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Modelling 3D legal spaces of Public Law Restrictions within the context of LADM revision

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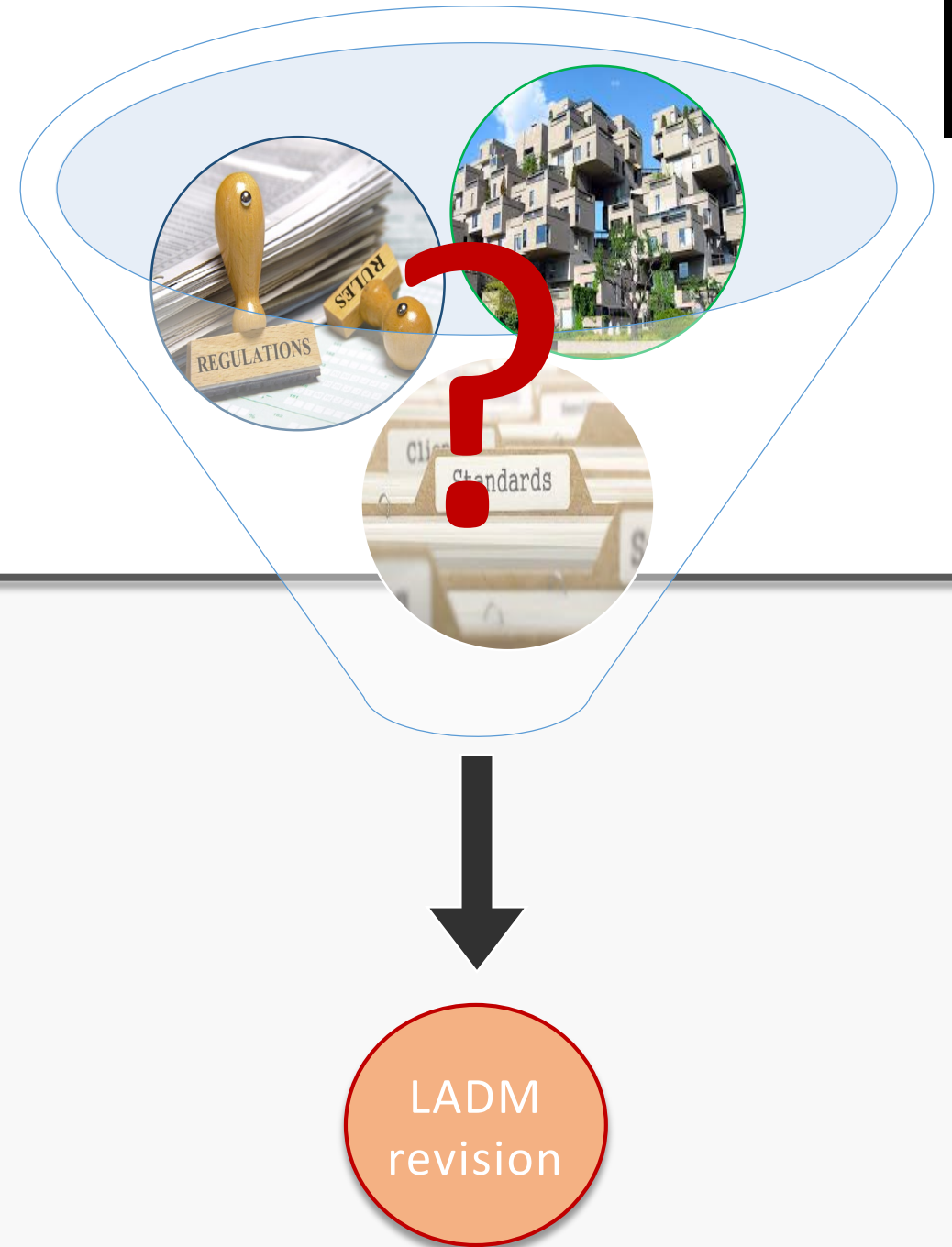
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MOTIVATION

- ✓ Gradual increase of PLRs - in number & complexity
- ✓ Legal & technical challenges on PLRs registration
- ✓ A few literature on their management with 3D LAS
- ✓ Ongoing revision process of ISO 19152 LADM

SCOPE

- ✓ Propose a flexible framework to model PLRs at conceptual level in the context of ISO 19152 LADM Edition II
- ✓ Classification of PLRs
- ✓ Investigate alternatives on PLRs' organisation & modelling using LADM Part 2
- ✓ Validation of modelling proposal using two case studies in Greece



PUBLIC LAW RESTRICTIONS

- ✓ Imposed by the state on individuals
- ✓ Derive from multiple legal statutes of different scientific fields
- ✓ Descriptively defined
 - Geometrical 3D definition
 - Non-geometrical 3D definition
 - Implied 3D definition
- ✓ Parcel-based or non-parcel based
- ✓ Registered on various registries

