

Description and usage – Building footprint area

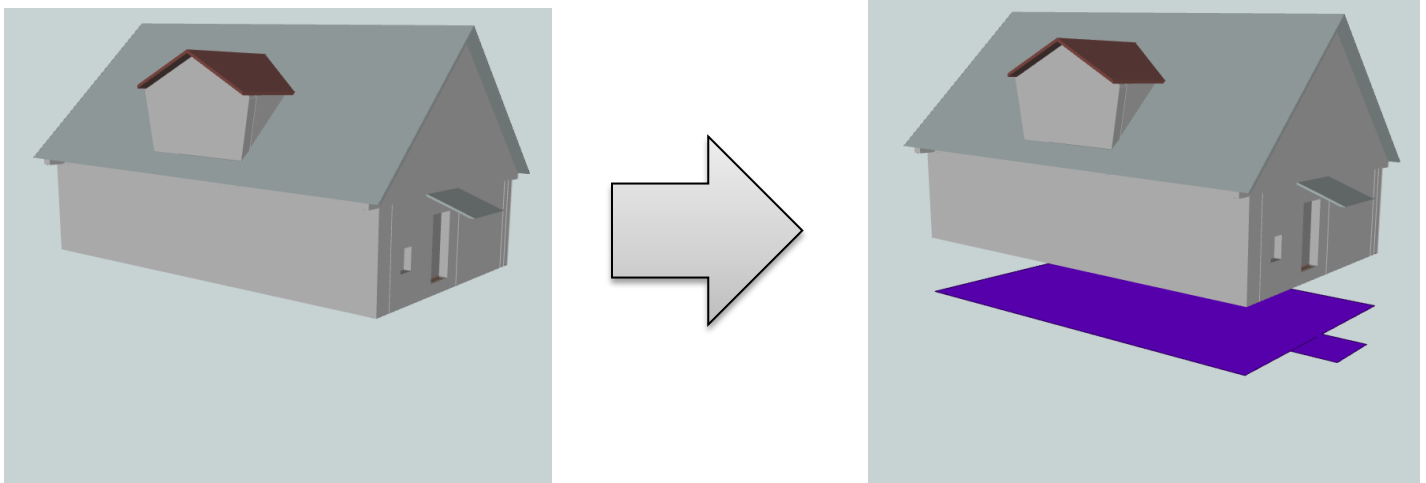
This document describes the use custom transformers calculating building footprint area in the GitHub repository *Testbed_BIM_GIS*. The scripts are developed in the software FME (Feature Manipulation Engine) version 2017.1.

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History

Version	Date	Comments	Person
1.0	2018-07-03	First version of this document that describes the script	Josefine Axelsson

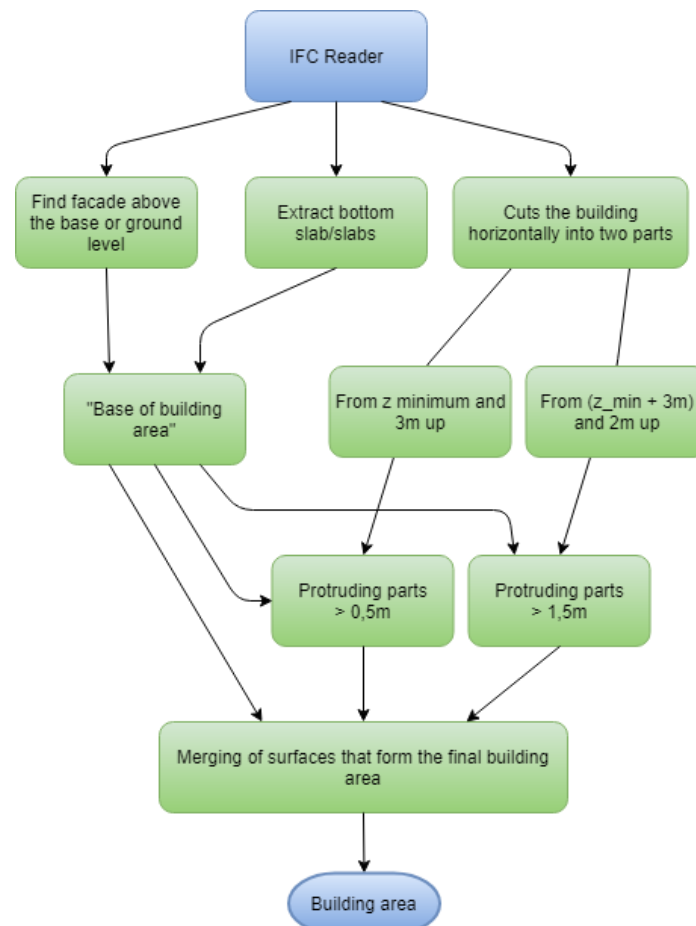
Automated calculation – IFC-model without object for building footprint area

