

# **INSPIRE process, standardization of geoinformation (in Europe)**

**LPIS Workshop 17-18 September 2008, Sofia, Bulgaria**

**September 22, 2008**

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# Overview

1. INSPIRE data specification  
(part sheets from Paul Smits, JRC)
2. INSPIRE cadastral parcels
3. ISO 19152 Land Administration Domain Model

# Harmonizing geoinformation in Europe

- Concerns about 34 different types of data sets
- 27 different countries with 22 languages (and more influence; e.g. Iceland, Norway and Switzerland are also involved)
- Agreement on content during **exchange**, considering consistency (within, but also) between:
  - Themes
  - Scales (levels of detail)
  - Borders

# Bridge near Laufenburg collapsed due to altitude measurement difference of 0.54 m between Swiss and German side

Map of Europe showing the change in the number of people aged 65 and over between 1995 and 2020 for various countries. The map uses color-coding: yellow for positive changes, orange for moderate positive changes, green for moderate negative changes, red for significant negative changes, and blue/purple for smaller changes. Numerical values are placed on each country.

Country	Change (1995-2020)
Iceland	+4
Norway	+1
Sweden	+4
Finland	+2
Estonia	+1
Lithuania	+4
Latvia	+5
Poland	+6
Czechia	+2
Slovakia	+2
Hungary	+18
Slovenia	+17
Croatia	+16
Bosnia and Herzegovina	+15
Serbia	+14
Montenegro	+14
Albania	+10
Moldova	+12
Ukraine	+14
Romania	+3
Bulgaria	+3
Greece	+3
Turkey	+3
Portugal	-32
Spain	-39
France	-49
Germany	-35
Austria	-28
Italy	-35
Malta	-35
Cyprus	-33
Gibraltar	-33
Belgium	-33
Netherlands	-34
Denmark	-46
Switzerland	-23
United Kingdom	+12
Ireland	+7
Malta	+1
France	+1
Germany	+1
Poland	+1
Czechia	+1
Slovakia	+1
Hungary	+1
Slovenia	+1
Croatia	+1
Bosnia and Herzegovina	+1
Serbia	+1
Montenegro	+1
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Moldova	+1
Ukraine	+1
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Bulgaria	+1
Greece	+1
Turkey	+1
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Gibraltar	+1

# Themes (annex I and II)

## Annex I:

- Coordinate reference systems
- Geographical grid systems
- Geographical names
- Administrative units
- Addresses
- Cadastral parcels
- Transport networks (water,..)
- Hydrography
- Protected sites

## Annex II:

- Elevation
- Land cover
- Orthoimagery
- Geology (aquifers,..)

# Themes (annex III)

- Statistical units
- Buildings
- Soil
- Land use
- Human health and safety
- Utility and Government services (water supply, sewage,..)
- Environmental monitoring facilities
- Production and industrial facilities (water abstraction,..)
- Agricultural and aquaculture facilities
- Population distribution – demography
- Area management/restriction/regulation zones & reporting units (areas around drinking water,..)
- Natural risk zones
- Atmospheric conditions
- Meteorological geographical features
- Oceanographic geographical features
- Sea regions
- Bio-geographical regions
- Habitats and biotopes
- Species distribution
- Energy resources
- Mineral resources

# INSPIRE components (drafting teams)

- metadata\*
- data specification\*
- network services\*
- access and rights of use for Community institutions and bodies\*\*
- monitoring and reporting mechanisms\*\*

\* technical: under JRC responsibility

\*\* legal/procedural: under Eurostat responsibility

## INSPIRE is a Framework Directive

Detailed technical provisions for the issues above will be laid down in Implementing Rules. Once adopted, Implementing Rules become European legislative acts and national law in 27 Member States and in some EFTA countries

# Time table metadata and data in years after 15 may 2007

	Implementing rules metadata	Metadata (+after rules)	Implementing g rules data	New data (+after rules)	Existing data (+after rules)
<b>Annex I</b>	1 2008	(+2 =) 3 2010	2 2009	(+2 =) 4 2011	(+7 =) 9 2016
<b>Annex II</b>	1 2008	(+2 =) 3 2010	5 2012	(+2 =) 7 2014	(+7 =) 12 2019
<b>Annex III</b>	1 2008	(+5 =) 6 2013	5 2012	(+2 =) 7 2014	(+7 =) 12 2019

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# Data specifications, results until today

Deliverable	Status
D 2.3: <b>Scope and Definition of Annex I/II/III Themes</b> based on INSPIRE position papers, Selected reference materials submitted by the SDICs and LMOs	Version 3.0
D 2.5: <b>Generic Conceptual Model</b> based on ISO 19101, 19103, 19107, 19108, 19109, 19110, 19111, 19112, 19115, 19123, 19126, 19131, 19136, 19139, ISO/IEC 19501, OGC 06-103r3	Version 3.0
D 2.6: <b>Methodologies for data specifications</b> based on Methodology developed by the RISE project Selected reference materials submitted by the SDICs and LMOs	Version 3.0
D 2.7: <b>Implementing rules for exchange of spatial data</b> based on ISO 19118, 19136, 19139 INSPIRE Generic Conceptual Model	Comment resolution