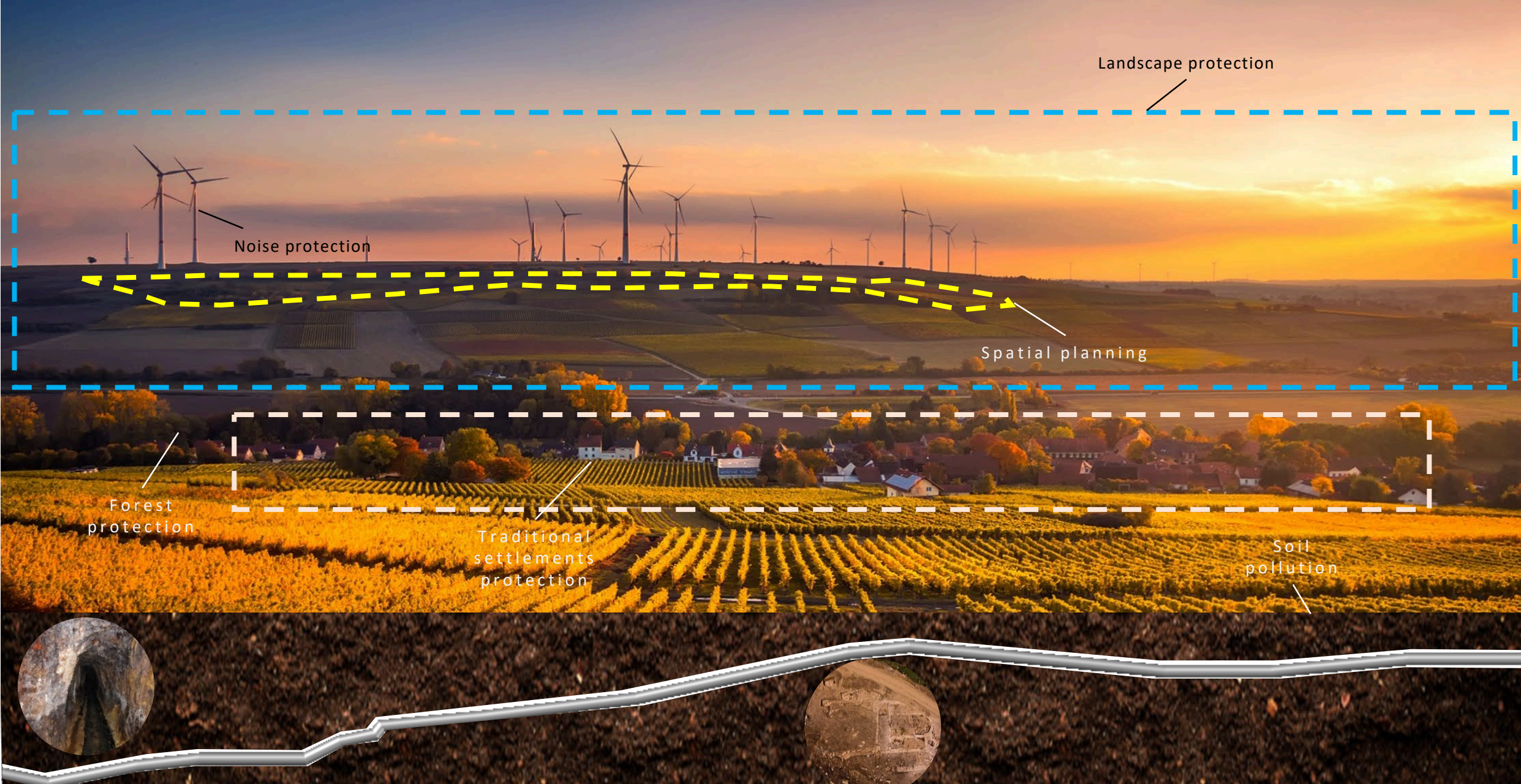
- ✓ Obligatory character
- ✓ Regulate various aspects of different activities
 - Not traced in one place
 - Usually not related to Land Law
- ✓ 2D based
- ✓ Need to be “translated” to spatial terms (volume, depth, height)
- ✓ Independent from cadastral parcels

- ✓ Complexities regarding the space affected by PLRs
- ✓ Time consuming research
- ✓ Jeopardise investments

