

Annex A. Abstract test suite (normative)

A.1 Test cases for mandatory conformance requirements for a data set with this ISO TC211 LADM specification

Conformance and abstract test suite in conformance with the ISO 19105 and the ISO TC211 LADM specification.

A mandatory conformity element can take one of the following values:

1. Conformant (conformant). The resource is fully conformant with the cited specification.
2. Not Conformant (notConformant). The resource does not conform to the cited specification.
3. Not evaluated (notEvaluated). Conformance has not been evaluated.

This conformance clause tests for conformance to the ISO TC211 LADM specification, not to the Implementing Rule/Regulation on LADM that will be derived from it.

A.2 General

1. Test Purpose: Verify that a data set is conformant with the ISO TC211 LADM specification.
2. Test Method: Inspect the data specification and check it against the requirements included in the ISO TC211 LADM specification.
3. Reference: ISO TC211 LADM specification.
4. Test Type: Basic Test

Annex B. STDM (informative)

The Social Tenure Domain Model (STDM) is an initiative of UN-HABITAT to support pro-poor land administration ([UN-HABITAT, 2009](#)). STDM is meant specifically for developing countries, countries with very little cadastral coverage in urban, or rural areas. It is also meant for post conflict areas, areas with large scale informal settlements, or large scale customary areas. The focus of STDM has been on the relationships between people and land, independently from the level of formalization, or legality of those relationships. It is a search for a model that should support all forms of land rights, social tenure relations, and overlapping claims to land ([Van Oosterom et al. 2005](#); [Augustinus, 2006](#)).

LADM originated from areas with formal cadastre and land registry systems. It should be observed that STDM contains the functionality of LADM, but under different terminology. Formal terminology as used in the LADM may not always be applicable because of the informal environment. In STDM the same classes as in LADM are used, but sometimes under different terminology: e.g. class RRR is named class SocialTenureRelationship (see [Table B1](#)).

<i>LADM class name</i>	<i>STDM alias</i>
AdminDocument	SocialTenureInventory
BuildingReserve	Building
BuildingUnit	Unit
Mortgage	Collateral
NetworkReserve	UtilityNetwork
RRR	SocialTenureRelationship
SourcePoint	SurveyPoint

SpatialSourceDocument	SpatialUnitInventory
SpatialUnitSet	AdminSpatialUnit

Table B1. LADM class names with their aliases in STDM

In order to add more flexibility for the identification of the various kind of social tenure relationships a class STDM_Relationship has been added to LADM, as an additional subclass of SocialTenureRelationship (LA_RRR) (see [Figure B1](#)), with its own code list of social tenure relationships (see [Figure B2](#)).

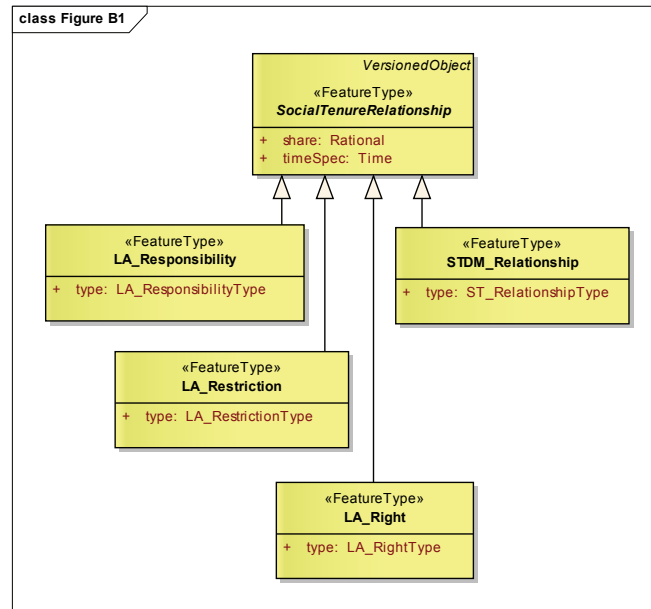


Figure B1. STDM_Relationship as an additional class in STDM

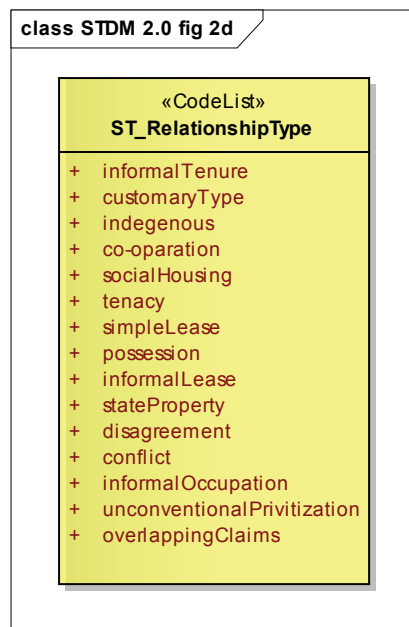


Figure B2. Code list for social tenure relationships

Annex C. Instance level cases (informative)

Note that the content of this Annex is based on:

ISO 19109, *Geographic Information – Rules for Application Schemas*

ISO 19110, *Geographic Information – Methodology for Feature Cataloguing*

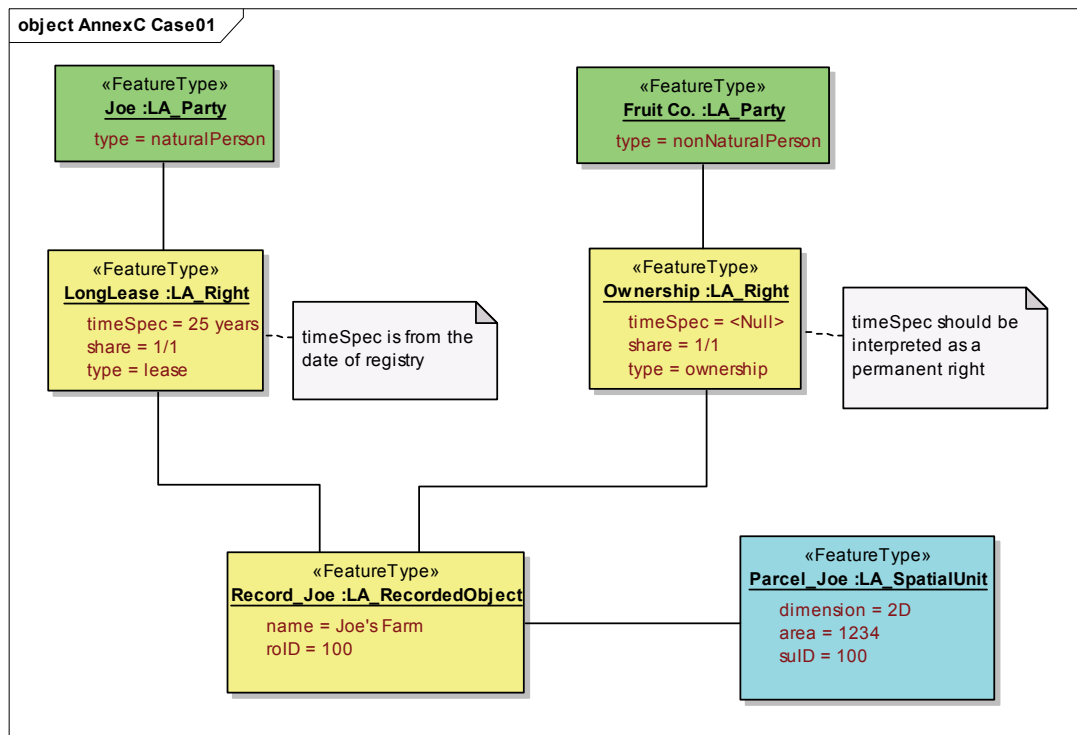
ISO 19126, *Geographic Information – Feature Concept Dictionaries and Registers*

ISO 19131, *Geographic Information – Data Product Specification*

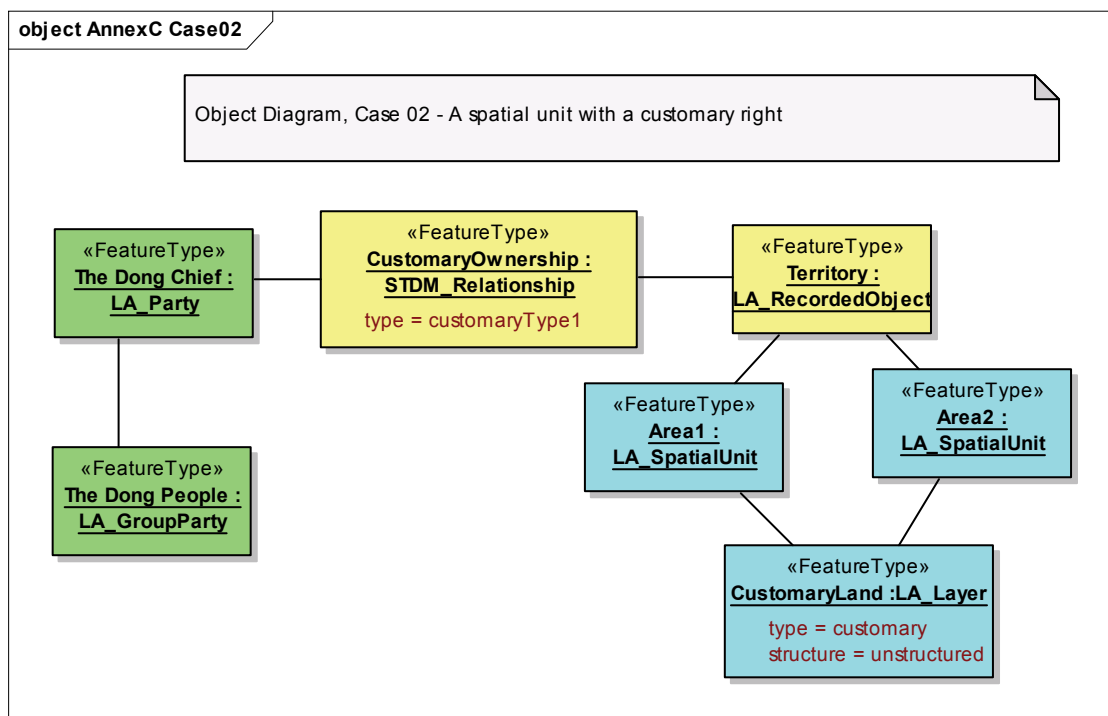
The examples are partly based on the terminology of the STDM (Annex B).

1. A natural person is leaseholder, and a non-natural person is owner; ownership and leasehold based on civil code for a particular country ([Case C1](#)).
2. A spatial unit with a customary right ([Case C2](#)).
3. Two persons hold a share in a right; one person a share of $\frac{2}{3}$, and the other person a share of $\frac{1}{3}$ ([Case C3](#)).
4. A serving parcel provides access to four parcels, and the serving parcel is not public ([Case C4](#)).
5. A group party holds a property right on a parcel ([Case C5](#)).
6. A building reserve contains individual units (apartments), and a shared unit, with a common threshold (entrance) on ground level ([Case C6](#)).
7. A 3D volume spatial unit with one owner ([Case C7](#)).
8. A timeshare ownership for the month of February ([Case C8](#)).
9. A restriction not to change a building because of its monumental status ([Case C9](#)).
10. Mortgage on ownership, bank included as party ([Case C10](#)).
11. Mortgage on usufruct of ownership, loan provider included as party ([Case C11](#)).
12. Informal right by a party (natural person) on a text spatial unit ([Case C12](#)).
13. Informal right by a group party on a point spatial unit ([Case C13](#)).
14. A conflicting claim on a spatial unit ([Case C15](#)).
15. A network reserve with one owner and a mortgage (bank included as party) ([Case C16](#)).
16. A group party (pastoralists) with an access right for a certain period of time ([Case C17](#)).
17. A spatial unit with one owner, with a building reserve from a different owner ([Case C18](#)).
18. A farmer owning several spatial units in rural area; example Finland ([Case C19](#)).
19. Value as basis for taxation valid for five years ([Case C20](#)).
20. A milk right to a spatial unit ([Case 21](#)).
21. A responsibility to clean the ditches ([Case C22](#)).
22. A right to use a road on a property of somebody else ([Case C23](#)).
23. A restriction area (“it is not allowed to built within 200 meters of a fuel station”) with its own geometry ([Case C24](#)).
24. Spatial unit complex with one owner ([Case C25](#)).
25. Spatial unit complex with building, one owner ([Case 26](#)).

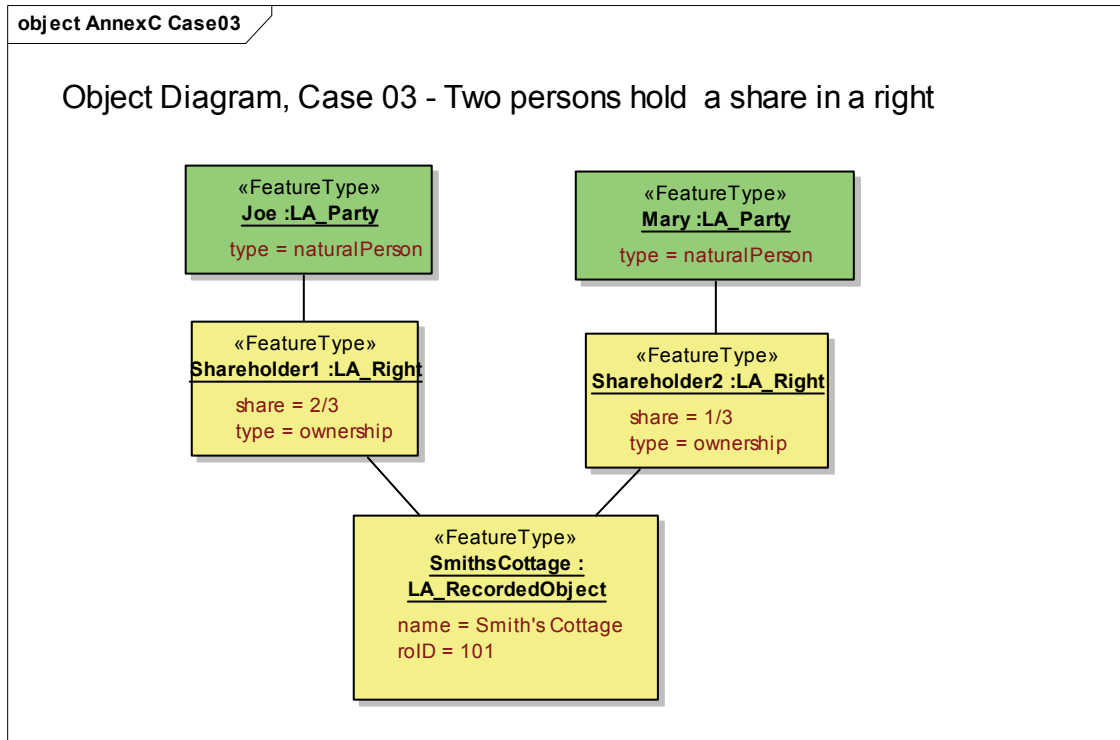
26. Complex of parcels with two owners ([Case C27](#)).
27. ([Case C28](#)).
28. Spatial unit with micro credit ([Case C29](#)).
29. Tax valuations on condominium rights in Spain ([Case C30](#)).
30. Marriage and inheritance relationships to property (simple) in Spain ([Case C31](#)).
31. Marriage and inheritance relationships to property (complex) in Spain ([Case C32](#)).
32. Spanish 'real estate' form of property ([Case C33](#)).
33. Norwegian categories of basic properties ([Case C34a](#) and [Case C34b](#)).
34. Individual and joint property in Spain ([Case C35](#)).



Case C1. A natural person is leaseholder, and a non-natural person is owner; ownership and leasehold based on civil code for a particular country



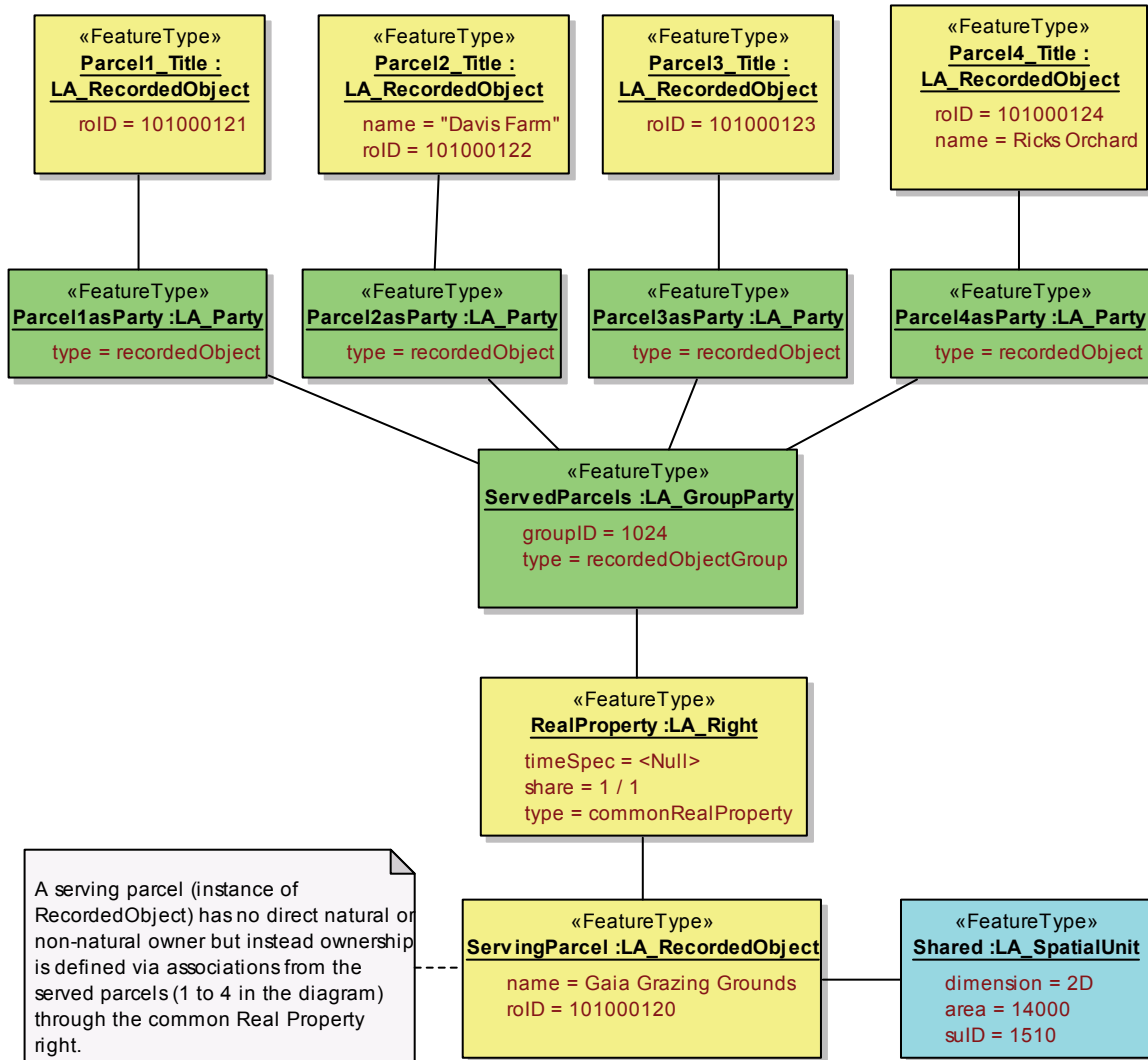
Case C2. A spatial unit with a customary right



Case C3. Two persons hold a share in a right; one person has a share of $\frac{2}{3}$, and the other person has a share of $\frac{1}{3}$

object AnnexC Case04

Object Diagram, Case 4 - A serving parcel provides access to four parcels, and the serving parcel is not public