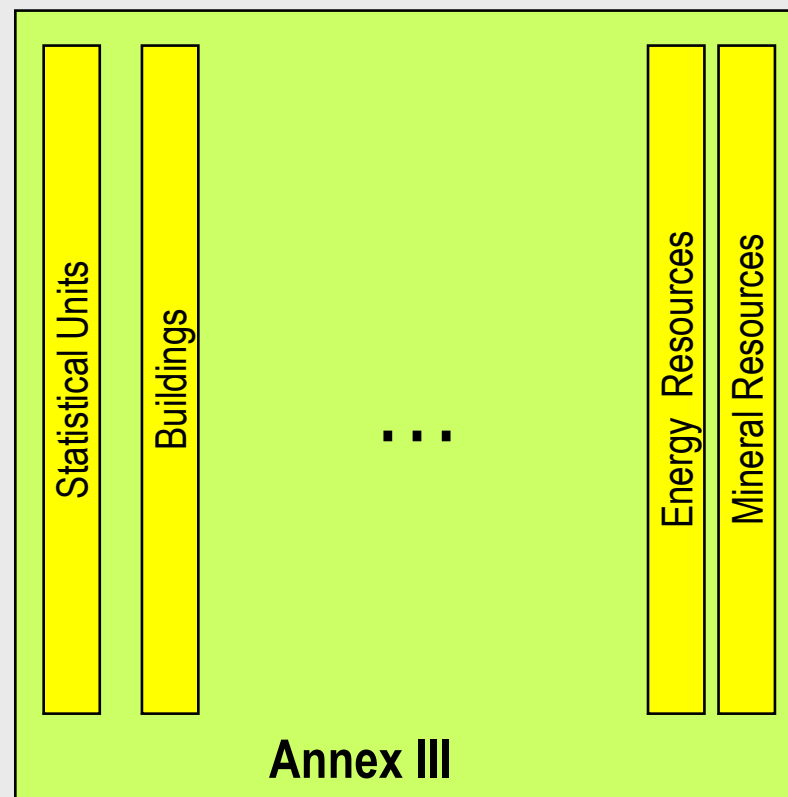
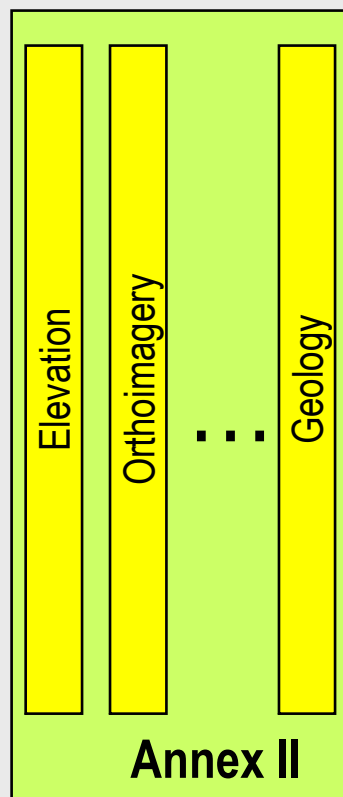
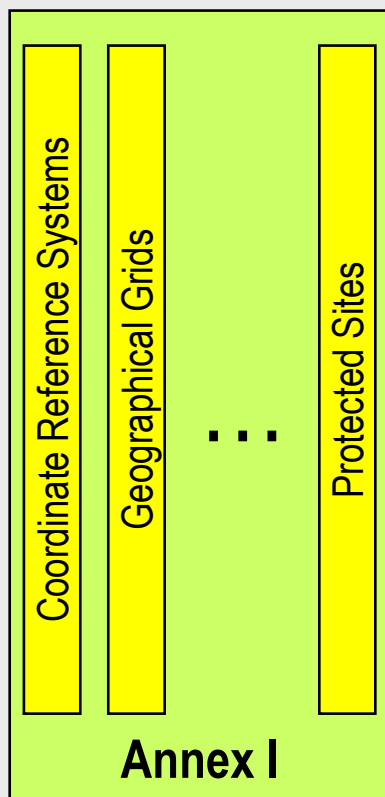
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not yet theme specific data specification

# Data Specifications - Approach

Implementing Rules comprising data (product) specifications for 34 themes



## Conceptual Framework

**D2.3**  
Definition of Annex  
Themes & Scope

**D2.5**  
Generic Conceptual Model

**D2.6**  
Methodology for  
Specification Development

**D2.7**  
Guidelines for Encoding

# General principles

INSPIRE lays down general rules to establish an infrastructure for spatial information in Europe

- for the purposes of Community **environmental** policies and
- policies or activities which may have an impact on the **environment**

INSPIRE must be based on existing data

Harmonisation in INSPIRE must be done based on user requirements:

- pan-european use cases
- cross-border use cases
- linked with **environment**

Harmonisation has to be feasible and cost-benefits have to be analysed.

# Overview

1. INSPIRE data specification
2. INSPIRE cadastral parcels  
(part sheets from Dominique Laurent, IGN France)
3. ISO 19152 Land Administration Domain Model

# Stakeholders' participation

Data specifications are developed by Thematic Working Groups consisting of domain experts proposed by the stakeholders (SDIC/LMO) and a facilitator and editor nominated by the Commission

## 8 Thematic Working Groups on Annex I data

**September**

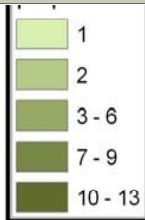
The slide contains the following elements:

- INSPIRE Call for Expression of Interest:**
  - Title: Call for Expression of Interest for Development of Data Specifications:
    - to submit Candidate Specifications (scenario 1)
    - to participate in Specification Development (scenario 2)
  - Creator: INSPIRE Consultation Team
  - Date: 04 September 2007
  - Subject: INSPIRE - Call for Expression of Interest for development Data Specifications
  - Status: Final
  - Publisher: JRC-Institute for Environment and Sustainability-SDI Unit, Ispra
  - Type: Text
  - Description: INSPIRE\_data specification, terms of reference, call for expression of interest.
  - Contributor: Daria Uhliringer, Katalin Tóth, Vanda Maria de Lima, Eva Pauknerová, Michel Mior, Alessandro Annotti
  - Format: MS Word 95/2000 (.doc)
  - Source: N/A
  - Rights: Public
  - Identifier: Call\_scenario\_1\_2\_update230807.doc
  - Language: En
  - Revision: 1. INSPIRE Work Programme Transposition Phase (2007-2009)  
2. Terms of Reference for developing Implementing Rules laying down Technical Arrangements for interoperability and harmonisation of Spatial Catalogue  
3. Terms of Reference for developing Implementing Rules laying down Technical Arrangements for interoperability and harmonisation of Spatial Catalogue
  - Coverage: 2007-2012
- Map of Europe:** Countries are shaded in five levels of green based on the number of thematic working groups:
  - Level 1 (lightest green): UK, DK, LV, PL, HU
  - Level 2: SE, FI, NL, BE, DE, FR, IT, ES, PT
  - Level 3-6 (medium green): NO
  - Level 7-9 (dark green): None
  - Level 10-13 (darkest green): None
- Meeting Photo:** A group of people sitting around a conference table with laptops, engaged in a discussion.
- Date:** September

## 8 Thematic Working Groups on Annex I data

Call for Expression of Interest for Development of Data Specifications:

- to submit Candidate Specifications (scenario 1)
- to participate in Specification Development (scenario 2)