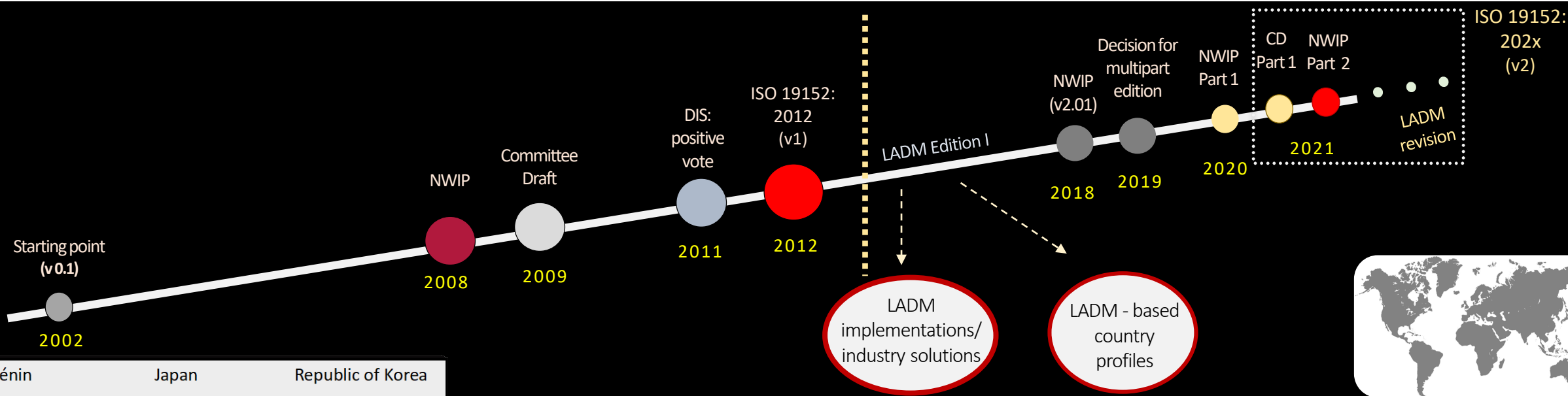
PUBLIC LAW



PUBLIC LAW



LADM EVOLUTION [ISO 19152]



Bénin	Japan	Republic of Korea
Brazil	Kenya	Saudi Arabia
Cape Verde	Malaysia	Scotland
China	Mongolia	Serbia
Colombia	Montenegro	Singapore
Croatia	Morocco	Slovenia
Cyprus	Mozambique	South Africa
Czech Republic	Nigeria	South Korea
Greece	Poland	The Netherlands
Honduras	Portugal	Trinidad and Tobago
Hungary	Queensland, Australia	Turkey
Indonesia	Republic of Srpska	Victoria, Australia
Israel	Russian Federation	Vietnam

LADM implementations/
industry solutions

LADM - based
country profiles

- ✓ Fully & Partly operational implementations
- ✓ UN Habitat/ GLTN STDM
- ✓ Fit for Purpose Land Administration
- ✓ ESRI, CADASTRAL, IGNFI, etc.
- ✓ References: IHO, WorldBank, UN GGIM

PLRs IN LADM EDITION II

- Legal differences depending on jurisdiction
- Deriving from multiple authorities

- ✓ Classification
- ✓ Organisation based on LADM Edition II

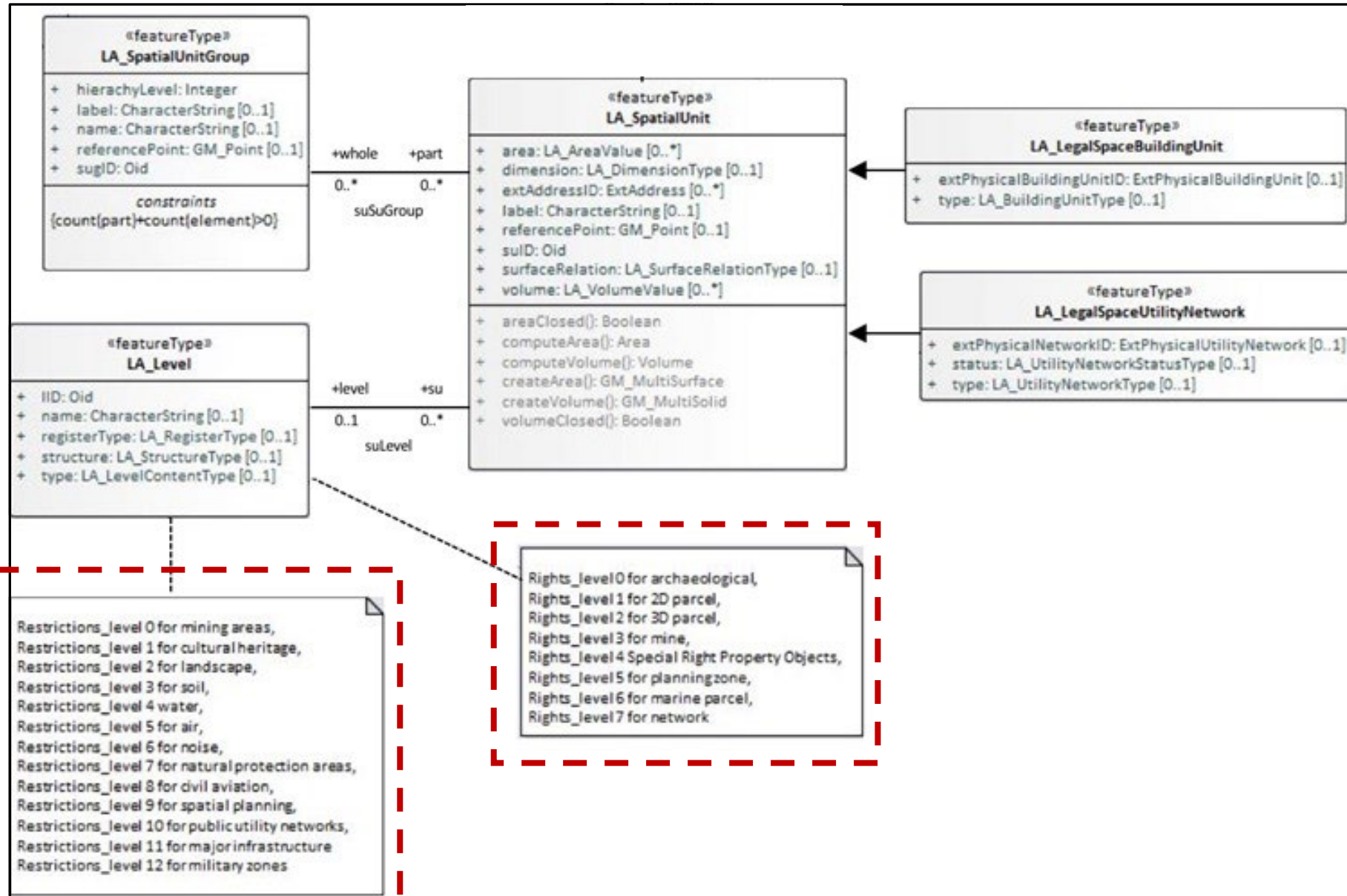
2 main criteria:

- Should PLRs be modelled at the legal part of the LADM or at the spatial part ?
- Should subclasses to organise the various PLR categories, or a structure with semantically enriched code lists with hierarchical structure ?



Sector	Description
Mining areas	<ul style="list-style-type: none"> ▪ Health and safety provisions ▪ Restrictions on activities related to the ownership of minerals/quarry material
Cultural Heritage	<ul style="list-style-type: none"> ▪ Restrictions to avoid harm of underground antiquities (e.g. in-situ preservation of antiquities; restrictions due to construction of infrastructures or other activities) ▪ Restrictions in constructing new buildings, alteration, restoration and use ▪ Restrictions in maritime activities within or in the vicinity of marine antiquities
Building Regulations and Spatial Planning	<ul style="list-style-type: none"> ▪ Construction Regulations/ Building restrictions (e.g. Restrictions on building height for landscape protection; Restrictions on materials, scale, colour, size, architectural style of constructions to match surrounding landscape, etc.) ▪ Urban, zone and spatial planning provisions (e.g. land uses, zoning plans, Shoreline and coastal zones , forest zones etc.)
Civil Aviation	<ul style="list-style-type: none"> ▪ Non-military manned air vehicles (e.g. definition of special flights' rules such as non-flight zones; definition of general minimum flight height; definition of obstacle limitation surfaces, designating the airspace around an airport where restrictions apply to constructions' or physical objects' heights) ▪ Unmanned Air Vehicles (e.g. Fly under permission above specific heights; Flight prohibition over infrastructures or correctional facilities; Definition of maximum flight height)
Environment protection	<ul style="list-style-type: none"> ▪ Natural protection zones (such as restrictions on forest protection; natural habitats; biodiversity and protected areas) ▪ Soil (restrictions regarding soil contamination (deriving from soil geological or chemical characteristics); mitigation measures on contaminated soil) ▪ Water (restrictions regarding the protection of surface and groundwater bodies) ▪ Air (such as restrictions for the protection of public health from contaminants in the air; restrictions regarding radio waves propagation to ensure efficient communication and broadcasting as well as protect public health and the natural environment from extended exposure to electromagnetic

