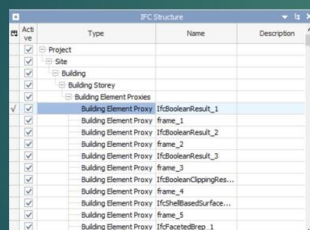


6) Attach other screenshots or files that you consider useful

1. Visualizations in BIMVision (before conversion)

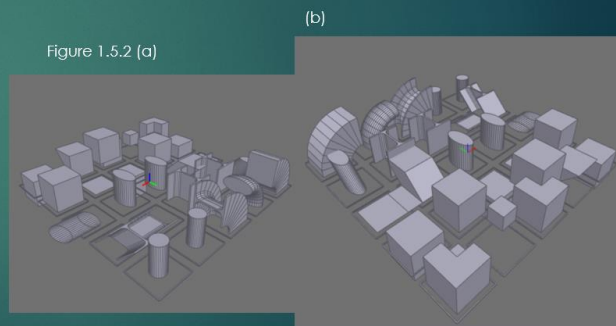
IFCGeometries – Dataset IFC4

- ▶ Similar dataset with different number of geometries and IFC format
- ▶ Different dataset file size compared to IFC 2X3 format



Active	Type	Name	Description
<input checked="" type="checkbox"/>	Project		
<input checked="" type="checkbox"/>	Site		
<input checked="" type="checkbox"/>	Building		
<input checked="" type="checkbox"/>	Building Storey		
<input checked="" type="checkbox"/>	Building Element Proxies		
<input checked="" type="checkbox"/>	Building Element Proxy	15IsoclearResult_1	
<input checked="" type="checkbox"/>	Building Element Proxy	Frame_1	
<input checked="" type="checkbox"/>	Building Element Proxy	15IsoclearResult_2	
<input checked="" type="checkbox"/>	Building Element Proxy	Frame_2	
<input checked="" type="checkbox"/>	Building Element Proxy	15IsoclearResult_3	
<input checked="" type="checkbox"/>	Building Element Proxy	Frame_3	
<input checked="" type="checkbox"/>	Building Element Proxy	15IsoclearClippings...	
<input checked="" type="checkbox"/>	Building Element Proxy	Frame_4	
<input checked="" type="checkbox"/>	Building Element Proxy	15IsoclearSurface...	
<input checked="" type="checkbox"/>	Building Element Proxy	Frame_5	
<input checked="" type="checkbox"/>	Building Element Proxy	15FacetedStep_1	

Figure 1.5.1



Visualizations: BIMVision

2. Conversion through FME Quick Translator

a. Visualization in FME Data Inspector

IFCGeometries – Experiment IFC4 to CityGML

- ▶ Few complex geometries aren't transformed
- ▶ IFC reader in FME QT transforms similar geometries compared to IFC 2X3 dataset

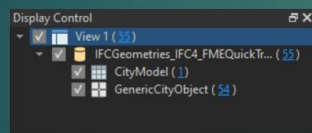
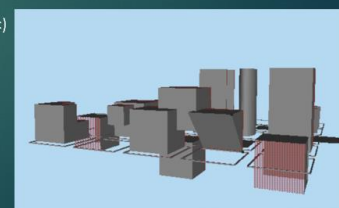
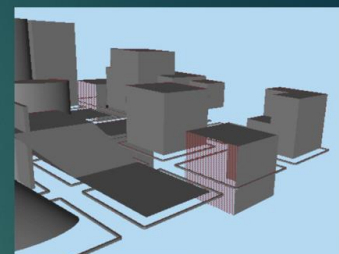
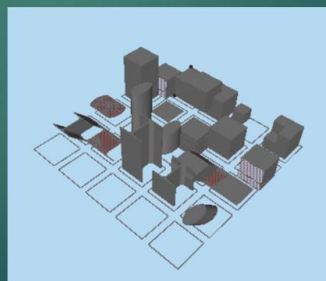