September



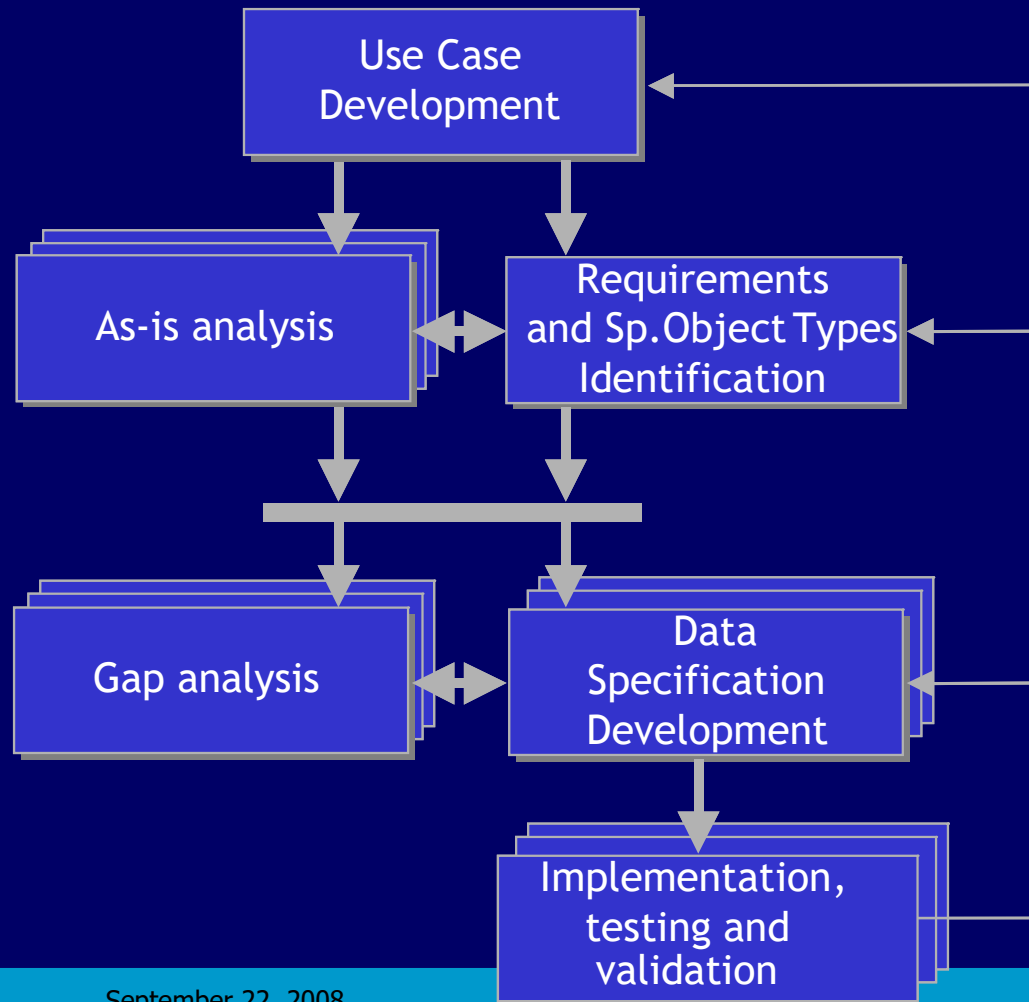
# The context

1. Identification of main stakeholders:
  - PCC
  - EuroGeographics Expert Group on Cadastre
  - FIG
  - UN WPLA
  - EURODIN ( eContent +project)
2. Identification of relevant standards : LADM a new work item proposal to ISO/TC 211 (by FIG)
3. Use a classification based on the one provided by WG-CPI survey
  - Land market                      - Agriculture
  - Environment                      - Spatial planning
  - Infrastructures                      - Public administration
  - Public safety                      - Socio-economic analysis

# Definition of parcel

- In the INSPIRE Directive:
  - “areas defined by cadastral registers or equivalent”
  - not very explicit (specially for MS having sub-parcels or “over-parcels”)
- TWG CP explanation
  - **single** part of earth surface with homogeneous **rights**
- 5 Core elements (WG-CPI): Geometry, Surface (area/size), Identifier, Georeferencement, Temporal information, and many optional ones...

# D2.6 Methodology for the development of data specifications



Step-wise methodology

Guideline for the  
INSPIRE  
Thematic Working Groups  
(TWGs)



# The first three steps...

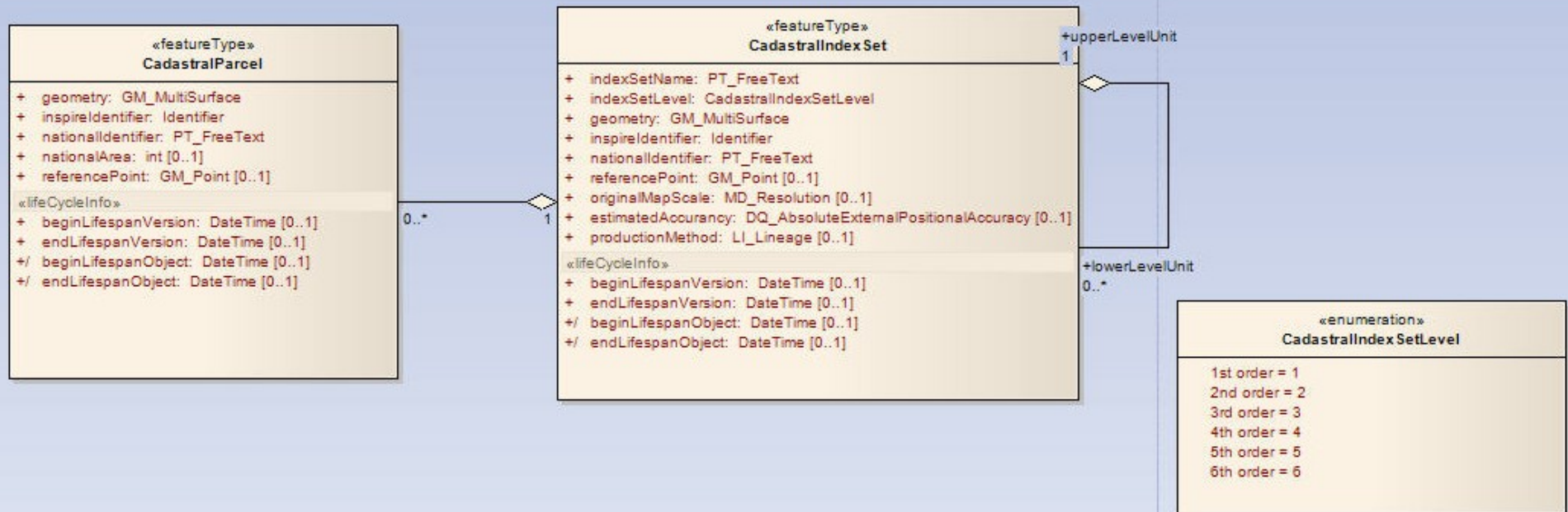
- As-is analysis
  - General overview (from WG-CPI survey in 2005)
  - More detailed information on 11 countries
- Requirements
  - INSPIRE (D2.5)
  - Available use cases/check-lists
  - TWG CP members expertis
- Gap analysis/first proposals
  - Discussion papers
  - Discussion during TWG CP meetings

# Content Data Product Specification

## ISO 19131 based

- |   |                                |    |  |
|---|--------------------------------|----|--|
| 1 | Scope (of the Document)        | 8  | Metadata                                   |
| 2 | Overview                       | 9  | Delivery                                   |
| 3 | Specification scopes           | 10 | Data Capture (optional)                    |
| 4 | Data product<br>identification | 11 | Portrayal                                  |
| 5 | Data content and<br>structure  | 12 | Additional information<br>(optional)       |
| 6 | Reference systems              |    | Annex A (normative) Abstract<br>Test Suite |
| 7 | Data quality                   |    |  |

# Clause 5, data content and structure (example UML diagram 4-sept-08)



Ongoing work, optional class added (boundary)...