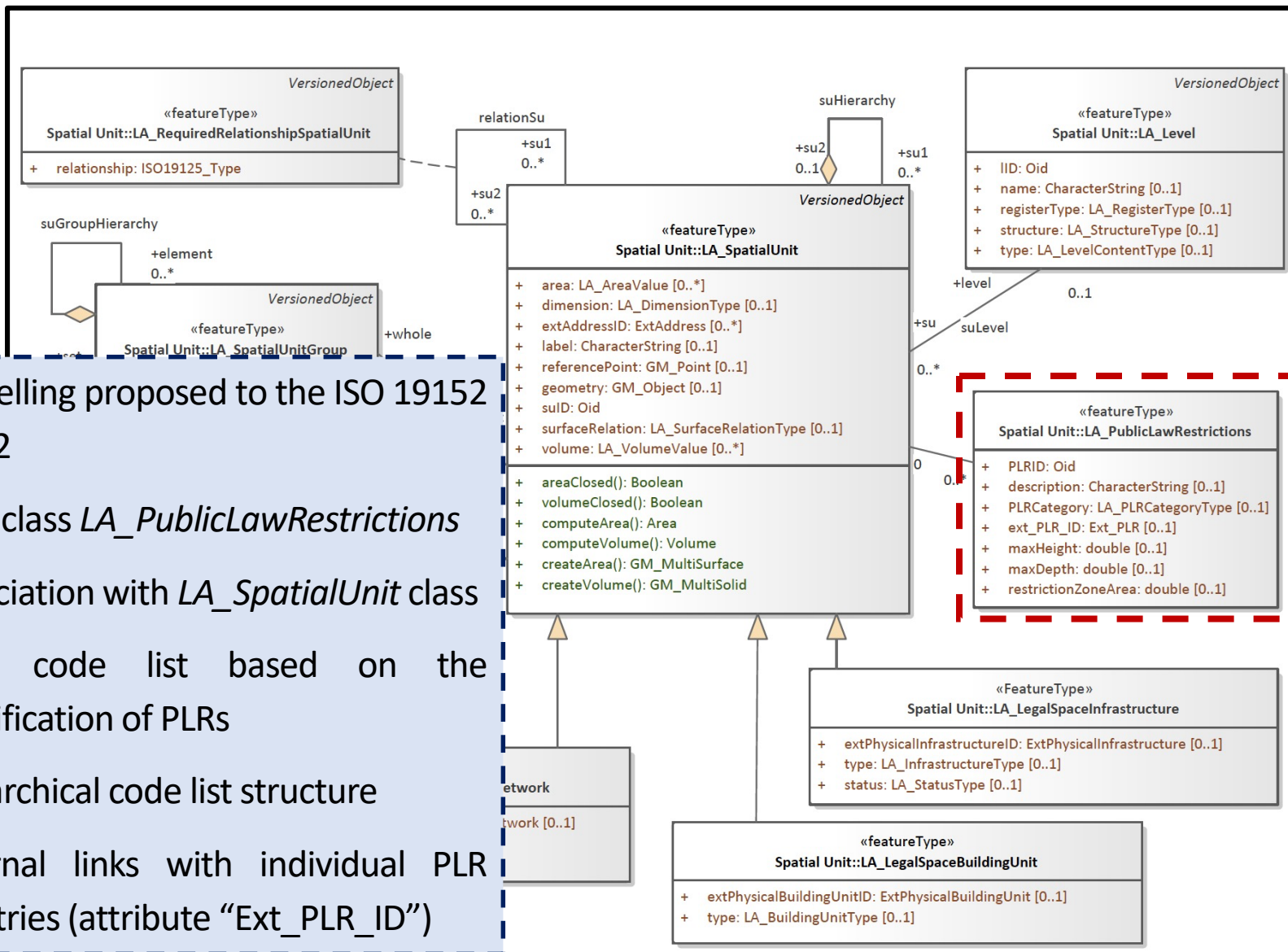
MODELLING THE SPATIAL PART - ALTERNATIVE 1



- Use of *LA_Level* concept
- Enriched code list values of the *LA_RestrictionType*
- Corresponding “Rights” levels is included

- «codeList» Administrative: LA_RestrictionType**
- + adminPublicServitude
 - + monument
 - + monumentPartly
 - + mortgage
 - + noBuilding
 - + PLRair
 - + PLRcivilAviation
 - + PLRculturalHeritage
 - + PLRlandscape
 - + PLRmajorInfrastructure
 - + PLRmilitaryZones
 - + PLRminingArea
 - + PLRnaturalProtectionArea
 - + PLRnoise
 - + PLRpublicUtilityNetwork
 - + PLRspatialPlanning
 - + PLRwater
 - + servitude
 - + servitudePartly