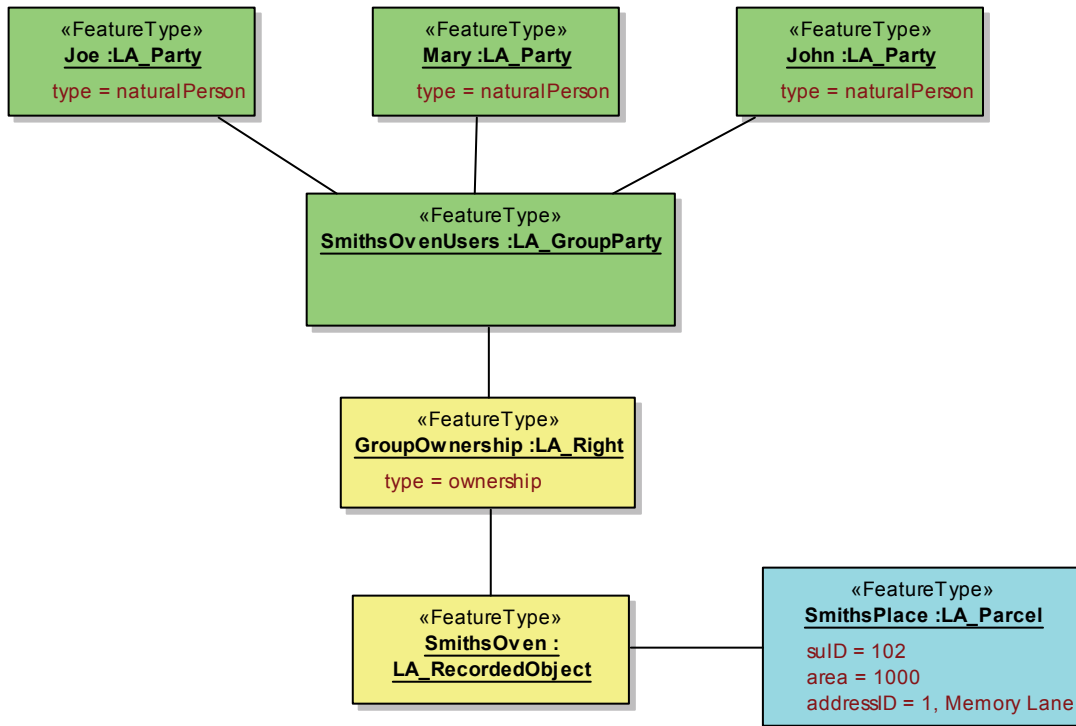


Case C4. A serving parcel provides access to four parcels, and the serving parcel is not public

object AnnexC Case05

Object Diagram, Case 05 - Group property (Formal and Informal Rights)

A group of persons hold a property right on a parcel



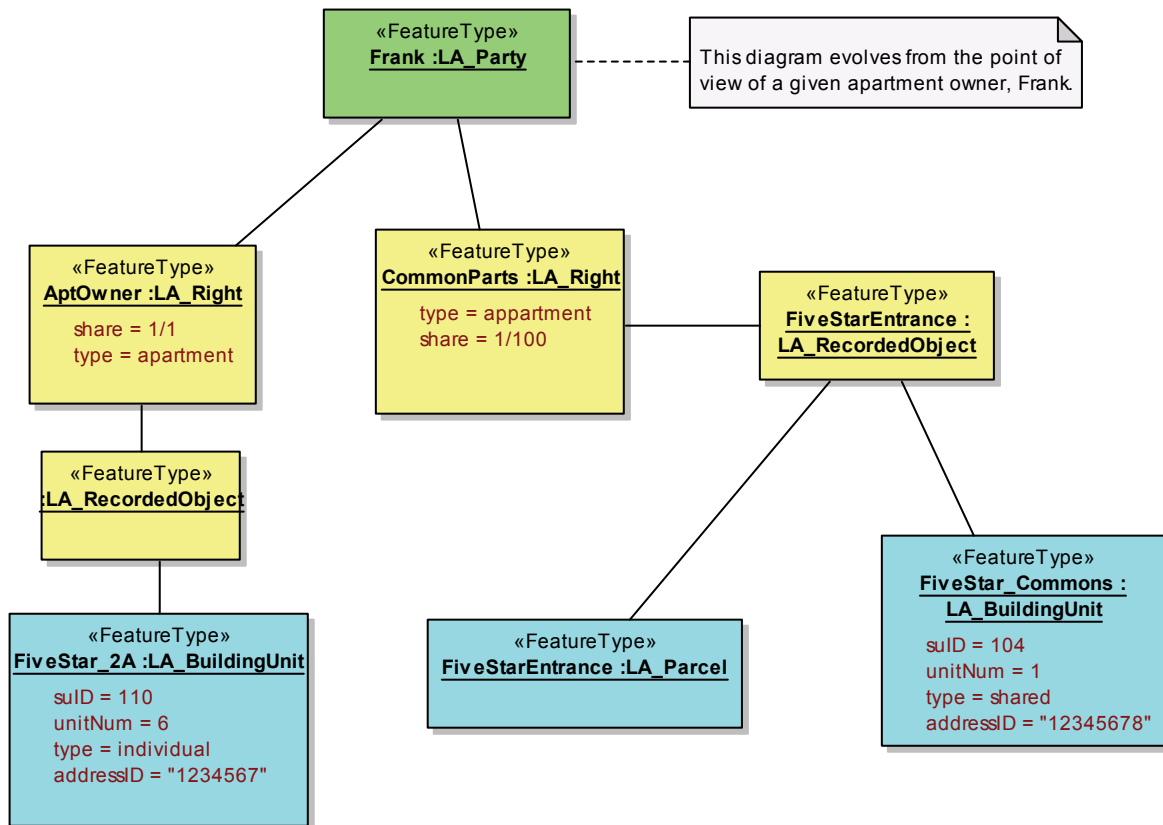
Case C5. A group party holds a property right on a parcel

object AnnexC Case06

Object Diagram, Case 06 - Condominium Rights (Formal Rights)

Description:

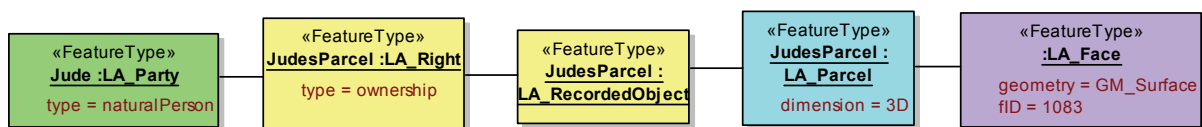
A building reserve contains individual units (apartments) and a shared unit (commons), and a ground parcel. Each unit owner holds a share in the shared unit and the ground parcel



Case C6. A building reserve contains individual units (apartments), and a shared unit, with a common threshold (entrance) on ground level

object AnnexC Case07

Object Diagram, Case 7 - A 3D volume parcel with one owner

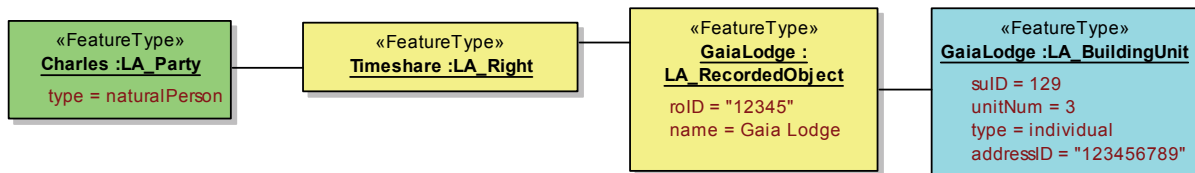


Case C7. A 3D volume spatial unit with one owner

object AnnexC Case08

Object Diagram, Case 08 - Timeshare Rights (Formal Rights)

Description:
A timeshare ownership for the month of February.

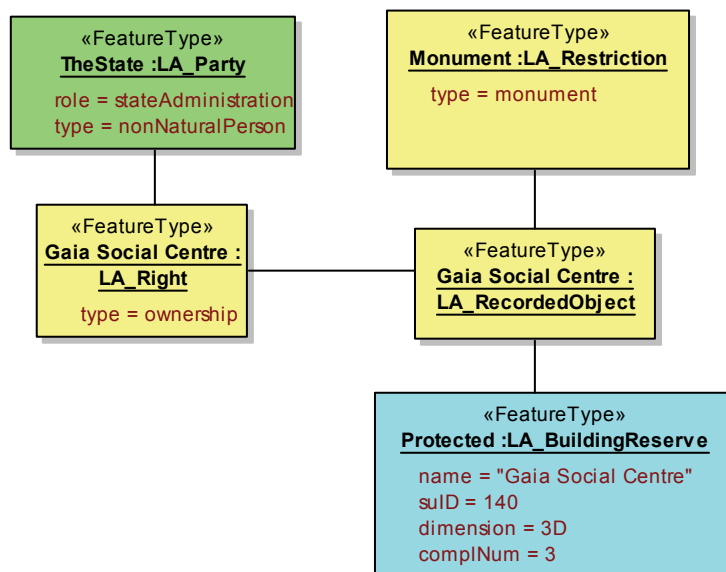


Case C8. A timeshare ownership for the month of February

object AnnexC Case09

Object Diagram, Case 09 - Public Restriction on a Building (Formal Rights)

Description:
A restriction not to change a building because of its monument status.



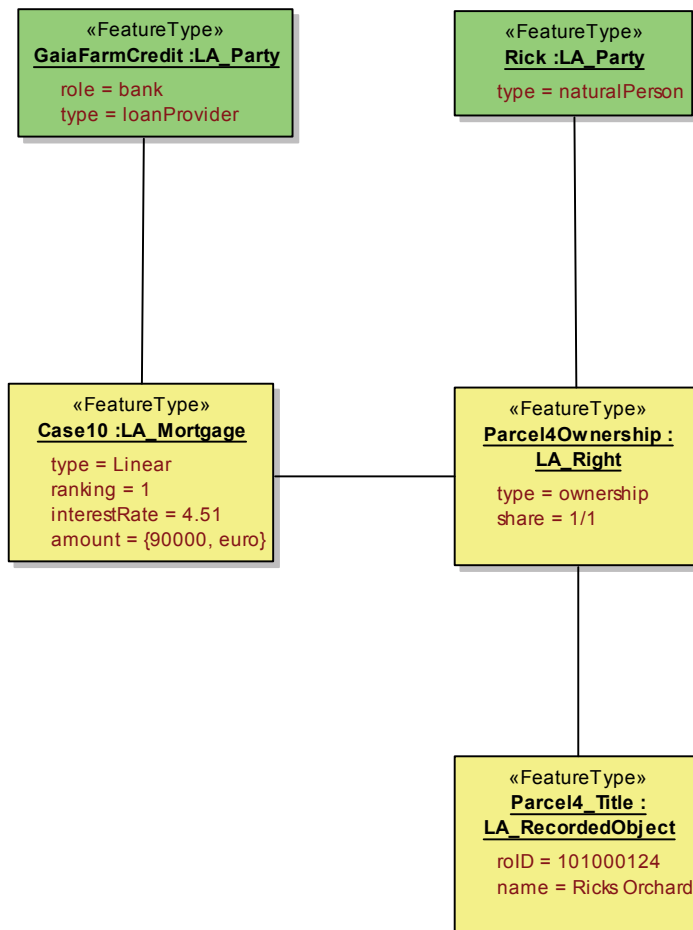
Case C9. A restriction not to change a building because of its monumental status

object AnnexC Case10

Object Diagram, Case 10 - Mortgage on Ownership (Formal Rights)

Description:

Mortgage on ownership, bank included as party.



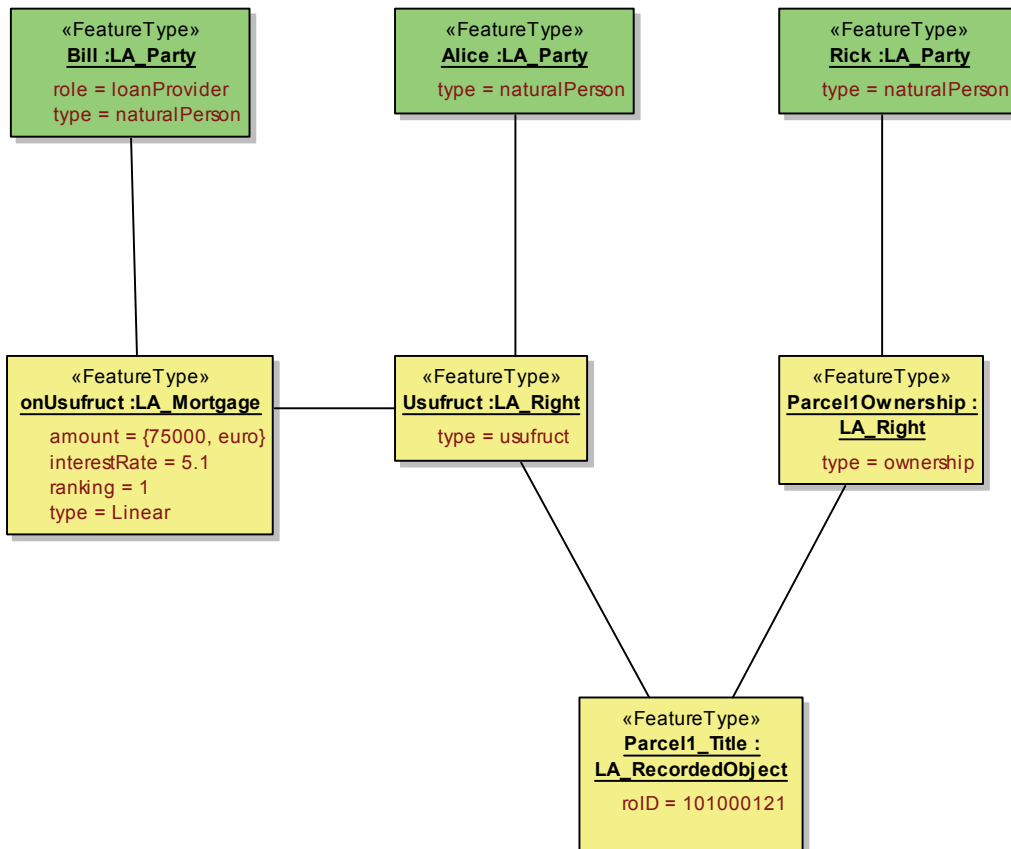
Case C10. Mortgage on ownership, bank included as party

object AnnexC Case11

Object Diagram, Case 11 - Mortgage on Usufruct (Formal Rights)

Description:

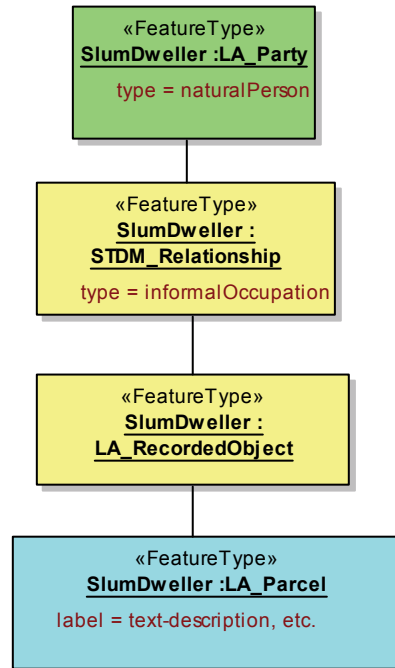
Mortgage on Usufruct on Ownership, loan provider included as party.



Case C11. Mortgage on usufruct of ownership, loan provider included as party

object AnnexC Case12

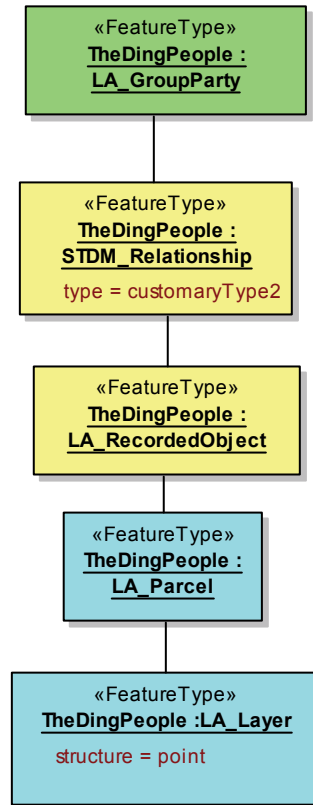
Object Diagram, Case 12 - Informal right by a person on a text parcel



Case C12. Informal right by a party (natural person) on a text spatial unit

object AnnexC Case13

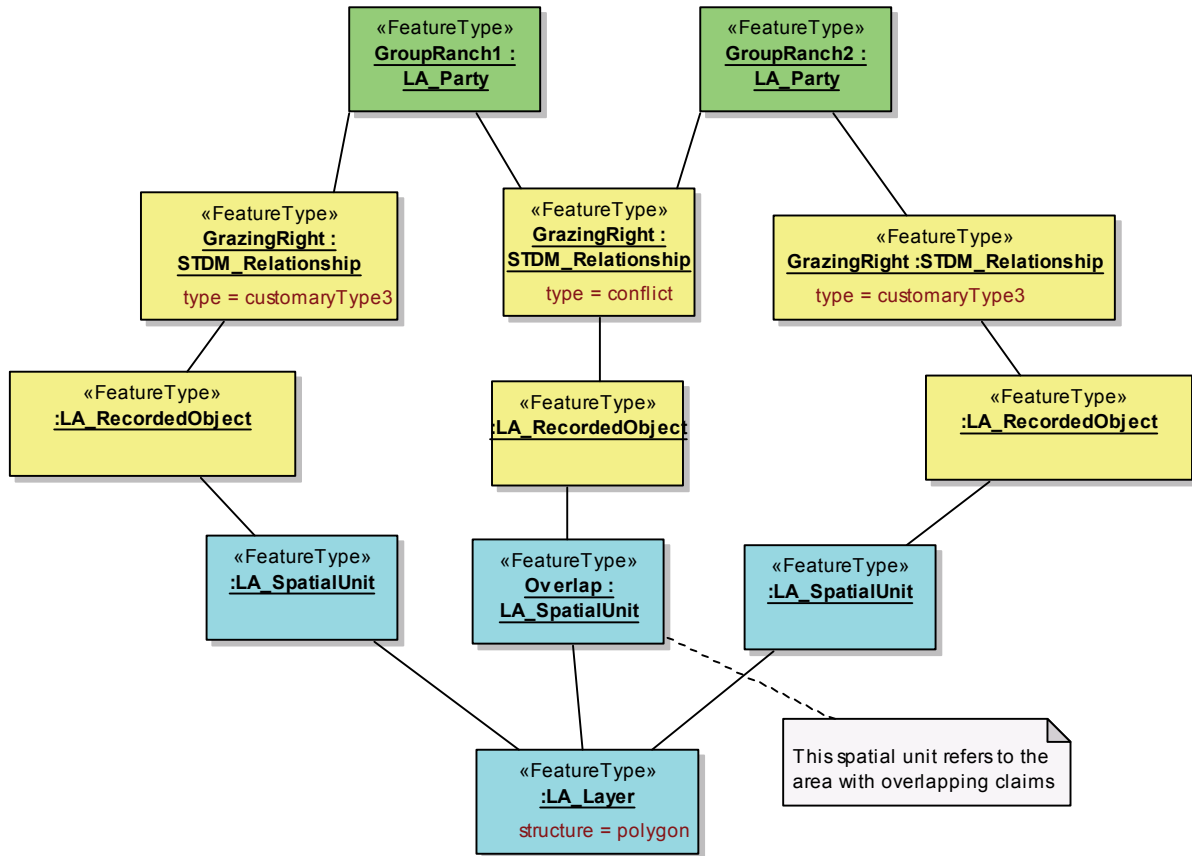
Object Diagram, Case 13 - Informal right by a group on a point parcel



