The Modelling of Rights, Restrictions and Responsibilities (RRR) in the Land Administration Domain Model (LADM)

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FIG International Congress, 11-16 April 2010 – Sydney, Australia
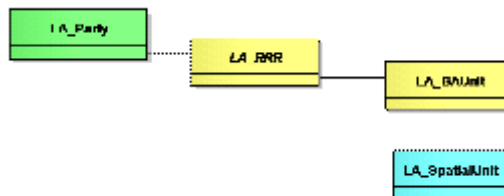
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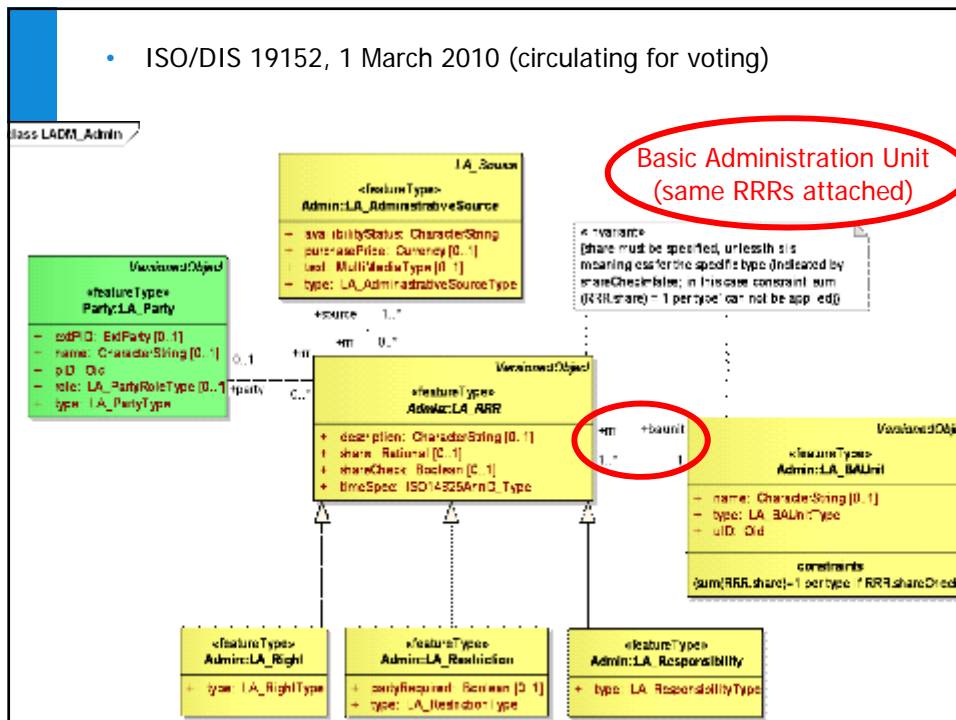
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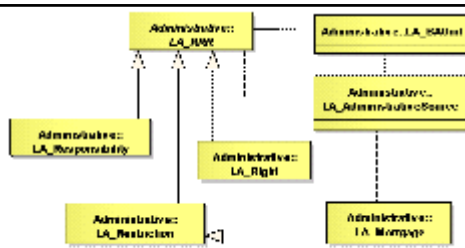6. Conclusion

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1. Introduction

- LADM has aggregation objects for:
  - People/organizations: LA_Party, LA_GroupParty, LA_PartyMember
  - Parcels: LA_SpatialUnit, LA_Spatial_UnitGroup
- No explicit aggregation for rights, restrictions responsibilities (LA_RRR), but implicit group modelling using constraints

- Two model alternatives explored:
  - Extended LADM with LA_RRR_Group
  - Standard LADM (with refined constraint for LA_RRR)

- Studied (complex) case of easement(s) with multiple parties

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- ISO/DIS 19152, 1 March 2010 (circulating for voting)

Basic Administration Unit (same RRRs attached)

