
  <CompositionType>element</CompositionType>
  <InteriorOrExteriorSpace>internal</InteriorOrExteriorSpace>
</IfcSpace>
<IfcQuantityLength id="ID101">
  <Name>Height</Name>
  <LengthValue>2.5</LengthValue>
</IfcQuantityLength>
<IfcQuantityLength id="ID102">
  <Name>Perimeter</Name>
  <LengthValue>35.667246</LengthValue>
```

```

</IfcQuantityLength>
<IfcQuantityVolume id="ID103">
  <Name>GrossVolume</Name>
  <VolumeValue>16.4</VolumeValue>
</IfcQuantityVolume>
<IfcQuantityVolume id="ID104">
  <Name>NetVolume</Name>
  <VolumeValue>16.4</VolumeValue>
</IfcQuantityVolume>
<IfcQuantityArea id="ID105">
  <Name>GrossFloorArea</Name>
  <AreaValue>6.56</AreaValue>
</IfcQuantityArea>
<IfcQuantityArea id="ID106">
  <Name>NetFloorArea</Name>
  <AreaValue>6.56</AreaValue>
</IfcQuantityArea>
<IfcQuantityArea id="ID107">
  <Name>GrossWallArea</Name>
  <AreaValue>28.5</AreaValue>
</IfcQuantityArea>
<IfcQuantityArea id="ID108">
  <Name>NetWallArea</Name>
  <AreaValue>28.5</AreaValue>
</IfcQuantityArea>
<IfcElementQuantity id="ID109">
  <GlobalId>lscWlSxSf3TOXzYi$H3NZC</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>BaseQuantities</Name>
  <MethodOfMeasurement></MethodOfMeasurement>
  <Quantities ex:cType="set">
    <IfcQuantityLength pos="0" xsi:nil="true" ref="ID101"/>
    <IfcQuantityLength pos="1" xsi:nil="true" ref="ID102"/>
    <IfcQuantityVolume pos="2" xsi:nil="true" ref="ID103"/>
    <IfcQuantityVolume pos="3" xsi:nil="true" ref="ID104"/>
    <IfcQuantityArea pos="4" xsi:nil="true" ref="ID105"/>
    <IfcQuantityArea pos="5" xsi:nil="true" ref="ID106"/>
    <IfcQuantityArea pos="6" xsi:nil="true" ref="ID107"/>
    <IfcQuantityArea pos="7" xsi:nil="true" ref="ID108"/>
  </Quantities>
</IfcElementQuantity>
<IfcRelDefinesByProperties id="ID110">
  <GlobalId>1DDDIoyWl6bfZwIs31XdDs</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <RelatedObjects ex:cType="set">
    <IfcSpace pos="0" xsi:nil="true" ref="ID100"/>
  </RelatedObjects>