# Roadmap TWG Annex I themes

- Kick-off meeting: February 2008
- Evaluation of user requirements: June 2008
- As-it analysis and gap analysis: August 2008
- First draft of data product specification: September 2008
- Internal review of first draft (DT DS, CT, EIONET): October 2008
- Second draft of data product specification: November 2008
- Review by SDIC/LMO: January 2008
- **Testing, revised DPS: March 2008**
- Submission to the INSPIRE Committee: May 2009

# Overview

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(part sheets from Chrit Lemmen, ITC/Kadaster NL)

# Standardization in Land Administration?

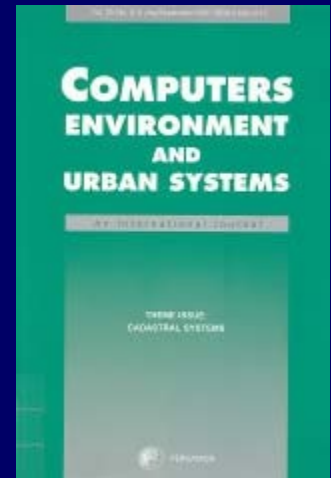
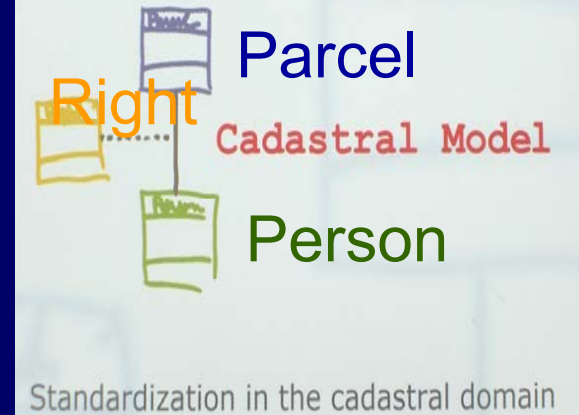
- There are supposed to be huge differences between cadastral and land registry systems
- Look to the common area's:
  - Standardised Model (adaptable, extensible)
  - Avoid re-inventing the wheel
  - Enable involved parties to communicate
- Lack of a shared set of concepts and terminology in the Land Administration Domain

# Proposal (FIG, Washington 2002) by Lemmen/van Oosterom

- Develop standard Core Cadastral Domain Model (CCDM), including:
  - Spatial part (geometry, topology)
  - Extensible frame for legal/admin part
  - Based on core **object-right-subject**
- Object-orientation Æ express in UML
- Model Driven Architecture (MDA)
- Accepted by large community: FIG, OGC, UN, ISO, user support, this means it can be **adapted by the industry**
- Maximize co-operation, minimize double effort