Figure 2.5.1



Visualizations: FME Data Inspector
Conversion tool: FME Quick Translator

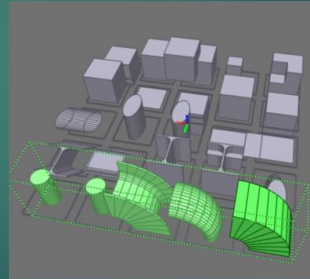
b. Visualization in BIMVision, FME Data Inspector and FZK Viewer

IFCGeometries – Experiment (contd.) IFC4 to CityGML

- ▶ *IfcRevolvedAreaSolid* and *IfcSweptDiskSolid* weren't transformed
- ▶ Geometry normal are rendered differently across softwares
- ▶ Transformed geometries with same type have different heights

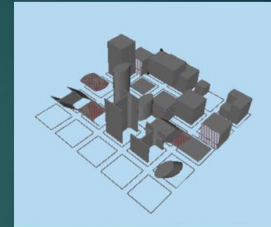
Figure 2.5.3 (a)

✓	✓	Building Element Proxy	IfcRevolvedAreaSolid_1
✓	✓	Building Element Proxy	Frame_21
✓	✓	Building Element Proxy	IfcRevolvedAreaSolid_2
✓	✓	Building Element Proxy	Frame_22
✓	✓	Building Element Proxy	IfcRevolvedAreaSolid_3
✓	✓	Building Element Proxy	Frame_23
✓	✓	Building Element Proxy	IfcSweptDiskSolid_1
✓	✓	Building Element Proxy	Frame_24
✓	✓	Building Element Proxy	IfcSweptDiskSolid_2
✓	✓	Building Element Proxy	Frame_25

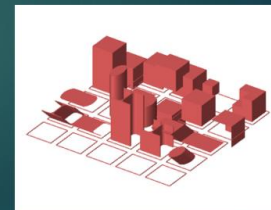


(b)

Figure 2.5.4 (a)



(b)



Visualizations: BIMVision, FME Data Inspector and FZKViewer
Conversion tool: FME Quick Translator

IFCGeometries – Experiment (contd.) IFC4 to CityGML

- ▶ Regenerated *gml_id* (attributes are missing in CityGML file)
- ▶ Generic Attributes like *Name* and *Guid* (from IFC) remains same

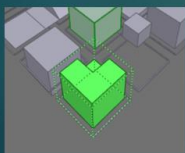
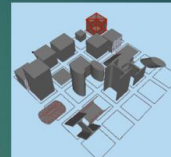


Figure 2.5.5 (a)

Properties	Location	Classification	Relations	Value
Element Specific				
Guid		2T0dO2uX2QeLFia5vBLng		
IfcEntity		IfcBuildingElementProxy		
Name		IfcBooleanResult_1		

(b)

Figure 2.5.6 (a)



(b)

Property	Value
Feature Type	GenericCityObject
Coordinate System	Unknown
Dimension	3D
Number of Vertices	90
Min Extents	-1, -1, 0
Max Extents	1, 1, 2
Attributes (13)	
citygml.feature_role (citygml:FeatureRole)	cityObjectMember
citygml.level_of_detail (citygml:LevelOfDetail)	4
citygml.target_uri (citygml:TargetUri)	http://www.opengis.net/citygml/gml
fme_geometry (string)	fme_aggregate
fme_type (string)	fme_collection
GlobalId (encoded: UTF-8)	2T0dO2uX2QeLFia5vBLng
gml_id (encoded: UTF-8)	fme-gen-84712b2b-4a8d-4074-bfca-f
gml_parent_id (encoded: UTF-8)	fme-gen-2e8bf7c2-9484-45d9-b565-1
ifc_parent_id (encoded: UTF-8)	0R51bTDQPB8DnXFOalo
ifc_parent_unique_id (ifc:ParentUniqueIdentifier)	0R51bTDQPB8DnXFOalo_30
ifc_unique_id (encoded: UTF-8)	2T0dO2uX2QeLFia5vBLng_50
Name (encoded: UTF-8)	IfcBooleanResult_1
xml_type (string)	xml_aggregate
IFMEAggregate (MultiGeometry)	lod4Geometry
Geometry Traits (3)	