  <RelatingPropertyDefinition>
    <IfcElementQuantity xsi:nil="true" ref="ID109"/>
  </RelatingPropertyDefinition>
</IfcRelDefinesByProperties>
<IfcOwnerHistory id="ID2">
  <OwningUser>
    <IfcPersonAndOrganization xsi:nil="true" ref="ID5"/>
  </OwningUser>
  <OwningApplication>
    <IfcApplication xsi:nil="true" ref="ID6"/>
  </OwningApplication>
  <ChangeAction>added</ChangeAction>
  <LastModifiedDate>0</LastModifiedDate>
  <CreationDate>1207828354</CreationDate>
</IfcOwnerHistory>
<IfcPerson id="ID3">
  <Id>Matthias Weise</Id>
  <FamilyName></FamilyName>
  <GivenName></GivenName>
</IfcPerson>

```

```
<IfcOrganization id="ID4">
  <Id></Id>
  <Name></Name>
  <Description></Description>
</IfcOrganization>
<IfcPersonAndOrganization id="ID5">
  <ThePerson>
    <IfcPerson xsi:nil="true" ref="ID3"/>
  </ThePerson>
  <TheOrganization>
    <IfcOrganization xsi:nil="true" ref="ID4"/>
  </TheOrganization>
</IfcPersonAndOrganization>
<IfcApplication id="ID6">
  <ApplicationDeveloper>
    <IfcOrganization xsi:nil="true" ref="ID4"/>
  </ApplicationDeveloper>
  <Version>IFC-Application X</Version>
  <ApplicationFullName>IFC-Exporter V2.3</ApplicationFullName>
  <ApplicationIdentifier>Company Y</ApplicationIdentifier>
</IfcApplication>
```

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IFC Release Specific Concept Description (IFC2x3)

Single Value Property Definition

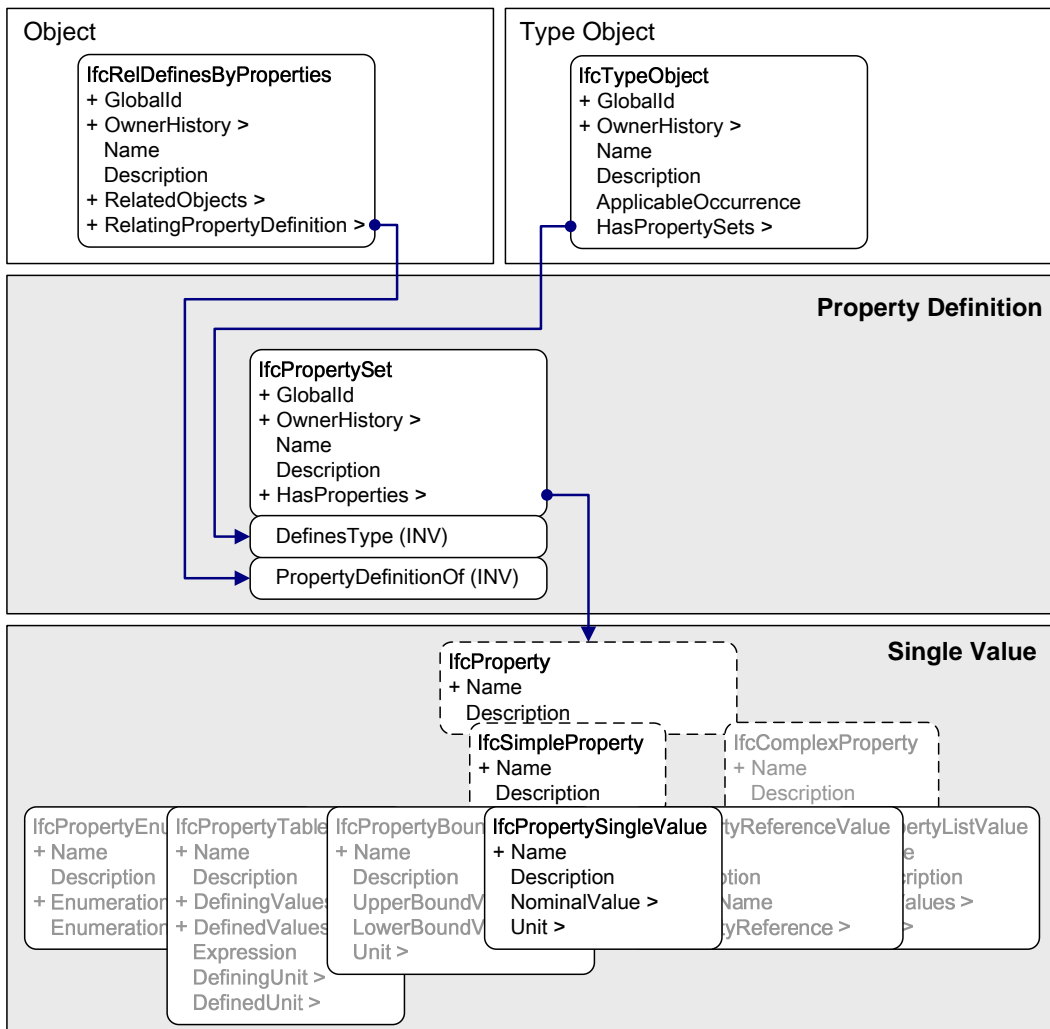
Reference		Version	1.0	Status	Proposal
Relationships					
History	9 th June, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3 (with friendly support by the German research initiative "ZukunftBau")				

Usage in view definition diagram



Please note that the "Single Value Property Definition" concept is an adapter concept that will be refined by other concept definitions. The purpose of "Single Value Property Definition" is to specify the definition of properties that can be attached to "Objects" and "Type Objects".

