

Knowledge transfer from Building Information Model(s) to City CIM?

CITIES – Consortium Meeting (June 2014)

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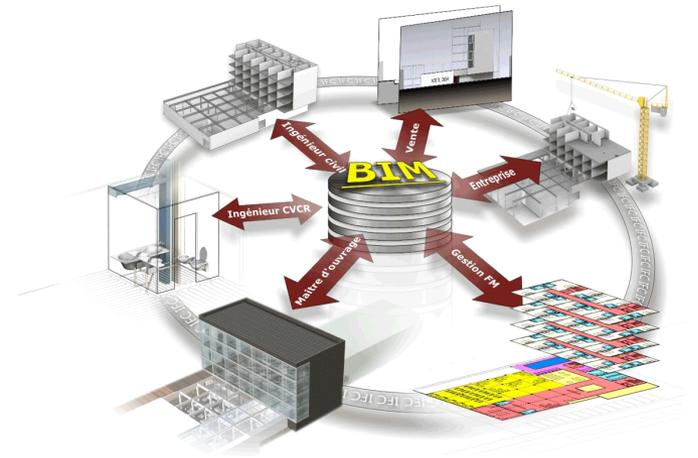
CITIES

Centre for IT Intelligent Energy Systems

Context

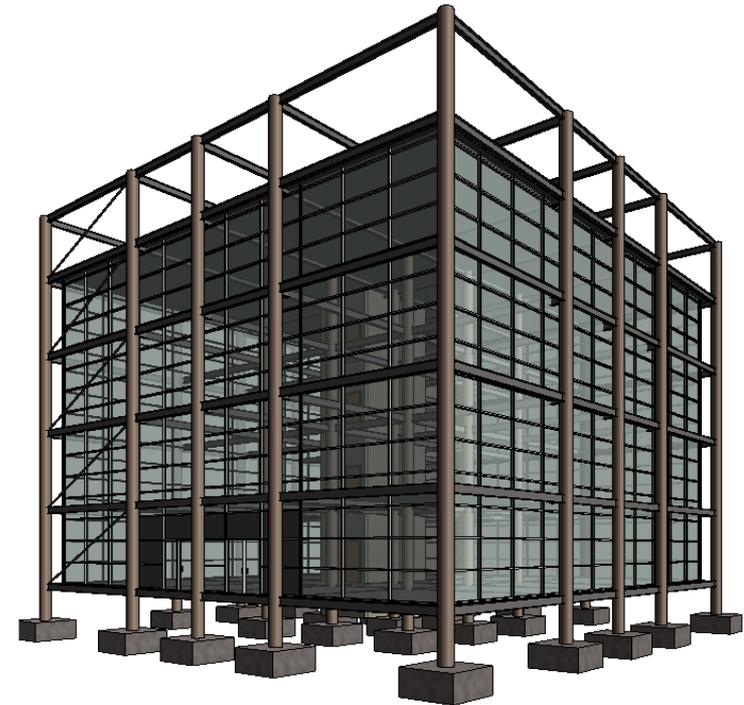
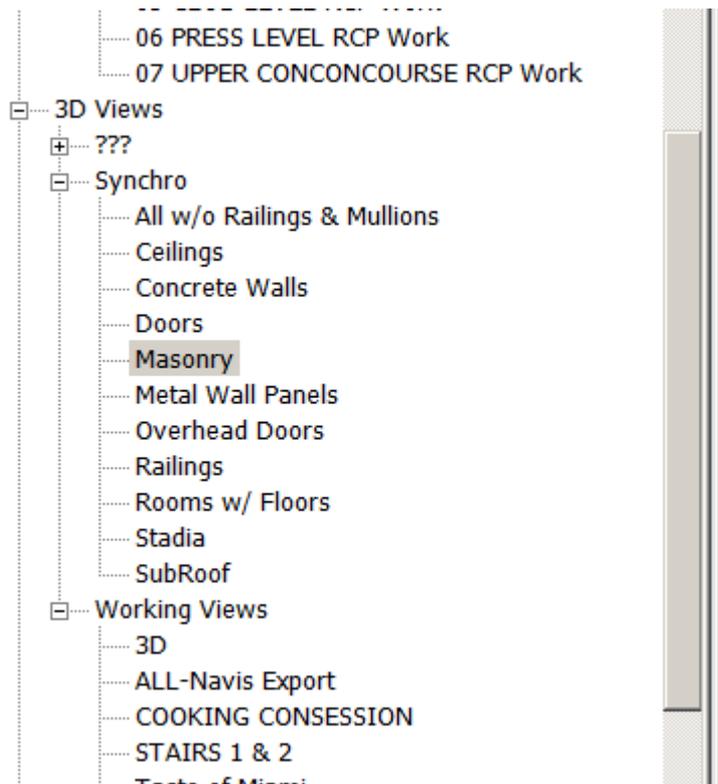
- BIM Introduction
- The Idea
- State of Arte in CIM