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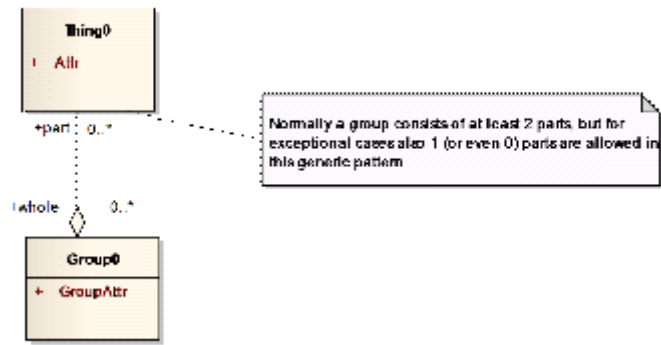

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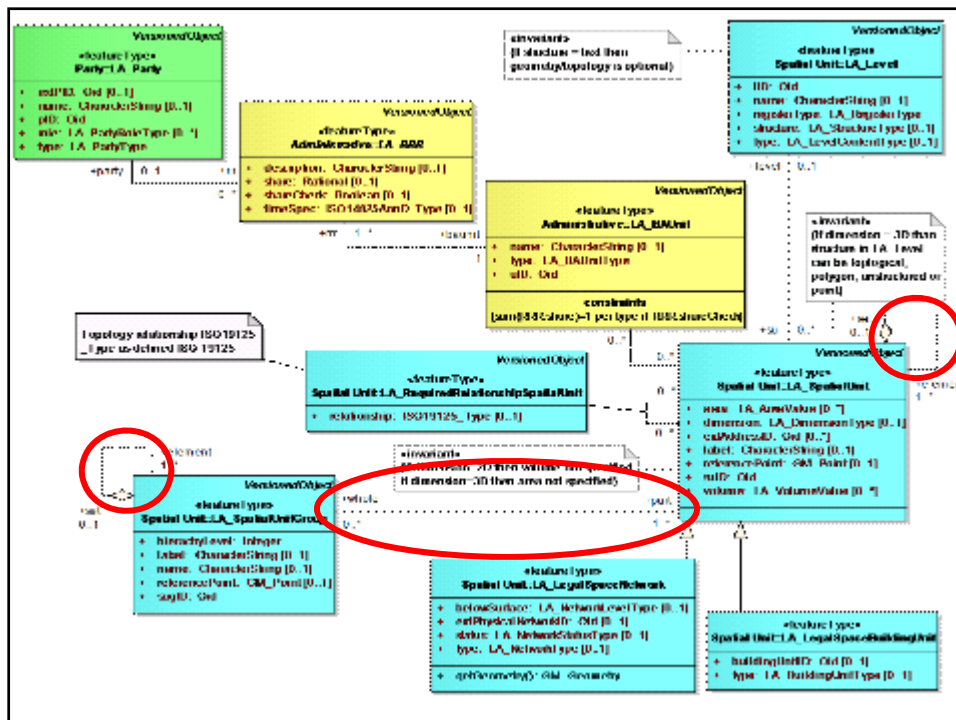6. Conclusion

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2. Part-whole model patterns

- Standard 'part-whole' aggregation in UML
- Group modelling pattern 1, most general case
- Group modelling pattern 2, simplified
- Group modelling pattern 3, most simplified

- Issues:
  - can shares (fraction/rational) be modelled?
  - is whole also subclass of the thing?
  - is there some kind of hierarchy?
  - can parts be shared in multiple wholes?
  - model/pattern simple or complex? (#classes)
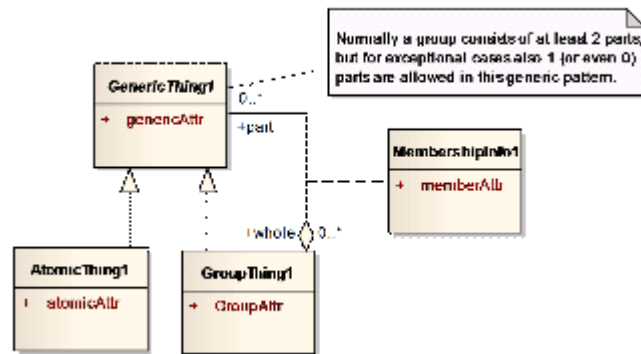
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Standard 'part-whole' aggregation in UML

