IndoorGML concept

- Cell is the most important unit
- Complete space subdivision
- Poincaré duality

['Thin' door, 'Thick' door, 'Thin' room (visibility graph)]
IndoorGML spaces

- **Primal space**
- **Dual Space**
Subdivisions (1/2)
Subdivisions (2/2)

Dynamic Subdivision

- Safe Sub-Space
- Hazardous Sub-Space
- Fire
- Smoke
IndoorGML & LADM

Common concepts:
- It is possible to have virtual spaces
- Full subdivision of space (no gaps or overlaps)
- Physical space can be subdivided or united
- Spatial component (polygon, solid)

Differences
- LADM
  - indoor/outdoor
  - Space can be unbounded
  - Line and point spatial units can exist
  - Classes very elaborated
- IndoorGML
  - (Currently) Indoor
  - Spaces are intended to create network
  - Limited set of classes for the topographic model
LADM

- **LA_Party**: Peter has **LA_RRR** ownership on **LA_BAUnit** Peter’s estate consisting of 2 **LA_SpatialUnit** parcels (with same **LA_RRR**)

- **LA_Party** is a person or institution with rights
- **LA_BAUnit** stands for Basic Administrative Unit
- **LA_RRR** stands for Right Restriction Responsibility
- **LA_SpatialUnit** stand for the physical (spatial) representation
Public regulations influencing property right ownership (after, Ekbäck 2000)

- Effective ownership functions
- Public regulation functions
- Effective ownership functions restored by a regulation
- Public obligations

- Obligations to utilize certain functions
- Regulation restoring (part of) ownership right
Considering property rights

- The house belongs to Jim
- He has rented the first floor to Tim, but Jim has rights on the stairs
Considering property restrictions
Cases

- Shopping malls: visitors, employees of the specific shop, maintenance/cleaning services only.
- Railway and metro stations: all users, platforms available only for passengers, metro tunnels available only for train personnel, ticket service area available only for clerks selling the tickets, etc.
- Museums: visitors, storage halls used only by exhibitors, administration areas, restauration areas, available only for experts.
- Airports: visitors, check-in area for travelers, passport control accessible for checked-in travelers, waiting/shopping areas, boarding gates, transit areas, ‘international space’ (‘no men’s land’), and so on.
- Hospitals: common access areas, sections for examination patients, areas for hospitalized patients, surgery, laboratories, storage of medical equipment, etc.
IndoorGML & LADM

IndoorGML Core

- <<Feature>> IndoorCore::SpaceLayer
  - nodes: 1 *
  - edges: 0.1
    - <<Feature>> IndoorCore::State
    - connects: 2
      - <<Feature>> IndoorCore::Transition

- <<Feature>> IndoorCore::PrimalSpaceFeatures
  - cellSpaceBoundaryMember
  - cellSpaceMember

- <<Feature>> IndoorCore::CellSpaceBoundary
  - partialBoundedBy: 0.1

- <<Feature>> IndoorCore::CellSpace

IndoorGML-LADM Extension

- <<Feature>> LADM::LA_SpatialUnit
  - <<Feature>> LADM::LA_Party
  - <<Feature>> LADM::LA_RRR
  - <<Feature>> LADM::LA_BAUUnit

InoorGML

- Room 424
- Corridor
  - Room 423
  - Room 425

LADM

Cell Space Layer

- C1
- C2
- C3
- C4
  - SU1
  - SU2

LA_SpatialUnit Space Layer

- (C1, SU1, Inside)
- (C2, SU2, Overlaps)
- (C3, SU2, Inside)
- (C4, SU2, Inside)
Next steps

- What property and rights influence the navigation?
  - Restrictions and responsibilities for users of indoor environment
  - Restrictions and responsibilities for maintenance of indoor environment
- Where the indoor stops? What happens with space above terraces for example?
- Define geometrically Rights and Responsibilities and derive networks
- Maintenance of datasets for administration purposes. Link to external databases with party data, address data, taxation data, land use data, valuation data, physical utility network data, and archive data. LADM provides stereotype classes for these data sets.
Thank you for listening