BUILDING INFORMATION MODEL



3D CAD Drawing – Geometrical Information

- Represented in a Object Tree

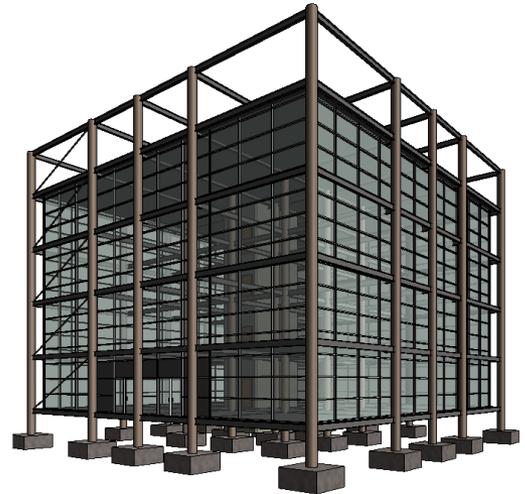


Interoperability Representation

- Represented IFC og gbxml

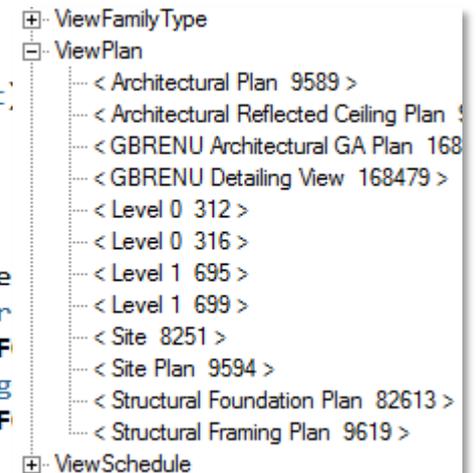
XSD Specification:

```
<xs:element name="IfcObjectDefinition" type="ifc:IfcObjectDefini
<xs:complexType name="IfcObjectDefinition" abstract="true">
  <xs:complexContent>
    <xs:extension base="ifc:IfcRoot"/>
  </xs:complexContent>
</xs:complexType>
```