Case C13. Informal right by a group party on a point spatial unit

object AnnexC Case15

Object Diagram, Case 15 - A conflicting claim on a spatial unit



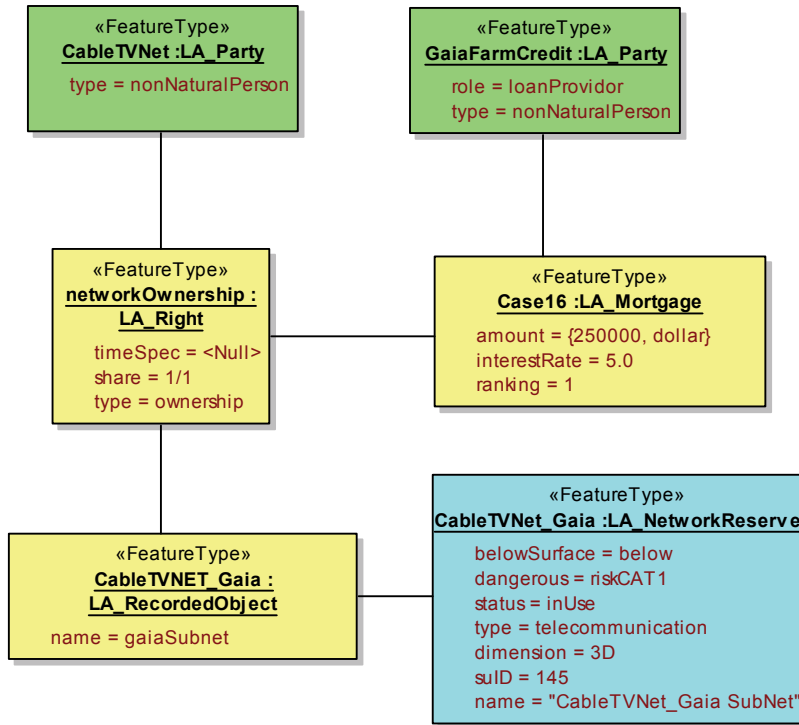
Case C15. A conflicting claim on a spatial unit

object AnnexC Case16

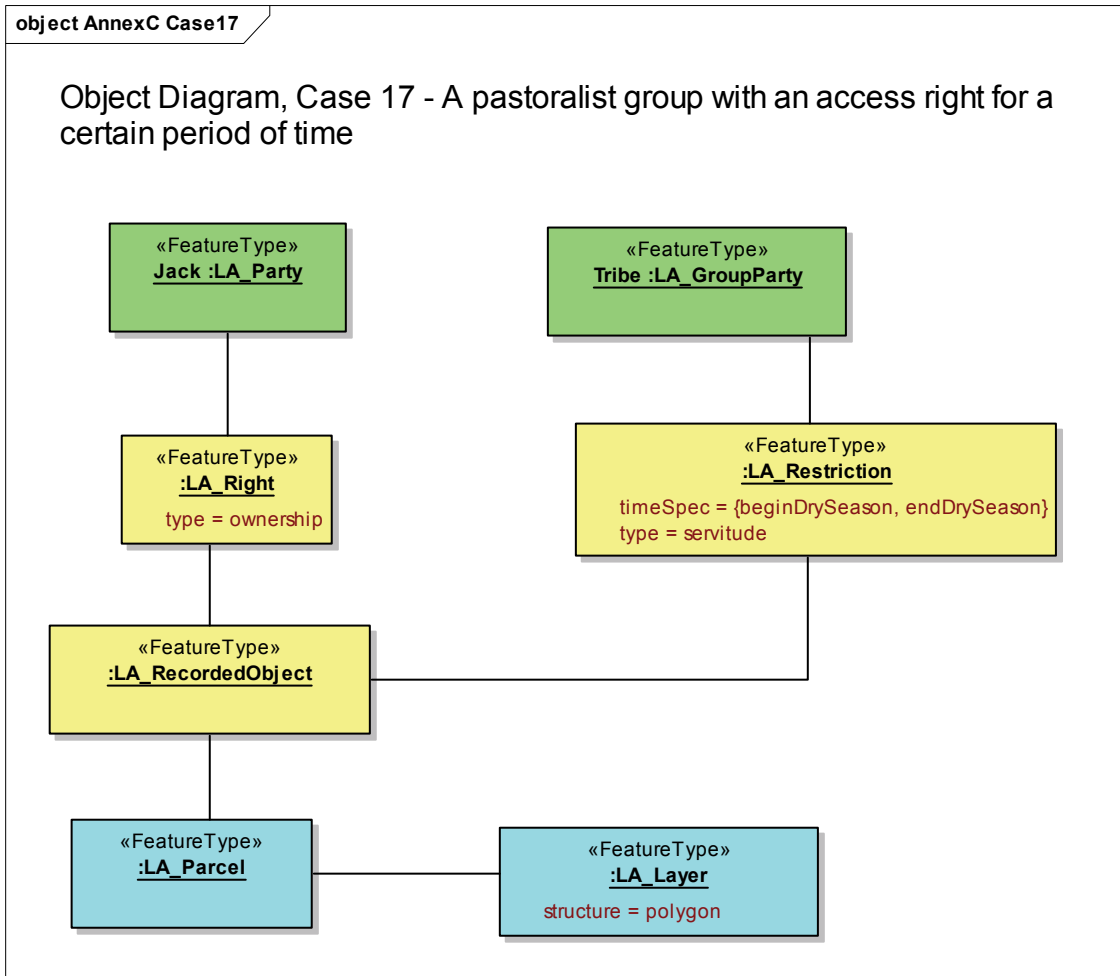
Object Diagram, Case 16 - Mortgage on a Network (Formal Rights)

Description:

A utility network with one owner and a mortgage (bank included as party).



Case C16. A network reserve with one owner and a mortgage (bank included as party)

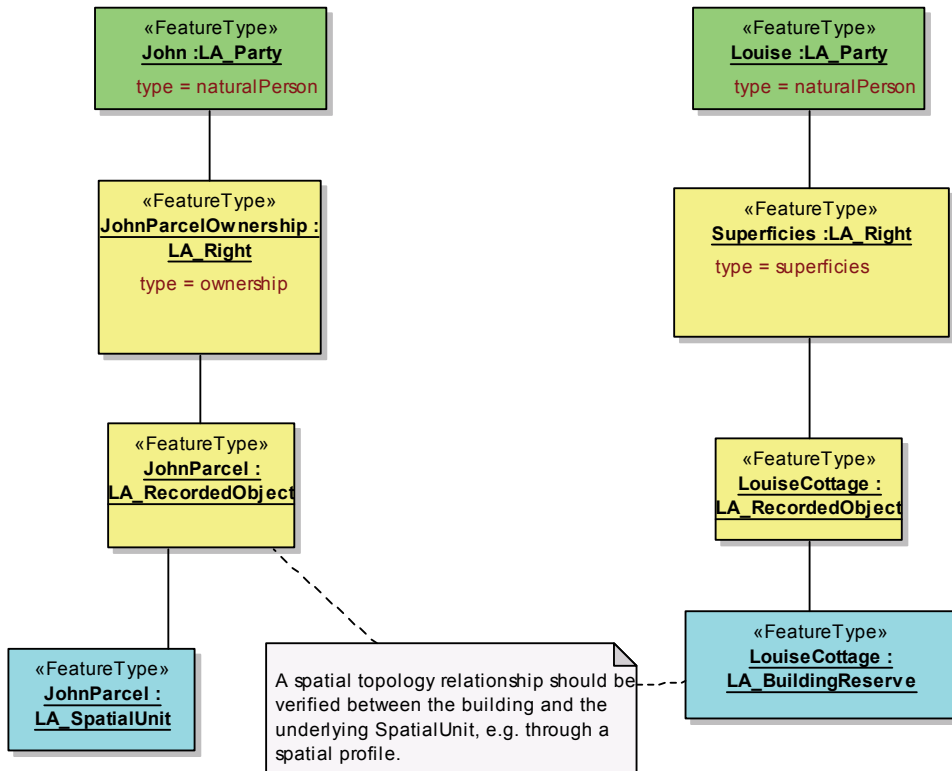


Case C17. A group party (pastoralists) with an access right for a certain period of time

Object Diagram, Case 18 - Surface Rights (Formal Rights)

Description:

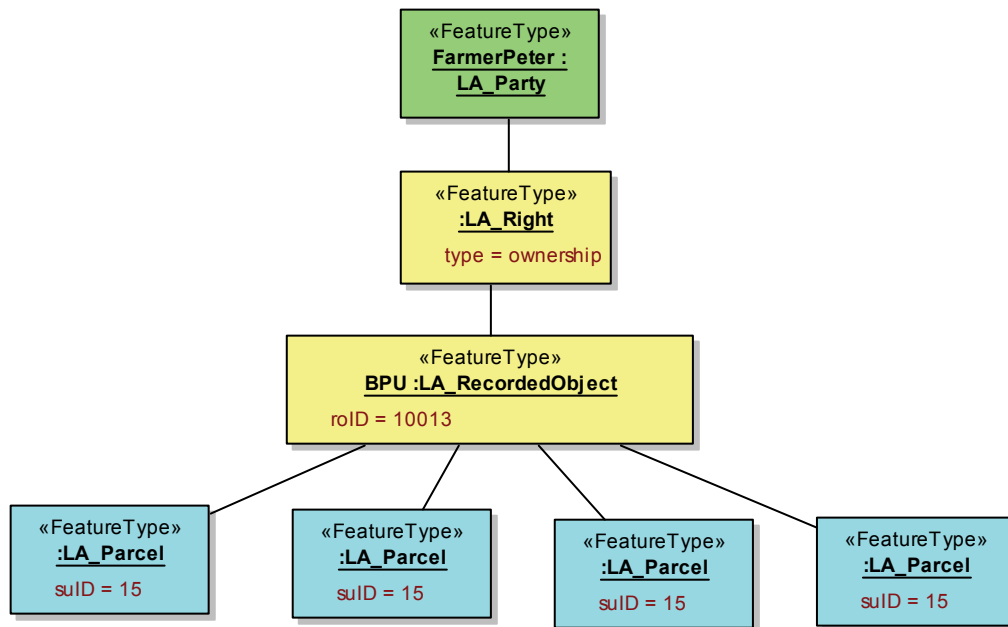
Spatial unit with one owner, and with building on it with another owner



Case C18. A spatial unit with one owner, with a building reserve from a different owner

object AnnexC Case19

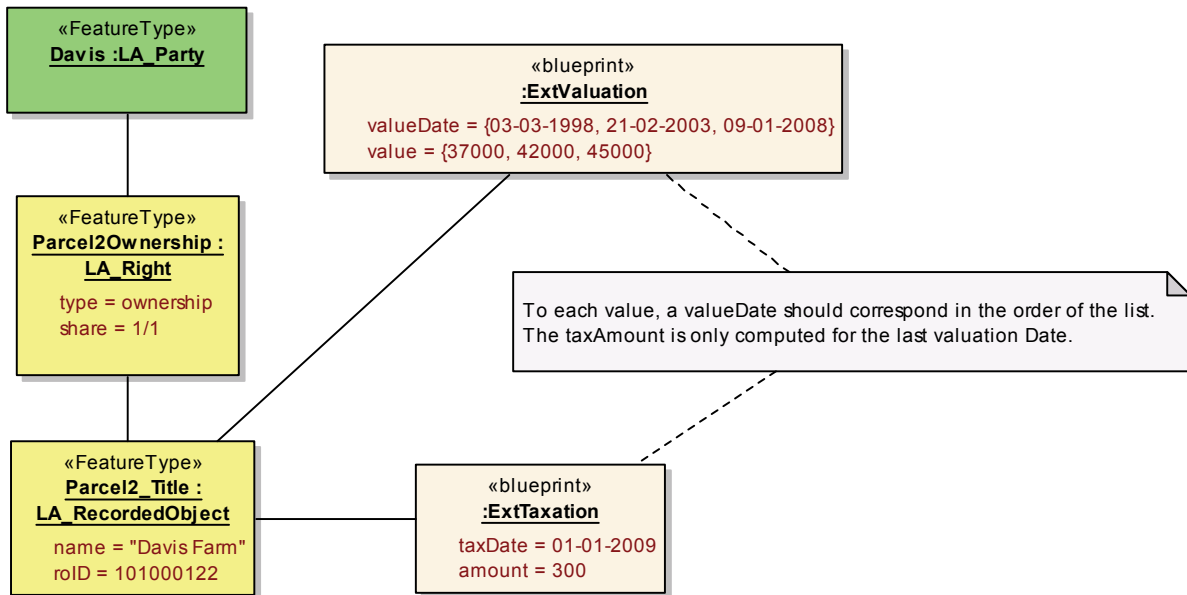
Object Diagram, Case 19 - Farmer owing several spatial units.
Example from Finland. Basic property unit 15 (Formal Rights)



Case C19. A farmer owning several spatial units in rural area; basic property unit = 15; example from Finland

object AnnexC Case20

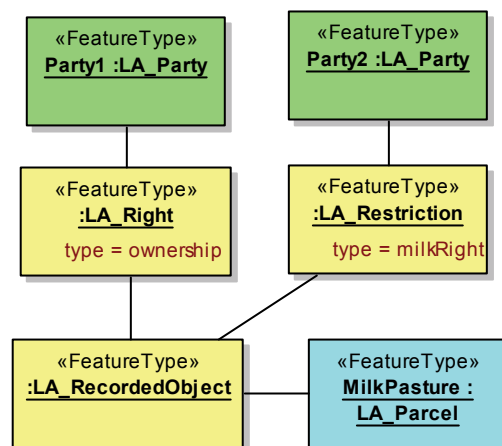
Object Diagram, Case 20 - Land Tax Validity (Fiscal Role)



Case C20. Value as basis for taxation valid for five years

object AnnexC Case21

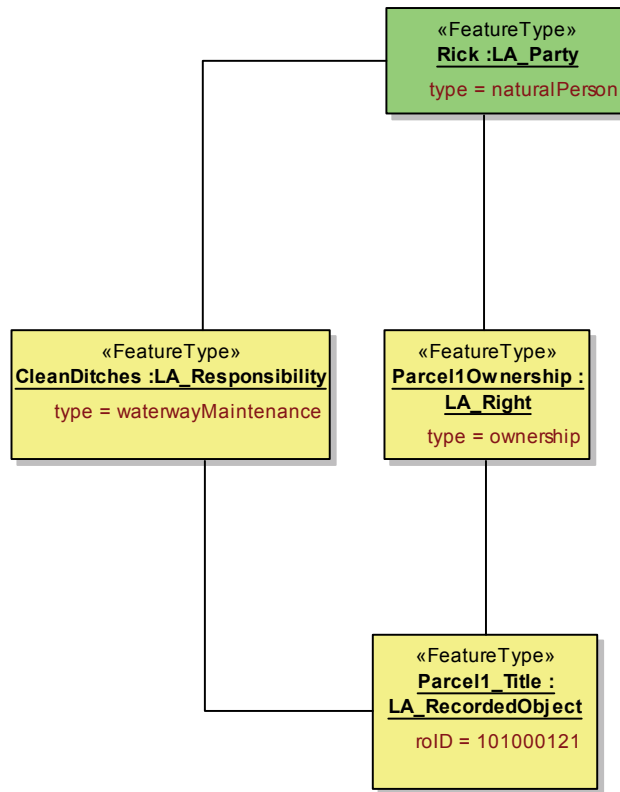
Object Diagram, Case 21 - A milk right to a parcel (Formal Rights)



Case C21. A milk right to a spatial unit

object AnnexC Case22

Description:
A responsibility to clean the ditches

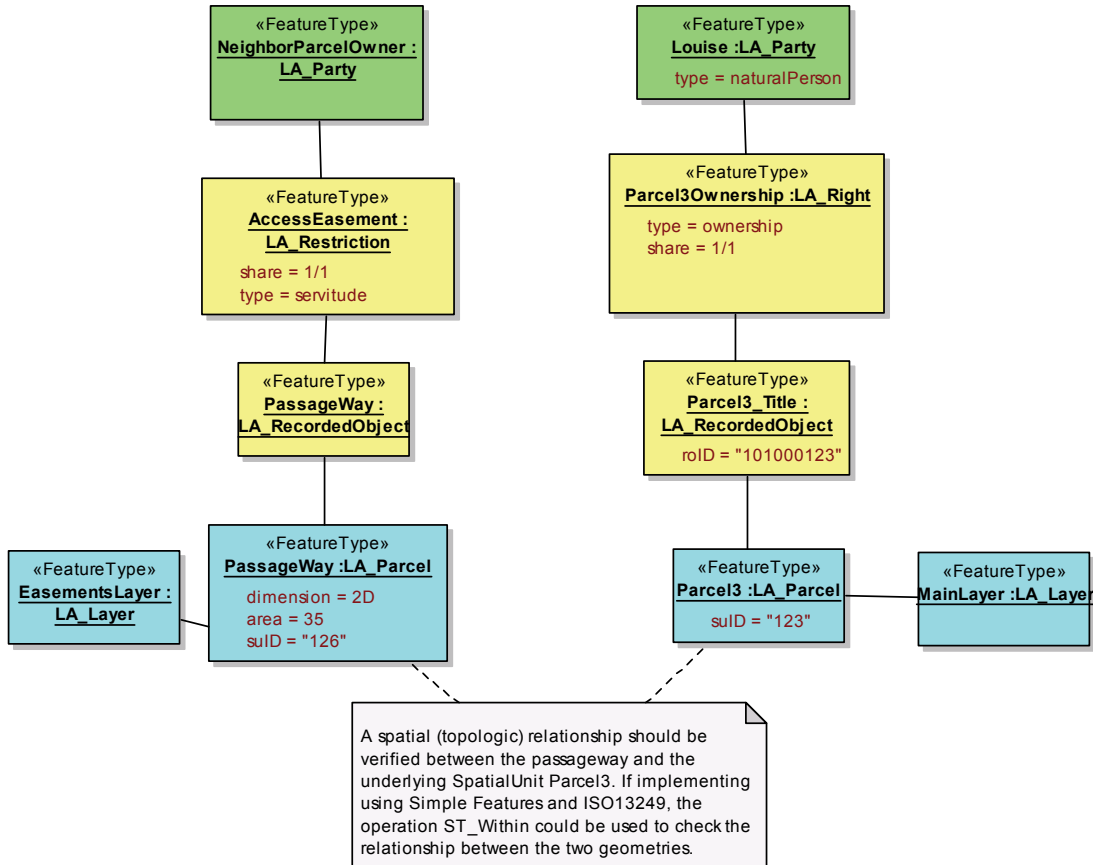


Case C22. A responsibility to clean the ditches)

object AnnexC Case23

Object Diagram, Case 23 - An access easement (Formal Rights)

