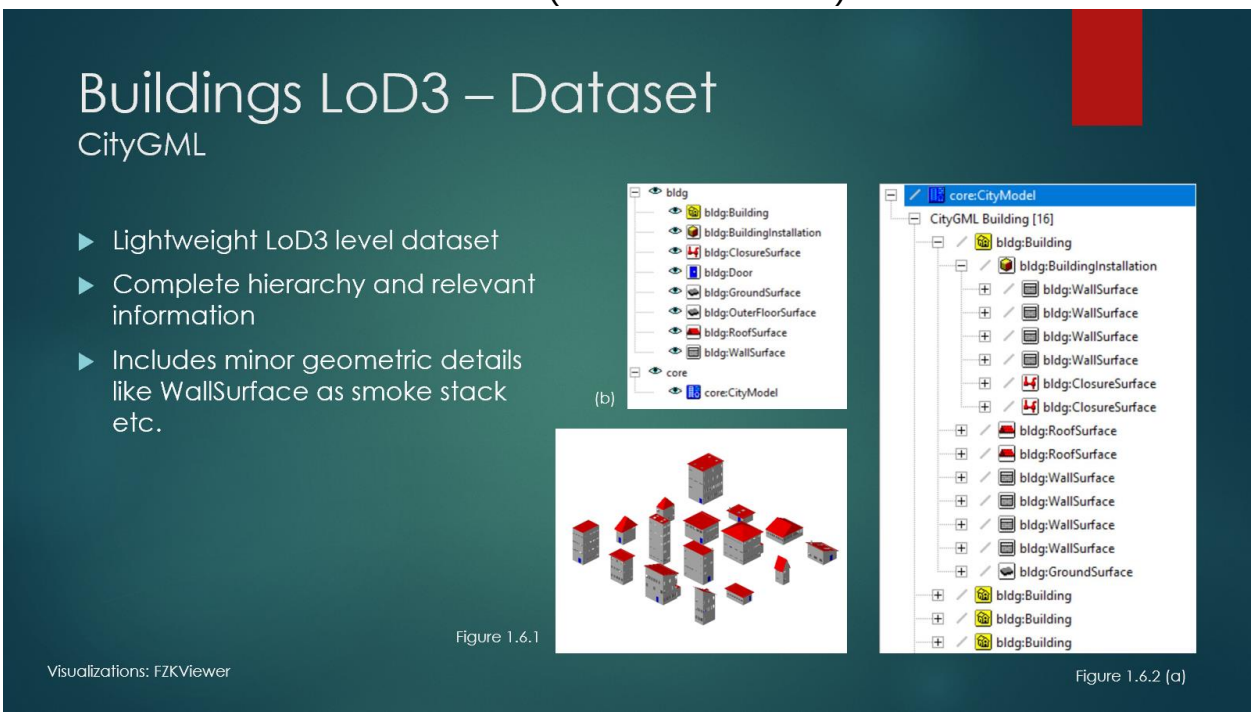
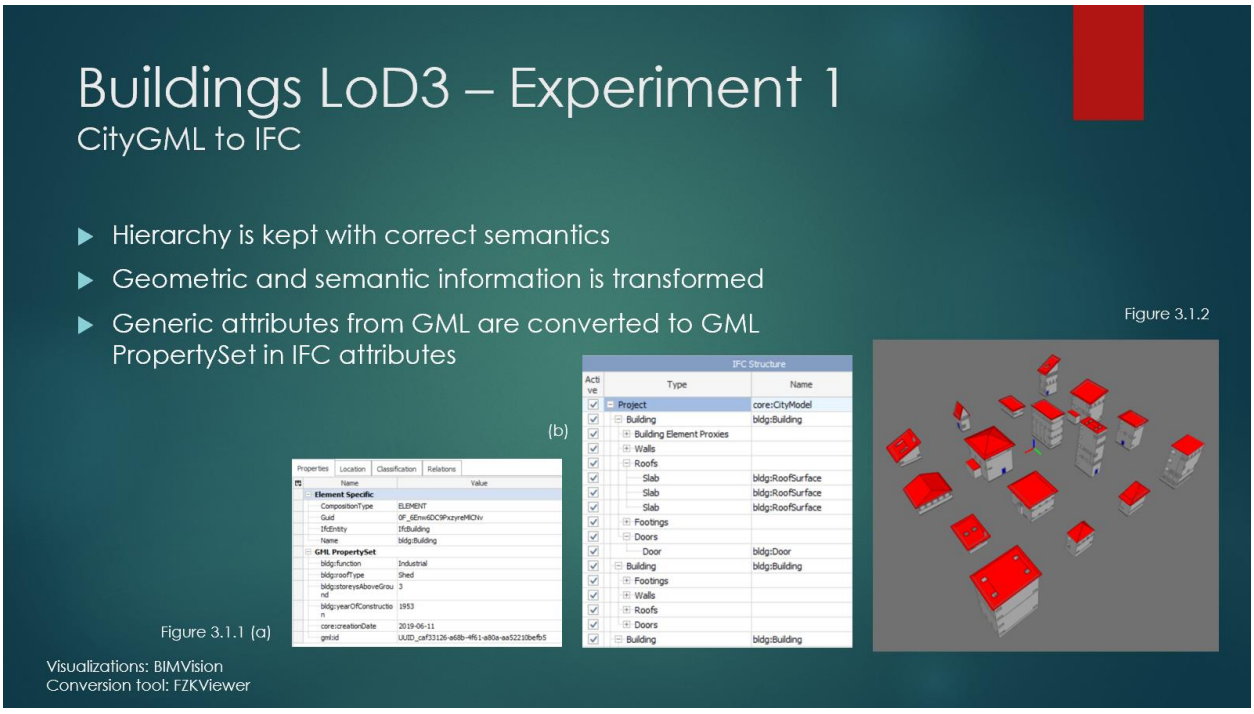
6) Attach other screenshots or files that you consider useful