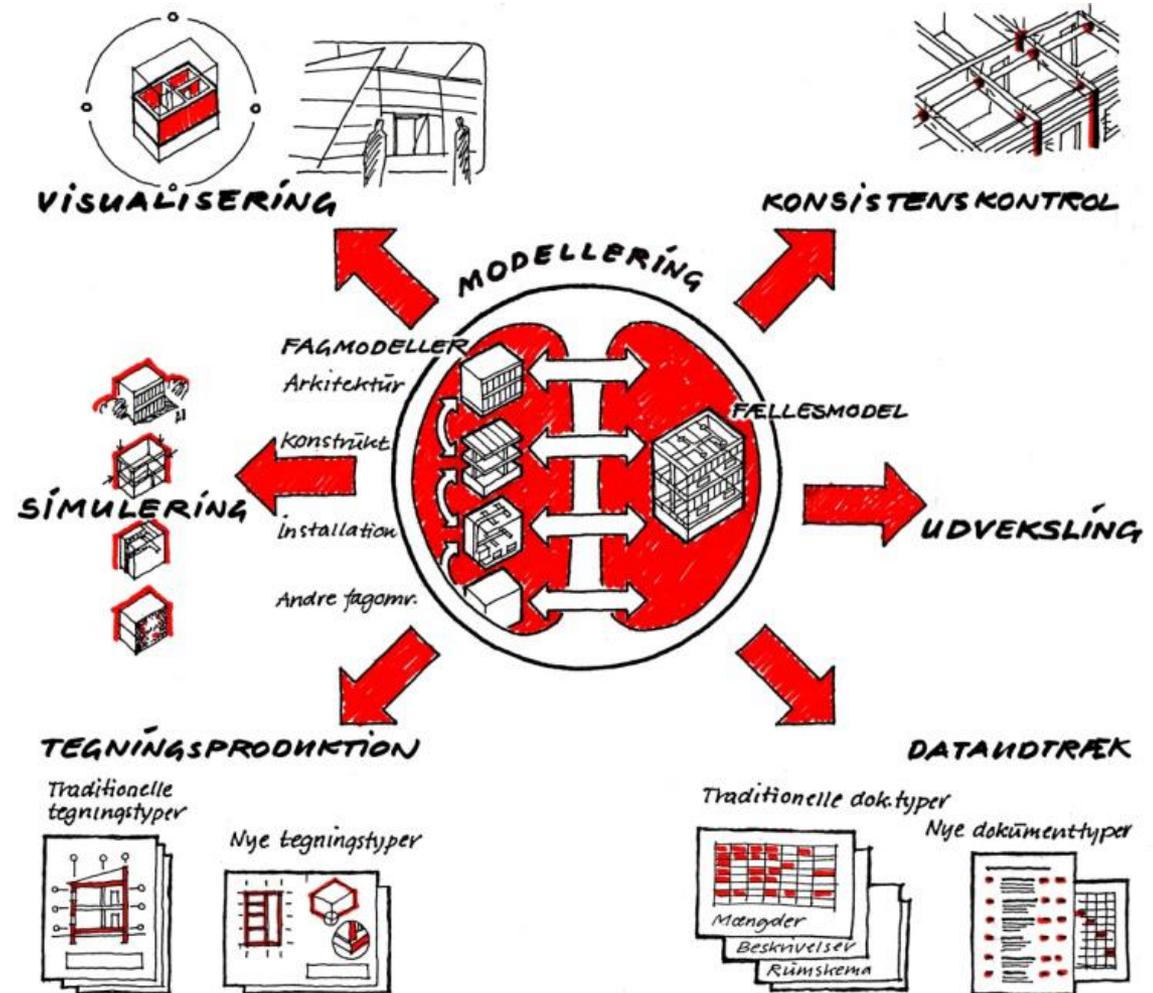
EXPRESS Specification:

```
ENTITY IfcObjectDefinition
  ABSTRACT SUPERTYPE OF(ONEOF(IfcContext, IfcObject, IfcTypeObject);
  SUBTYPE OF IfcRoot;
  INVERSE
    HasAssignments      : SET OF IfcRelAssigns FOR
    Nests                : SET [0:1] OF IfcRelNests
    IsNestedBy           : SET OF IfcRelNests FOR Re
    HasContext           : SET [0:1] OF IfcRelDeclar
    IsDecomposedBy      : SET OF IfcRelAggregates F
    Decomposes           : SET [0:1] OF IfcRelAggreg
    HasAssociations     : SET OF IfcRelAssociates F
END_ENTITY;
```