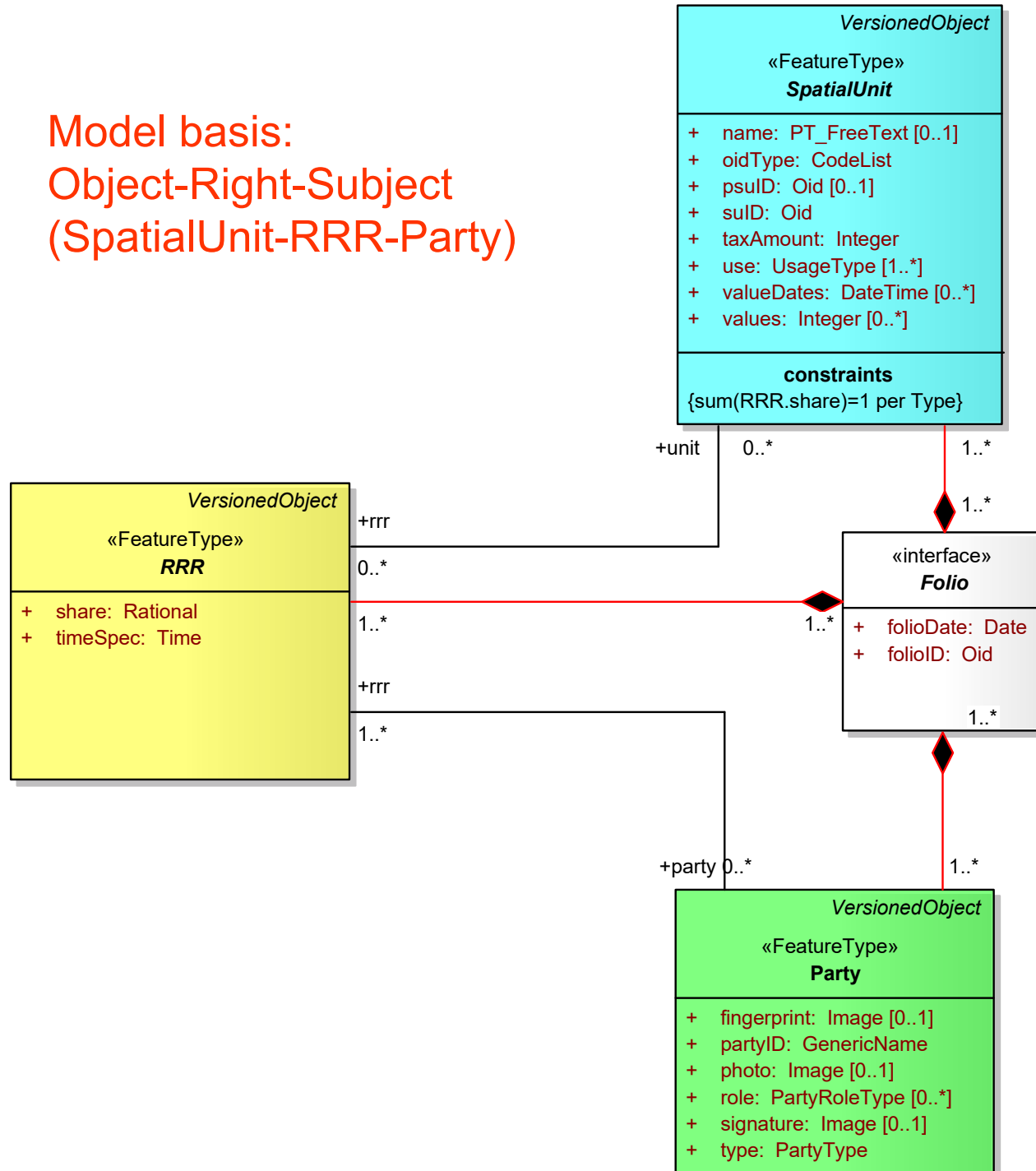
# CCDM/LADM

- Workshops:
  - Enschede, The Netherlands, 2003
  - Bamberg, Germany, 2004
- Reviews by many experts
- Several Publications
- Many persons involved in this development
- Version 1.0 presented in Munich 2006, Germany
- FIG proposed LADM to ISO TC211, January 2008
- Accepted after voting by P-members
- ISO 19152 – started in Copenhagen in May 2008