Description:
A right to use a road on a property of somebody else

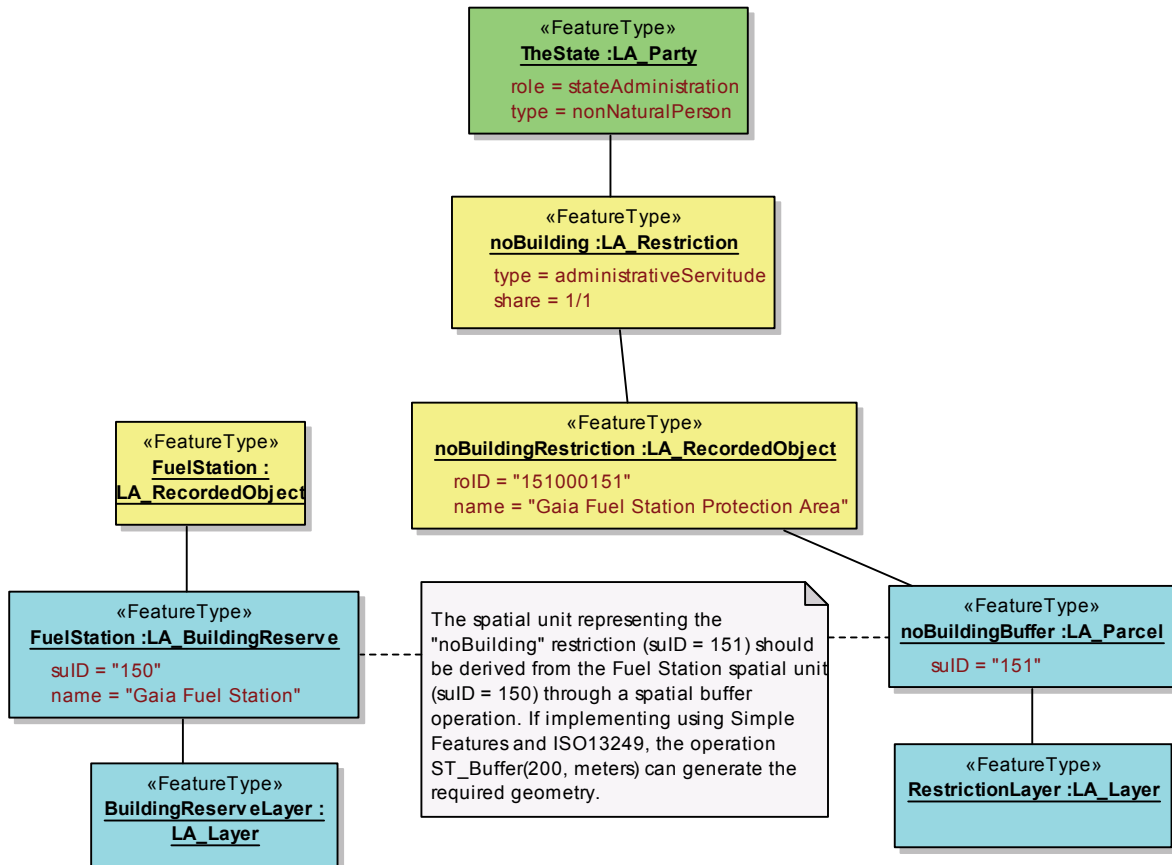


Case C23. A right to use a road on a property of somebody else

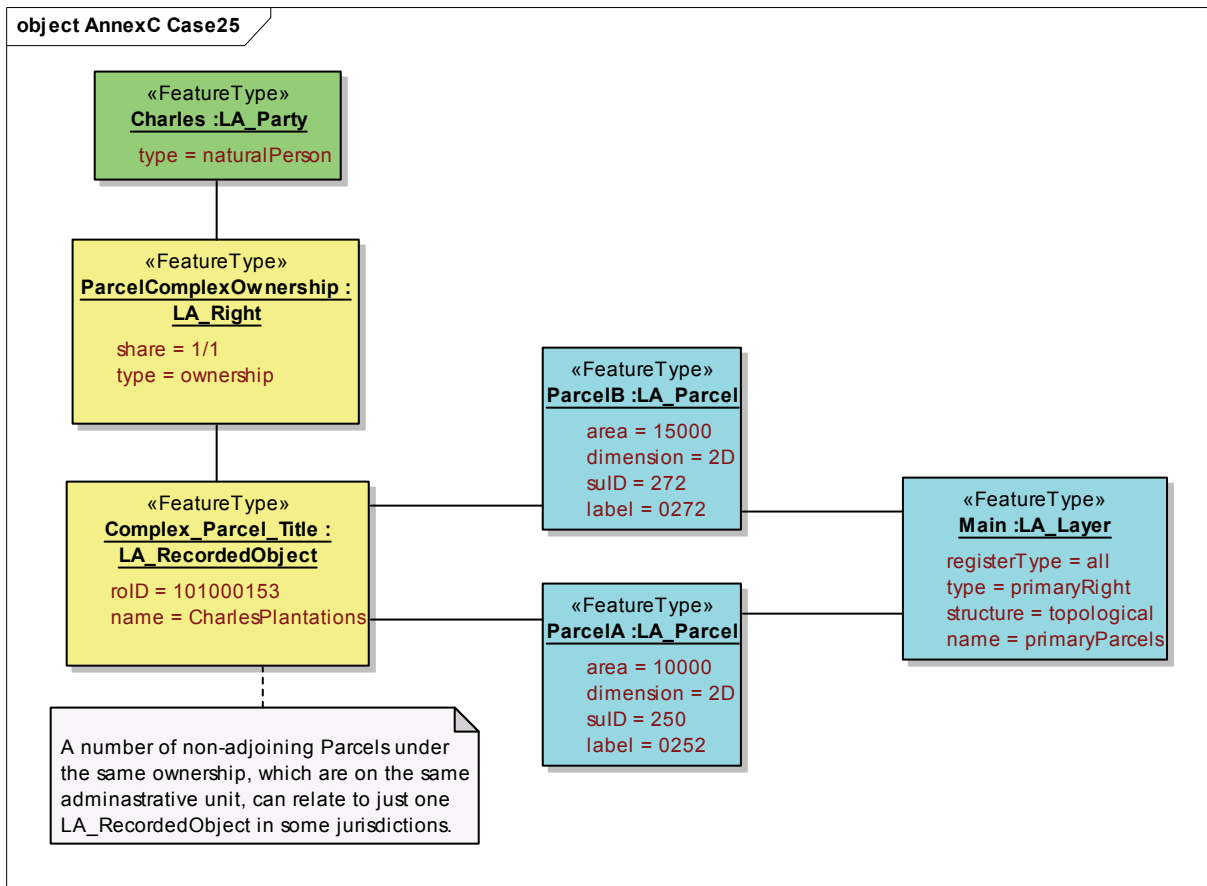
Object Diagram, Case 24 - A no-building restriction around a facility (Formal Rights)

Description:

A restriction area with its own geometry: not allowed to build 200 metres around a fuel station



Case C24. A restriction area (“it is not allowed to built within 200 meters of a fuel station”) with its own geometry

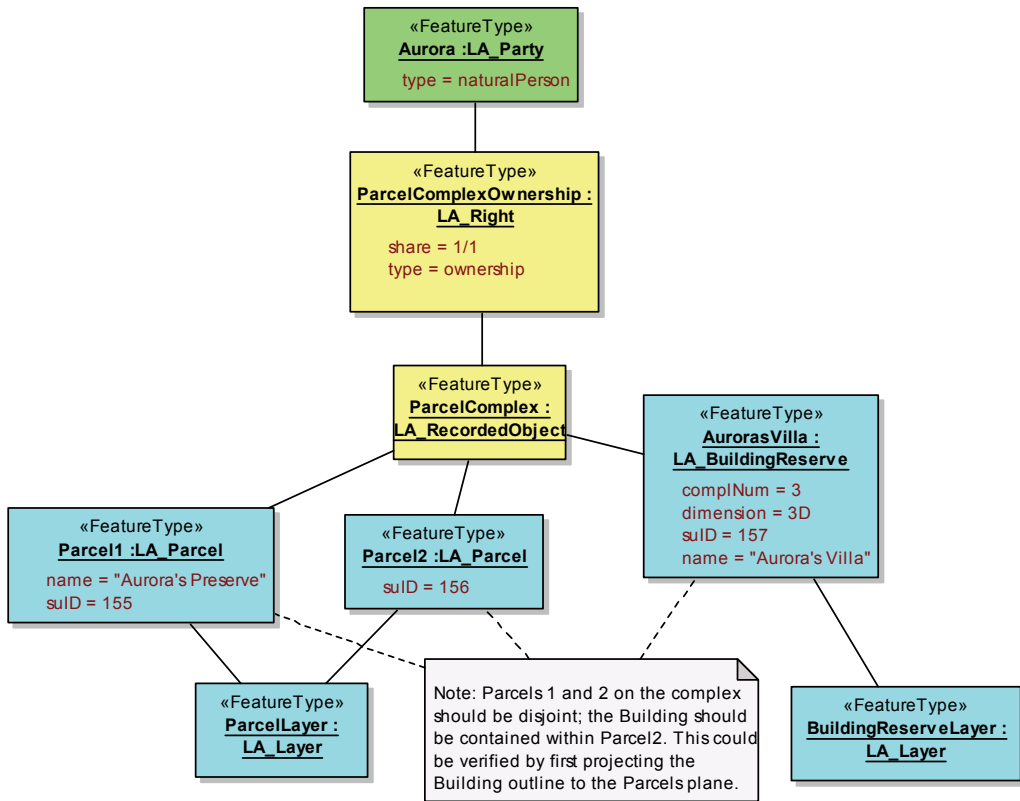


Case C25. Spatial unit complex with one owner

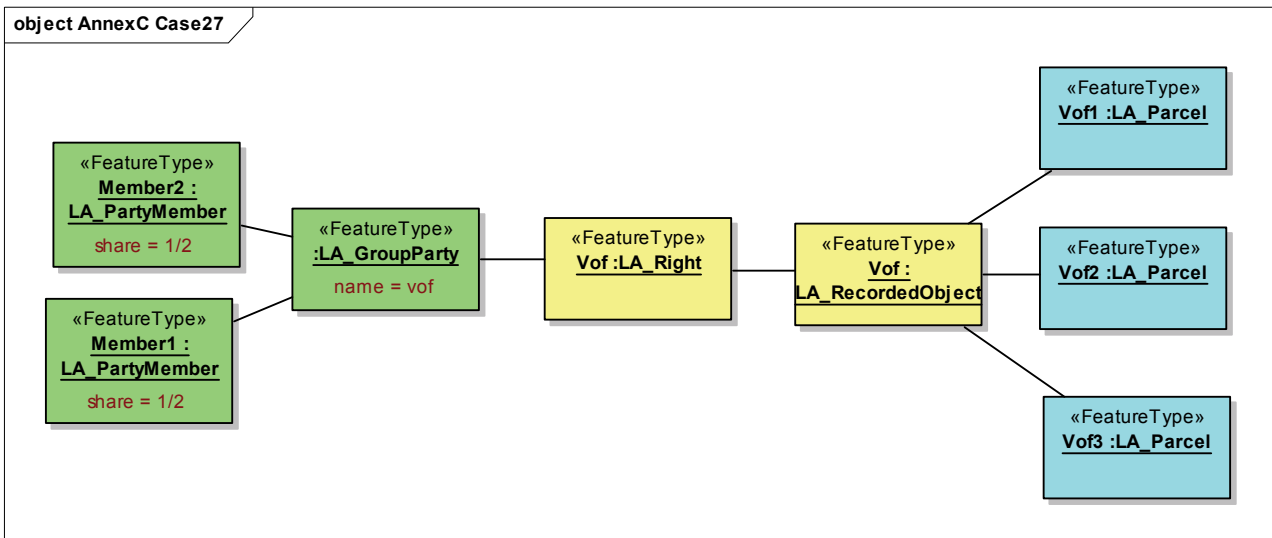
object AnnexC Case26

Object Diagram, Case 26 - A parcel complex with a building and a single owner (Formal Rights)

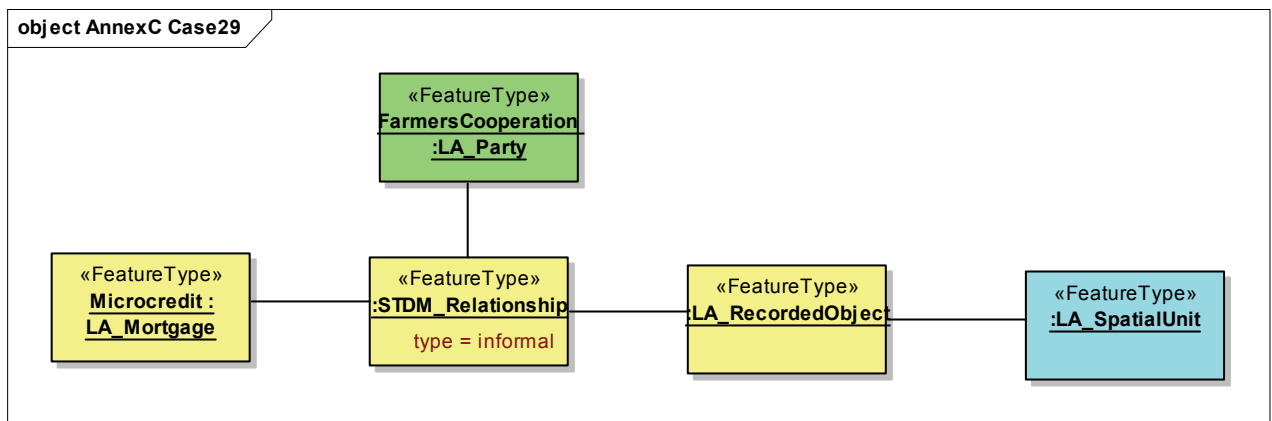
Description:
Complex of parcels and building with a single owner



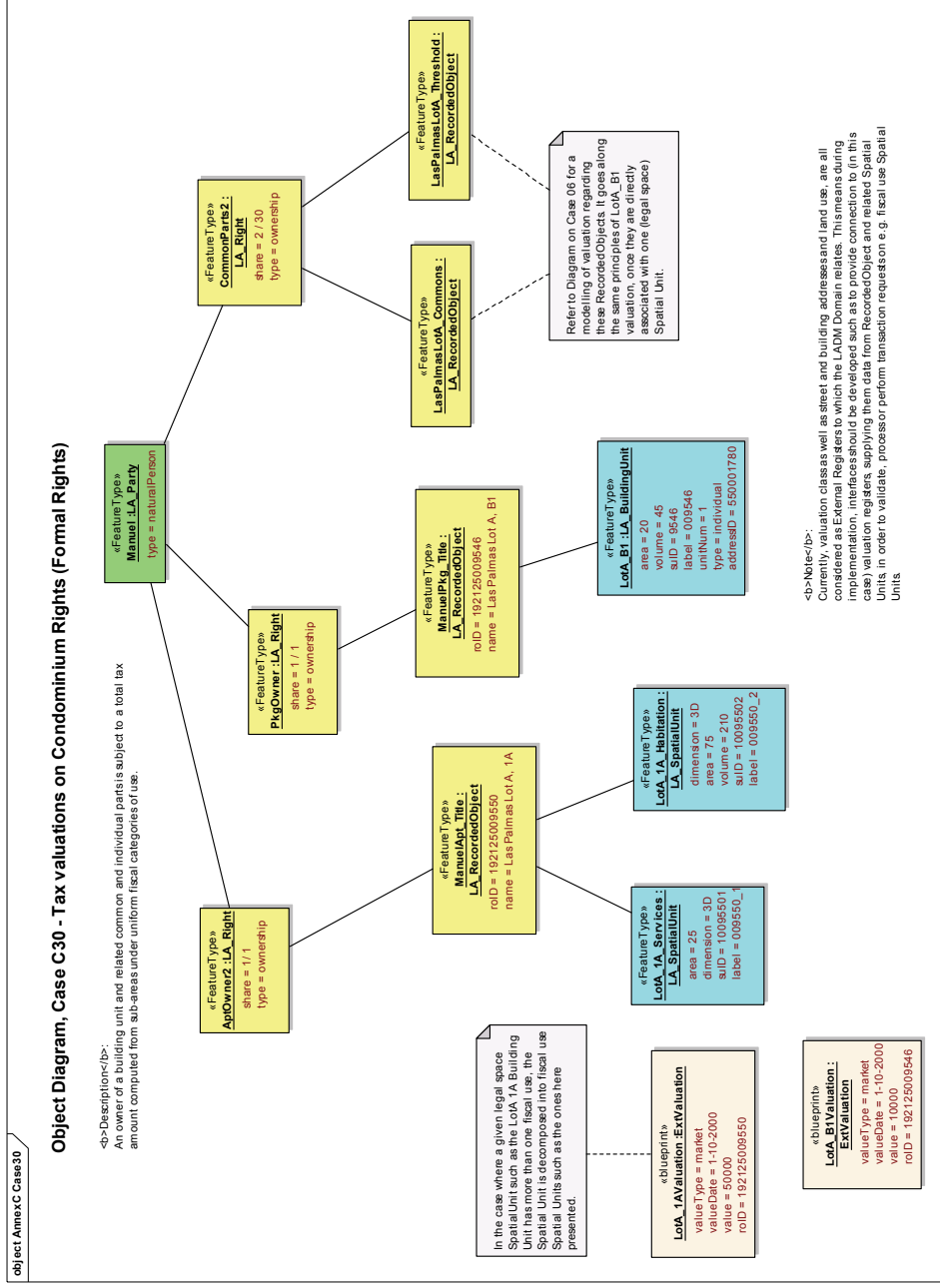
Case C26. Spatial unit complex with building, one owner



Case C27. Complex of parcels with two owners



Case C29. Spatial unit with micro credit



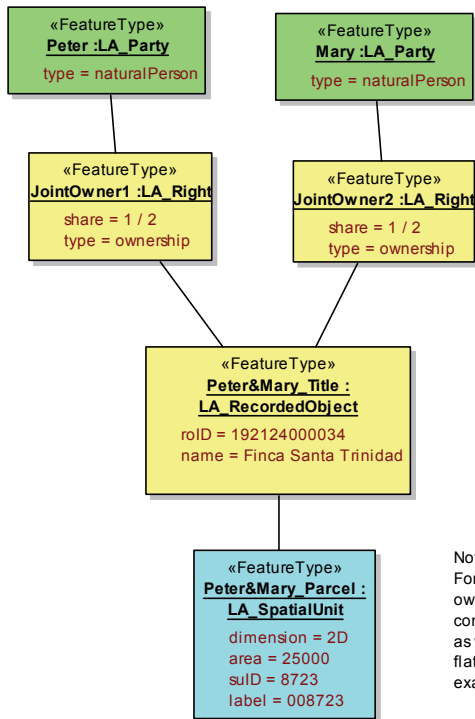
Case C30. Tax valuations on condominium rights in Spain

object AnnexC Case31

Object Diagram, Case C31 Part1 - Marriage and Inheritance relations to Property (Formal Rights)

Description:

A married couple owns a property with equal shares. This is the original situation of a two part case, complemented with diagram Case 32.



Note:

For this case, a simple example of joint ownership over a simple rural parcel was considered. The model could represent as well property over a condominium flat, but it will be a more complex example.

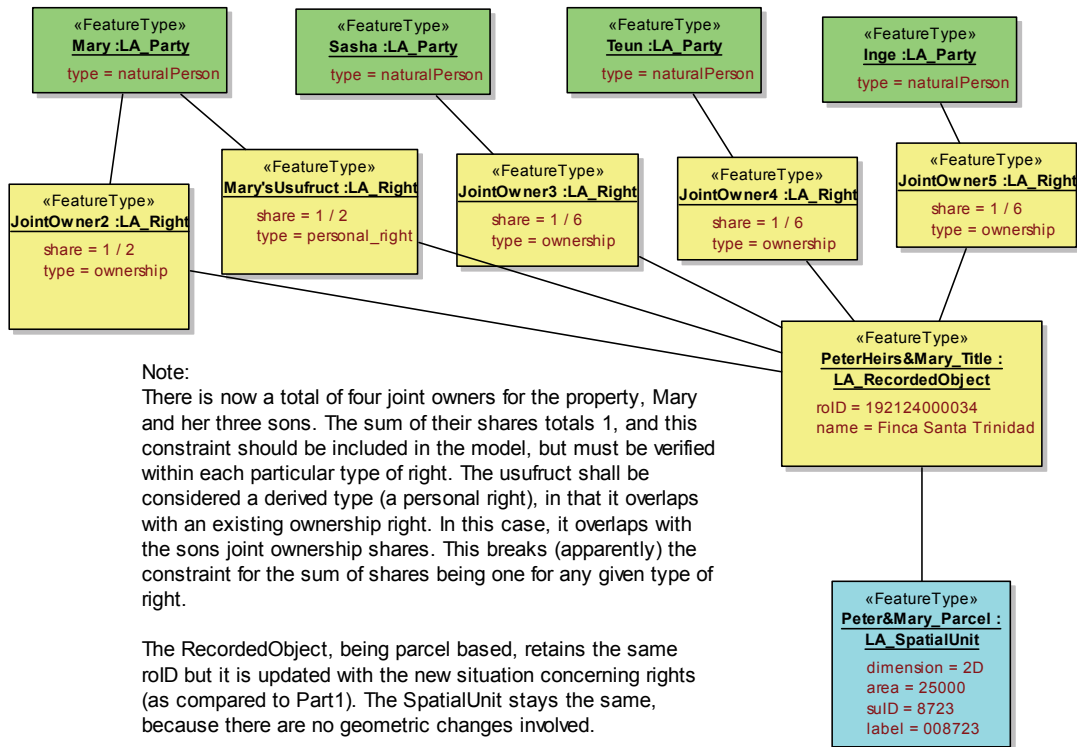
Case C31. Marriage and inheritance relationships to property (simple) in Spain

object AnnexC Case32

Object Diagram, Case 32, Part2 - Marriage and Inheritance relations to Property (Formal Rights)

Description:

After Peter has died, he leaves an usufruct from his share to Mary, which still holds her half share of the property. Their three sons, Sasha, Teun and Inge, all inherit an equal share of Peter's part



Case C32. Marriage and inheritance relationships to property (complex) in Spain

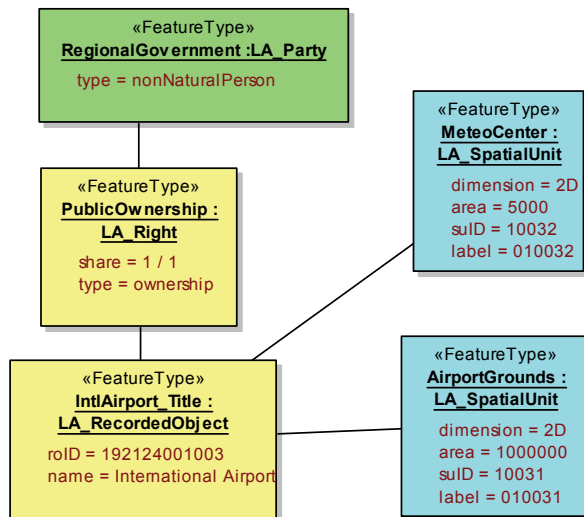
object AnnexC Case33

Object Diagram, Case C33 Spanish "special real estate" form of property (Formal Rights)

The Spanish Cadastre distinguishes between two basic categories: urban real estate and rural real estate. A third residual category exists for special real estates, whose characteristics require different treatment, namely with regard to assessment. The example is focused on an airport.

This case extends the generic LADM, considering one of the mechanisms available for individual country models, namely adding their specific type categories into code values and enumerations. In this Case, the registerType receives a new "ES_special" type.

Furthermore, the single recorded object instance relates to a number of distinct parcels, which can be spatially disjoint. Although such parcels are disjoint, they belong to the full partition of (2D) space, that could be verified topologically.