The custom transformer *FootprintAreaCalculator* calculates the area of BIMs (building information model) in IFC format. The different scripts using this transformer are:

- Hjaltevadshus Spira 168 – without object for BUA.fmw
- Hjaltevadshus Spira 175 – without object for BUA.fmw
- Multihuset – without object for BUA.fmw
- House45 – without object for BUA.fmw
- KTHDemohouse – without object for BUA.fmw

Description

The architecture of the custom transformer is illustrated in the figure below. The custom transformer calculates the building footprint area according to the *area standard* (Area och volym för husbyggnader - Terminologi och mätregler ss 21054:2009).



StoreyIndexFinder

Find/sort *IfcSlab* objects based on the building storey.

Building_Clipper

Cutting the building to a certain (a set value) extent in z-direction (according to certain requirements in the *area standard*).

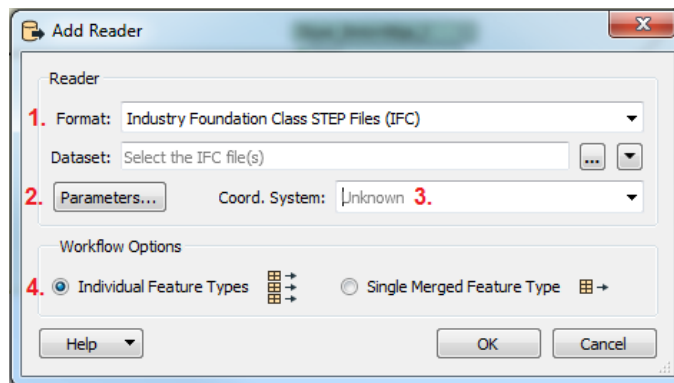
PointCloudClipper

Some IFC objects cannot be clipped with FME's ordinary *Clipper* used in *Building_Clipper*. The unclipped objects from *Building_Clipper* is therefore converted to point clouds and then clipped.