Instantiation diagram




```

<Tag>551AD3C3-A8C3-4199-A4-81-BD6279342FF4</Tag>
<OverallHeight>2.5</OverallHeight>
<OverallWidth>0.75</OverallWidth>
</IfcWindow>
<IfcPropertySet id="ID105">
  <GlobalId>231j_uqLjE68vZCU88NGXV</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <Name>Pset_WindowCommon</Name>
  <HasProperties ex:cType="set">
    <IfcPropertySingleValue pos="0" xsi:nil="true" ref="ID107"/>
    <IfcPropertySingleValue pos="1" xsi:nil="true" ref="ID108"/>
    <IfcPropertySingleValue pos="2" xsi:nil="true" ref="ID109"/>
  </HasProperties>
</IfcPropertySet>
<IfcRelDefinesByProperties id="ID106">
  <GlobalId>3$xtB9ZE17dRVzAdr8gFZB</GlobalId>
  <OwnerHistory>
    <IfcOwnerHistory xsi:nil="true" ref="ID2"/>
  </OwnerHistory>
  <RelatedObjects ex:cType="set">
    <IfcWindow pos="0" xsi:nil="true" ref="ID100"/>
  </RelatedObjects>
  <RelatingPropertyDefinition>
    <IfcPropertySet xsi:nil="true" ref="ID105"/>
  </RelatingPropertyDefinition>
</IfcRelDefinesByProperties>
<IfcPropertySingleValue id="ID107">
  <Name>FireRating</Name>
  <NominalValue>
    <IfcLabel>F30</IfcLabel>
  </NominalValue>
</IfcPropertySingleValue>
<IfcPropertySingleValue id="ID108">
  <Name>GlazingAreaFraction</Name>
  <NominalValue>
    <IfcPositiveRatioMeasure>0.8</IfcPositiveRatioMeasure>
  </NominalValue>
</IfcPropertySingleValue>
<IfcPropertySingleValue id="ID109">
  <Name>IsExterior</Name>
  <NominalValue>
    <IfcBoolean>true</IfcBoolean>
  </NominalValue>
</IfcPropertySingleValue>
<IfcOwnerHistory id="ID2">
  <OwningUser>
    <IfcPersonAndOrganization xsi:nil="true" ref="ID5"/>
  </OwningUser>
  <OwningApplication>
    <IfcApplication xsi:nil="true" ref="ID6"/>
  </OwningApplication>
  <ChangeAction>added</ChangeAction>