- LADM: more or less used LA_SpatialUnit-LA_SpatialUnitGroup

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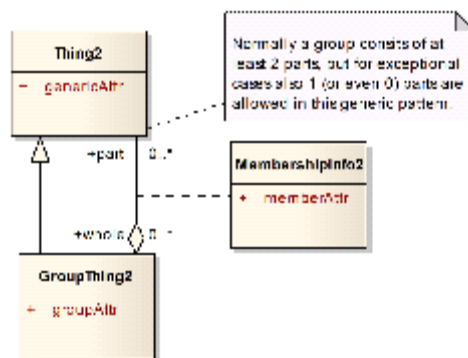
Group modelling pattern 1, most general case

• not used in LADM

Group modelling pattern 2, simplified

• LADM: LA_Party, LA_GroupParty, LA_PartyMember
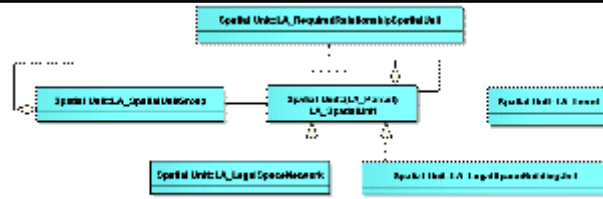
Group modelling pattern 3, most simplified

Normally a group consists of at least 2 parts, but for exceptional cases also 1 (or even 0) parts are allowed in this generic pattern

- LADM: LA_SpatialUnit (Parcel-Subparcel)

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3a. Real-world case: single easement (later on: two easements)

Three options (differs per country):
- easement geometry causing subdivision of crossed parcel
- easement geometry on a different 'level'
- easement without geometry

easement = servitude
(right of way)

Road

SU_E1

SU_PA   SU_PB   SU_PC

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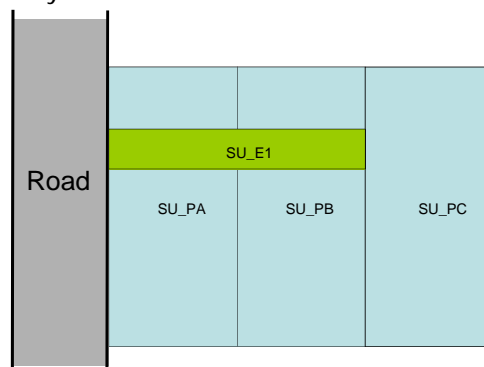
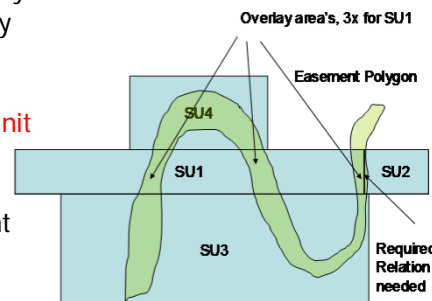# Single easement, geometry option 1: easement causing subdivision

- SU_PA1, SU_PA2, SU_PB1, SU_PB2, SU_PC: ownership right
- SU_PA3, SU_PB3: ownership right (with an associated party) + 'easement without party' (a restriction, i.e "object restriction")
- LA_BAUnit can group SU_PA1, SU_PA2 (having same rights)
- idem SU_PB1, SU_PB2

- 'principle of legal independence' not applied
- negative side (restriction) is stored, but positive side is possible (benefiter; e.g. owner of SU_PC or even SU_PC via baunitAsParty)

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Single easement, geometry option 2: easement on different 'level'

- SU's ownership and SU's easement in different 'level'
- According to 'principle of legal independence'
- 2 slides ago: SU_PA, SU_PB, SU_PC: ownership; SU_E1: easement
- Negative side: detected via overlay
- Positive side: associated LA_Party

- If geometry not accurate, then LA_RequiredRelationshipSpatialUnit (instead of overlay)
- Multiple overlays are possible for single parcel and single easement

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Single easement, geometry option 3: easement without geometry

Location of the easement is unknown
2 options for representing the 'negative' side:
1. 'two level' approach: easement on separate level, 'text spatial unit' (with a restriction) + link via LA_RequiredRelationship to parcel
2. 'one level' approach: easement directly attached parcel