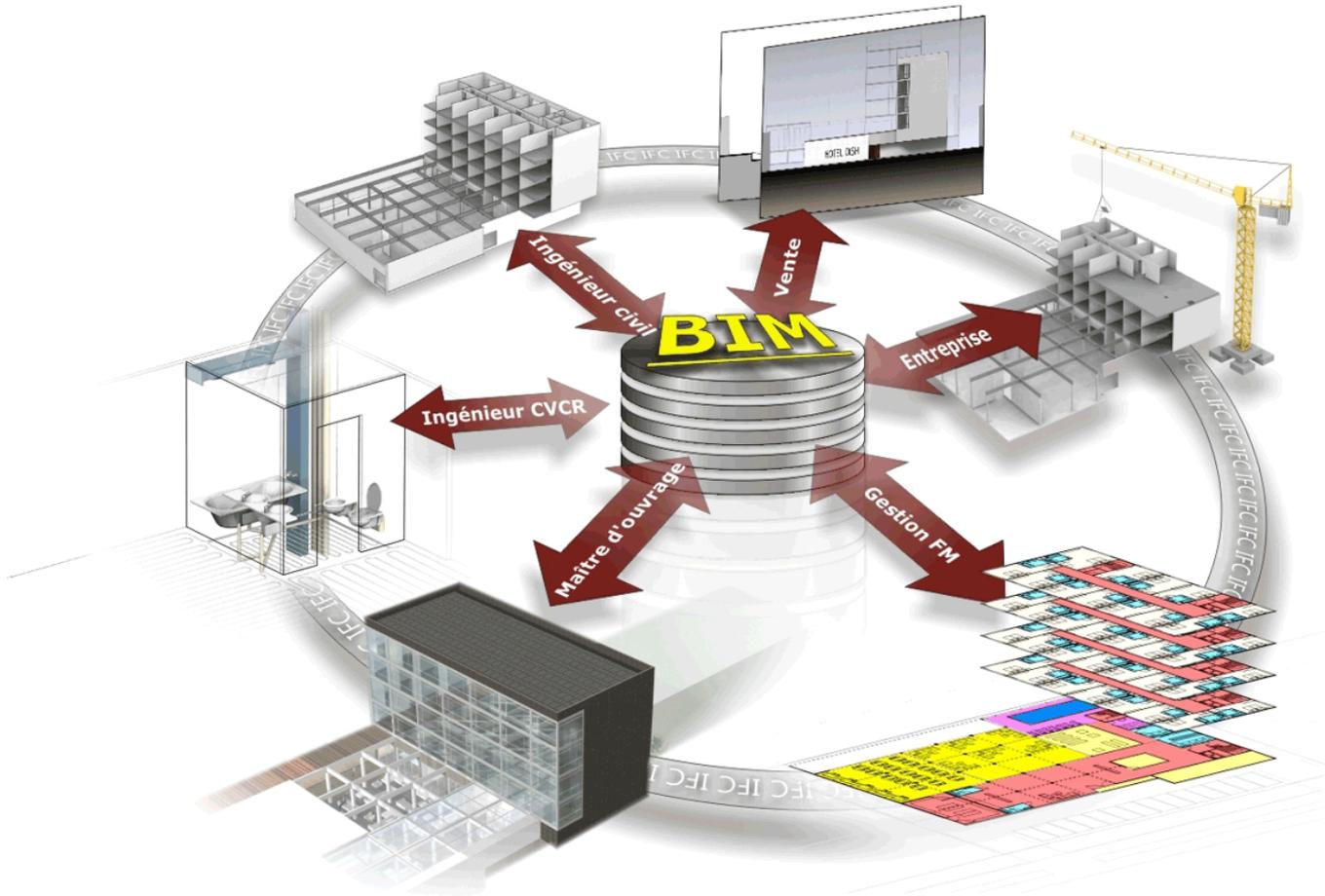


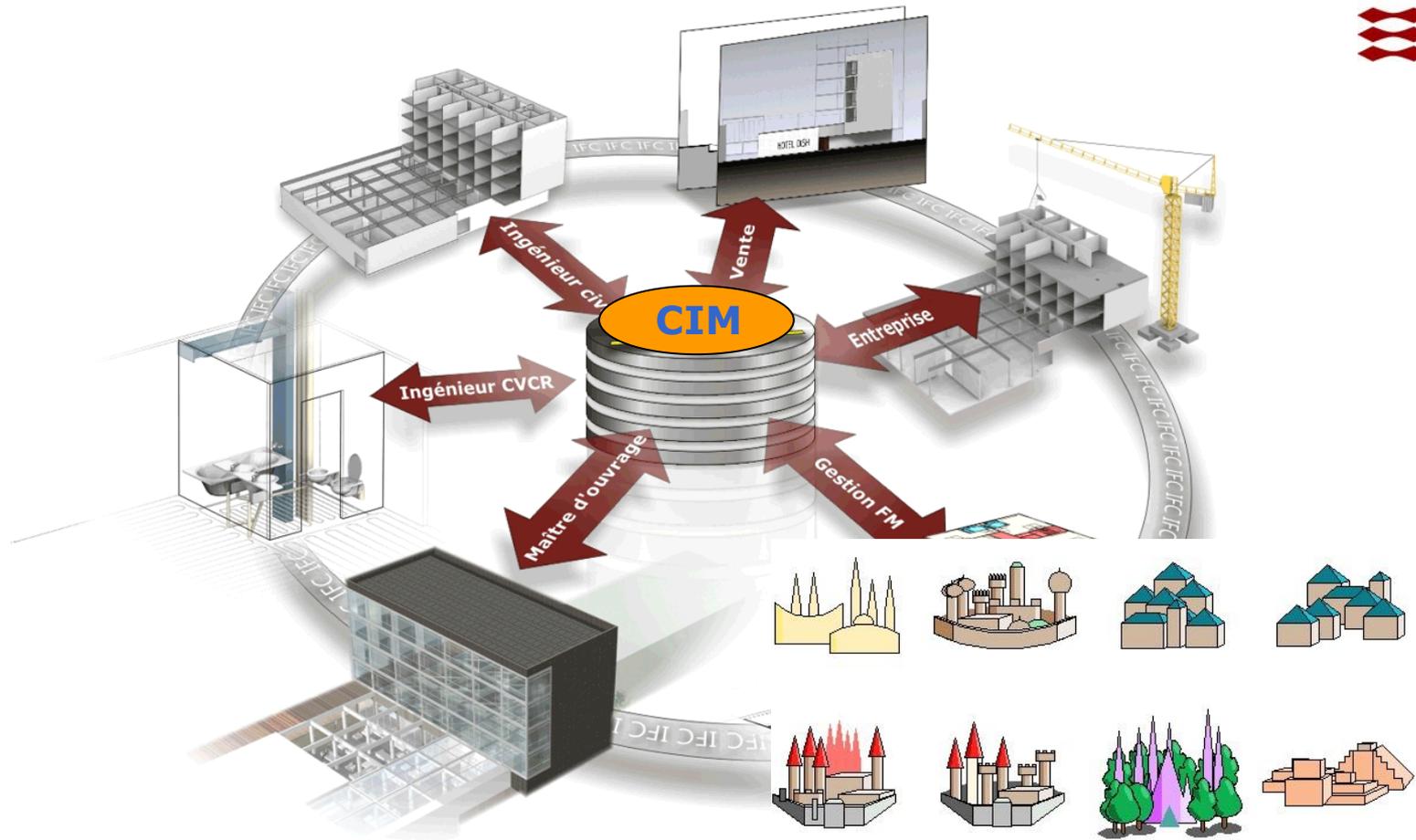
The Revit Implementation

- From Model
- ↓
- Through Exchange Format
- ↓
- To Domain Specific Software Applications



