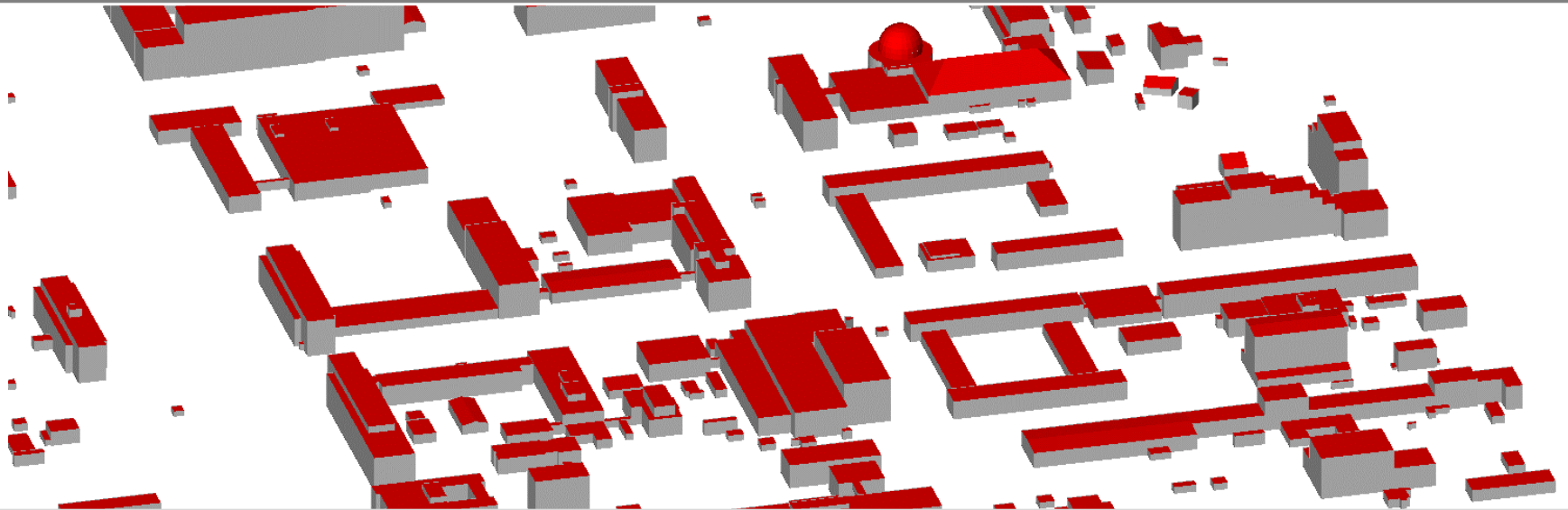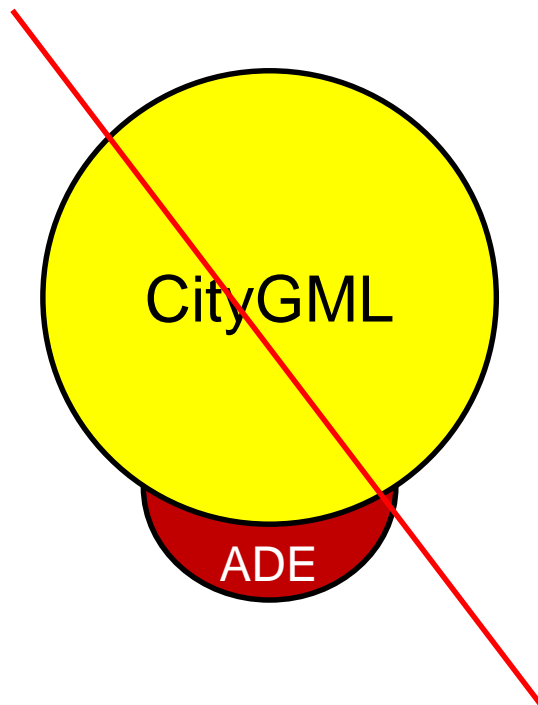# Overlaps and synergies between Energy ADE and Utility Network ADE

