Integration of 3D cadastre, addressing and topography

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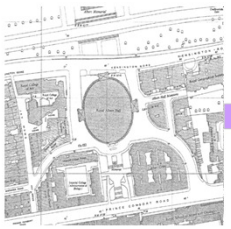
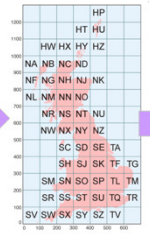
Evolution of Geographic Information in National Mapping



Initial Survey

National Coverage



Metric, national CRS

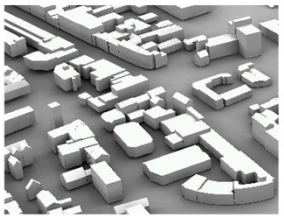
Nationally consistent data

Digital spaghetti

GIS use

Topological geometric object layers

Object Referencing, change mngmnt



Classification, Componentisation Rules and 3D

Integrated maintenance, data-content separation, 3D models

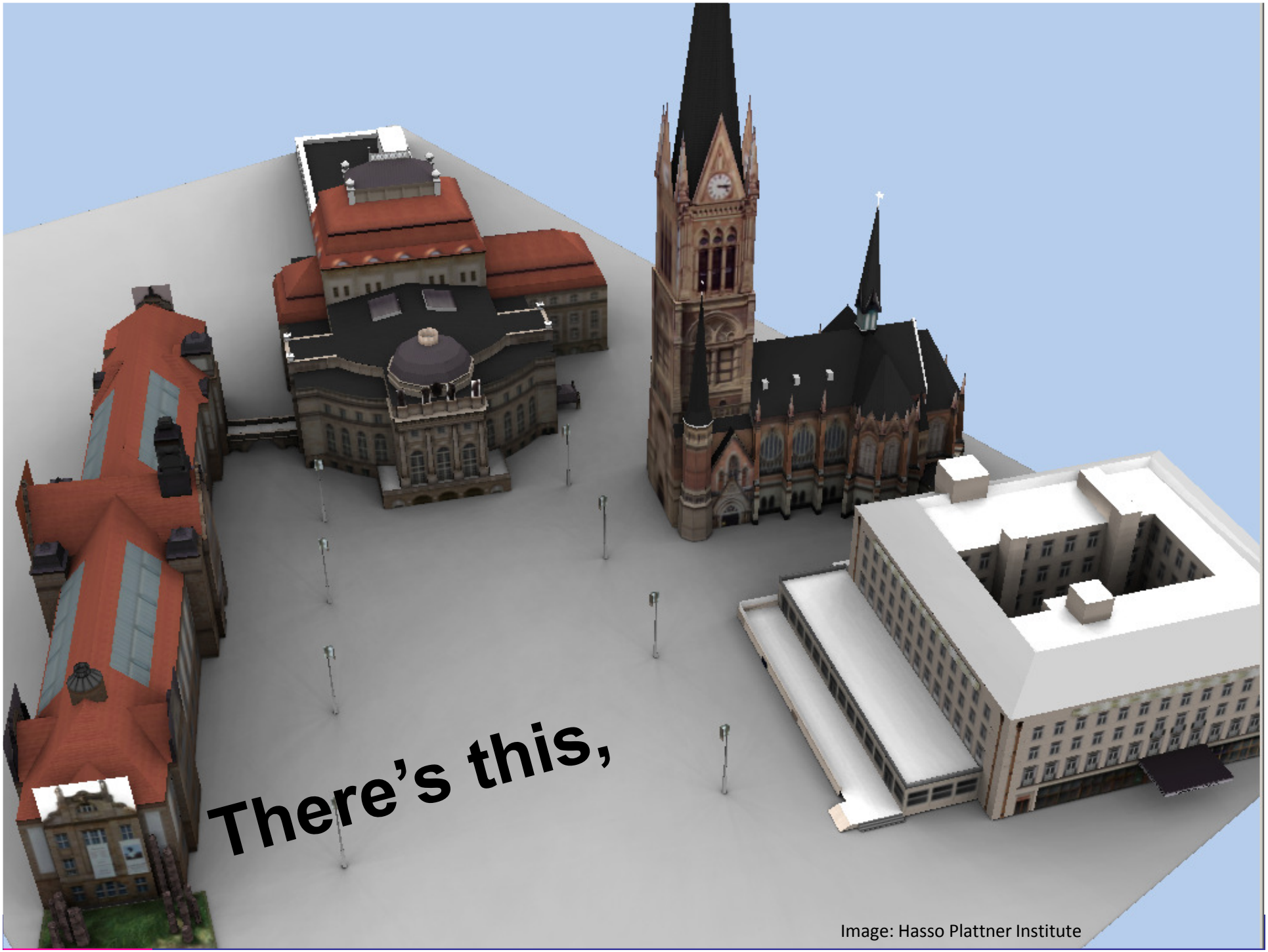
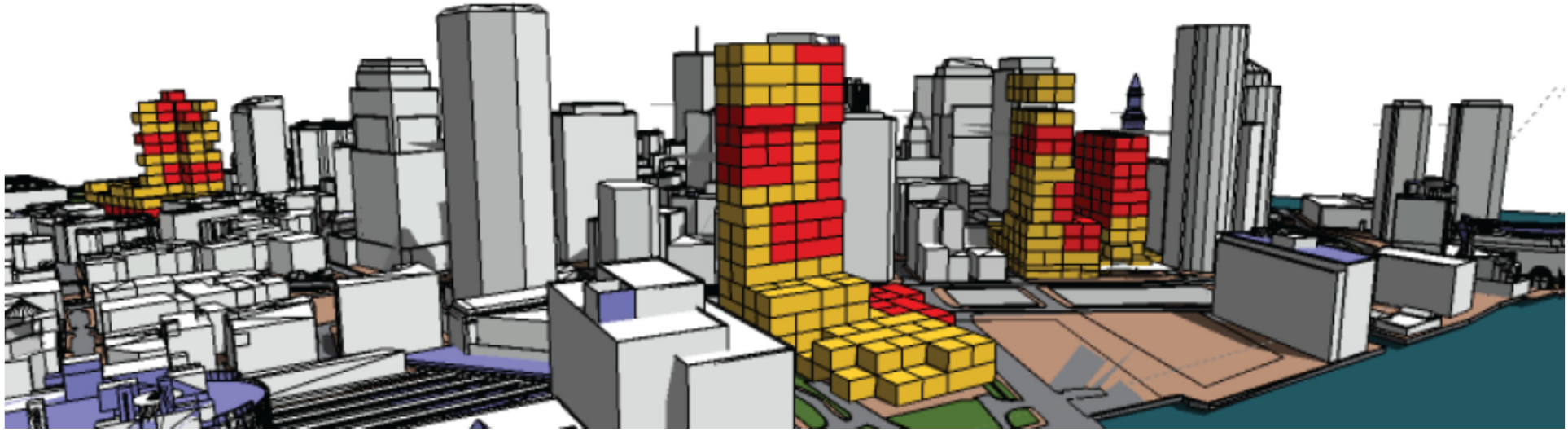