One DB that rules them all

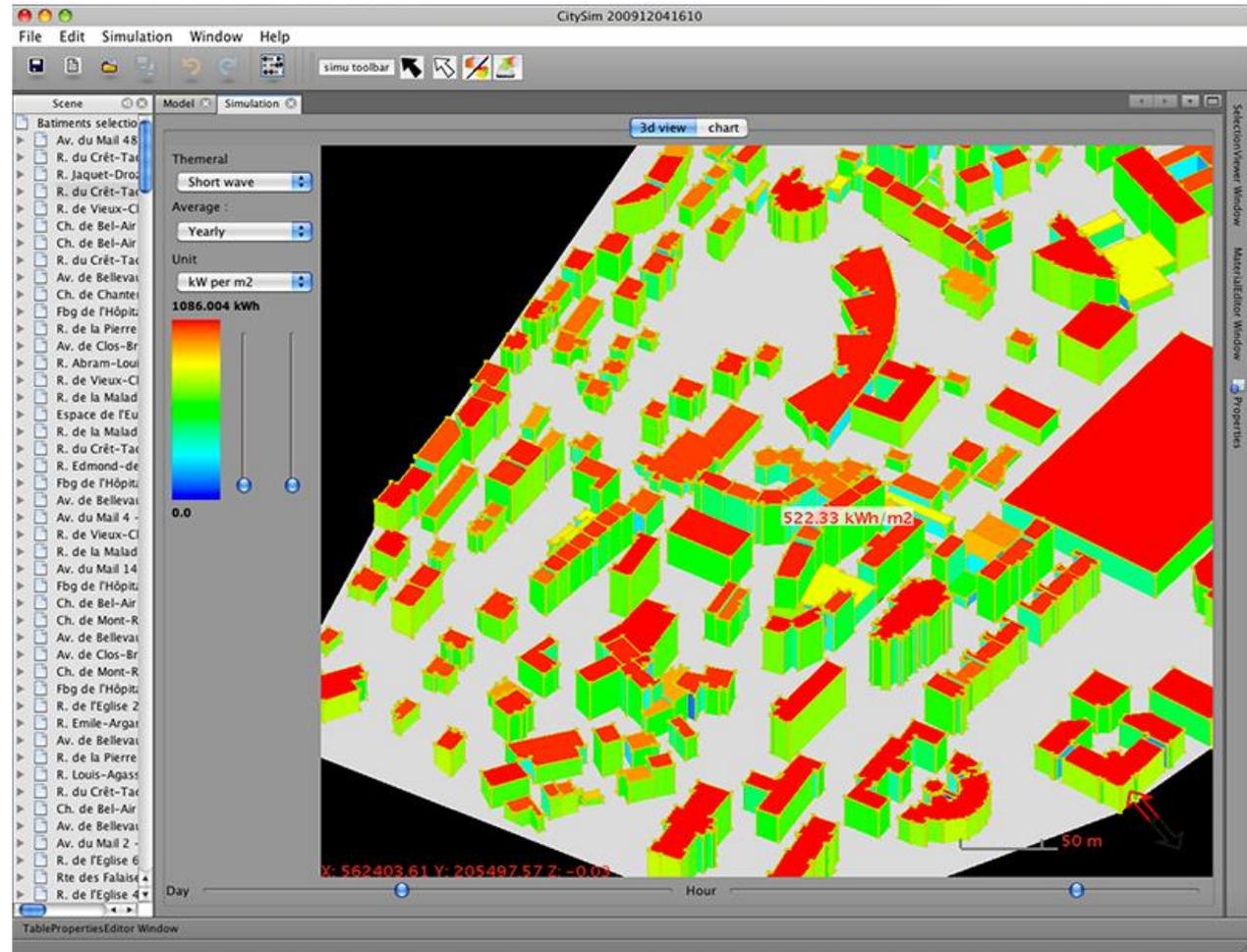




THE IDEA

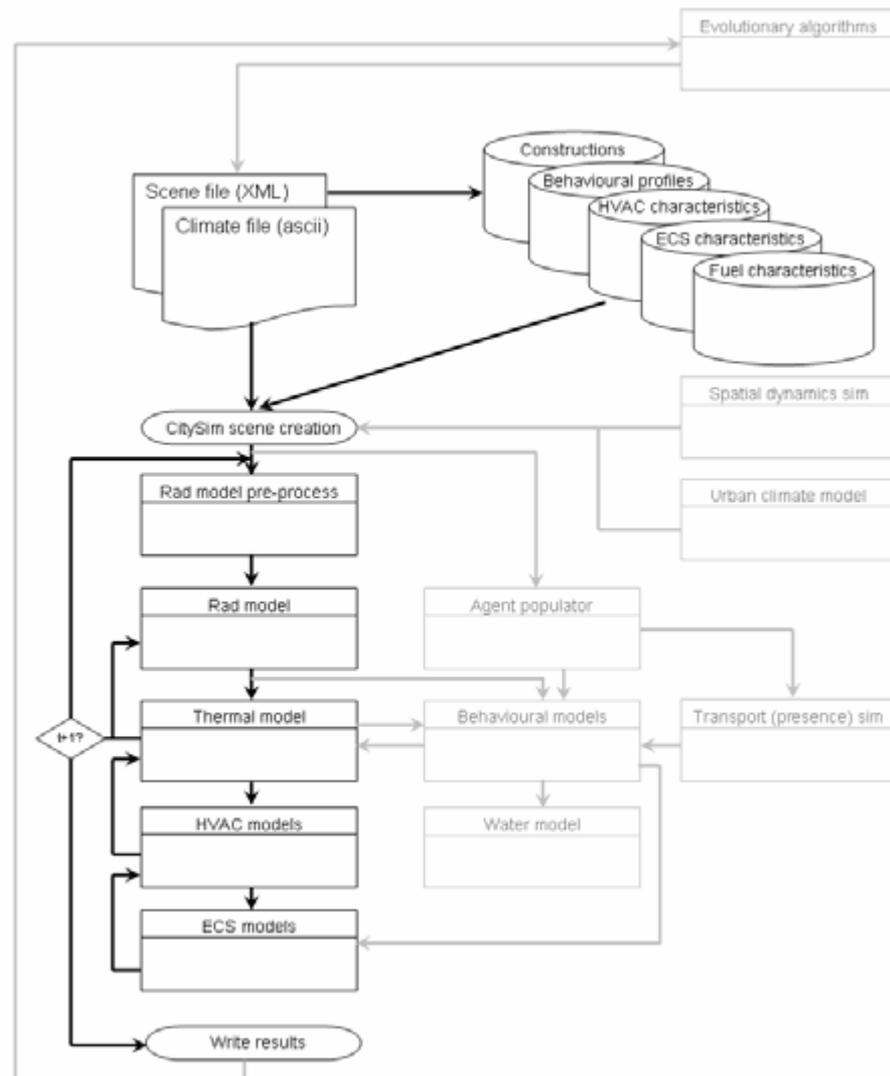
CITY INFORMATION MODEL

- 3D Building Block Model
- Thermo-Physical properties
- Own simulation model (weak)



Source: <http://http://citysim.epfl.ch/>

- XML structure
 - Not documented
 - (?)