  <LastModifiedDate>0</LastModifiedDate>
  <CreationDate>1207828354</CreationDate>
</IfcOwnerHistory>
<IfcPerson id="ID3">
  <Id>Matthias Weise</Id>
  <FamilyName></FamilyName>
  <GivenName></GivenName>
</IfcPerson>
<IfcOrganization id="ID4">
  <Id></Id>
  <Name></Name>
  <Description></Description>
</IfcOrganization>
<IfcPersonAndOrganization id="ID5">
  <ThePerson>
    <IfcPerson xsi:nil="true" ref="ID3"/>
  </ThePerson>

```

```
<TheOrganization>
  <IfcOrganization xsi:nil="true" ref="ID4"/>
</TheOrganization>
</IfcPersonAndOrganization>
<IfcApplication id="ID6">
  <ApplicationDeveloper>
    <IfcOrganization xsi:nil="true" ref="ID4"/>
  </ApplicationDeveloper>
  <Version>IFC-Application X</Version>
  <ApplicationFullName>IFC-Exporter V2.3</ApplicationFullName>
  <ApplicationIdentifier>Company Y</ApplicationIdentifier>
</IfcApplication>
```

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IFC Release Specific Concept Description (IFC2x3)

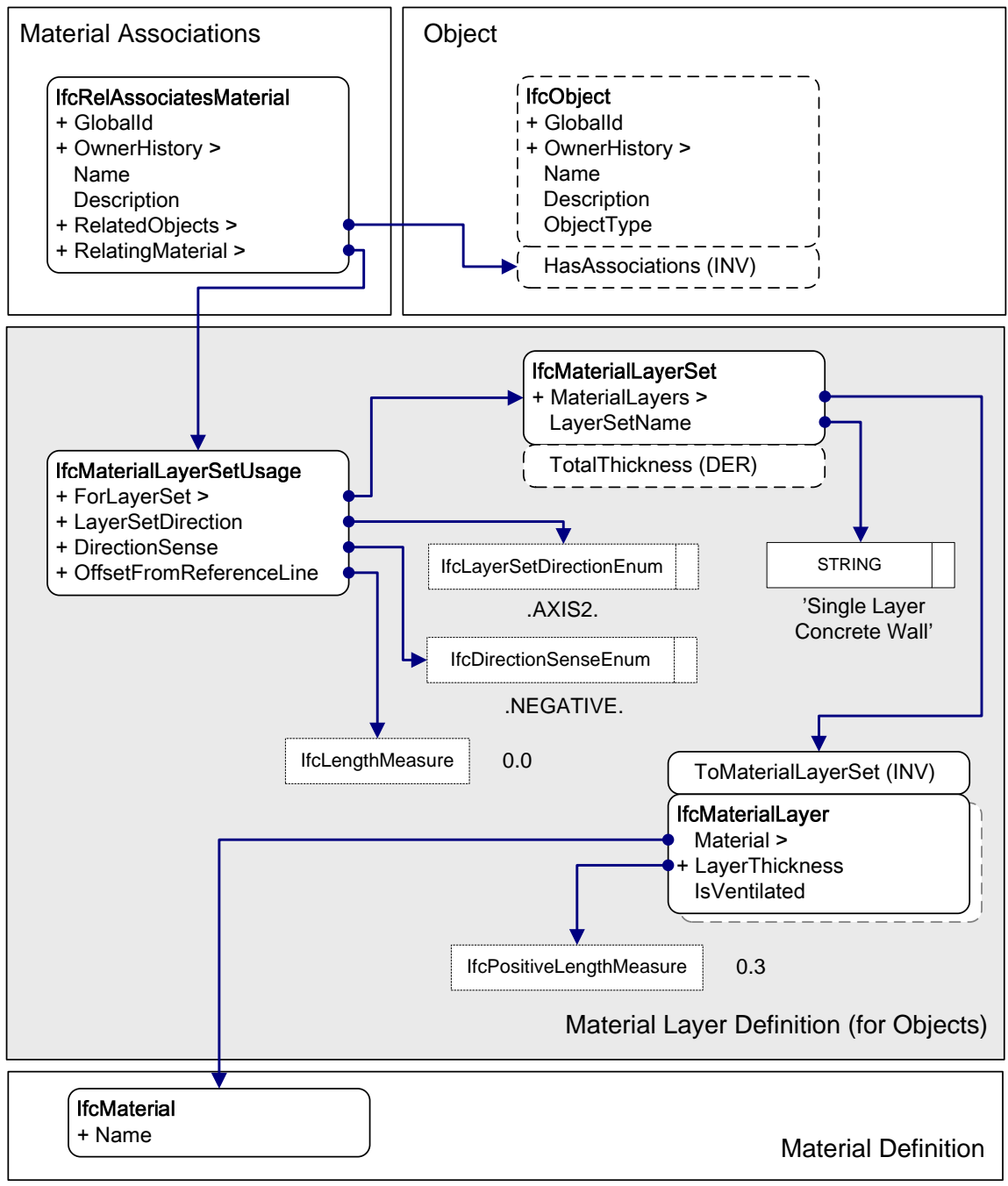
Material Layer Definition (Object)

Reference		Version	1.0	Status	Draft
Relationships					
History	4 th August, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3				

Usage in view definition diagram



Instantiation diagram (example for standard walls)



Implementation agreements

IfcMaterialLayerSetUsage

Attribute	Implementation agreements
ForLayerSet	Must be provided – if an object is defined by a type object and the type object defines a material layer set, then the same instance shall be referenced by this attribute (see also IAI documentation of the object, e.g. IfcWallStandardCase)
LayerSetDirection	Must be provided – for standard walls it shall be defined to .AXIS2.; for standard slabs it shall be defined to .AXIS3.