For the 'positive' side the options are:
1. no party (object restriction)
2. party (normal person)
3. party role played by 'baunit' (baunitAsParty)

LADM facilitates all, so for single easement 3 * 3 = 9 options
   3/geometry (subdivision, 2 levels, no) * 3/positive side (above)

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3b. Real-world case: two easements

Three options (differs per country, similar to single easement):
1. easement geometries causing subdivision of crossed parcel
2. easement geometries on a different 'level'
3. easements without geometry
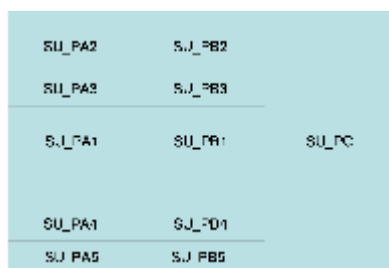
subdivision

different level

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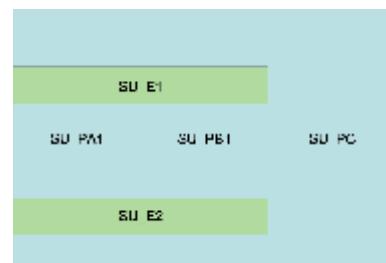# Real-world case: two easements without geometry

Most tricky is now the grouping of easements without geometry

SU_PA has 4 easements-parts (restrictions):
- 2 in top part (for SU_PB, SU_PC)
- 2 in bottom part (again for SU_PB, SU_PC)

Not possible to group easements-parts in 2 groups

(Note problem does not occur when there is easement geometry)

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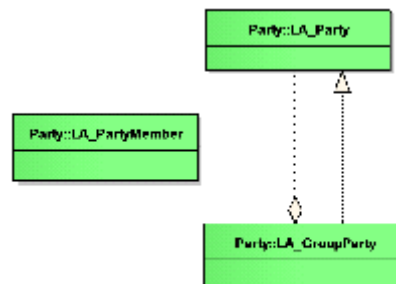
4. Model alternatives: LADM with LA_RRR grouping

Two alternatives:
1. Standard LADM with refinement of constraint shareCheck
2. LADM Extension with new class LA_RRR_Group

Alternative 1 (refined constraint)
- LA_RRR has attributes share (rational) and shareCheck (boolean)
- LA_BAUnit grouping with constraint:
  sum(RRR.share) = 1 per type if RRR.shareCheck

Only applicable when shares are relevant for this type of LA_RRR and works well for ownership (sum of shares should be 1)
Problem when 2 different instances of LA_RRR of same type and both with shares (e.g. the 2 easements without geometry)

Alternative 2: add LA_RRR_Group
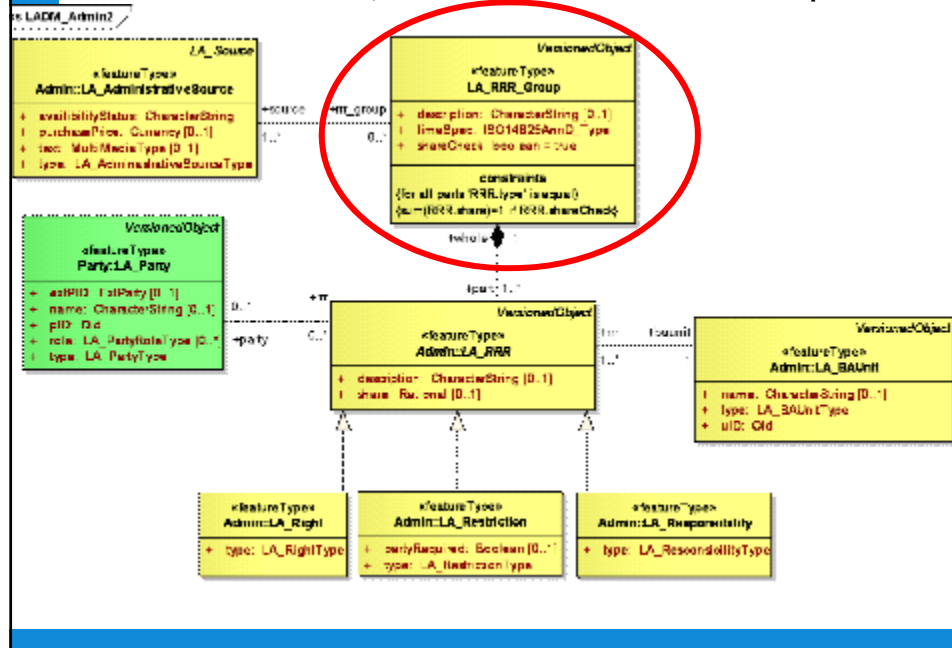
Alternative 2: reflection