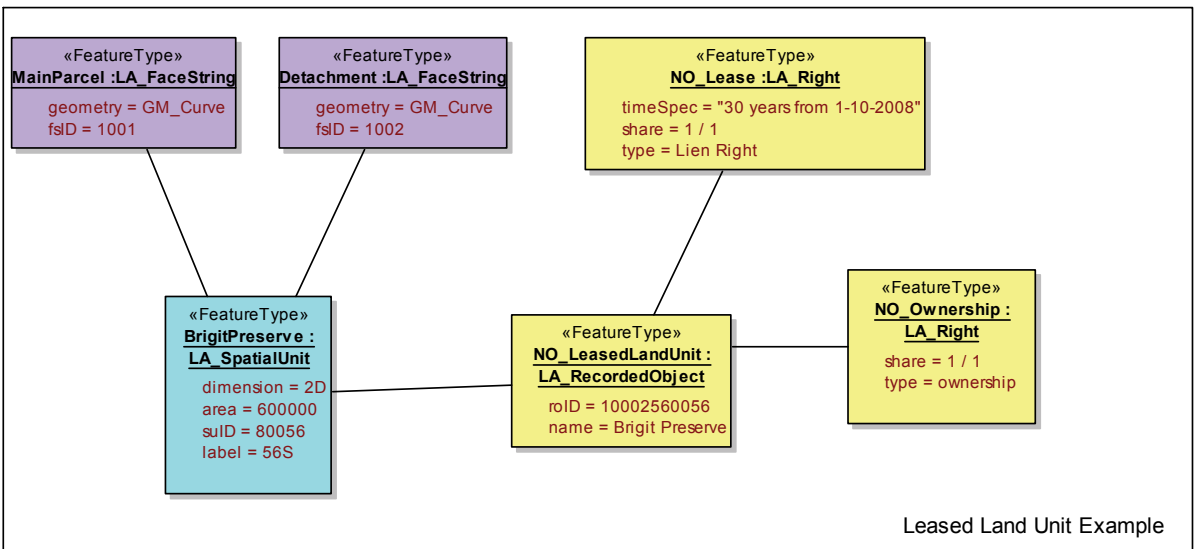
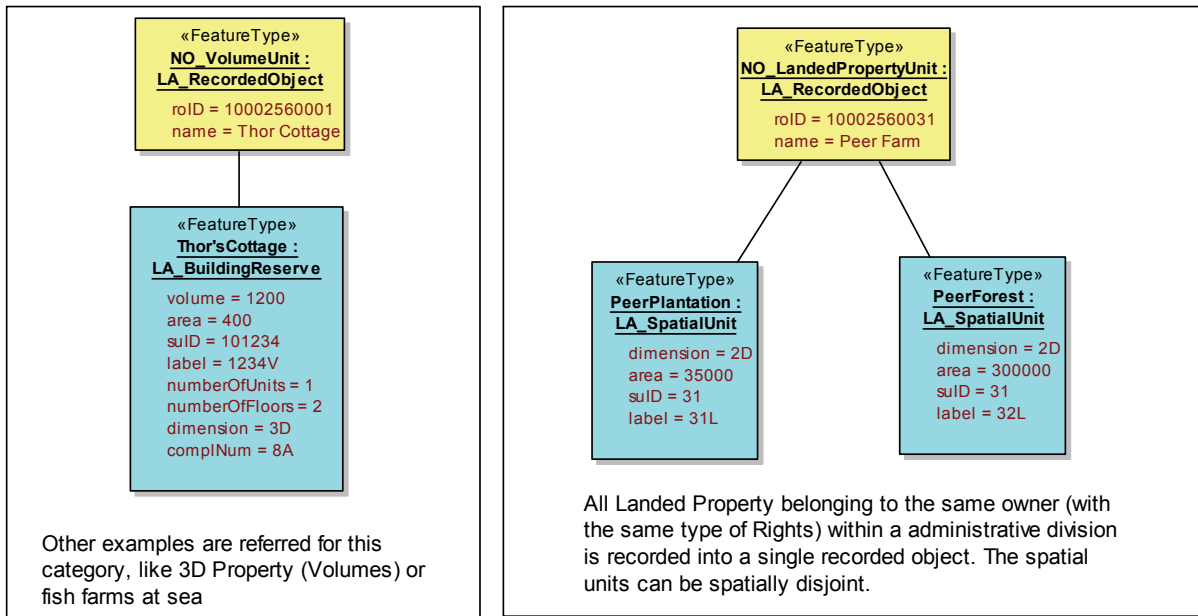


Case C33. Spanish 'real estate' form of property

object AnnexC Case34a

Object Diagram, Case C34a - Norway categories of the Basic Property Unit. Examples for Volume Unit, Landed Property and Leased Land Unit.

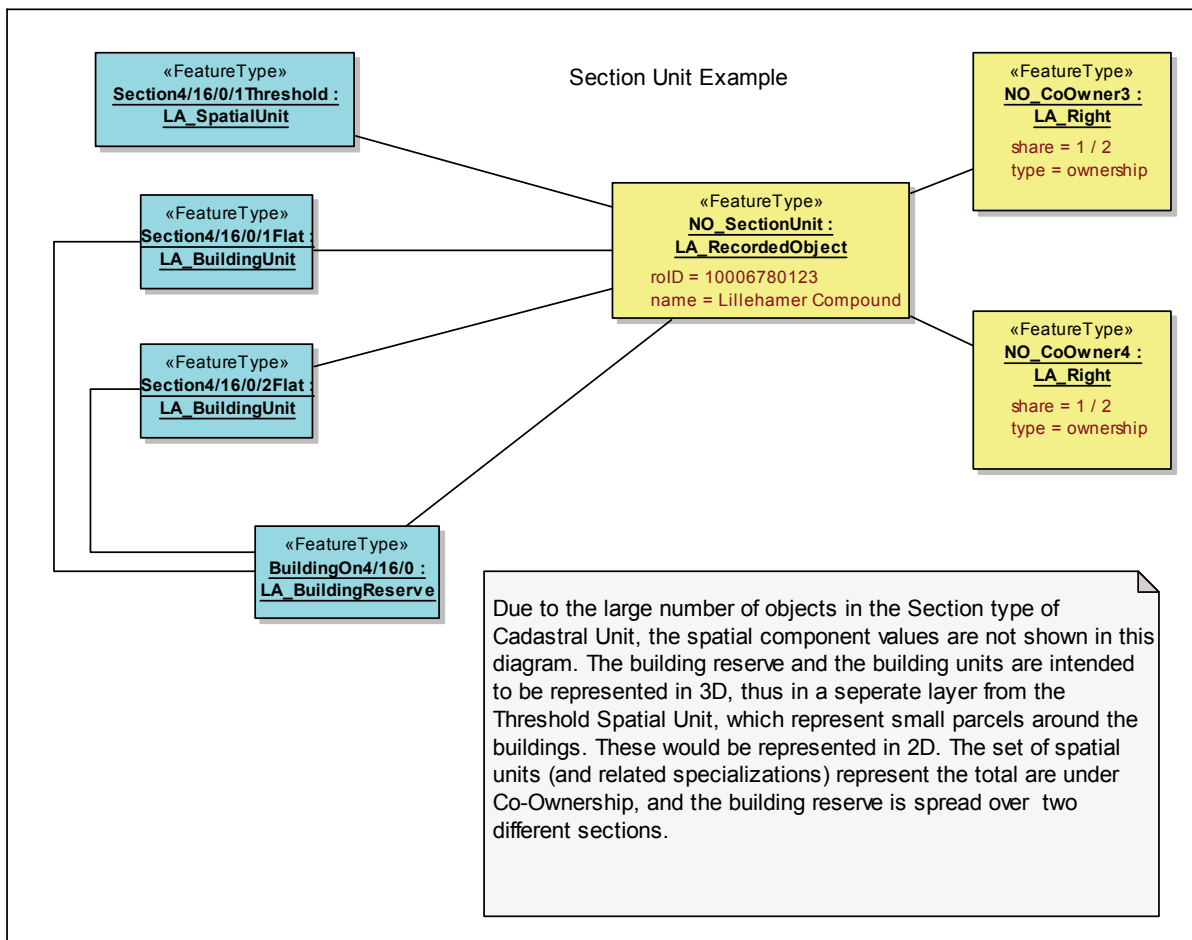
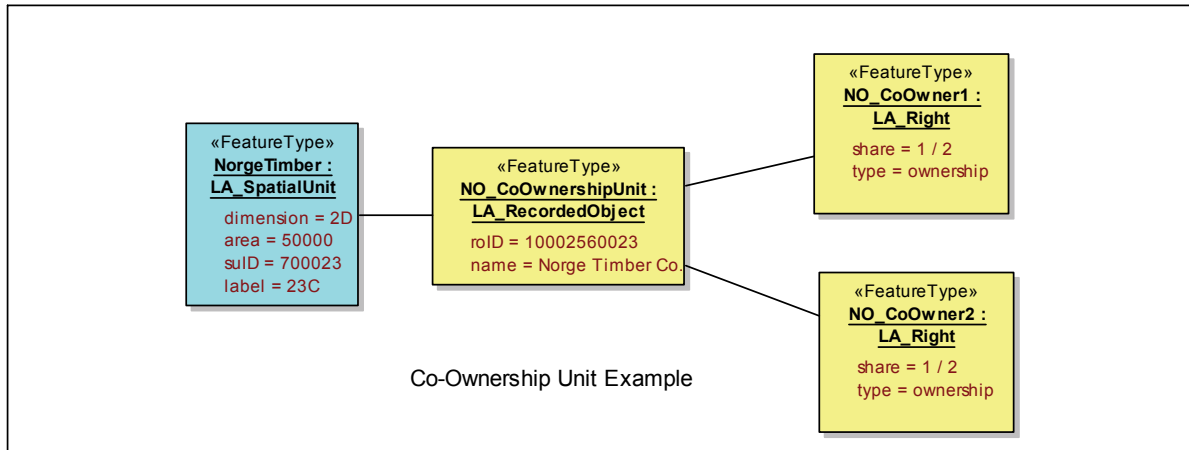
Each of the five specializations (together with case C34b) of the Norway Basic Property Unit is shown through a specific instance connected to a LADM Recorded Object. Association to Rights is shown wherever relevant, but Parties are not shown on these diagrams



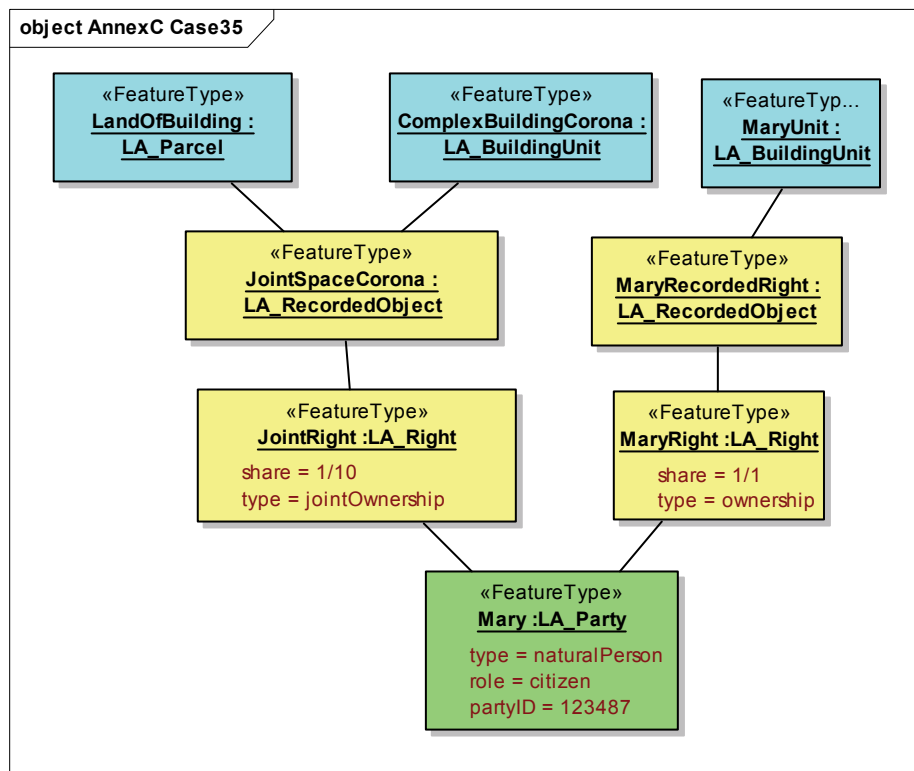
Case C34a. Norwegian categories of basic properties

object AnnexC Case34b

**Object Diagram, Case C34b - Norway Categories of the Basic Property Unit.
Examples for a Co-Ownership Unit and a Section Unit.**



Case C34b. Norwegian categories of basic properties



Case C35. Individual and joint property rights in Spain ('Corona' is the building name)

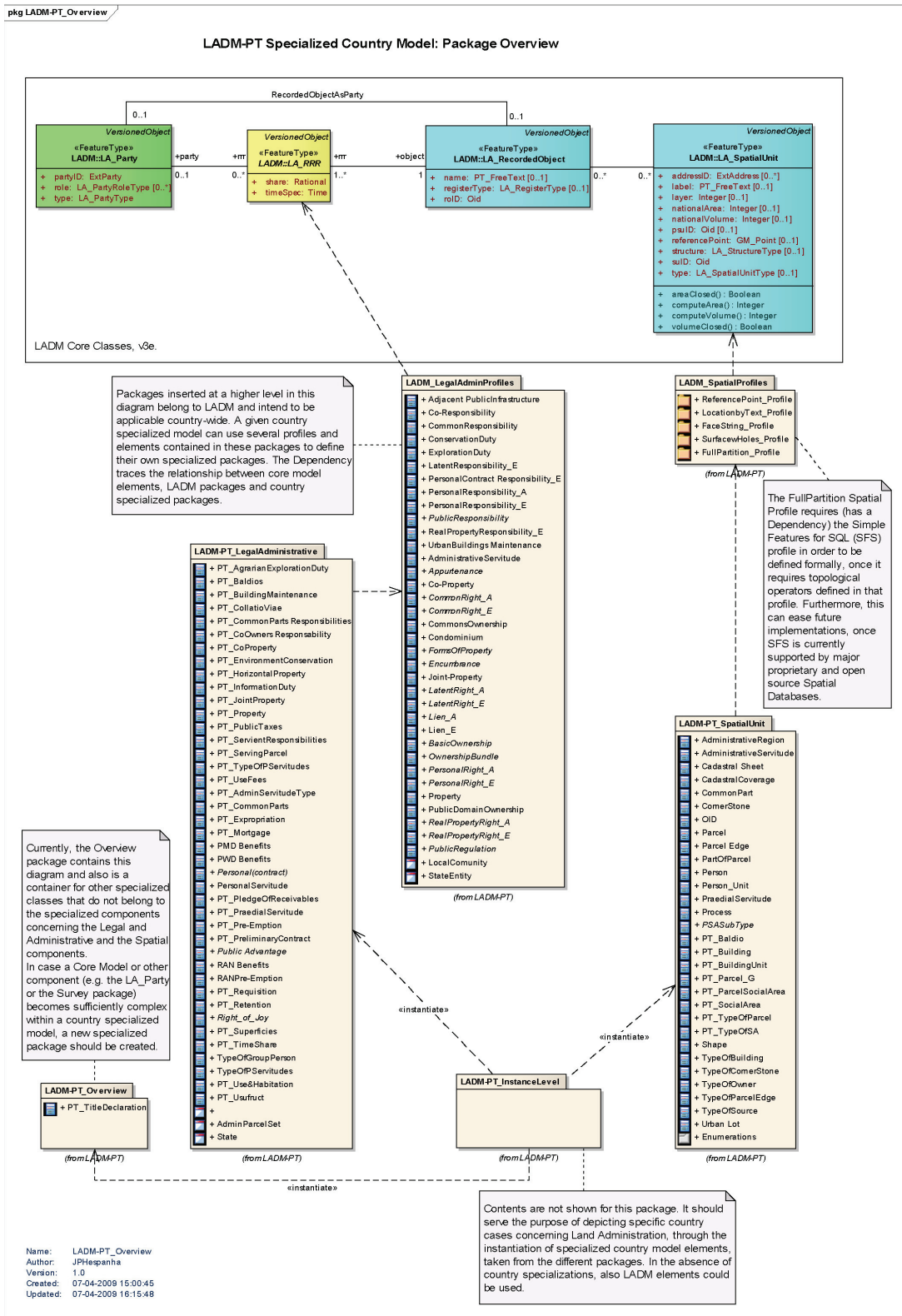
Annex D. Country profiles (informative)

In this annex three country profiles of LADM are mentioned:

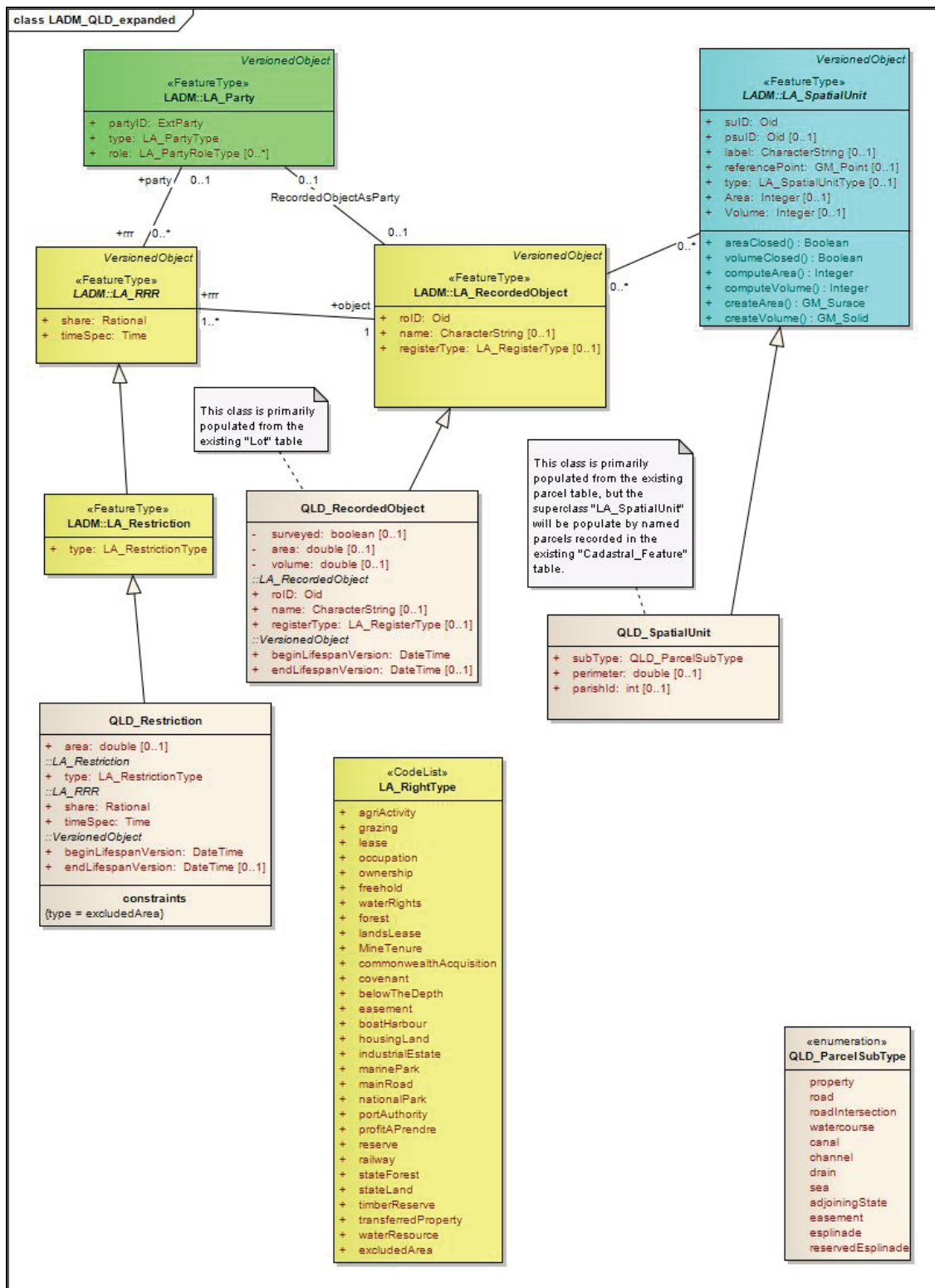
1. Portugal ([Profile D1](#)).
2. Queensland, Australia ([Profile D2](#)).
3. Japan ([Profile D3](#)).

Portugal country model

NOTE. This specialised country model of Portugal is the result of academic research towards a methodology to derive a country model from LADM using state-of-the-art Information Technologies. A new Cadastral Data Model has just been published by IGP (the official cadastral agency for Portugal). A proposal to reach full compatibility of this data model with LADM is in preparation.