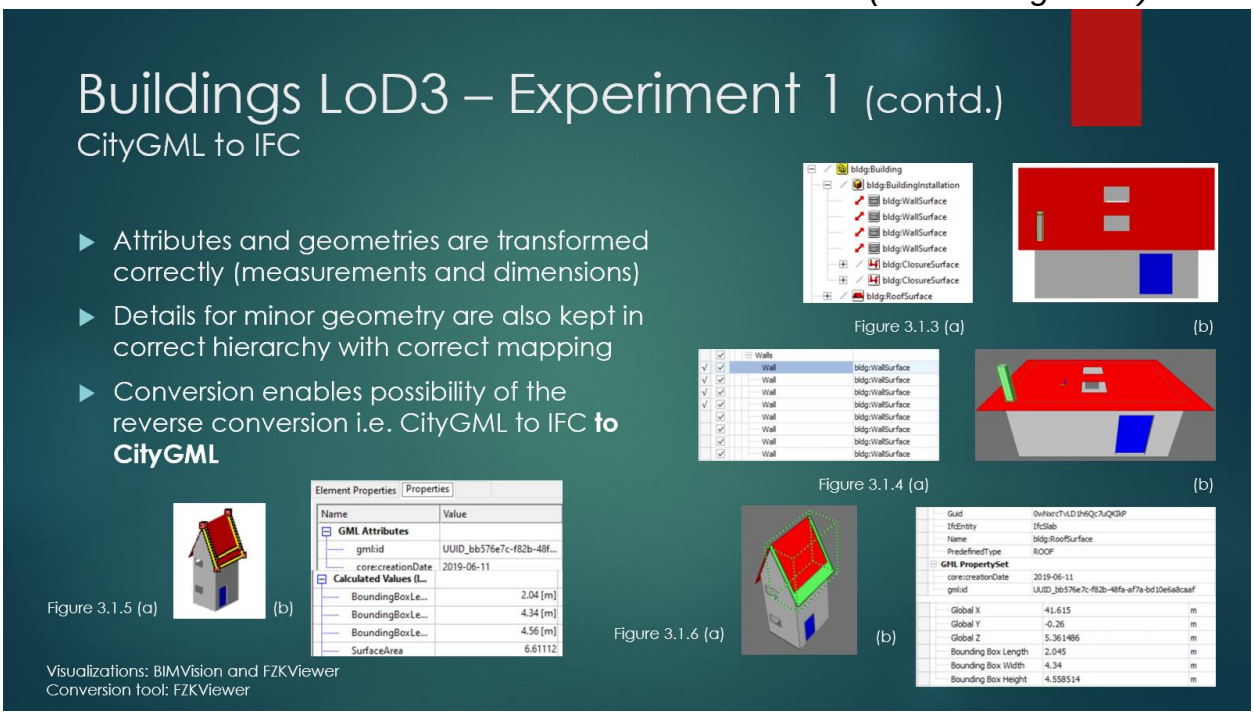
1. Visualizations in FZK Viewer (before conversion)



2. Conversion through FZK Viewer
    a. *Visualization in BIM Vision*



b. *Visualization in FZK Viewer and BIM Vision (dark background)*



c. *Discussion*

FZK Viewer is generally used for viewing and analysis of data. However, it provides you with option of exporting data into multiple formats like IFC, Collada, STL etc. In this case, we used CityGML file exported as IFC data and as results it converts data both in terms of semantic and geometric details very accurately. Hierarchy is kept as original and CityGML elements are translated to matching IFC entities (Figure 3.1.3 and 3.1.4). In these figures, elements are selected in original CityGML data set and crosschecked with converted IFC LOD 200 data.

Interestingly, conversions are almost immediate and dataset that is exported has same size each time which states the contents are consistent if not fully completed. However, contents are checked in terms of attributes, measurement extent and they are completely translated (see Figure 3.1.5 and 3.1.6). Most importantly, such transformation enables bidirectional conversion, for instance this approach gives CityGML to IFC and if correct translation is adapted, new converted IFC file can produce matching CityGML data to original data set.

FZKViewer also provides option for IFC data to be exported in multiple formats; EXPRESS (.ifc), XML (.ifcxml) or Zip (.ifczip) with IFC 2x3 or IFC4 format. CityGML data set was converted to IFC 2x3 and IFC4 with EXPRESS based IFC LOD 200 file and they were observed as identical.