- LA_RRR_Group–LA_RRR follows standard 'part-whole' pattern UML

- LA_RRR_Group enables expressing a title to be subdivided
- Attributes move LA_RRR → LA_RRR_Group: timeSpec, shareCheck
- Members (LA_RRR) of LA_RRR_group all same type → constraint

- Open issues:
  - membership association class useful (move share from LA_RRR)?
  - should LA_RRR_Group also be an LA_RRR (and connect to LA_Party and LA_BAUnit)?
  - should there be an ordering of LA_RRR(_Group): solve conflicting claims on same LA_BAUnit?

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Spatial Representation::
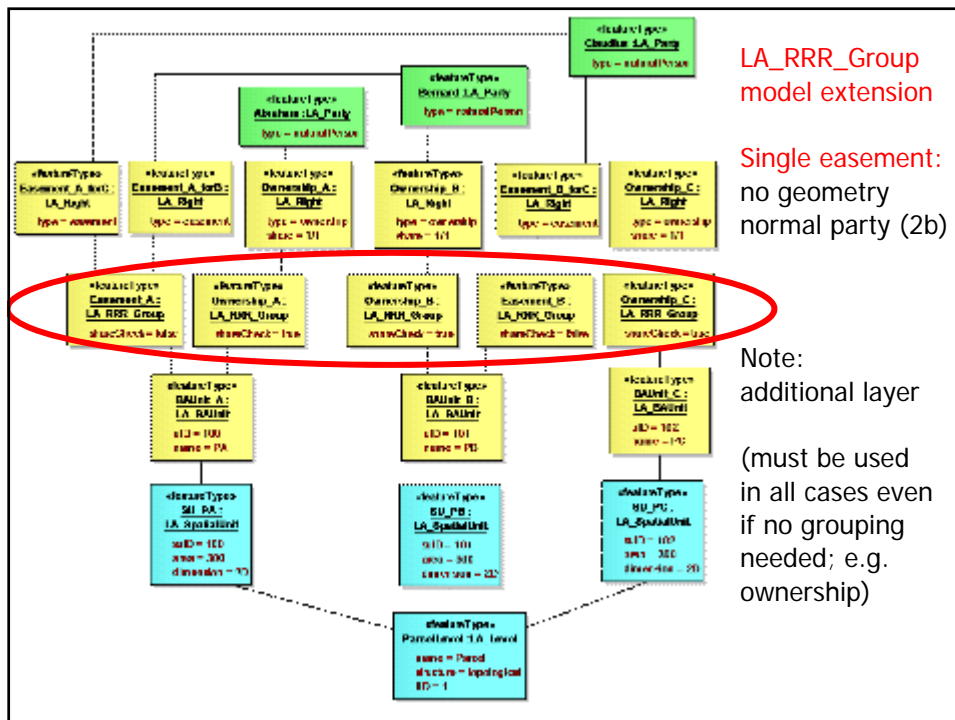LA_BoundaryFaceString