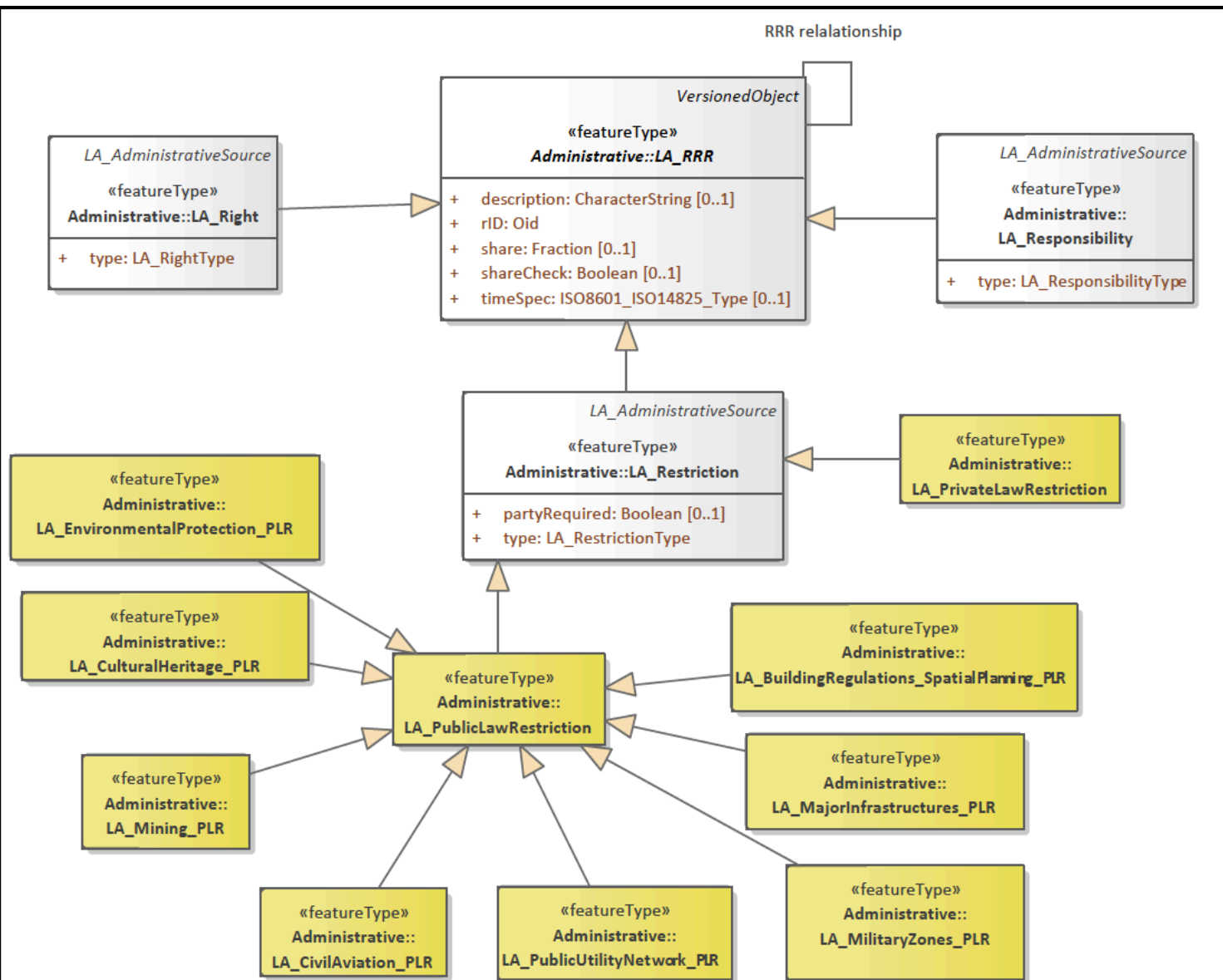
MODELLING THE SPATIAL PART - ALTERNATIVE 2



- Modelling proposed to the ISO 19152 Part 2
- New class *LA_PublicLawRestrictions*
- Association with *LA_SpatialUnit* class
- New code list based on the classification of PLRs
- Hierarchical code list structure
- External links with individual PLR registries (attribute “Ext_PLR_ID”)

«codeList» Spatial Unit::LA_PLRCategoryType	
+ 1 - mining areas	
+ 1.1 health & safety provisions	
+ 1.2 ownership restrictions	
+ 2 - cultural heritage	
+ 2.1 buffer zone restrictions to avoid harm of antiquities	
+ 2.2 construction of new buildings, renovations	
+ 2.3 maritime activities	
+ 3-building regulations & spatial planning	
+ 3.1 construction regulations & building restrictions	
+ 3.2 urban, zone & spatial planning provisions	
+ 4-environmental protection	
+ 4.1 natural protection zones	
+ 4.2 soil	
+ 4.3 water	
+ 4.4 air	
+ 4.5 noise	
+ 5-civil aviation	
+ 5.1 non-military manned air vehicles	
+ 5.2 Unmanned Air Vehicles	
+ 6-public utility networks	
+ 6.1 land use restrictions	
+ 6.2 rights of way	
+ 6.3 servitudes of passage	
+ 7-major infrastructures	
+ 7.1 land use restrictions	
+ 7.2 rights of way	
+ 7.3 servitudes of passage	
+ 8-military zones	
+ 8.1 restricted area	
+ 8.2 no flight zone	

MODELLING THE LEGAL PART



- 2 new subclasses at *LA_Restriction* class related to public and private law
- *LA_PublicLawRestriction* class has 8 subclasses based on PLR classification

COMPARISON OF ALTERNATIVES

SPATIAL PART - ALTERNATIVE 1

- Flexible and discrete modelling of information
- Rights and restrictions related to PLRs are both being modelled