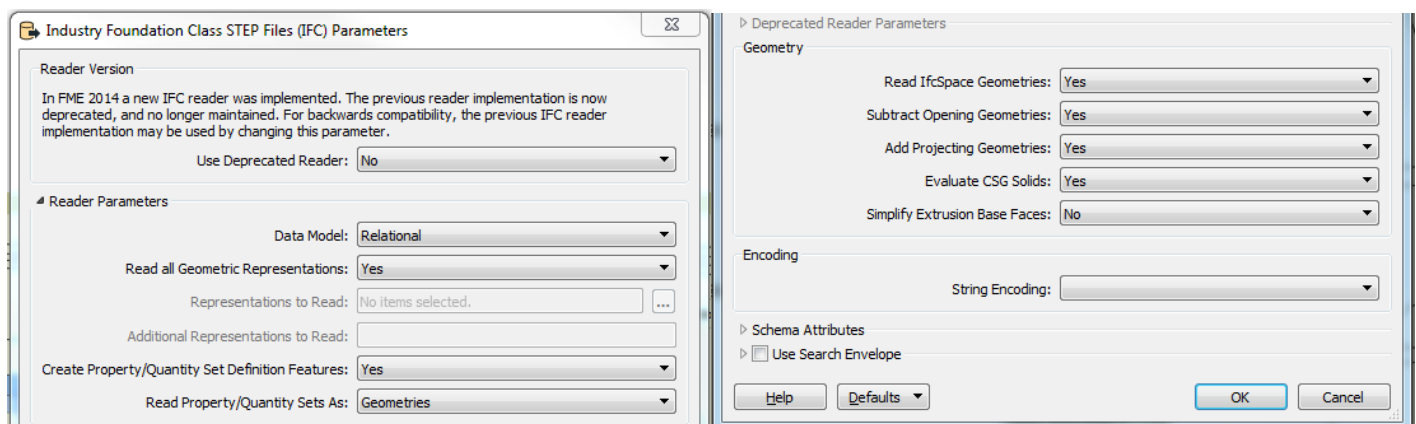
Protruding_Part

According to the *area standard* some building components, in addition to those placed on the ground, will be included in the building area if they meet certain criteria. The transformer *Protruding_Part* clips the building according to those criteria. If any object is clipped the projection of this object on the ground shall be included in the building footprint area.

Usage

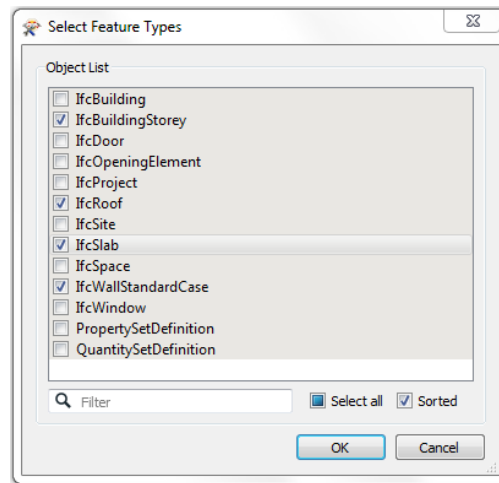


1. The IFC model is read to the program with a *Reader* choosing the file format *Industry Foundation Class STEP Files (IFC)*.
2. Reader parameters are chosen as the shown in figure below.



3. Coordinate system is not needed to be set.

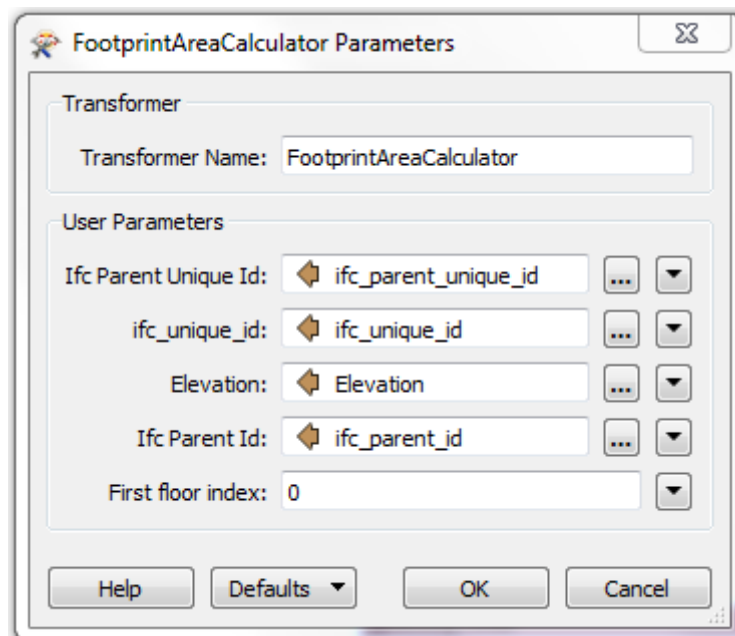
4. To be able to handle different element *Individual Feature Types* is chosen.
5. Chose elements/features.



Different models contain a different amount of elements. Most common elements that affect the building area are *IfcSlab*, *IfcWall* and *IfcStandardWallCase*.