DirectionSense	Must be provided
OffsetFromReference-Line	Must be provided

IfcMaterialLayerSet

Attribute	Implementation agreements
MaterialLayers	Must be provided (at least one required)
LayerSetName	optional
TotalThickness	Derived value – sum of all layer thicknesses

IfcMaterialLayer

Attribute	Implementation agreements
Material	optional
LayerThickness	Must be provided (must be greater than zero)
IsVentilated	optional

Example (spf)

```
***** Product *****
#100= IFCWALLSTANDARDCASE('3rPX_Juz59peXXY6wDJl18',#2,
    'Wand-Ext-ERDG-1',,$,$,$,$,$);
***** Material *****
#150= IFCRELASSOCIATESMATERIAL('3Zjxha$L90cgCDGANQHD18',#2,$,$,(#100),#151);
#151= IFCMATERIALLAYERSETUSAGE(#152,.AXIS2.,.NEGATIVE.,0.);
#152= IFCMATERIALLAYERSET(#153,'Single Layer Wall');
#153= IFCMATERIALLAYER(#154,0.3,.U.);
#154= IFCMATERIAL('Light Concrete');
***** Data Management Information *****
#2= IFCOWNERHISTORY(#5, #6, $, .ADDED., 0, $, $, 1207828354);
#3= IFCPERSON('Matthias Weise', '', '$, $, $, $, $');
#4= IFCORGANIZATION('', '$, $');
#5= IFCPERSONANDORGANIZATION(#3, #4, $);
#6= IFCAPPLICATION(#4, 'IFC-Application X', 'IFC-Exporter V2.3', 'Company Y');
```

All values needed for definition of material layer set usage are marked with bold letters.

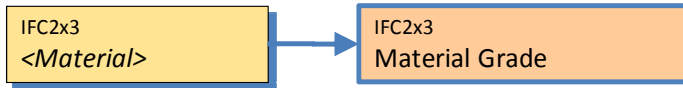
This document uses the official IFC Model View Definition Format version 1.1.0. of the IAI (www.iai-international.org)
The content of this document has to be certified by the IAI before becoming part of an official IFC Model View Definition.