Profile D1. Country profile Portugal



Profile D2. Country profile Queensland (Australia)

JCDM (Japan Cadastral Domain Model) (Draft)

In 1872, the Government of Japan authorized people to own, buy and sell the land. Until 1889, cadastral mapping for registration has been conducted in the whole country. The landowners surveyed by themselves with the undeveloped technique at the time.

After the World War II, the National Land Survey Act was enforced in 1951 and the more precise cadastral survey was started. The reformed cadastral survey is mainly conducted by local municipalities. Each land parcel is clarified on its ownership, parcel number and type of land-use. The boundaries are decided based on the consensus between the landowners. The markers are pegged on the boundaries and the parcels' actual dimensions are determined.

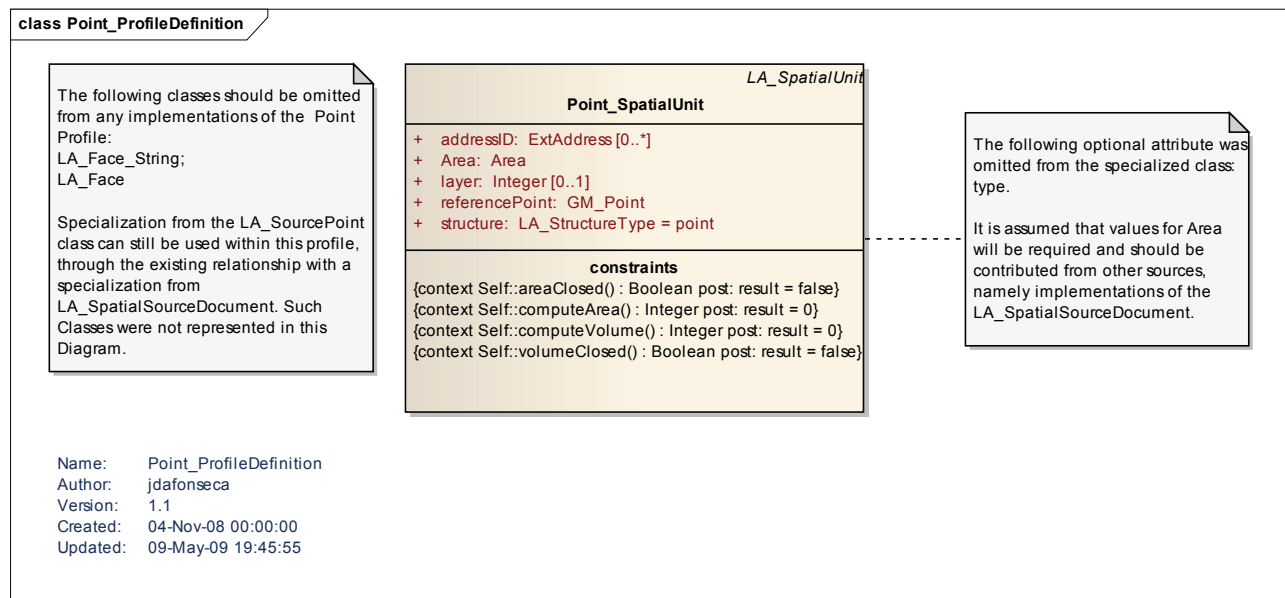
Until now, about a half of the registered cadastral maps has been developed by the reformed cadastral survey since 1951. The rest is still based on old maps developed in 19th century. For this reason, there are a lot of mismatches in boundaries, shapes and dimensions between the registered and actual ones.

The reformed cadastral survey has developed the land ledger and printed maps in the early stage. Then, in 1986, digitalization with digital cadastral record format was introduced for advanced management and utilization of the data. Since 2002, a world geodetic system is applied in Japan and the "Cadastral Format 2000" is adapted. The JCDM is a provisional model of the "Cadastral Format 2000."

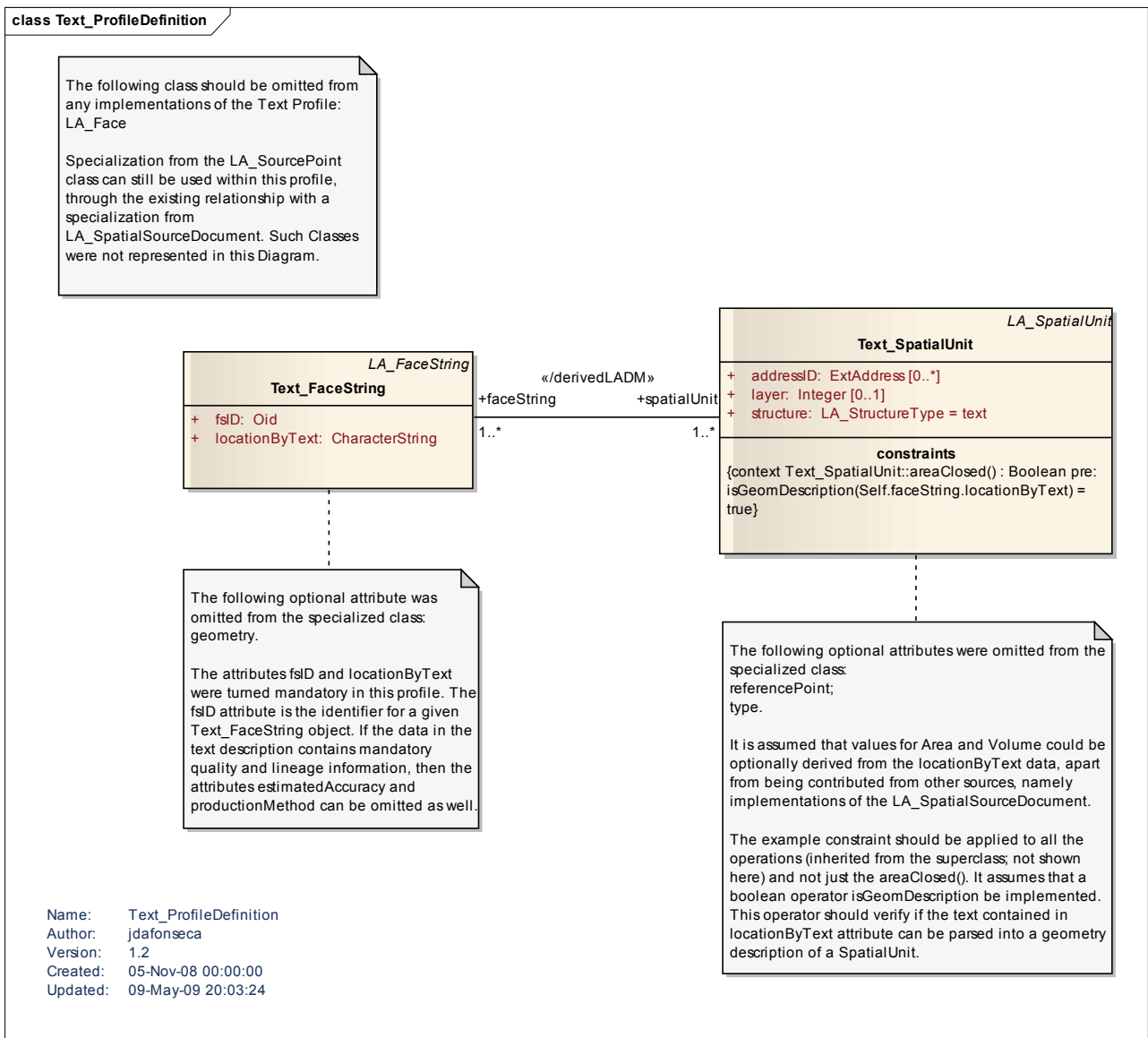
Annex E. Spatial profiles (informative)

The spatial representation package of the LADM ([Section 6.6](#)) allows a large number of possible representations of spatial units in 2D, 3D, or mixed 2D and 3D. For one specific type of spatial representation, there are often just a limited number of classes and attributes needed. This annex shows per spatial profile the needed classes and attributes. The 3D cases also cover mixed 2D and 3D configurations. Further, in a specific country profile it is possible to combine several spatial profiles; e.g. parcels with 2D topology based spatial units and building reserves with 2D polygons.

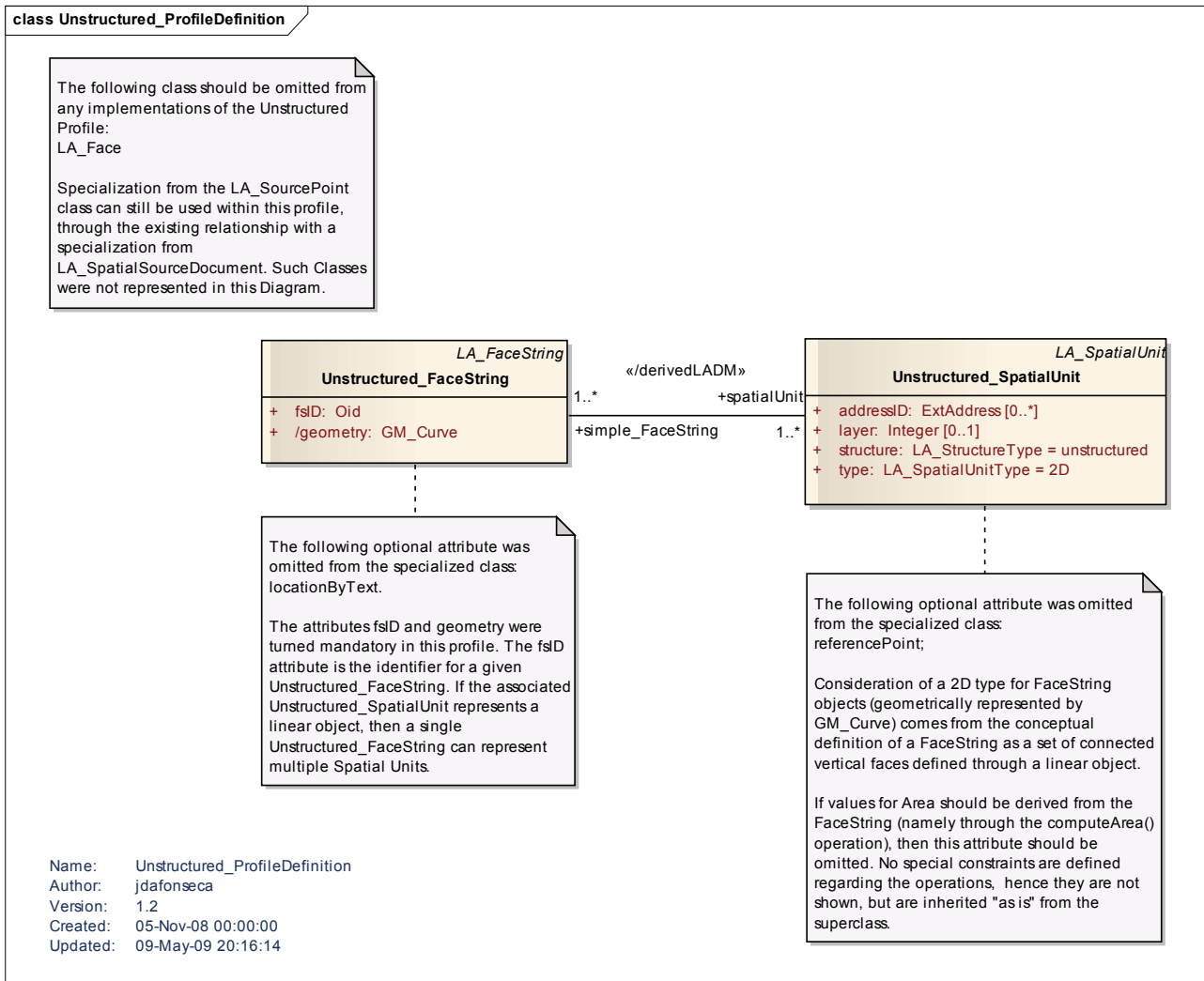
- 2D Point based ([Profile E1](#))
- 2D Text based ([Profile E2](#))
- 2D Unstructured (Line) based ([Profile E3](#))
- 2D Polygon based ([Profile E4](#))
- 2D Topological based ([Profile E5](#))
- 3D Topological based ([Profile E6](#))



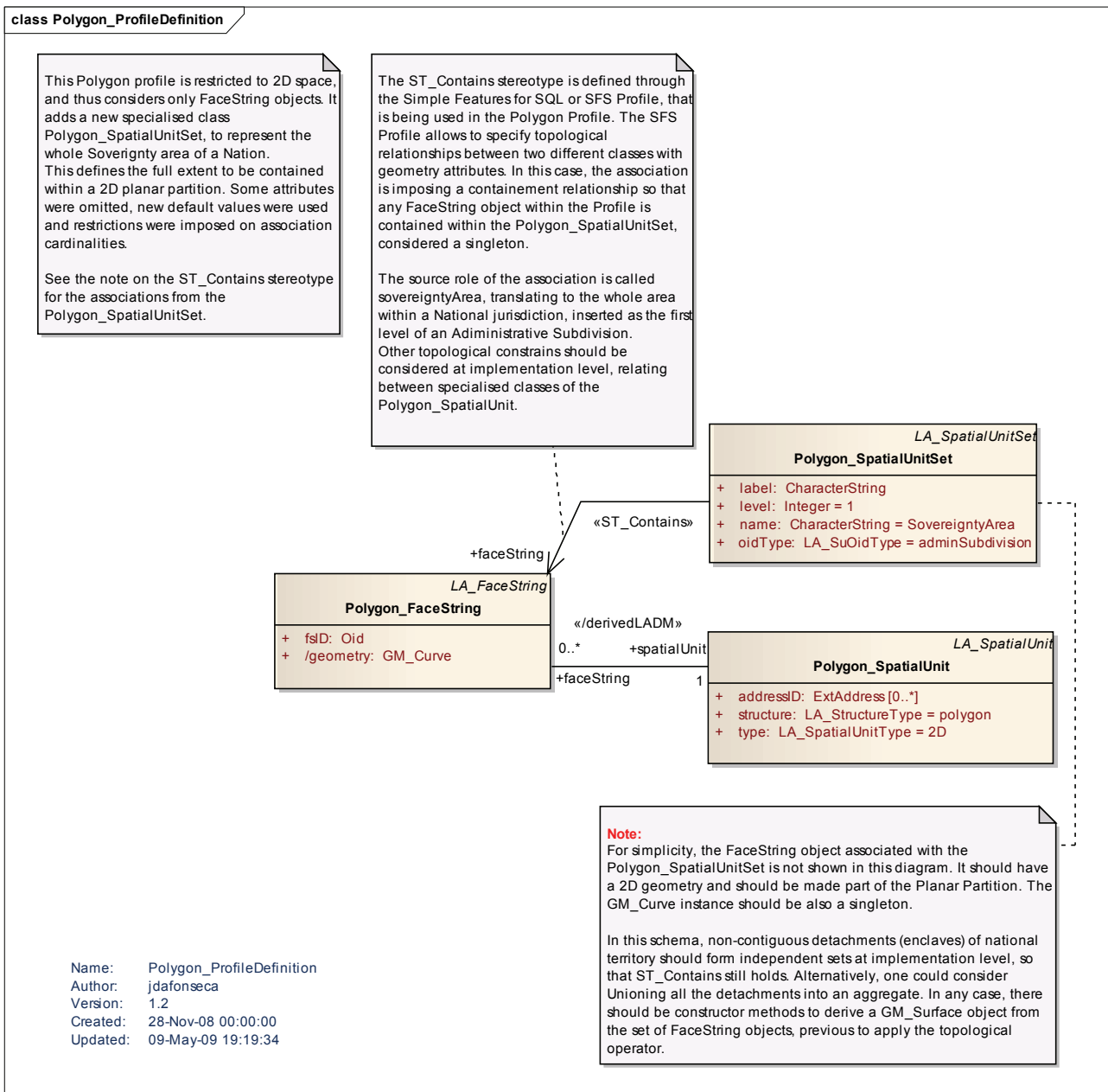
Profile E1. 2D Point based



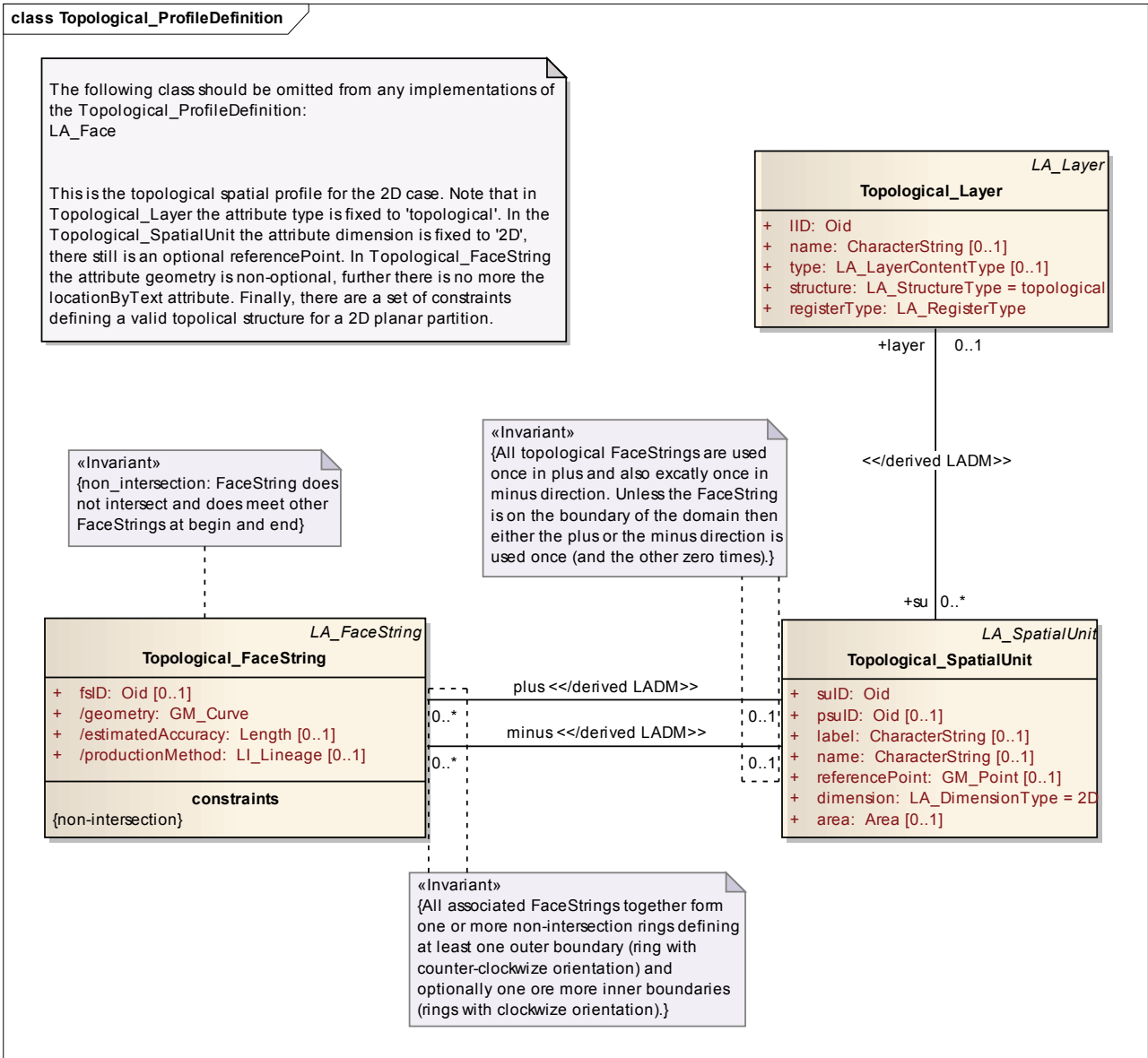
Profile E2. 2D Text based



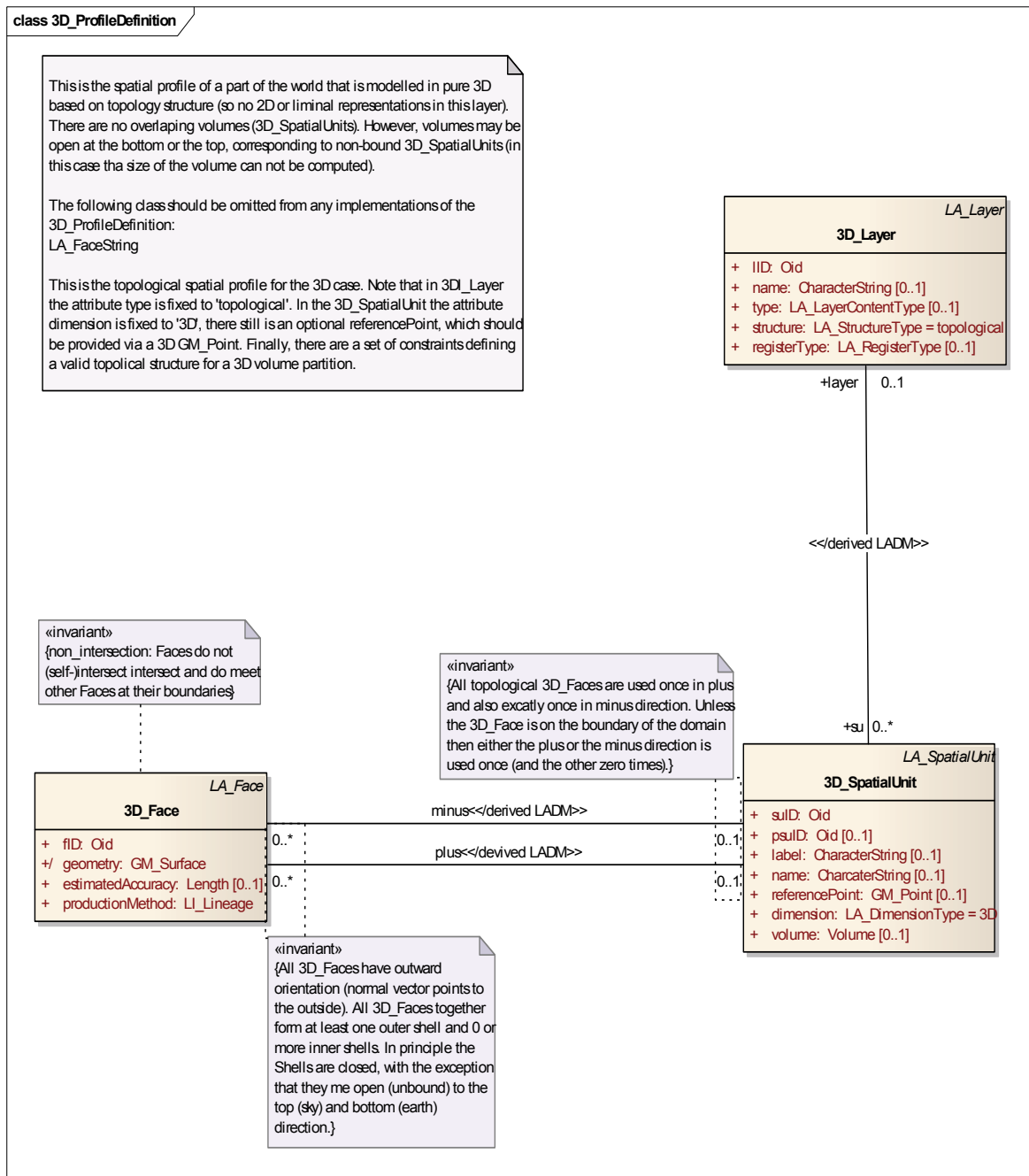
Profile E3. 2D Unstructured (Line) based



