

Table S1: Variables specifications

| Interactive variables | Input Data requirements (IFC) | Output destination data requirements (CityGML3.0) |
|--------------------------------|--------------------------------------|--|
| Entities | Indoor Daylight → IfcZone/ IfcSpace | <ul style="list-style-type: none"> - Bldg::Room - Bldg::BuildingUnit |
| | Sound level → IfcSpace | |
| | Air flow level → IfcSpace | |
| | Temperature Level → IfcZone/IfcSpace | |
| | Energy Efficiency → IfcZone, | |
| Attributes/ Pset_properties | IfcSpace/IfcZone : +Rate | <ul style="list-style-type: none"> - Bldg::Room - Bldg::BuildingUnit |
| Relationships | --- | Room is child/parent hierarchy with Building unit |

Table S2: Variables specifications

| Indoor variables | Input Data requirements (IFC) | Output destination data requirements (CityGML3.0) |
|----------------------------|--|--|
| Entities | IfcBuilding, IfcbuildingStorey : PU Position PU Size PU Floor | To BuildingFloor and Building class |
| | PU Cost → Ifc building elements, a semantic attribute to Property Unit mapping | - Bldg::BuildingUnit |
| | PU Quality | - Bldg::BuildingUnit |
| Attributes/Pset_properties | <i>IfcBuilding:</i> +Address of Building <i>IfcBuildingStorey:</i> +PU Height +Floor Number <i>Ifcwall,ifcslab,ifccolumn:</i> | BuildingConstructiveElement : +PU Cost estimation +PU Materials Type +PU Materials Quantities |

| | | |
|--|--|---|
| | +Item Cost +Pset_Materials Quantities +Pset_ cost <i>IfcInstallations :</i> + Installations Type | |
| Relationships | ---- | From BuildingConstructiveElement to Building unit : a part of |
| “PropertyUnit” Specifications : | Input Data requirements (IFC) | Output destination data requirements (CityGML3.0) |
| Generic Entities | <i>IfcSite</i> | <i>CityModel</i> |
| | <i>IfcBuilding</i> | <i>Building</i> |
| | <i>IfcbuildingStorey</i> | <i>BuildingFloor</i> <i>Building Unit</i> |
| | <i>Ifc building parts:(IfcWall, IfcSlab, IfcColumn, IfcMember)</i> | <i>Building Constructive Element</i> |
| | <i>Ifc installations</i> | <i>Building</i> |
| | <i>Ifc opening (door, window)</i> | <i>Building</i> |
| | <i>IfcSpace</i> | <i>Bldg:: Room</i> |
| Generic Attributes | <i>IfcbuildingStorey :</i> + CompositionType : Partial | <i>Building Constructive Element</i> +BuildingElementType |
| | <i>IfcSpace:</i> +Area; +Volume, +PropertyUnitName; +PropertyUnitNumber | <i>Bldg:: Room</i> |
| Relationships | <i>Ifc building parts:</i> Merge <i>IfcbuildingStorey:</i> Spatial Structure | From <i>Building Constructive Element</i> To <i>Building Unit</i> : A part of From <i>Blding: Room</i> to <i>Building Unit</i> : A part of |

Table S3: Variables specifications

| Outdoor variables | Input Data requirements (IFC) | Output destination data requirements (CityGML3.0) |
|-------------------|---|--|
| Entities | Sunlight Exposure → --- | <ul style="list-style-type: none"> - CityGML_Core::_CityObjects - CityGML_Core::_CityObjectsGroup - Bldg::Room - Bldg::BuildingUnit - LandUse::_LandUse |
| | Noise Level → --- | <ul style="list-style-type: none"> - CityGML_Core::_CityObjects - CityGML_Core::_CityObjectsGroup - Bldg::Room - Bldg::BuildingUnit - LandUse::_LandUse - Transportation::Road |
| | Air Quality → --- | <ul style="list-style-type: none"> - CityGML_Core::_CityObjects - CityGML_Core::_CityObjectsGroup - Bldg::Room - Bldg::BuildingUnit - LandUse::_LandUse - Transportation::Road |
| | View quality → --- | <ul style="list-style-type: none"> - CityGML_Core::_CityObjects - CityGML_Core::_CityObjectsGroup - Bldg::Room - Bldg::BuildingUnit - Bldg::_Opening - LandUse::_LandUse |
| Attributes | <p><i>IfcOpening :</i></p> <p>+Opening dimensions</p> <p>+Opening thermal properties</p> <p><i>Ifcwall:</i></p> <p>+Materials Type</p> <p>+Thermal properties</p> | <p>Bldg::BuildingUnit:</p> <p>+Sunlight Value</p> <p>+Sunlight Quality</p> <p>+Noise Value</p> <p>+Noise Quality</p> <p>+Air quality</p> <p>+View Type</p> <p>+View Rate</p> <p>+View Quality</p> |