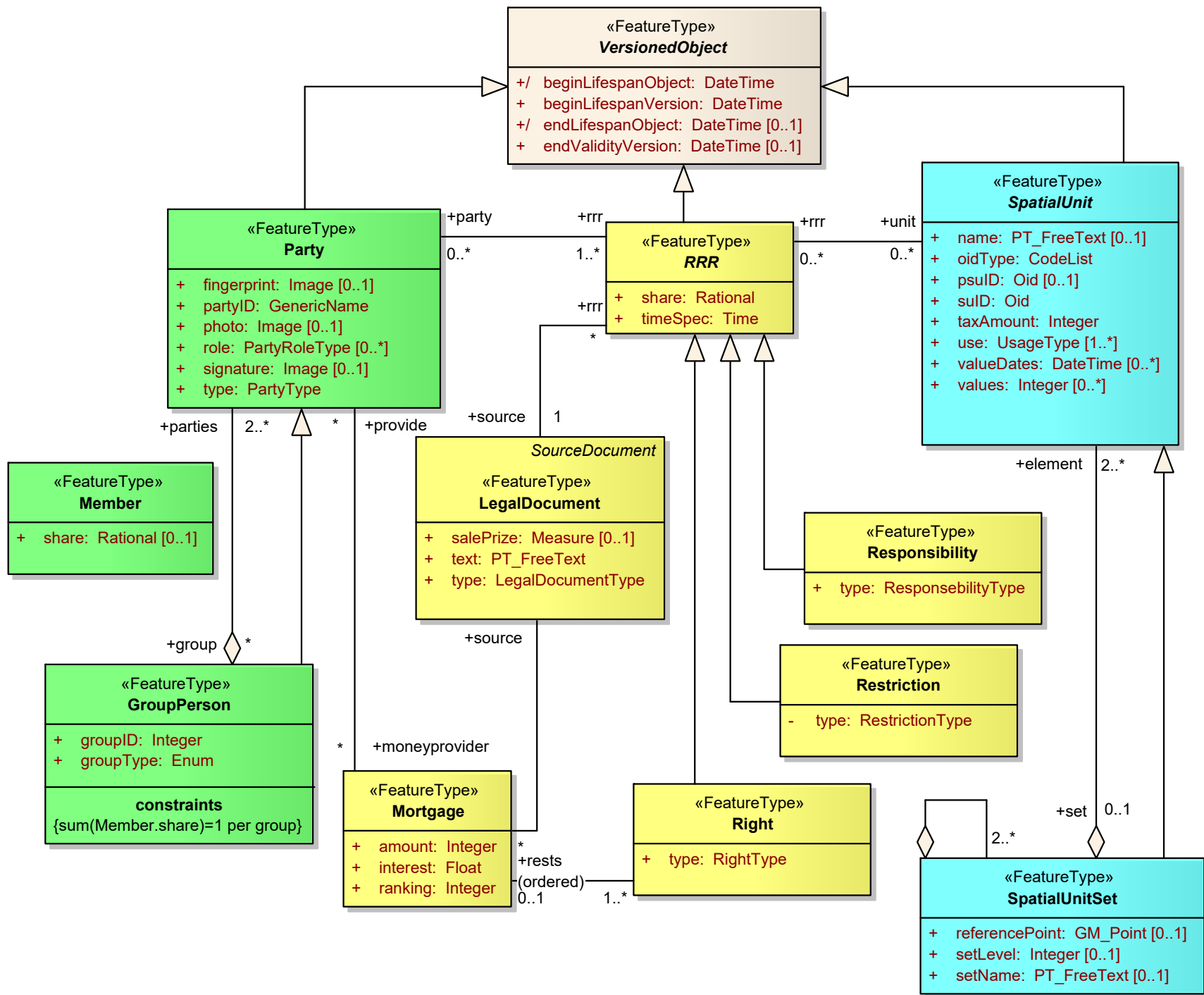


# Model basis: Object-Right-Subject (SpatialUnit-RRR-Party)



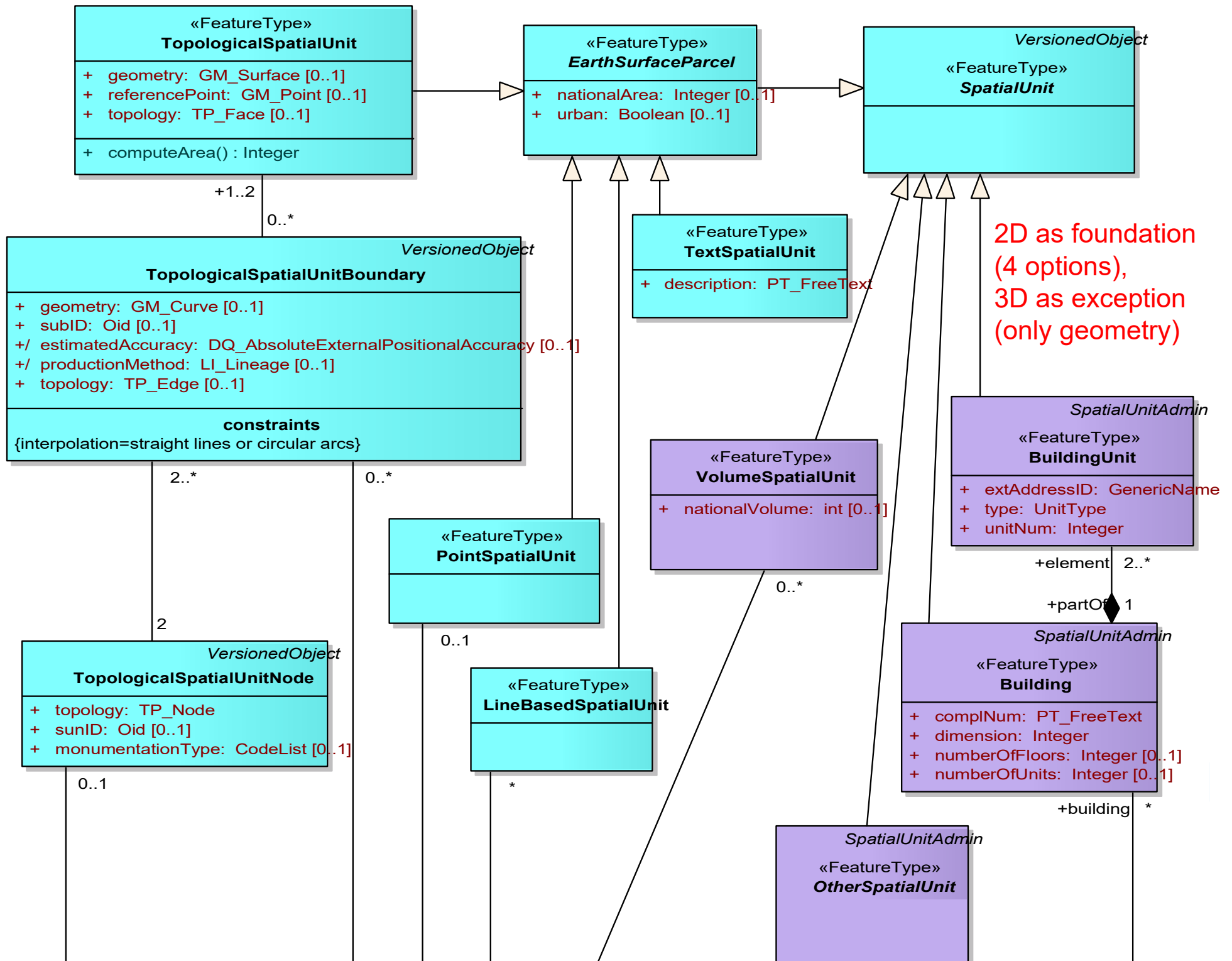
## LADM:Legal-administrative

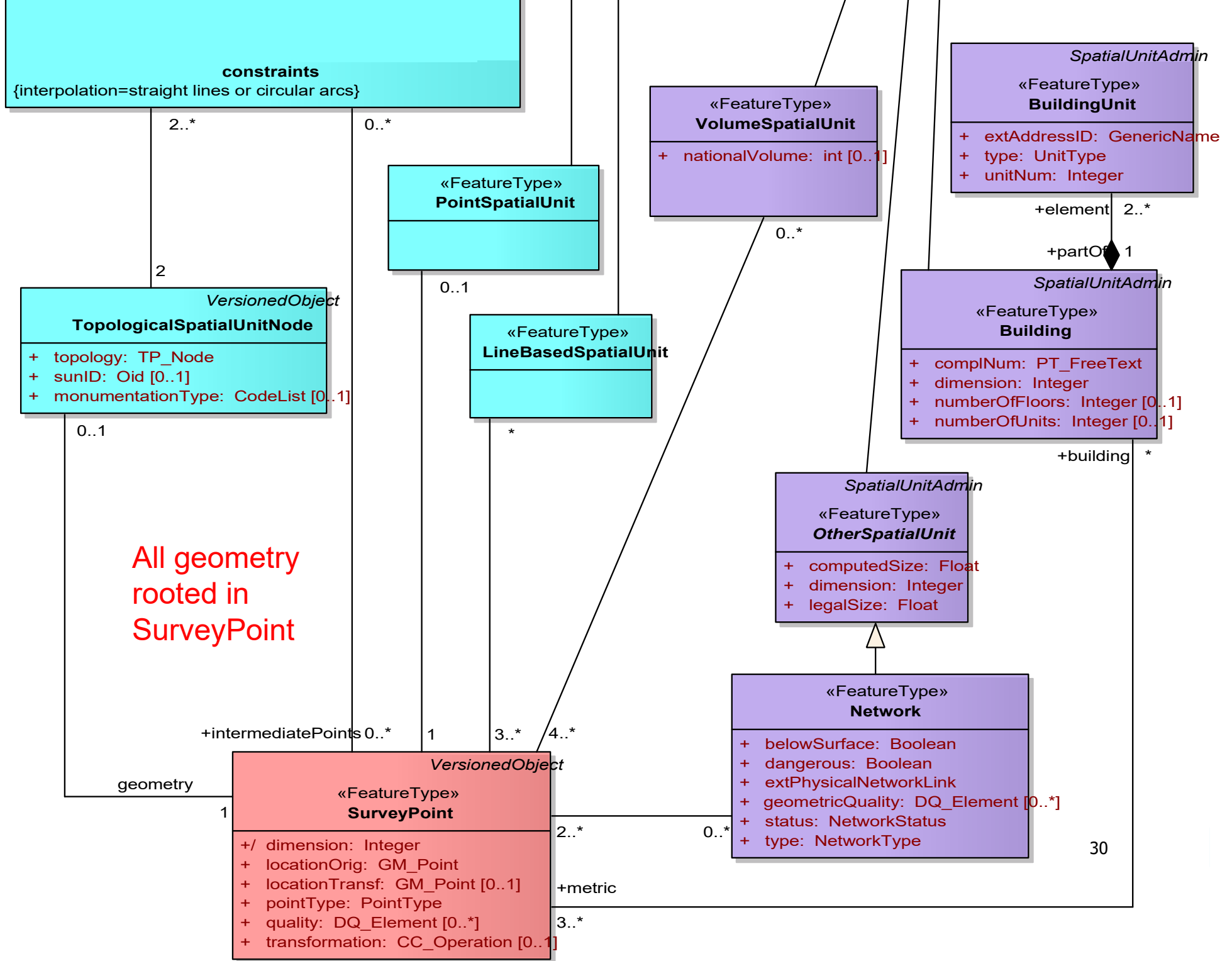
- RRR (Right Restriction Responsibility) has associations with Party (Person) and SpatialUnit (RegisterObject)
- Mortgage and RRRs are based on **legal documents** or decisions
- Parties can be natural or non natural (private, gov, groups, etc.)
- Surveyor, farmer, notary, money provider are included, role types of the Party class
- A RRR can be temporal:
  - Long lease (or ownership for limited time)
  - Nomadic behaviour
  - Time-sharing (mon-fri:X, sat-sun:Y)
  - Fishing/hunting rights during certain season