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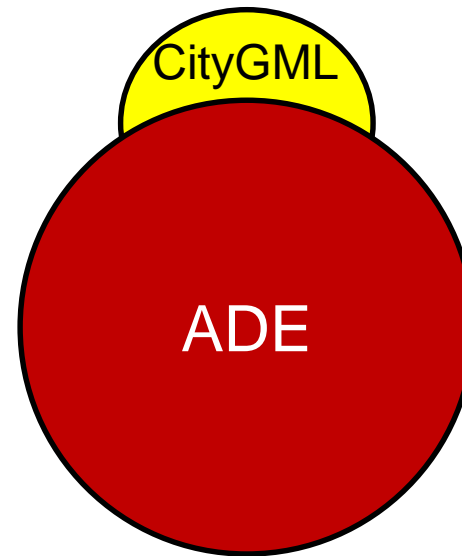
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Most (if not all) CityGML ADEs are in fact new GML application schemata with (little) relations to CityGML

Extension

New GML application schema

Comparison of data model "size"

	Energy ADE	CityGML Building Module
Number of Feature Types	58	20
Number of Data Types	15	0
Number of Enumerations	20	0
Number of Codelists	6	16

Typical ADE instance documents

Energy ADE document

Namespace	#XML-Tags	Percentage
core	3	0,2
bldg	70	5,8
gml	919	75,3
energy	228	18,7

Utility Networks ADE document

Namespace	#XML-Tags	Percentage
core	2	0
gml	47611	79,8
utility	12036	20,1

Consequences

- The implementation effort for an ADE is comparable to the implementation effort for a domain specific data format like, e.g. IFC, gbXML, landXML, PipelineML, LandInfra or CIM

- CityGML ADEs have not (yet) reached the BIM, GIS or simulation system market

What can we make better?

- Long term: Perform functional extensions and a structural revision of the CityGML base standard
    - All functional parts of an ADE modelling general, application independent concepts should be part of the base standard.
    - All functions which are represented in more than one ADE should be part of the base standard.
    - The base standard should integrate many more non-geometric properties from different application domains ("Property-Sets").
    - The base standard should support a clearer specified and more general and flexible concept for the geometrical representation of features.
- Short term: Harmonize and extend overlapping functionality in separate modules / ADEs

Proposed functional extension of CityGML

New / revised CityGML function or concept	Energy	Utility Networks
Subdivision of volumetric city objects into spaces with common space boundaries (1st and 2nd level)	•	
For the boundary surfaces of volumetric city objects: Separate representation of the "void" in the surface and the object (e.g. window, door) filling the void	•	
Well defined, flexible and extendible concept for geometric representation of city objects, including parametric and schematic representations		•
Representation of physical properties of volumetric and surface-like city objects ("Material" and "Construction")	•	•
Time series of scalar and vectorial data, e.g. for simulation results or sensor/measurement data	•	•
Modelling of physical units (SI units and derived units)	•	•

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Representation of physical properties

Energy ADE

- Explicit physical properties related with the boundary surfaces of volumetric objects
- Restricted to thermal and optical properties of solid and gaseous materials
- Support of ordered material layers ("Construction")
- Each layer may consist of a homogeneous material or a material mixture

Utility Networks ADE

- Physical properties of a network component (e.g. pipe, cable) are only implicitly specified by textual identifiers
- Explicit properties can be specified for the network commodities

Time series and schedules

- In the next CityGML version, this functionality shall be provided by the Dynamizer module.

- From a functional point of view, this module integrates 2 different parts
    - Functionality to represent a "Time Series of anything", based on the OGCstandard TimeseriesML, and
    - Functionality to transform any static CityGML property into a time-dependent one.

- The first functionality, restricted to "Time Series of scalar and vectorial properties" is surely general and should be part of the CityGML base module.

- The second functionality (at least for me) seems to be highly academic and extremely difficult to implement.

- It should be considered to split Dynamizer into (at least) two functional parts.

Modelling of physical units

- Both ADEs will be used to represent simulation input data, and therefore contain many properties with different physical units of measure (uom).

- The GML standard method to specify an uom is not really useful to support interoperability, because the corresponding identifiers / URIs are not standardized.

- For the Energy ADE, a list of feasible uom identifiers will be worked out and integrated into the specification document.

- A schema inherent functionality to specify the uom being used in an instance document would be a much better solution.