IFC Release Specific Concept Description (IFC2x3)

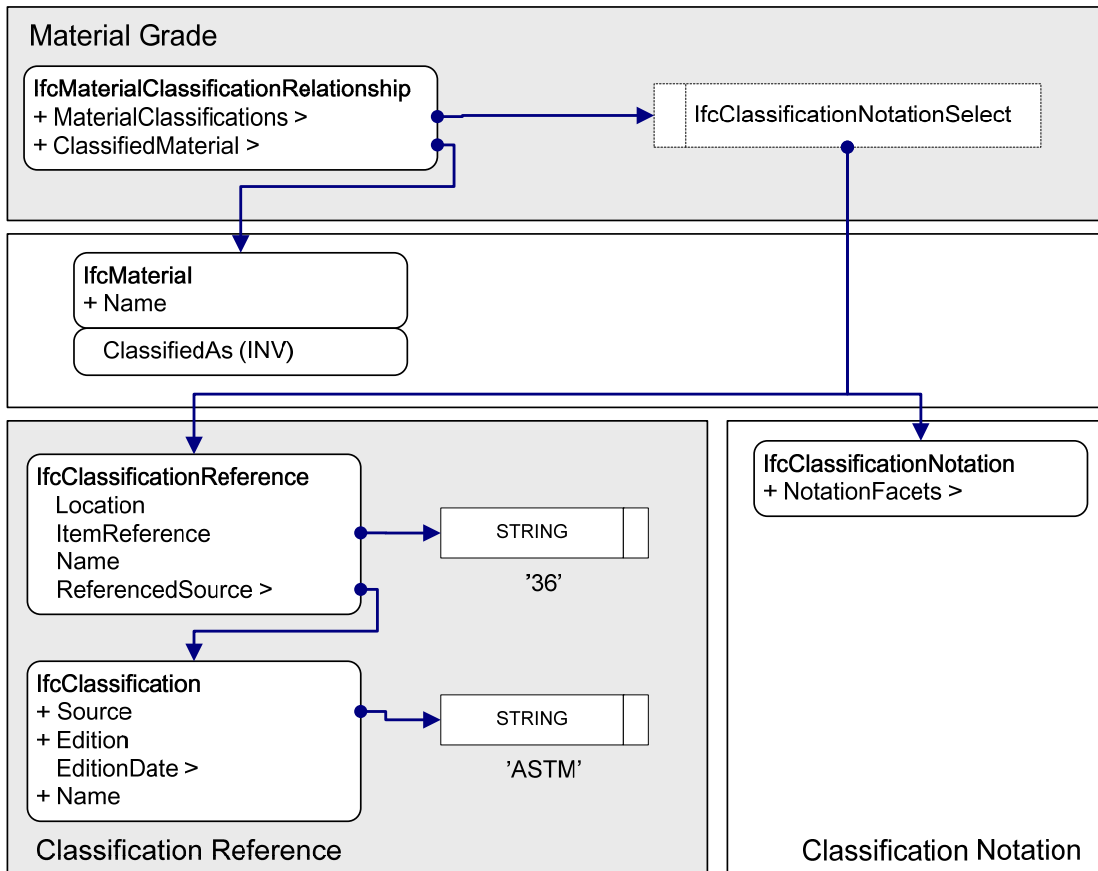
Material Grade

Reference		Version	1.0	Status	Draft
Relationships					
History	4 th July, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3				

Usage in view definition diagram



Instantiation diagram



Implementation agreements

IFC2x3 Material Classification Relationship

Attribute	Implementation agreements
MaterialClassifications	Must be provided
ClassifiedMaterial	Must be provided

IFC2x3 Classification Reference

Attribute	Implementation agreements
Location	Optional - Pointer or URL location of the classification (defined by the generating system)
ItemReference	Must be provided - Path (separated through "/") or ID of the referenced item within the classification system

Name	Must be provided - Human readable name
ReferencedSource	Must be provided - Reference to the classification

IfcClassification

Attribute	Implementation agreements
Source	Must be provided - GUID or standardized name of the classification/catalogue
Edition	Must be provided, but can be an empty String
EditionDate	Optional
Name	Must be provided - Human readable name

Example (spf)

```
#100= IFCMATERIAL('Steel');
#101= IFCMATERIALCLASSIFICATIONRELATIONSHIP(#102,#100);
#102= IFCCCLASSIFICATIONREFERENCE($,'36','ASTM 36',#103);
#103= IFCCCLASSIFICATION('ASTM','','$','American Society for Testing and Materials (ASTM)');
```

All values that are needed for the classification of a concept are marked with bold letters.