Image: Hasso Plattner Institute

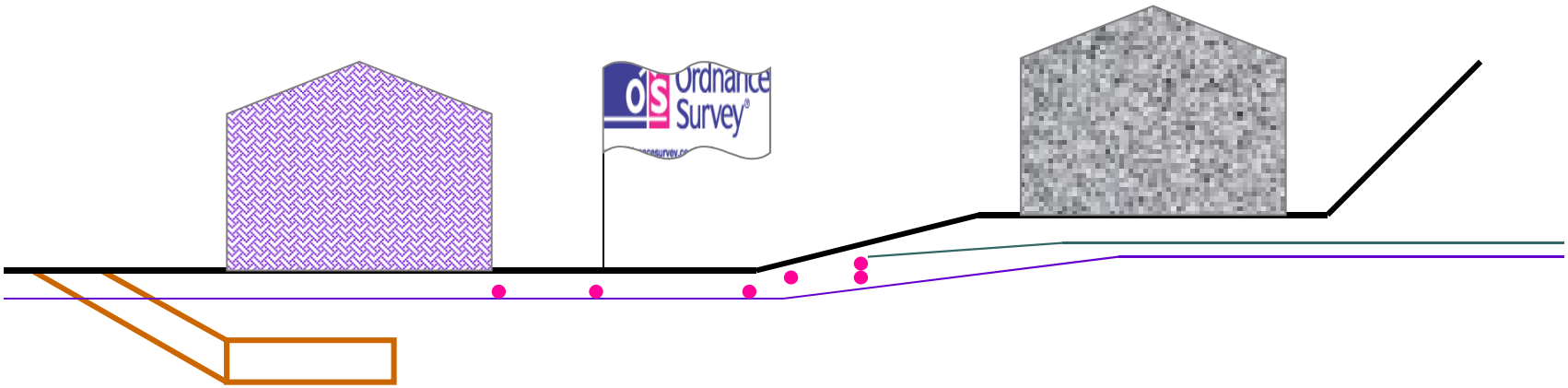


buildings may be [...] decomposed into different storeys
(and even more detailed into appartements and single rooms)

And there's this.

Image: Paul Cote, Harvard Graduate School of Design

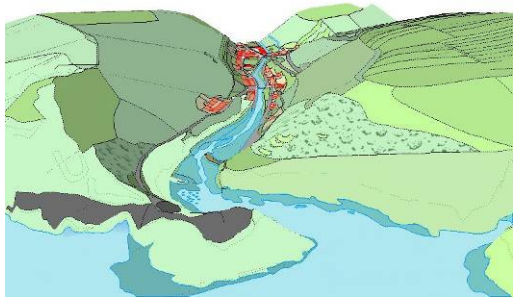
3 dimensions of 3D



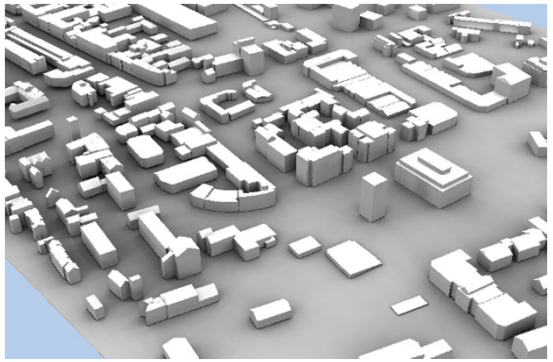
1. Earth surface ► DTM
2. Above ground ► City/building models
3. Below ground ► utilities, subsurface spaces

What does ‘3D’ mean?