Profile E4. 2D Polygon based



Profile E5. 2D Topological based



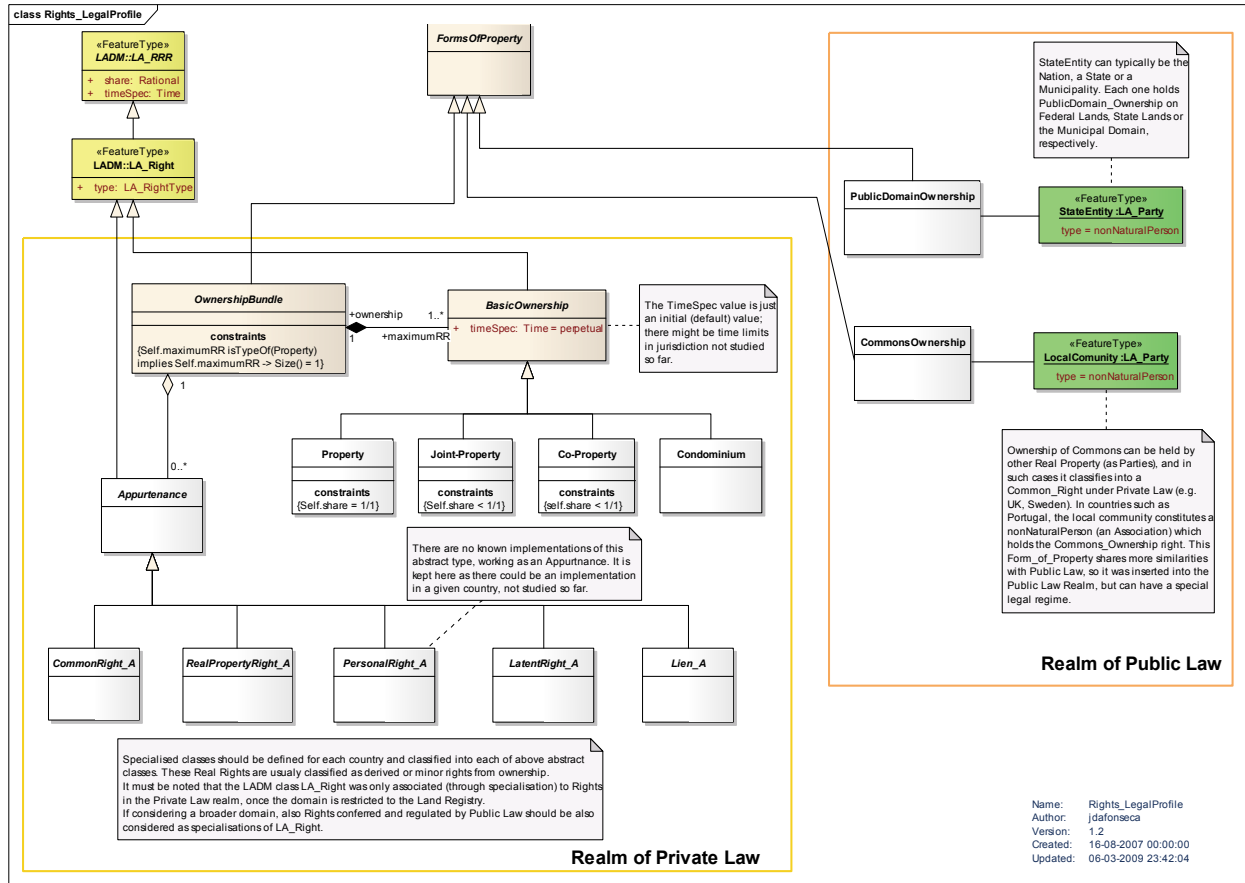
Profile E6. 3D Topological based

Annex F. Legal profiles (informative)

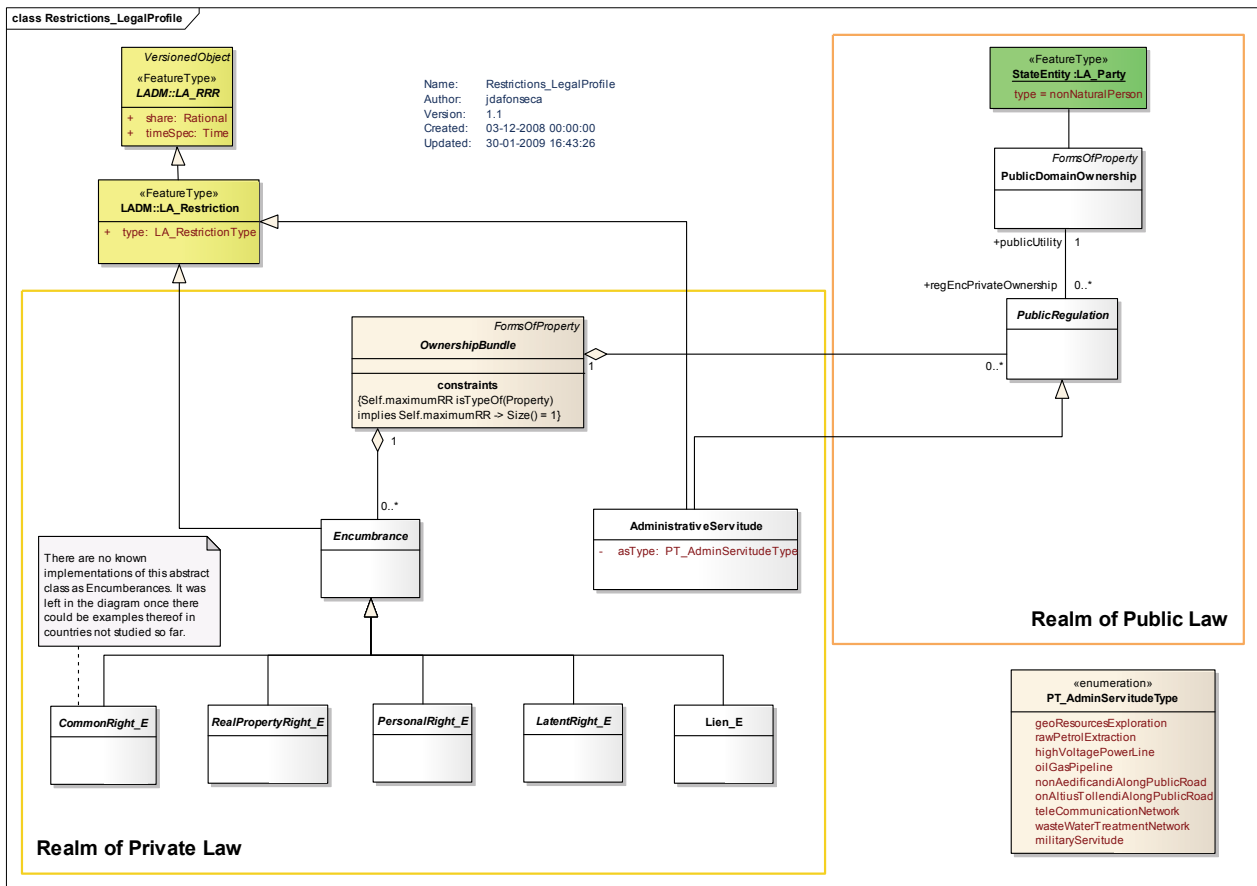
In this Annex three legal profiles are shown:

- a legal profile for rights ([Profile F1](#))

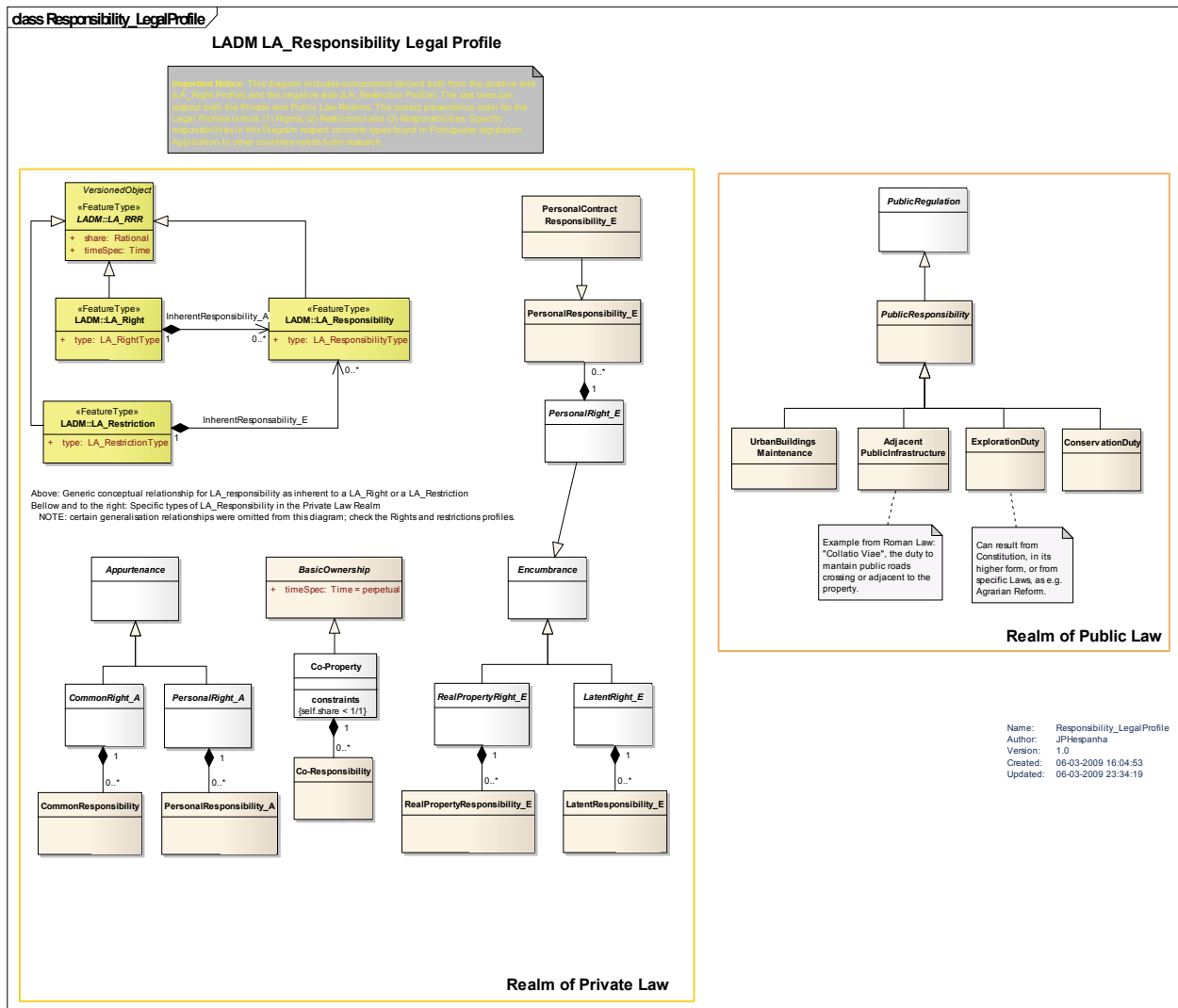
- a legal profile for restrictions ([Profile F2](#))
- a legal profile for responsibilities ([Profile F3](#)).



Profile F1. Legal profile for rights



Profile F2. Legal profile for restrictions



Profile F3. Legal profile for responsibilities

Annex G. LADM and INSPIRE (informative)

Within the European Community geo-information is harmonized according the INSPIRE legislation ([INSPIRE, 2007](#)). Cadastral parcels is one of the harmonized data sets. The data product specification of the INSPIRE cadastral parcels is currently under construction. According to the Directive the original planning is that this should be included in an implementing rule not later that 15 may 2009. However, there is a slight delay and the implementing rule for data specification is now expected in the fall of 2009.

In selecting relevant classes from LADM, using inheritance and adding attributes and constraints it has been possible to express the INSPIRE cadastral parcels data set consistent with LADM. Once the implementing rules will be adopted and the INSPIRE cadastral parcels data specification is final, this annex will contain two UML class diagrams: one showing how the INSPIRE cadastral parcels can be derived from the corresponding LADM classes and one diagram showing the result (without the inheritance relationships).

It should be noted that the current scope of the INSPIRE cadastral parcels is more limited than the LADM; e.g. it does not include rights, restrictions and responsibilities.

Annex H. LADM and LPIS (informative)

1. The integration of LADM with Land Parcel Identification Systems (LPIS)

One of the aspects of the Common Agricultural Policy (CAP) of the European Union is to focus on the management of subsidies to the farmers. For this purpose, member states have established Integrated Administration and Control Systems (IACS), including Land Parcel Identification Systems (LPIS) as the spatial component. The LPIS as a concept was developed already in 1992, when the need for identification of the agriculture parcels to support IACS emerged. At that time, the data model was purely alphanumerical without any geospatial reference. It was in the Council Reg. No 1593 (2000) that the spatial LPIS based on Geographic Information System (GIS) was promoted. Five years have been given to the member states to establish LPIS in digital and geo-referenced format. Thus, the first year of operational GIS-based LPIS was 2005. Although the regulatory requirements were unique across the sector, the particular implementations were a subject of the member states. In fact, during the development stages of different LPISs in different member states, the use of Land Administration (LA, or Cadastre) data, as well as large scale topography data, were on the agenda for a considerable while ([UN/ECE.2004](#)). In the following example a data model is designed that implies the collaboration or integration of LADM and LPIS. The standardization initiative in the area of LPIS ([Sagris and Devos. 2008](#)) by the Joint Research Centre (JRC) of the European Commission is used in this example in order to represent potentials for integration/collaboration between LADM and LPIS.

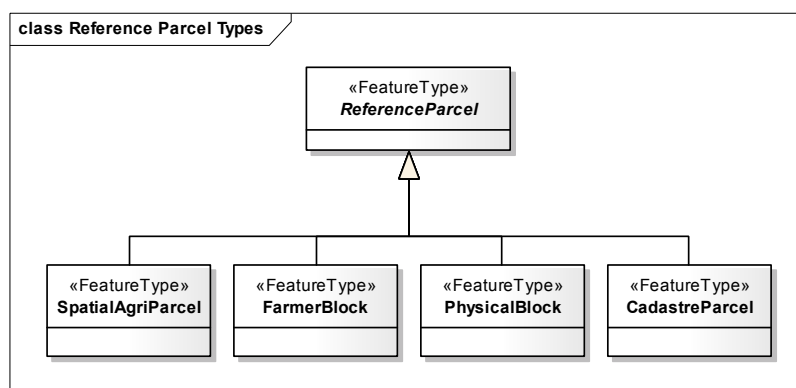


Figure H1. Reference parcel types

A declared agricultural parcel is a key concept applied in relation to area-based payments, which determines the subject of the aid application, geographic location and extent (area) of agricultural activity. The declared agricultural parcel is a subject of the payment calculation as well as for administrative control. Due to the dynamic nature of agricultural activities, declared agricultural parcel can be unstable over time and space (crop rotation, out of use, aggregation or subdivision of fields, different extent of use, conditions for eligibility for payments etc.). Therefore, the reference parcel (RP) is used as basic unit of LPIS for purpose of identification of the declared agricultural parcels where one RP can contain one or many (1..*) declared agricultural parcels. The EU regulations specify that reference parcel can be either cadastral parcel or production block (see [Figure H1](#)). In the end some member states decided to build their systems as close to declared agricultural practice as it possible and use reference unit which contains only one spatial agricultural parcel.

The main difficulties of Cadastral parcel as reference for subsidies' application are that (i) it contains non-agricultural land, so area eligible for payment can not directly determined, and (ii) that boundaries of agricultural activity are out of LA scope and their maintenance via cadastral update cycle is very complicated. Therefore in Section 2 the concept of SubParcel is introduced, which plays the role of a reference parcel (and as glue between LADM and IACS/LPIS).

2. A data model for the integration of LADM and LPIS

In the UML class diagrams, current LADM classes are used with or without small changes in their attributes or they are extended with new classes, and IACS/LPIS classes are shown in a single colour (grey).

2.1 Basics of LPIS Core Model (LCM)

LPIS Core Model (LCM) has been developed by the Agriculture unit of the EC Joint Research Center (JRC). The intention with this model is extracting general classes from functional LPIS system and test them for conformance with the EU Regulations; therefore model does not cover every aspect of the LPIS. MS experts could extend the boundaries of the LCM to fit for particular needs of national implementations. [Figure H2](#) represents the logical business model of the main concepts of the LCM. All basic concepts are represented as classes.