Example (ifcXML)

```
<IfcMaterial id="ID100">
  <Name>Steel</Name>
</IfcMaterial>
<IfcMaterialClassificationRelationship id="ID101">
  <MaterialClassifications>
    <IfcClassificationReference xsi:nil="true" ref="ID102"/>
  </MaterialClassifications>
  <ClassifiedMaterial>
    <IfcMaterial xsi:nil="true" ref="ID100"/>
  </ClassifiedMaterial>
</IfcMaterialClassificationRelationship>
<IfcClassificationReference id="ID102">
  <ItemReference>36</ItemReference>
  <Name>ASTM 36</Name>
  <ReferencedSource>
    <IfcClassification xsi:nil="true" ref="ID103"/>
  </ReferencedSource>
</IfcClassificationReference>
<IfcClassification id="ID103">
  <Source>ASTM</Source>
  <Edition></Edition>
  <Name>American Society for Testing and Materials (ASTM)</Name>
</IfcClassification>
```

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IFC Release Specific Concept Description (IFC2x3)

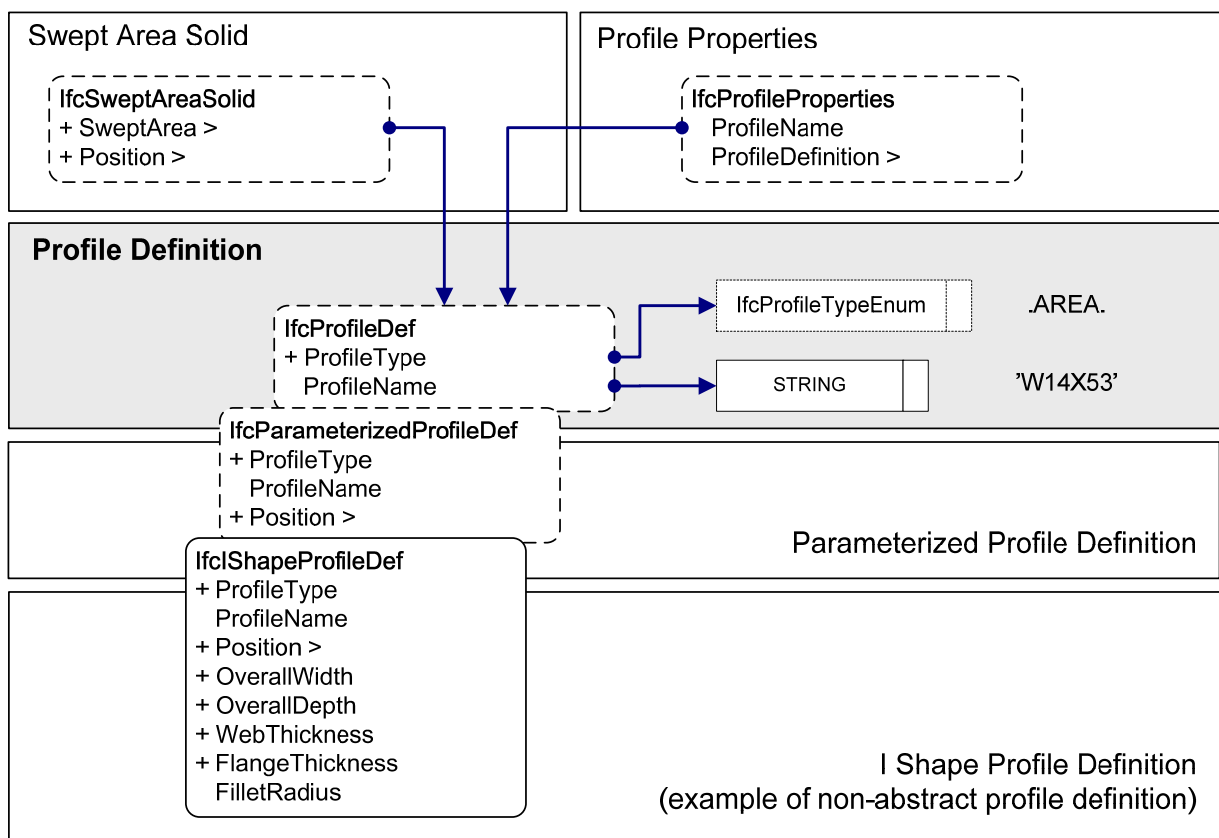
Profile Definition

Reference		Version	1.0	Status	Draft
Relationships					
History	4 th August, 2008				
Authors	Matthias Weise (mw@aec3.de)				
Document Owner	AEC3				

Usage in view definition diagram



Instantiation diagram



Implementation agreements

IfcProfileDef

Attribute	Implementation agreements
ProfileType	Must be provided – no further agreements needed (see IFC documentation)
ProfileName	Optional – might be used to identify the profile according to a profile library, there are two agreements/discussions about how to provide profile names <ol style="list-style-type: none"> (1) implementer agreement made for the “Coordination View” (#CV-2x3-137) (2) discussion within the “Structural Engineering Group” (3) Naming conventions for Structural Steel Products for use in Electronic Data Interchange (from the American Institute of Steel Construction)

(1) #CV-2x3-137 agreement on the export of profile names

number	CV-06-137
based on	IFC2x3
effects	extended coordination view
date	24. Feb 2006
initiator	ISG meeting in Berlin
summary	agreement on the export of profile names

Description

Profile names are an important information for all steel design, engineering and detailing applications. The profile name should therefore be exported, if available within the sending application. The following agreement is made:

- if the profile name is known, it should be exported as `lfcProfileDef.ProfileName` (being a string)
- if both the profile name and the profile table name (i.e. the standard that defines the profile name) is known, it should be exported as `lfcProfileDef.ProfileName` with the following convention:
 - profile name, followed by the " || " delimiter (white space, two pipe characters, white space), followed by the profile table name

(2) Discussion within the “Structural Engineering Group”

See document “Steel Profiles in IFC 2007-03-13.rtf”

(3) Naming conventions of the American Institute of Steel Construction (AISC)

The specification can be found at: http://www.aisc.org/content/navigationmenu/epubs/epubs_home/aisc_shapes_database/edi_naming_convention.pdf

Example (spf)

```
#100=IFCCOLUMN('lacm6ykuviGfHRLPvZRJfS',#2,'2 desc','W14X53','Column',#101,#102,'2 desc');
#101=IFCLOCALPLACEMENT($,#103);
#103=IFCAXIS2PLACEMENT3D(#104,#105,#106);
#104=IFCCARTESIANPOINT((180.,0.,0.));
#105=IFCDIRECTION((1.,0.,0.));
#106=IFCDIRECTION((0.,0.,1.));
#102=IFCPRODUCTDEFINITIONSHAPE($,$,(#110));
#110=IFCSHAPEREPRESENTATION(#10,'Body','MappedRepresentation',(#120));
#120=IFCMAPPEDITITEM(#121,#122);
#122=IFCCARTESIANTRANSFORMATIONOPERATOR3D($,$,#12,1.,$);
#121=IFCREPRESENTATIONMAP(#11,#123);
#123=IFCSHAPEREPRESENTATION(#10,'Body','SweptSolid',(#124));
#124=IFCEXTRUDEDAREASOLID(#113,#16,#15,120.);
#113=IFCISHAPEPROFILEDEF(.AREA.,'W14X53',#17,8.06,13.9,0.37,0.66,$);
#17=IFCAXIS2PLACEMENT2D(#18,#19);
#18=IFCCARTESIANPOINT((0.,0.));
#19=IFCDIRECTION((1.,0.));
#2=IFCOWNERHISTORY(#3,#4,$,NOCHANGE,$,$,$,1190221352);
#4=IFCAPPLICATION(#6,'7.49','NIST CIS/2 to IFC Translator','Translator');
#3=IFCPERSONANDORGANIZATION(#5,#6,$);
#5=IFCPERSON($,'CIS2export, v1.1',$,$,$,$,$,$);
#6=IFCORGANIZATION($,'CASE Center, Georgia Tech',$,$,$);
#10=IFCGEOMETRICREPRESENTATIONCONTEXT($,'Model',3,1.E-05,#11,$);
#11=IFCAXIS2PLACEMENT3D(#12,#15,#13);
#12=IFCCARTESIANPOINT((0.,0.,0.));
#13=IFCDIRECTION((1.,0.,0.));
#15=IFCDIRECTION((0.,0.,1.));
#16=IFCAXIS2PLACEMENT3D(#12,#13,#14);
#14=IFCDIRECTION((0.,1.,0.));
```

All values that are needed for the classification of a concept are marked with bold letters. The example shows the definition of an I-shaped profile (`lfcIShapeProfileDef`, subtype of `lfcProfileDef`) that has the name `W14X53`. The example also shows the usage of the profile definition by a swept area solid (`#124`, `lfcExtrudedAreaSolid`, subtype of `lfcSweptAreaSolid`) for the geometry definition of column `#100`.

This document uses the official IFC Model View Definition Format version 1.1.0. of the IAI (www.iai-international.org)
The content of this document has to be certified by the IAI before becoming part of an official IFC Model View Definition.