Digital Terrain/Surface Models

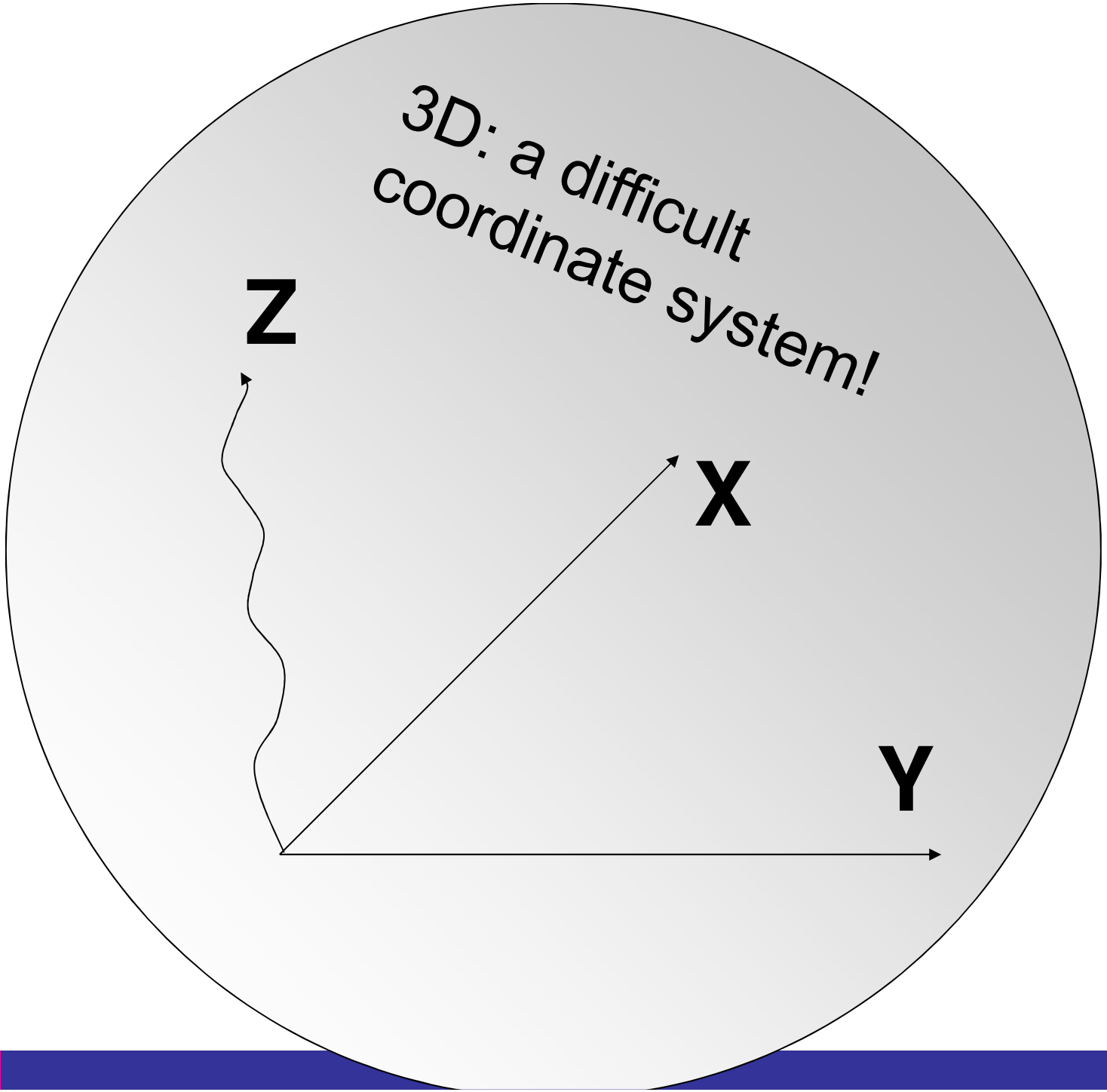


Heighted surface features

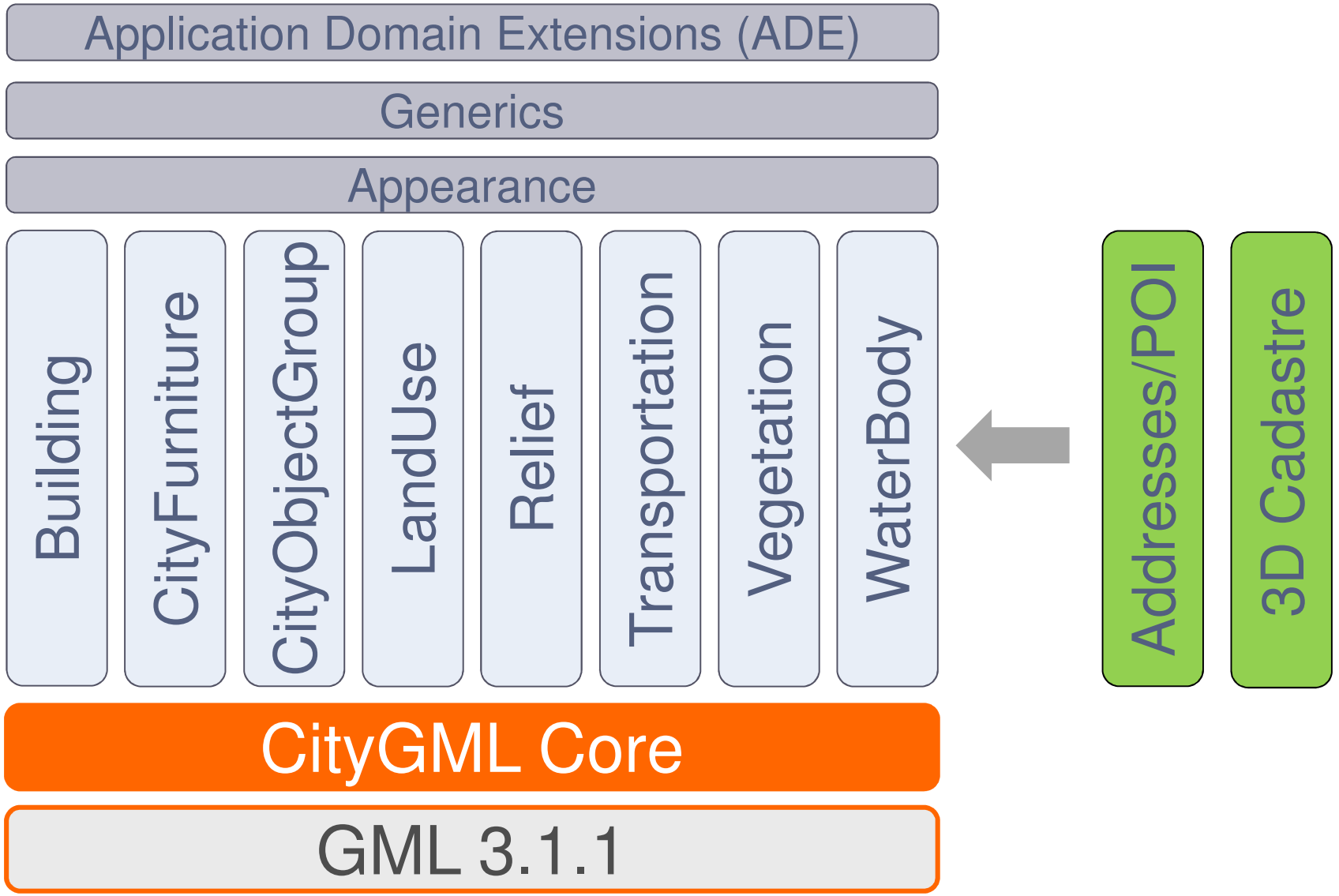


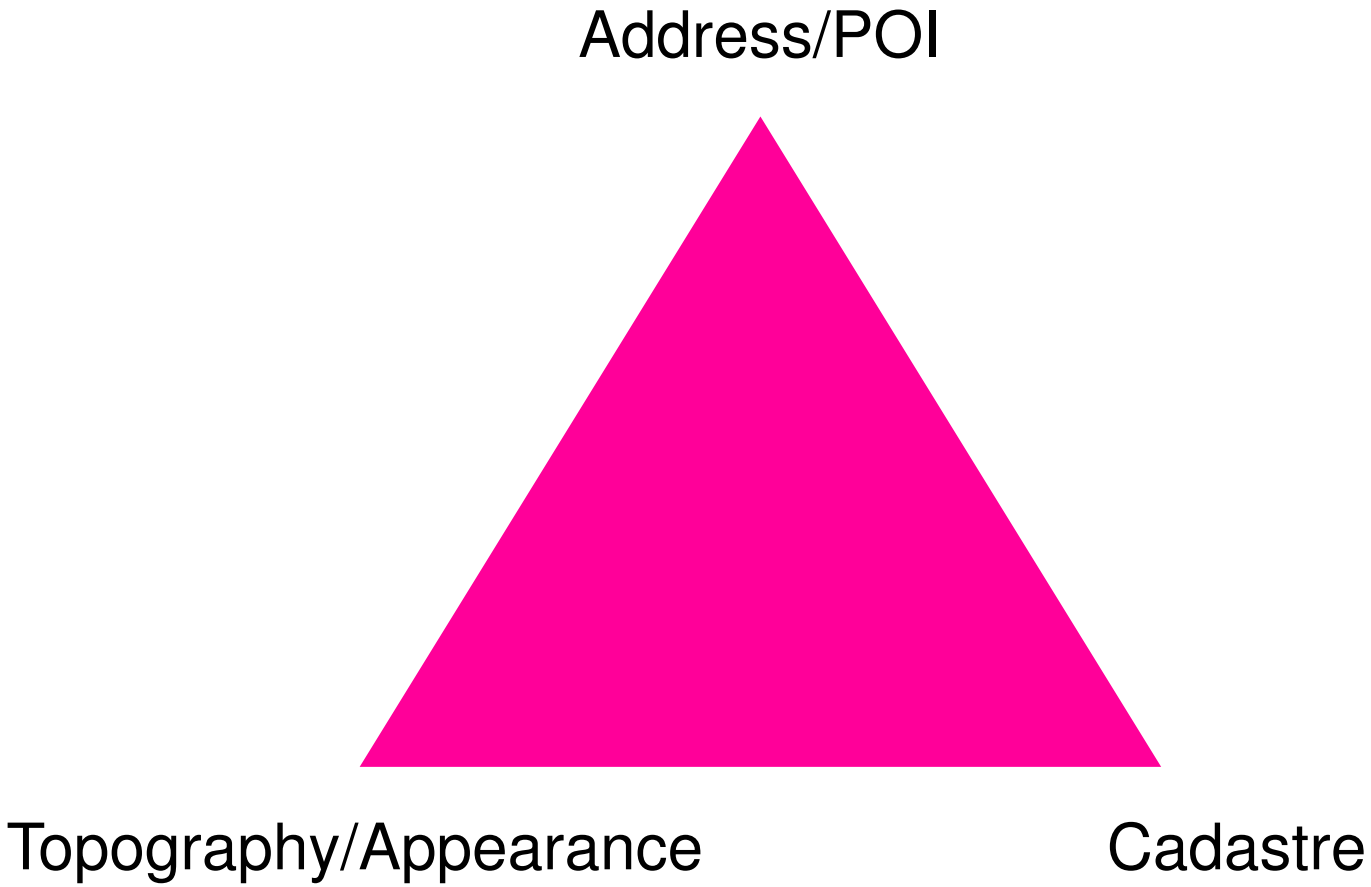
Heighted elevated features

National Geographic Database


3D: a difficult
coordinate system!
Z
X
Y

Potential future modules




Address/POI
Topography/Appearance
Cadastre

Addresses / POI

- AR runs on POIs, important for search
- POIs as a shorthand for a proper feature representation
- POIs usually have a strong classification hierarchy

- Addresses as a key reference geography
- POI/Address integration rather underdeveloped

- Referencing location within a building

3D cadastre

- LADM (ISO19152)
- Strata titles
- FIG working group on 3D cadastre—field that is still in its infancy

- Referencing property within an building/in 3D.

Are these the right Levels of Detail?