Spatial Representation::
LA_BoundaryFace

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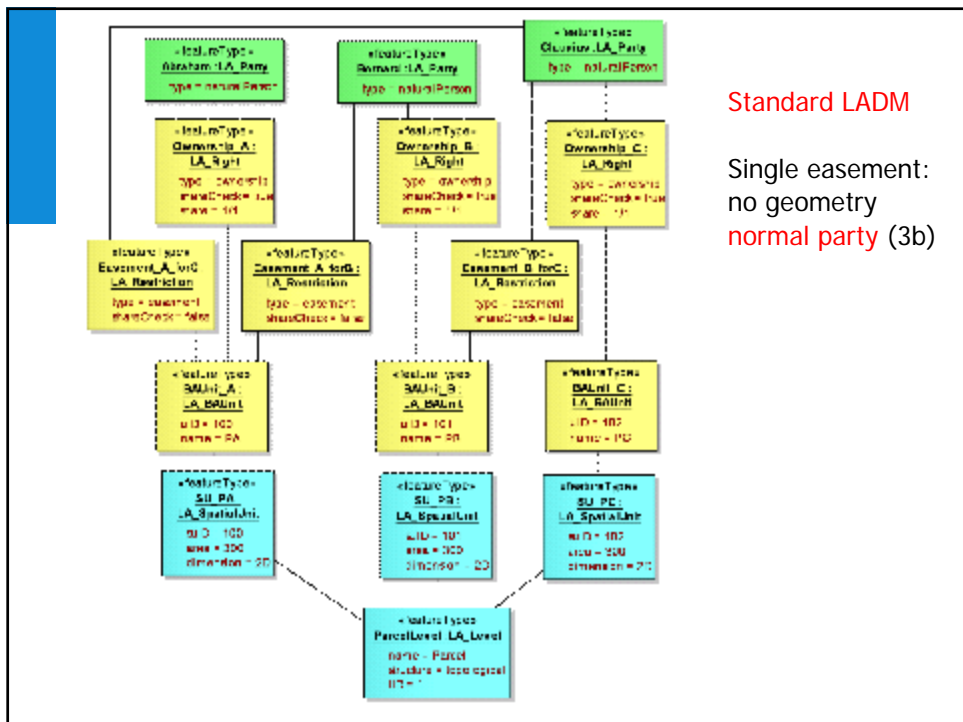4. Model alternatives
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5. Instance level diagrams for the easement real-world case

- 2 LADM alternatives (refined constraint, LA_RRR_Group extended) and 2 cases (1 or 2 easements) give 4 combinations
- For each combination there are 9 options to register easements:
  - geometry: 1. subdivision, 2. two levels, 3. no geometry
  - positive side: a. no party b. normal party, c. baunitAsParty
- Every option encoded as number-letter pair; e.g. 2c

- Total 4 * 9 = 36 instance level diagrams
- A subset will now be presented to illustrate the expression power of the 2 LADM alternatives

LA_RRR_Group model extension

Single easement:
no geometry
normal party (2b)

Note:
additional layer

(must be used in all cases even if no grouping needed; e.g. ownership)

LA_RRR_Group
model extension

Two easements:
no geometry
normal party (2b)

Note:
explosion of
instances
(becomes worse
with subdivision
geometry)

But possible
to group the 4
easement of
SU_PA in 2 groups

Standard LADM

Single easement:
no geometry
normal party (3b)

Standard LADM

Two easements:
no geometry
normal party (3b)

Not possible
to group the
4 easements
of SU_PA
in 2 groups

Standard LADM
(with 'trick')

Two easements:
no geometry,
2 levels
(text spatial unit)
normal party (4b)

Note:
new geometry
option introduced
for easements:
text spatial unit

In example SU_E1
covers both
SU_PA and SU_PB
(same for SU_E2)

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6. Conclusion

- Analysed need for grouping LA_RRRs
- Part-whole model patterns present   in LADM in different situations, different solutions   hogonal with reason)
- Most extreme grouping c   stigated: two easements on same parcel with m   rsons benefitting
- At least 9 differ   to register same easement situation (depending   ulations and traditions of specific countries)
- Both th   RR_Group extended LADM version and the   LADM could register all approaches:
    - andard LADM needed to use 'text spatial units'
    - LA_RRR_Group extended LADM → instance explosion (always)
- No need to change/make more complex current LADM

More time needed! See me in break if interested…

Standard LADM

Single easement:
no geometry
no party (3a)

Standard LADM

Single easement:
no geometry
baunitAsParty (3c)

Standard LADM

Single easement:
2 level geometry
normal party (2b)

Standard LADM

Single easement:
1 level geometry
(subdivision)
normal party (1b)

Standard LADM

Two easements:
2 level geometry
normal party (2b)