- Based on Rhino (CAD) for building designing
- Utilizes external simulation models = platform
- Aims at GIS representation
- Very weak documentation and support!!!!
- Interoperability measures (?)



UMI - URBAN DAYLIGHT

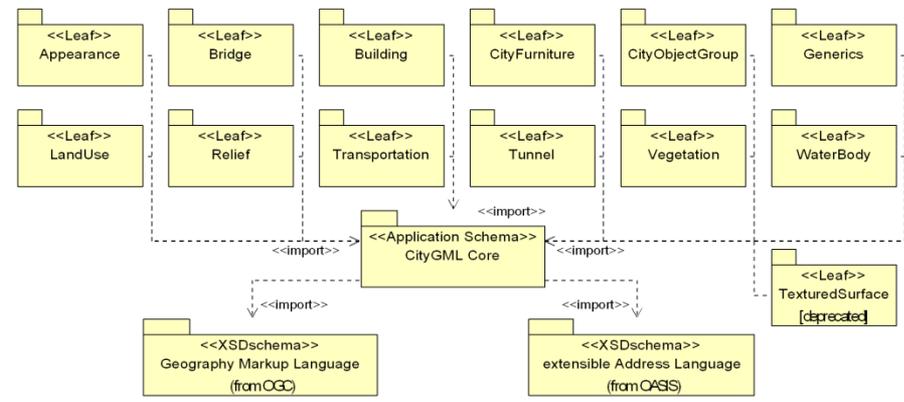
Source: <http://urbanmodellinginterface.ning.com/>