LOD 0—Regional Model

Digital terrain model

LOD 1—City model

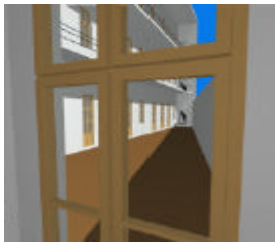
Block model, no roof structures

LOD 2—City/Site model

Roof structures, optional textures

LOD 3—Site model

Detailed architectural model



LOD 4—Interior model

Walkable interior spaces

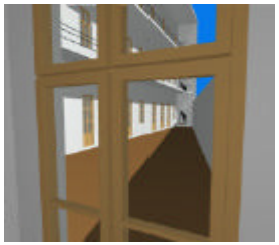
How to integrate Indoor Levels of Detail

LOD 0—something flat (to drape or anchor)

LOD 1—something extruded

LOD 2—better than extruded but generalised

LOD 3—detailed



LOD 4—doesn't really fit (sample data anyone?)

Questions

- Does a floor need to belong to a building?
- Can we talk about a floor without talking/knowing about the building?

Requirements for Indoor representations

- Storeys,
- Functional/addressable units (building units),
- Connectors (stairs, escalators, etc),
- Floorplans and
- Assets within buildings (building installations already there)

should be represented.

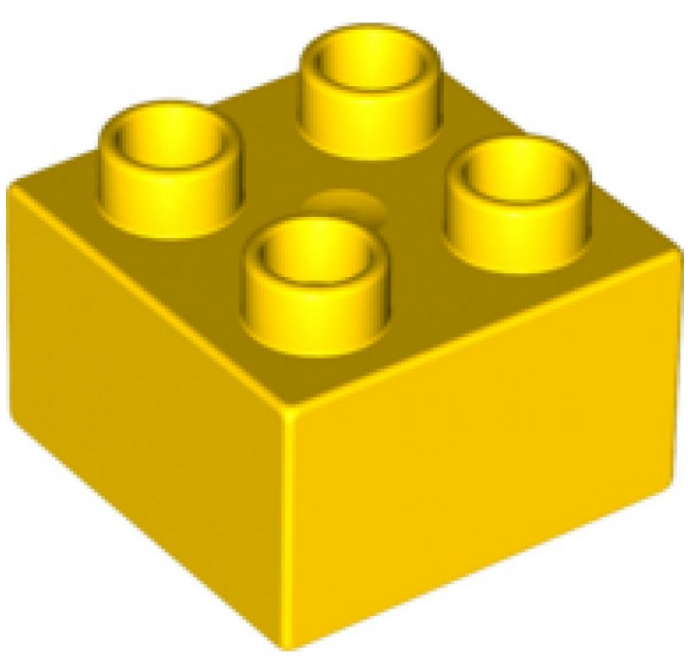
Allow only relevant parts of the building.

Create a model by stacking up storeys or functional units

Do we need storeys in multiple LoDs?

Could look like this

- Floorplan
- Block
- Generalised spaces
- Detailed spaces



- Should be able to stand on its own without exterior representation
- Storeys as implicit geometric representations of the outer shell
- CSG?
- Relationship between storeys and functional units.

Key Assumptions

- As web access and computing goes mobile, location information becomes more important.
- Geographic Information is the key to integrating all kinds of business information.
- 2D representations remain valid, they are often more appropriate.
- Datasets will be replaced by dynamic queries / sensor networks.
- Integration of indoor and outdoor spaces will (have to) be seemless.
- Integration of data will (have to) be simple.

Moving forward we will need

- To be able to reference the indoor and outdoor in an integrated way;
- High quality, authoritative and maintained 3D data of the built environment;
- Floor-plan, cadastre and address integration into buildings;
- More tools to create, manage, view, analyse and use data easily;
- A plug-and-play 3D location service / environment / API (not just data).

Address/POI

Easy integration of meaningful 3D data will be key.

Topography/Appearance

Cadastre