What is the need for building parts?

- A comparison of CityGML, INSPIRE Building, a Swedish building standard and IFC

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Information exchange of 3D building information

- From BIM model to geodata model:

- Between geodata models:
Geometric transformations

Information structures

Semantics

Standard

Information exchange issues

Level of Development vs. Level of Detail

Coordinate system transformations

Level of Detail
Information structure issues during exchange and transformation

• The definition and categorisation of small building parts (e.g. windows, doors and beams) can affect the complexity of the transformation of data (Isikdag and Zlatanova, 2009; de Laat and van Berlo, 2010; El-Mekawy et al., 2012 and Oldfield et al., 2017)
  – From IFC to IFC
  – From IFC to CityGML

• From CityGML to INSPIRE BU – “no fragmentation of building parts in further parts” is allowed when a CityGML-model is transformed to INSPIRE BU (Roschlaub and Batscheider 2016)

No comparison of building parts in various standards was found in the literature studied
What are building parts?

• Building parts is an example of a information structure
• A building can be divided into building parts when it is not homogenous, due to:

  - Functional aspects
  - Physical aspects
  - Temporal aspects

• Legal aspect – division into legal spaces
• Building parts are defined similar, but not identical in the following standards:

  - CityGML Building
  - Building
  - Svensk geoprocess Building

Examples from the INSPIRE specification on Buildings

Industry Foundation Classes (IFC)
ISO 16739:2013 Building
Test Case: Comparison of building part structures in four standards

How can information structures affect data harmonisation?

- **Within a standard** – when the definition of concepts is ambiguous and described as recommendation instead of requirements
- **Between standards** – when related standards share many concepts that are defined in slightly different ways

**Aim:**
- Study how building parts is defined in four geodata and BIM specifications
- Describe possible reasons for a building to be divided into building parts in potential applications
Conclusions from the specification comparison

Structures of building parts is allowed

The geometry is only defined on building parts

There are no building parts, but structures of buildings are allowed

Only building - building part structures is allowed
Conclusions cont.

• The structural differences of building parts have consequences when information is exchanged within and between standards

• The way a building is divided into building parts could have consequences when this information is used later in a different context, for example:
  – The building-building part structure of a geodata model will the same as in the BIM model, if this is the source
  – In the building permit process, building parts can be divided due to physical aspects, but 3D real property formation might want a functional division

• Should three different geodata specifications be used for 3D buildings? Or, should we rather only use CityGML with extensions?

• Or, at least have clear recommendations of how to use building parts in a national context
Future research

• Perform tests with 3D geodata building information to evaluate if and how different ways of dividing a building into parts would affect building permit and 3D real property formation applications

• Evaluate if having the geometry on the building or on the building parts make any difference in these applications
Thank you for your attention!

Questions?