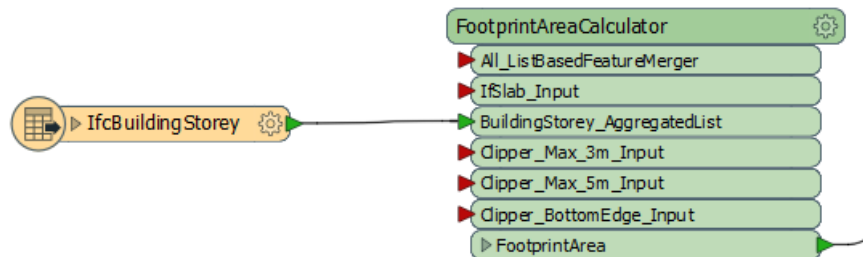
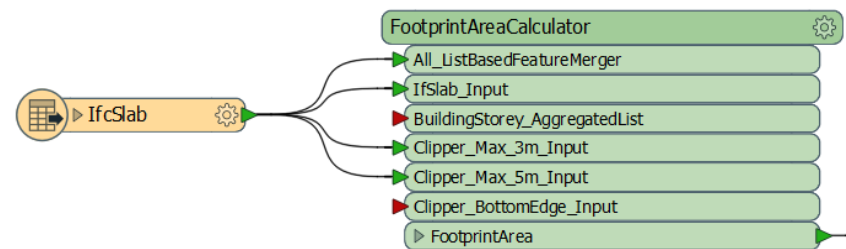
Connecting elements and transformer

All features are connected to the custom transformer *FootprintAreaCalculator* and the transformer parameters are shown in the figure below.

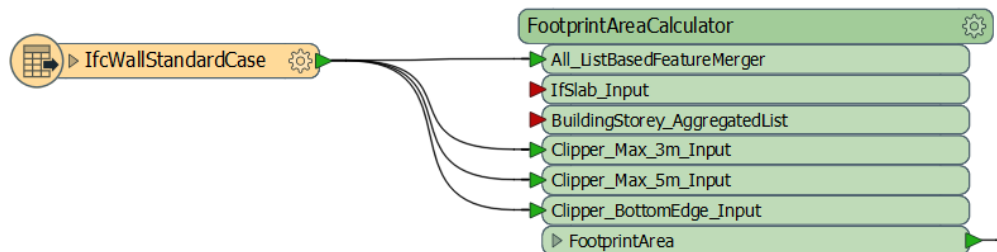


The parameters *Elevation* is used in the nested custom transformer *Building_Clipper* and is offset (z) deciding from which elevation objects are cut (Elevation + building minimum z) and should be set to 0. Depending on the construction of the building model the first floor may be sorted as floor 0 or 1 in the nested transformer *StoreyIndexFinder*. This is set with the parameter *First floor index*.

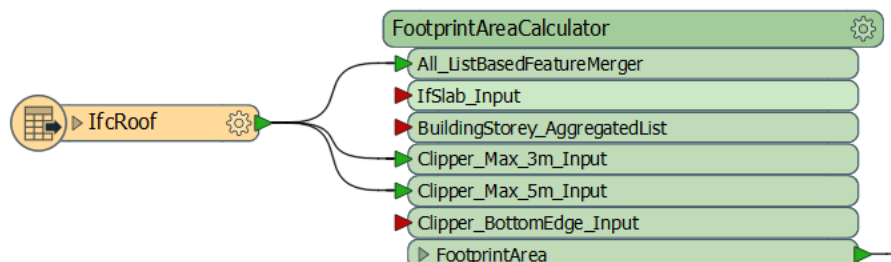
The selected elements are connected to the transformers as shown in the figures below.



The elements *IfcWall* and *IfcWallStandardCase* are connected as the figure below. Other elements that may represent wall objects shall be connected like this as well.



If the model contains an *IfcRoof* element it shall be connected as illustrated below.



Automated calculation – IFC-model with object for building area

This script calculates the area of an *IfcSpace* object representing the building area. This requires that the constructor/architect has created such object for the model. Script using this method:

- Kamakura House - with object for BUA.fmw

Description

In this script, the assessment of what constitutes the building footprint area has already been done by an architect or designer. The script takes the object representing the area and calculates the area.



Usage

The IFC-model is read the same way as for *Automated calculation – IFC-model without object for building area* above, the difference is when the elements are chose only *IfcSpace* is selected. The *IfcSpace* element is connected to the custom transformer *FootprintAreaCalculator_IfcSpace* as shown in the figure below. To select the right object the name of the *IfcSpace* object name is set as a parameter and the attribute is selected where the object name is stored.