Figure 2.5.7 (a)



(b)

Element Properties	Properties	Relations
Generic Attributes		
Name		Value
GlobalId	2T0dO2uX2QeLFia5vBLng	
Name	IfcBooleanResult_1	
ifc_parent_id	0R51bTDQPB8DnXFOalo	
ifc_parent_unique_id	0R51bTDQPB8DnXFOalo_30	
ifc_unique_id	2T0dO2uX2QeLFia5vBLng_50	

(c)

Name	Value
Entity Information	
Type	genericCityObject
Internal Type	CityGML.GenericCityObject
GUID	2e8bf7c2-9484-45d9-b565-1
GUID (readable)	8ed89ab3-d338-47ad-807c-3d6711a280f
Name	genericCityObject
Description	
Object Type	
Layer Name	
Color	---
gmlid	GML_8ed89ab3-d338-47ad-807c-3d6711a280f
gmlid:description	

Visualizations: BIMVision, FME Data Inspector and FZKViewer
Conversion tool: FME Quick Translator

c. Translation Errors (logs from FME Quick Translator)

```

Predefined coordinate system 'NonEarth_Meter' (1) matches dataset coordinate system
The IFC reader does not support the following type: 'IfcRevolvedAreaSolid'. All instances of this type will be skipped
The IFC reader does not support the following type: 'IfcSweptDiskSolid'. All instances of this type will be skipped
IFC: 54 objects read
FME Configuration: Source coordinate system for reader IFC[IFC] set to 'NonEarth_Meter' as read from input data
Coordinate System 'NonEarth_Meter' parameters: CS_NAME=NonEarth_Meter PROJ=MERIT QUAD=1 UNIT=METER
FME Configuration: Destination coordinate system set to input coordinate system 'NonEarth_Meter'
Emptying factory pipeline
CityGML Writer: Unable to convert the coordinate system 'NonEarth_Meter' to an EPSG code. No coordinate system will be set on this feature's geometry.
Error encountered while copying traits to generated solids. Some solid components may be missing traits, appearances, measures or attributes
CityGMLWriter - registered 46 messages of type: CityGML Writer: Unable to convert the coordinate system 'NonEarth_Meter' to an EPSG code. No coordinate system will be set on this feature's geometry.
-----
Features Read Summary
-----

```

d. Discussion

IFC reader in FME Quick Translator doesn't support all geometries. Even same geometry, like *IfcRevolvedAreaSolid*, *IfcSweptDiskSolid* or *IfcExtrudedAreaSolid* type, with different complex geometric representation would either not be transformed or transformed with incorrect measurements, selected in Figure 2.5.3 and highlighted in Figure 2.4.6 (a) respectively. This shows that geometrical interpretation of software still has room for improvement in reading as well as converting complex geometries.

In Figure 2.5.4 (a) and (b), difference of geometry rendering across software is observed similar to IFC 2x3 data set, FME Data Inspector and FZK Viewer, respectively. Also, some converted geometries have different dimension compared with original as highlighted in Figure 2.4.4. Thus during the conversion process the actual dimension of the geometry was not transformed in their correct measurements. Some generated solid components may be missing traits, appearance, measure or attributes.

In order to assess semantics of transformation process, attributes of single element were taken in consideration shown in Figure 2.5.5. During transformation, *gml_id* was not added as attribute to converted file which results in auto-regeneration of *gml_id* upon data import by software. However, *Guid* or *ifc_unique_id* was kept along with *ifc_parent_id* and *Name* attribute was translated.