Modelica (by RWTA, Aachen University, Germany)

- Based on Modelica Simulation Tool
- IEA EBC Annex 60

Source: <http://http://iea-annex60.org/about.html>

- Based on GIS platform and standards
- XML Schema based
 - standard IT skills necessary only
 - high interoperability



- Objects
 - Appearance
 - Bridge
 - Building
 - CityFurniture
 - CityObjectGroup
 - Generics
 - LandUse
 - Relief
 - Transportation
 - Tunnel
 - Vegetation
 - WaterBody

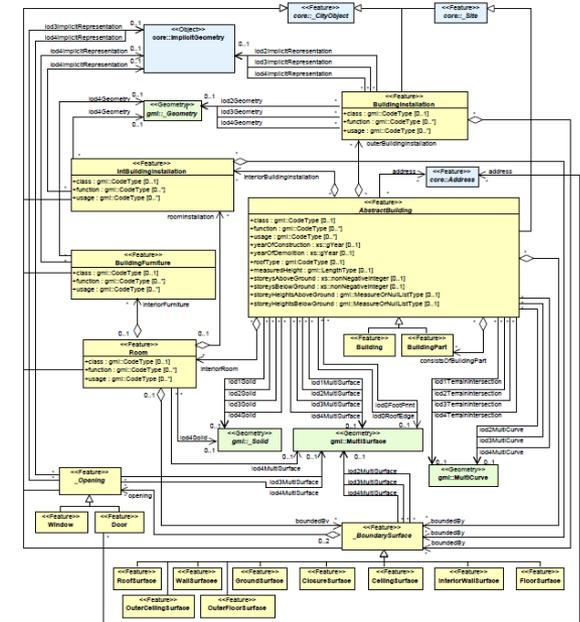
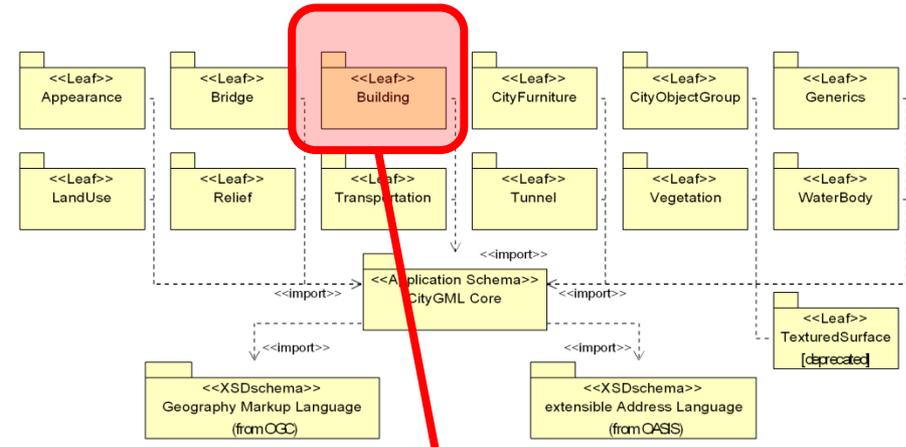
Geography Markup Language
Address Language
TextureSurface

A little arbitrary
A good start!!!

Source: <http://http://www.citygml.org/>

CityGML (by Special Interest Group 3D)

- Based on GIS platform and standards
- XML Schema based
 - standard IT skills necessary only
 - high interoperability
- Aggregation
 - Simple sum of each building
 - Each building is simulated individually
 - Performance bottle neck



Source: <http://http://www.citygml.org/>

Conclusion

- Demand for City Level Description
- Examples system approaches are found
- First standard seems to appear
- BIM could be a model
 - However
 - BIM has weaknesses
- Poster by Panagiota Gianniou and Emmanouil Katsigiannis on our research
 - Building Typology
 - Building Aggregation
 - City Modelling