- Simple modelling as only one class is added: generic characteristics that apply to most of the PLRs
- Not very flexible to add further insights/ information

SPATIAL PART - ALTERNATIVE 2

LEGAL PART

- Increase complexity due to multiple new classes
- Discrete & clear modelling of the various characteristics of the categories of PLRs

USE CASES

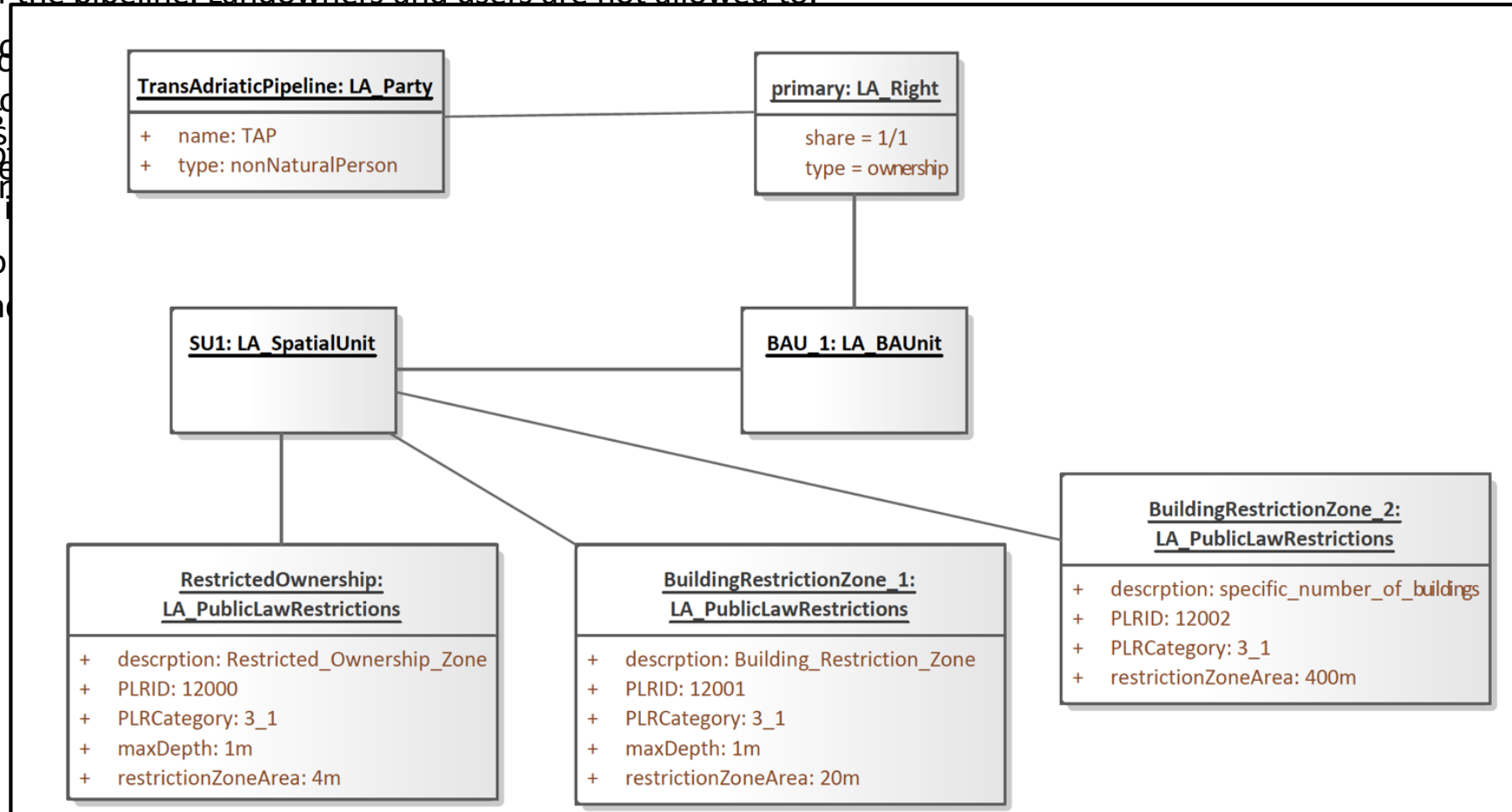
1. TRANSADRIATIC PIPELINE



- **Restricted Ownership Zone**

- **Building Restriction Zone** 4 metres along each side of the pipeline. Landowners and users are not allowed to:

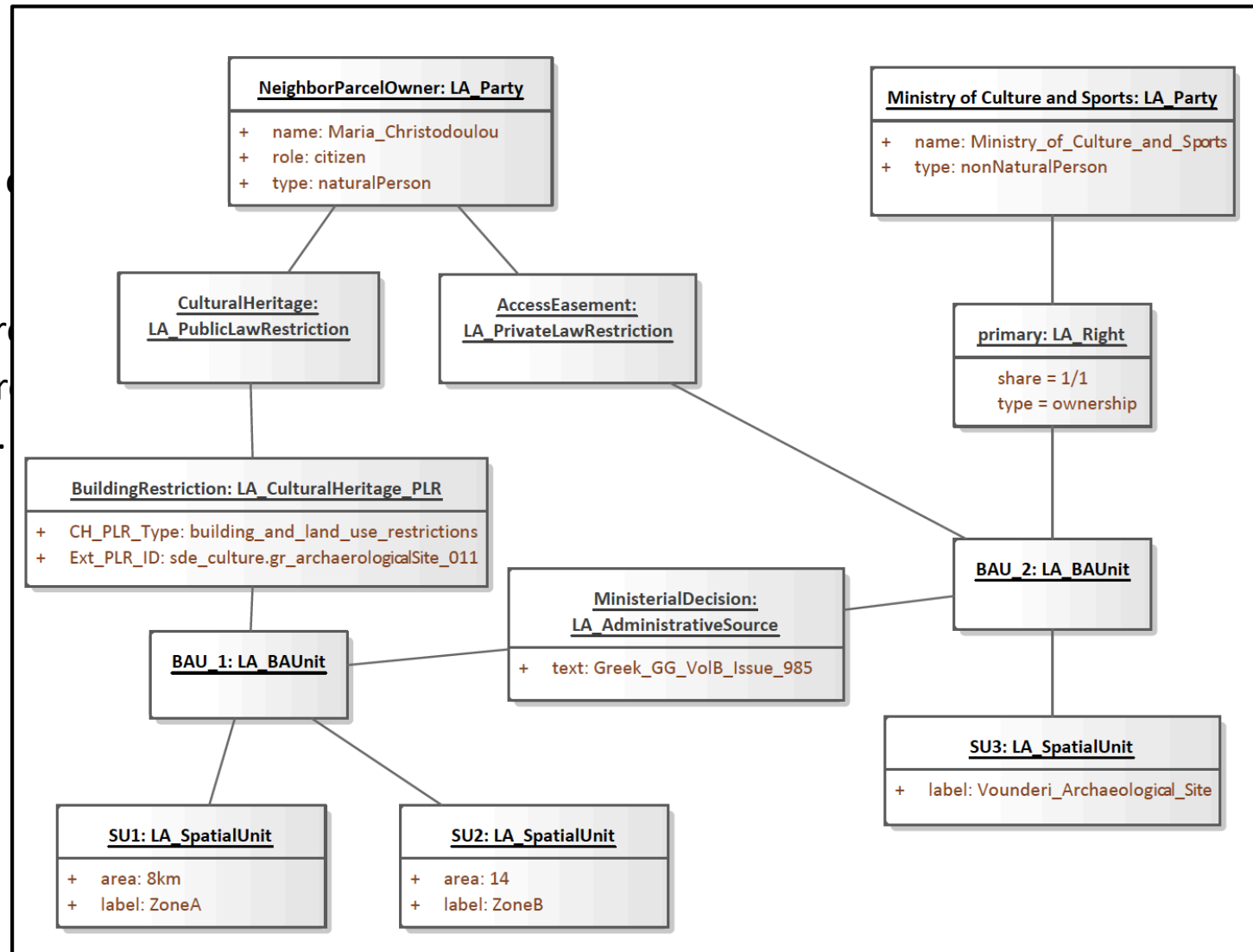
- Construct buildings
 - To cultivate deep-rooted plants
 - Construct buildings
 - Drilling or opening of pits
 - Install disposal systems
 - Restrictions to the use of land
 - Install underground infrastructure
 - Make alterations to the ground, such as spreading rubble, creating ponds, etc.
 - Build new roads



USE CASES

2. ARCHAEOLOGICAL SITE OF VOUNDENI

- **Zone A**
 - Only agricultural activities are allowed and roads
- **Zone B**
 - A specific region within Zone A, defined in minimum parcel area 4000 sq.m.
 - Minimum excluded from the non-construction plan is excluded from the plan at 50 metres
 - Minimum façade length on roads to 45 metres
 - Land parcels' building coefficient up to 0.20.



CONCLUSIONS

- ✓ Initiates discussion on developing a generic model for modelling PLRs
- ✓ Identification of pros and cons of each alternative
- ✓ Legal approach is more efficient when PLRs have different characteristics to be modelled as attributes
- ✓ Examined alternatives on spatial part show more emphasis on the spatial extent of PLRs

FURTHER RESEARCH

- ✓ Extend on other types of PLRs
- ✓ Examination of the approaches of different jurisdictions
- ✓ Examination of the alternatives on different jurisdictions
- ✓ Comparative analysis to identify best practices and drawbacks



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