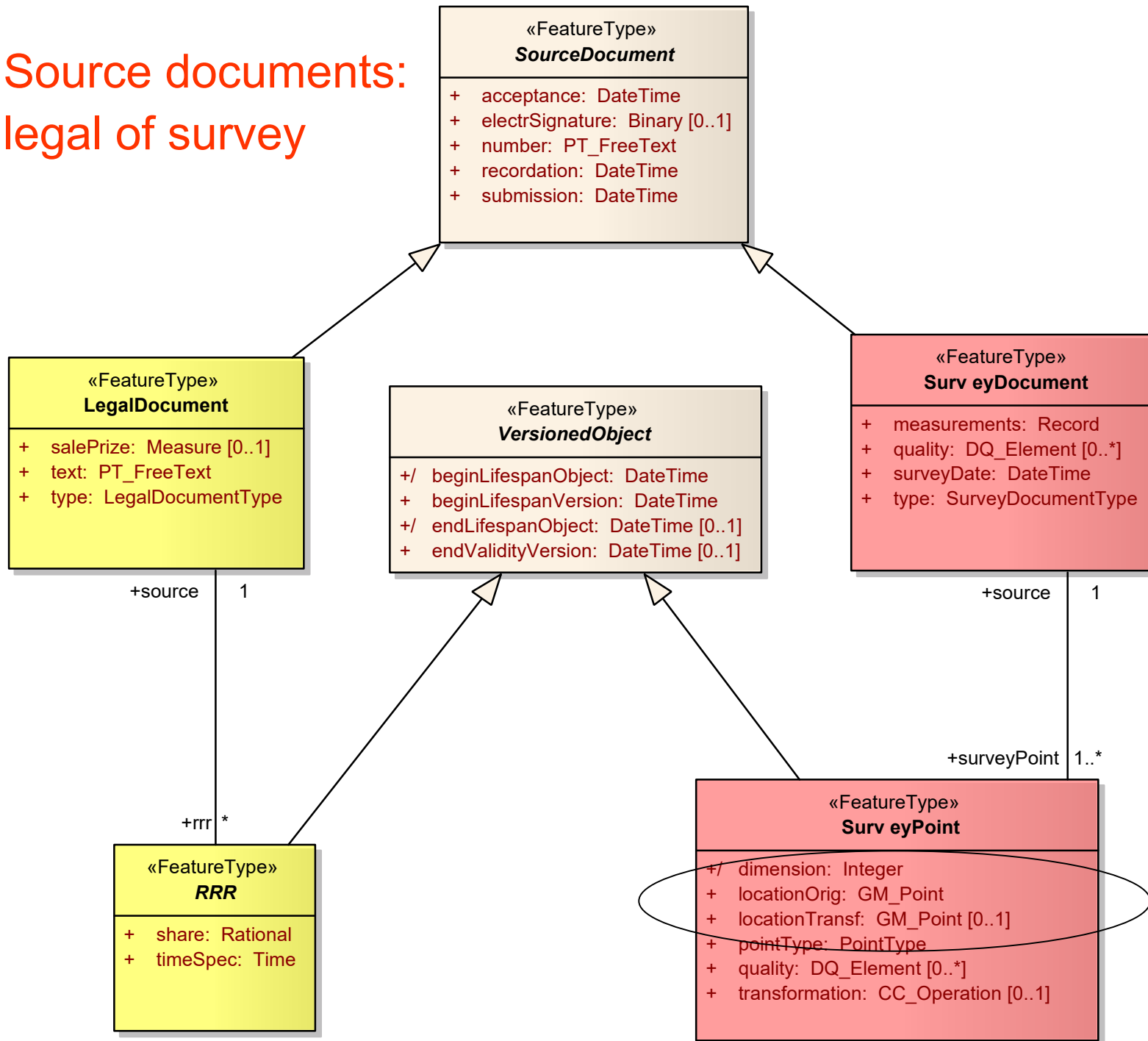
## LADM: Geometry

- SpatialUnit with specialisations, e.g. EarthSurfaceParcel (text, point, line, topology), VolumeSpatialUnit, Building(Unit), and Other (Network).
- Agregations like SpatialUnitSet, Building
- Link to surveying and survey documentation
- Link to ISO/OGC standard (both geometry and topology parts)

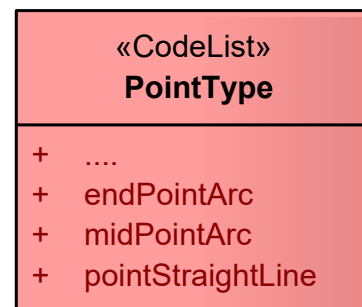
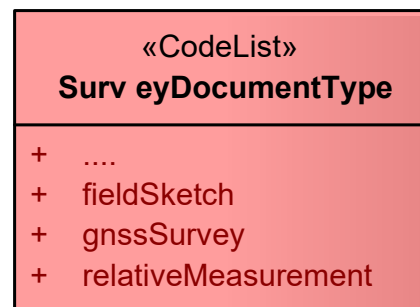
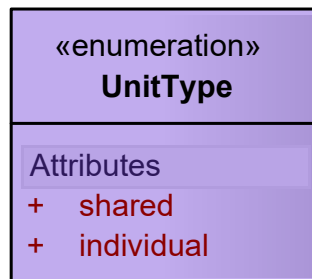
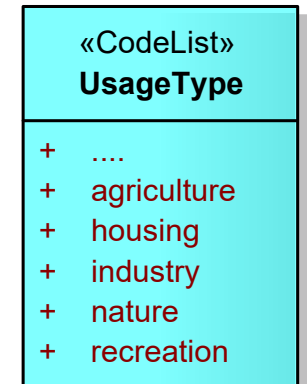
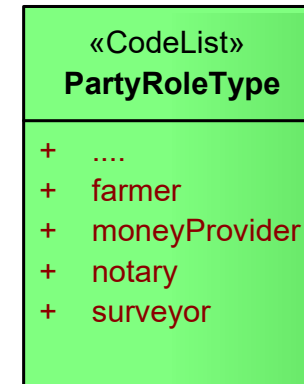
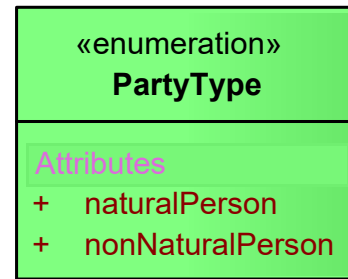
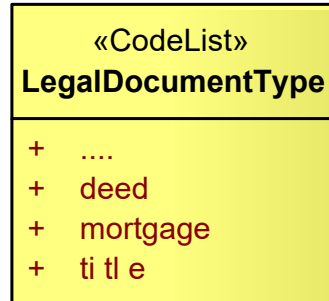
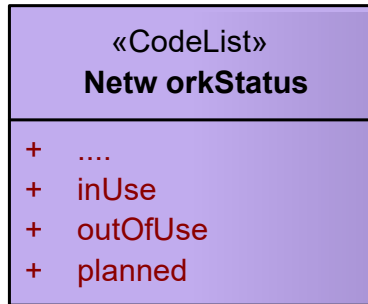
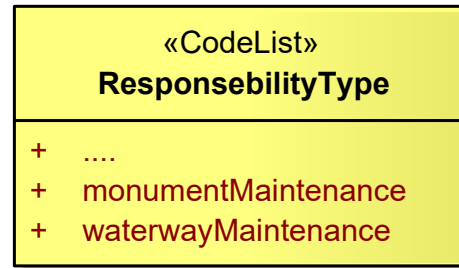