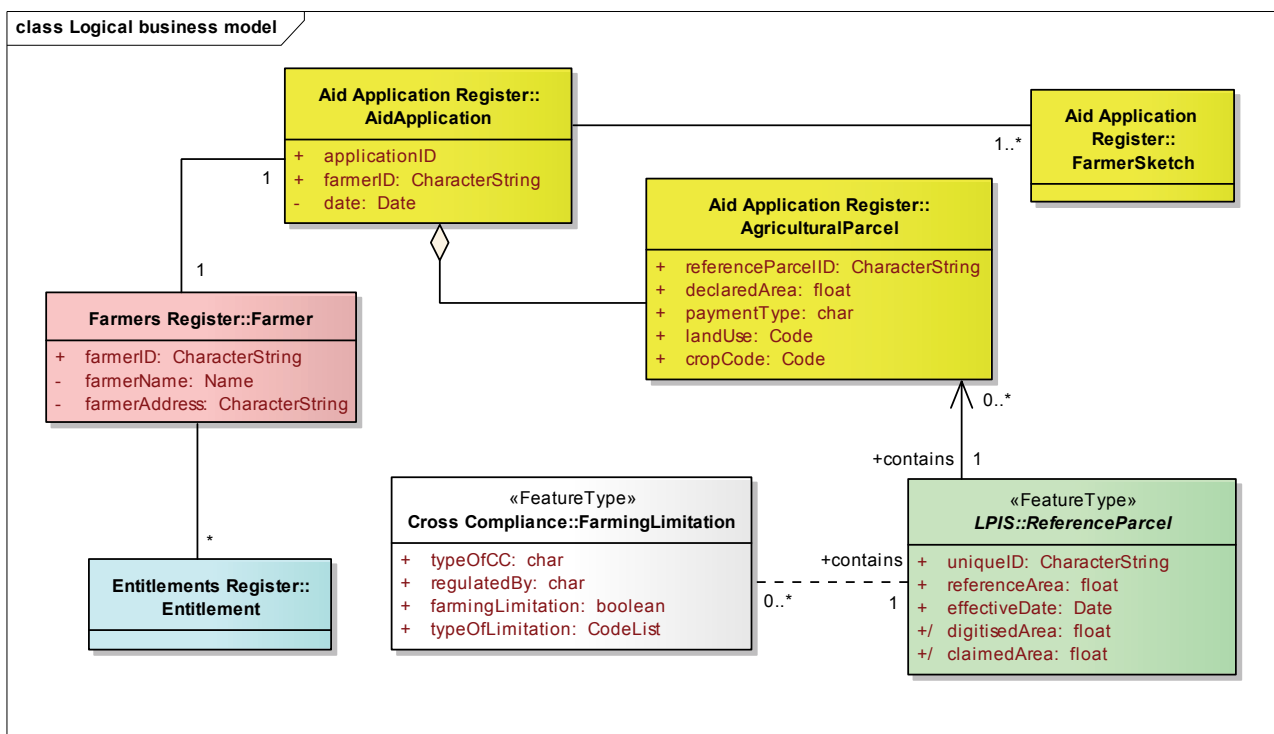


Figure H2. The core (classes) of the LCM

2.2 Integration of LCM and LADM Basic Classes

2.2.1 Spatial classes

The class LA_SpatialUnit is one of the core classes of LADM. LADM also provides the functionality of grouping the LA_SpatialUnits with the class LA_RecordedObject through which the legal facts (right,

restrictions, responsibilities in LA_RRR) are attached. The specialized classes of LA_SpatialUnit are outside of the scope of cadastral parcel (LA_BuildingReserve, LA_BuildingUnit, LA_NetworkReserve) as is the hierarchical grouping in LA_SpatialUnitSets (sections, municipalities, etc.); see Figure H3. For a meaningful, comparable and standardized classification of land, at least for the case of cadastral parcels as reference parcel, SubParcel class is designed as a part of cadastral parcels in the model. SubParcel has composition association with LA_RecordedObject. In the SubParcel class, the attribute typeSubParcel is designed to store different types of SubParcel. These are defined in the code list SubParcelType (Figure H3). One important consideration is that the boundaries of the defined classes should be stable over time. Otherwise, the update and maintenance procedures will definitely be a burden.

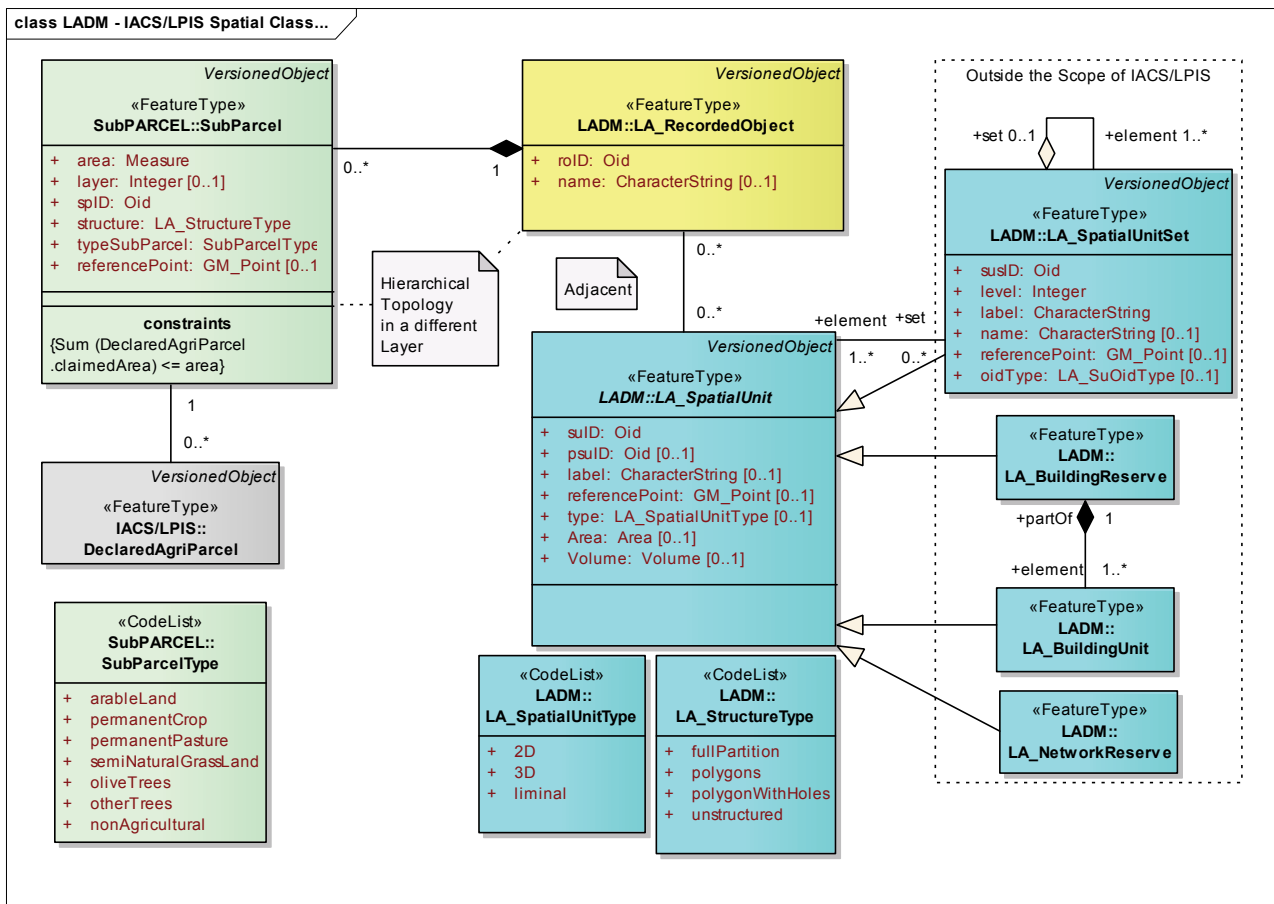


Figure H3. Spatial classes for LADM – IACS/LPIS collaboration

2.2.2 Administrative classes

LA_Party (person), Farmer, Right/Restriction/Responsibility (LA_RRR), YearlyAidApplication, YearlyFarmerSketch, DeclaredAgriParcel are the basic classes designed to manage administrative data in the model (Figure H4). LA_Party and LA_RRR are two core classes coming from the LADM. Other classes are designed for the representation of LPIS administrative data.

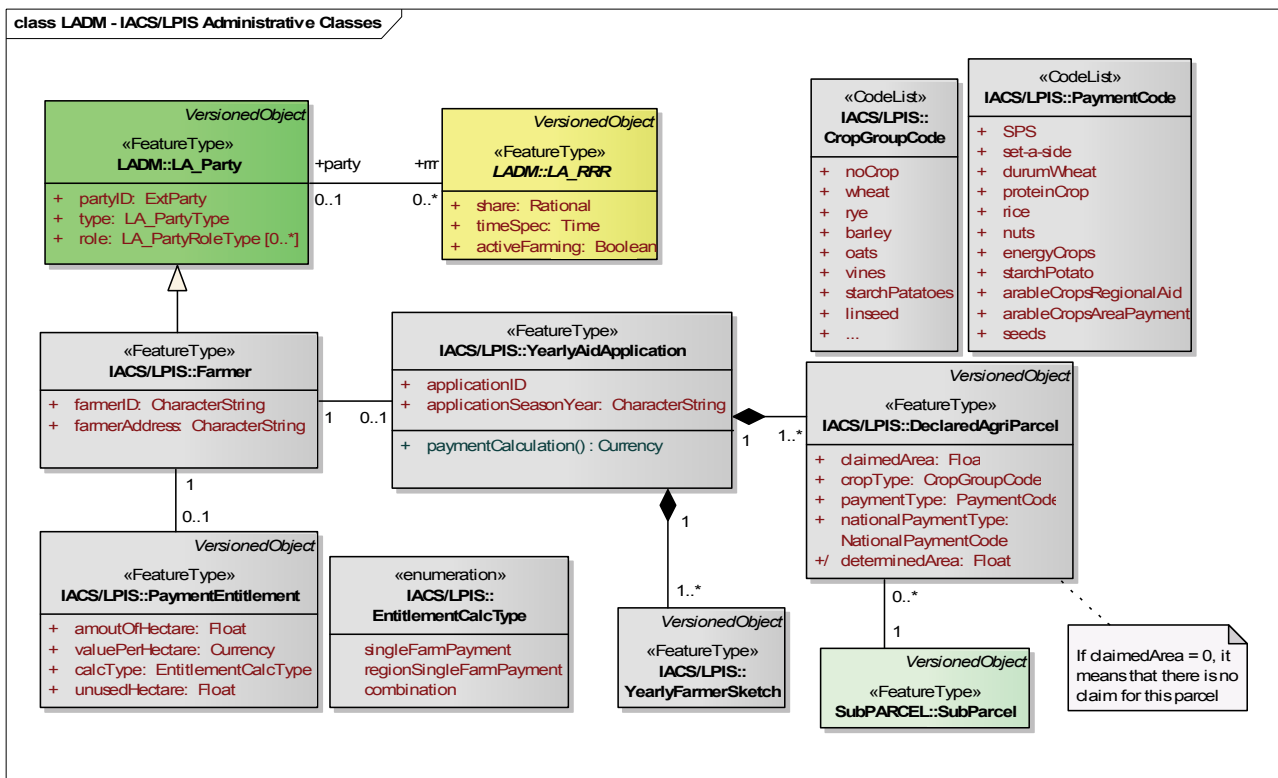


Figure H4. Administrative classes for LADM – LPIS integration

Farmer class is designed as a specialization of LA_Party class in order to handle the attributes specific to farmers. Farmers may apply for agricultural subsidies every year. To handle the application information of farmers, YearlyAidApplication class is designed. Aid applications submitted by farmers must be accompanied by farmer declarations which describe each piece of land used by farmer for agricultural activities and farmers' sketch. Therefore there are two corresponding classes (DeclaredAgriParcel and YearlyFarmerSketch) composing the YearlyAidApplication (a LA_SourceDocument) in the model. To represent their entitlement rights, PaymentEntitlement class is introduced in the model. In the sketch which farmers must provide together with their applications, they indicate the boundaries of their agricultural parcels. They may use one single agricultural parcel or many of them. They may draw the boundaries of their land in separate sketches for each piece of land. Some grouping is also possible depending on their location and the scale of the sketch. Aid applications submitted by farmers must be accompanied by farmer declarations which describe each piece of land used by farmer for agricultural activities. These declarations are subject to agricultural subsidies after some control processes are carried out. Farmer declarations are represented by DeclaredAgriParcel in the model. It is designed as a part of YearlyAidApplication class because this class can not be without any aid application.

3. Special issues for the integration of LADM and LPIS

Farmer is defined in article two of the Regulation EC No 1782/2003 as a natural or legal person or a group of natural or legal persons. This definition of person can be represented by LA_Party classes designed for LADM. In [Figure H5](#), the classes in green are LADM person classes. LA_Party is the main class which represents natural person and non natural person, and also groups of natural and non natural persons via LA_GroupParty class. So, LADM person classes have the functionality of representing farmers as all kinds

of persons. However, a new class Farmer is designed to represent the attributes which are specific only to farmers. Currently in the model, only two specific attributes. One is farmerID which indicates that the person is a farmer. The other is farmerAddress which includes up-to-date address information.

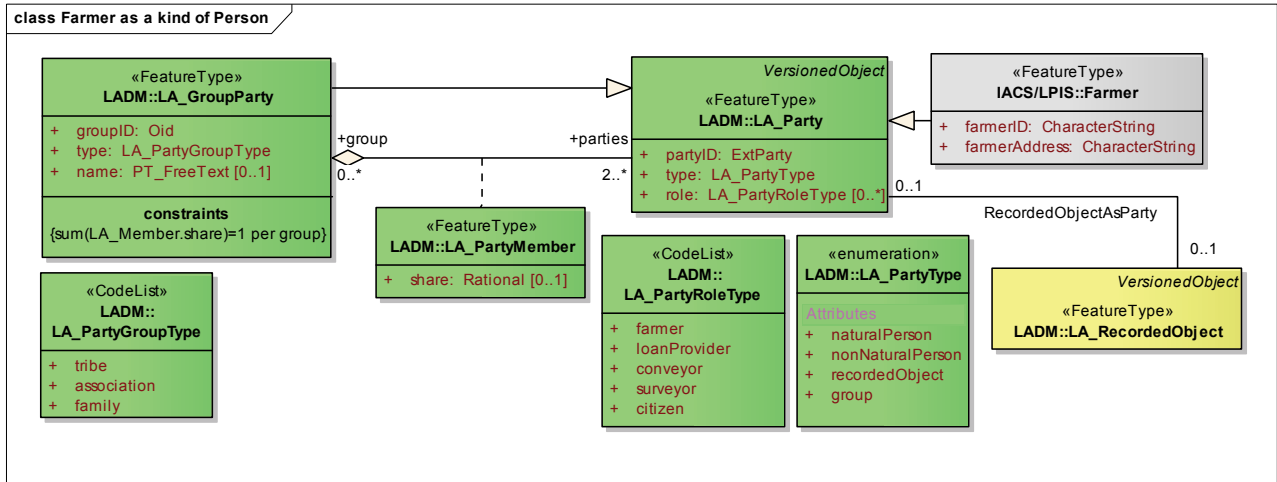


Figure H5. Person classes: LA_Party, LA_GroupParty and Farmer

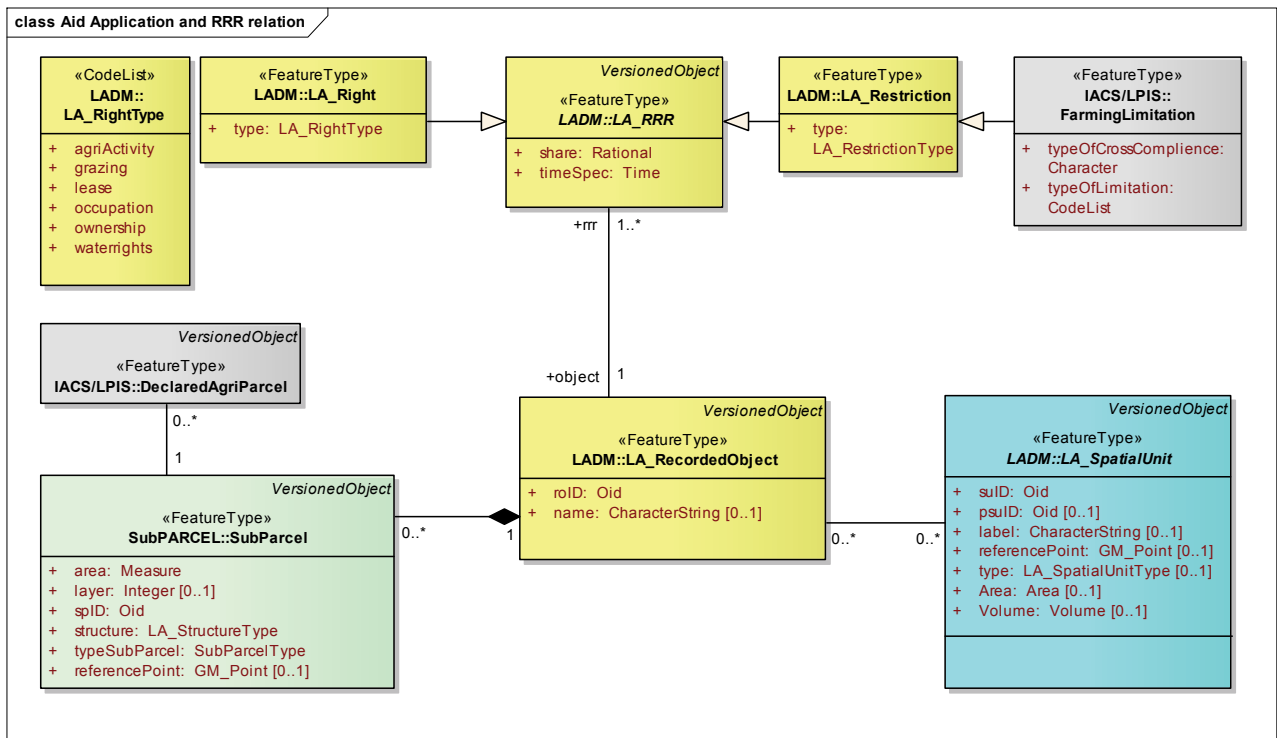


Figure H6. Association of rights and restrictions to DeclaredAgriParcel class

In the LADM, LA_RRR class has three main types of specialization classes – LA_Right, LA_Restriction, and LA_Responsibility. In the collaboration model for LPIS integration, farming rights are represented by LA_Right class and some of farming limitations are represented by FarmingLimitation class as a

specialization of LA_Restriction class (Figure H6). The only right IACS/LIPS is about is right to be paid (entitlement). It is associated with Farmer and via YearlyAidApplication and DecalredAgriParcel to SubParcel. It is not related directly to the whole LA_RecordedObject (with LA_SpatialUnit's).

4. Discussion

This Annex shows that several aspects of LADM can be used in the integration of different LPIS set-ups in different member states of the European Union. Several other important aspects are not mentioned here but can be found in (Inan et al. 2008).

There has been a common understanding that the LPIS deals with farmers (users of land) and the Cadastre (or the LAS) deals with owners and they may not be the same person. Unlike such kind of common understanding, LASs, by definition, deal with a wide range of information related to land including ownership, land use rights (right holders of registered properties), farming rights, restrictions, responsibilities etc. We can also call such kind of a LAS as multi purpose cadastre. However, it is a fact that conventional LASs as legacy systems are currently not always capable of administering all kinds of land related rights. This is why LASs are generally underestimated by third parties. Therefore, registration of farmers and farming rights in a LAS has been regarded as an obstacle when compared with LPIS. In fact, a farmer is a person who does some kind of agricultural activity on some piece of land. Farmers may own some land for their activities. They may lease and/or get some kind of consent from others for another piece of land.

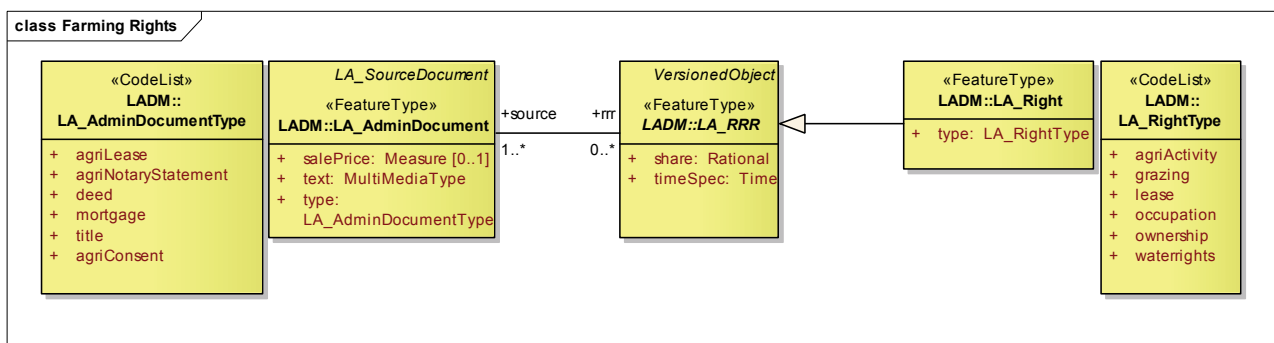


Figure H7. Registration of farming rights with the LADM classes

In this example, farming rights are designed as part of LAS with a few extensions in code lists (LA_RightType and LA_AdminDocumentType) with attribute values for attributes of some LADM classes (see Figure H7). The idea is that this will enable the application of an integrated solution for the management of land use rights both for LAS and LPIS applications.

In order to try to design and test properly the model presented above, a modeling of the use cases (from the business and system point of view) should be elaborated, including Activity diagrams of the processes and workflows.