## Source documents: legal of survey



Option for  
2 coord's



**Data types:**

- Enumeration  
fixed set of values
- CodeList  
extensible set of values
- Union



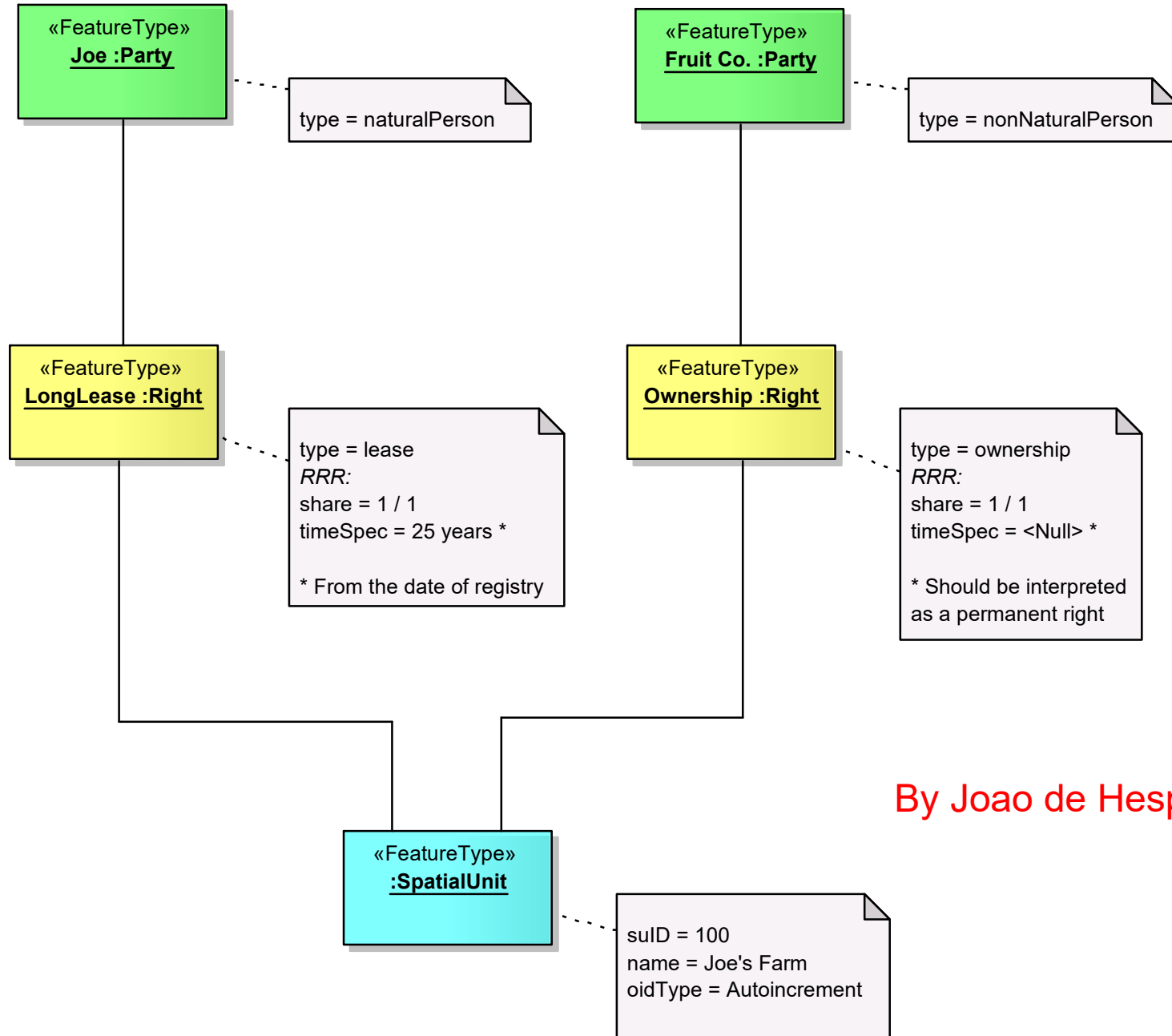
## Examples, instance level UML (annex C, currently 29 cases)

- 1 natural person is leaseholder another non-natural person is owner, ownership and lease hold based on civil code for one country
- 2 persons hold a share in a right (e.g. one person a share 1/2 and the other person a share 1/2 , or 2/3 and 1/3)
- A serving parcel provides access to 4 parcels, and the serving parcel is not public
- A group person holds property right on a spaghetti parcel
- A legal space building contains individual units (apartments) and a shared unit, with one common threshold on 1 ground parcel
- A timeshare ownership for the month of February
- A restriction not to change a building because of its monumental status
- Mortgage on ownership, bank included as person
- Mortgage on usufruct on ownership, money provider included as person
- 20 others...

## Object Diagram, Case 01 - Lease on a Parcel (Formal Rights)

### Description:

A natural person is a leaseholder; another non-natural person is a owner, ownership and lease hold based on civil code for one country.



By Joao de Hespana

# LADM based INSPIRE cadastral parcels

- Selection of relevant classes
- Based on inheritance
- Add attributes
- Add constraints (to refine meaning)



# Conclusion

- Standardization is a condition for realizing the GII
- Domain models (themes) contain knowledge
- INSPIRE is mega-construction
- ISO (TC211) is often the foundation
- ISO 19152 / LADM and INSPIRE cadastral parcel have different scope, but the overlap does fit
- Other LADM use... in the context of LPIS  
(see presentation 18 sept'08, 11:20-11:40 hours)
- Thanks for your attention!