Modular Standard: application to the Portuguese Cadastre

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Present Situation in Portugal

- **The Geometric Cadastre**
  - **Recent developments:**
    - **From a Fiscal to a Legal role (after new legislation DL172/95)**
    - **From analogue Rural Cadastre (w/ valuation) to Digital Urban and Rural Cadastre: "Cadastro Predial"**
  - **Cadastral coverage:**
    - **About 50% of territory covered with Rural Cadastre (though completely outdated)**
    - **Just 6 municipalities covered with Digital Cadastre**
- **The Legal Cadastre (Real Estate Register)**
  - **Recent developments:**
    - **Digitalization of registers started less than 1 year ago. It will be mainly a database of scaned documents**
  - **Coverage: incomplete, once just recently there is an indirect obligation to register**

Methodology

- **Start Up data: Modular and National Standards**
  - **Review of Modular Standard and National technical standards for cadastral acquisition and related legislation;**
  - **Review of Real Estate Register law code**
- **Core Cadastral Domain: does it apply?**
- **Modular Standard National equivalents:**
  - **Object Class equivalent descriptions**
  - **Review of associations between equivalents**
- **Modular Standard Classes w/ no equivalent:**
  - **Keep the ones usefull for a future implementation**
- **National Standard Classes w/ no equivalent:**
  - **Added to the class diagram; New associations created**

Static Model: Similarities and Differences

- **Similarities**
  - **Core Cadastral Model:**
    Fundamental relationship between real estate objects and persons via rights and restrictions applies well as core of proposed implementation
  - **Geometric Cadastre Class Diagram:**
    All classes presented on *Parcel Component* diagram have an equivalent in the standard model, as well as all *Geometry&Topology* classes
  - **Legal Component Class Diagram:**
    All classes in this diagram have an equivalent in the standard model, although some simplification was considered (e.g., not considering Public Restrictions nor temporarily stored paper documents)

Static Model Differences - 1

- **Geometric Cadastre Class Diagram**

  A total number of 4 new object classes was added to this diagram. New associations were defined between the standard and the new object classes. A brief description is given for each:

  - ***FolhaCadastral*: an aggregation of *PlantaCadastral* objects included in a certain bounding box area, forming a printable sheet. The method *SectionReport()* should reproduce one of the derivables of the present data model.**
  - ***ÁreaSocialdePrédio*: a specialization of *ÁreadeRestrição* which should overlap the area of at least 2 Prédio objects. Typical instance: a right-of-way.**

Static Model Differences - 2

- ***ÁreaCadastroDiferido*: sets of parcels where their Titular and/or boundaries could not be defined during Cadastral Survey, or are subject to legal litigation.**
- ***Construção*: any construction of permanent nature on a Parcel, provided it has a minimum dimension of its projected straight on the ground.**

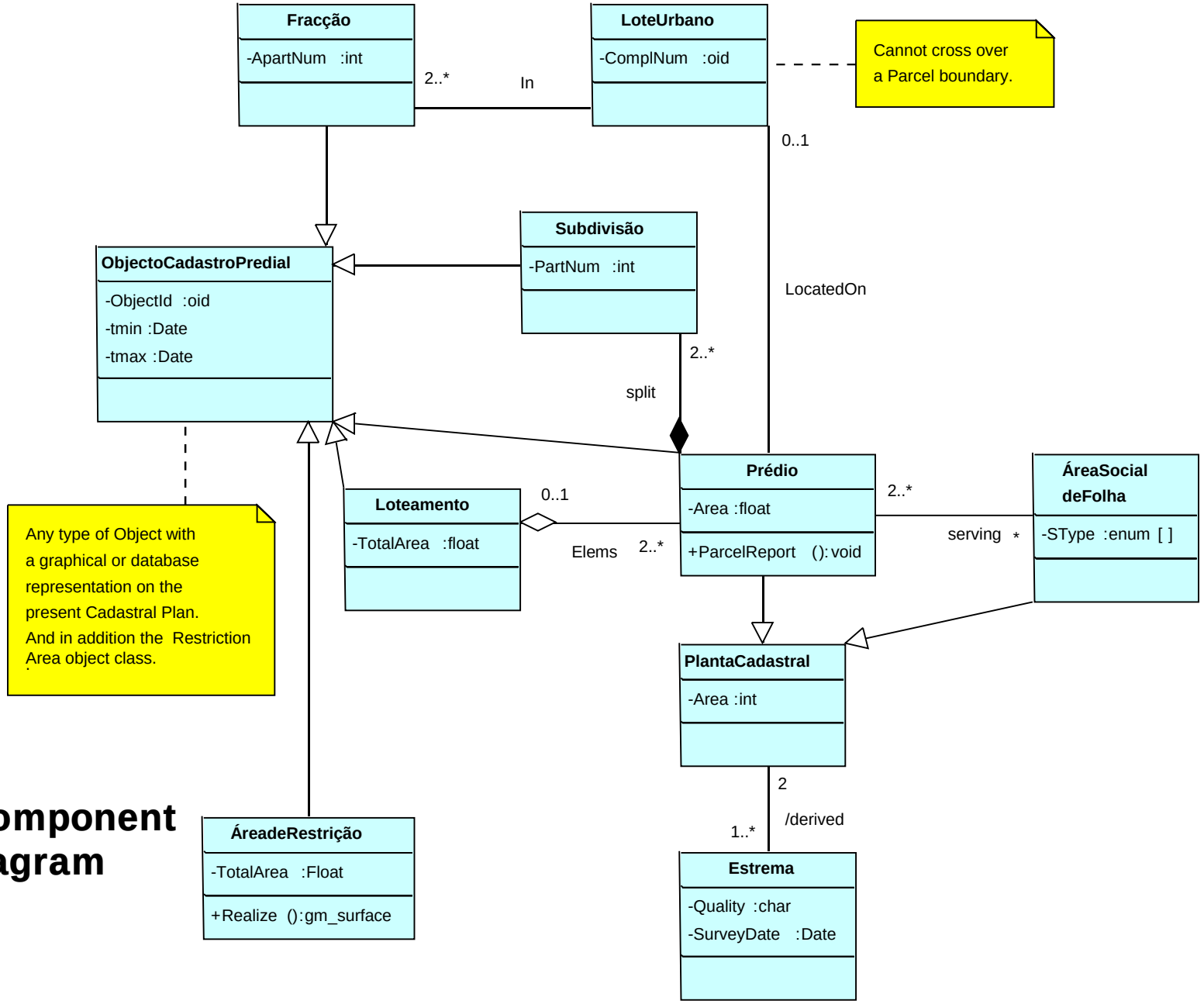
  These object classes are depicted on the figure "Geometric Cadastre – other objects", showing their associations with relevant standard classes.

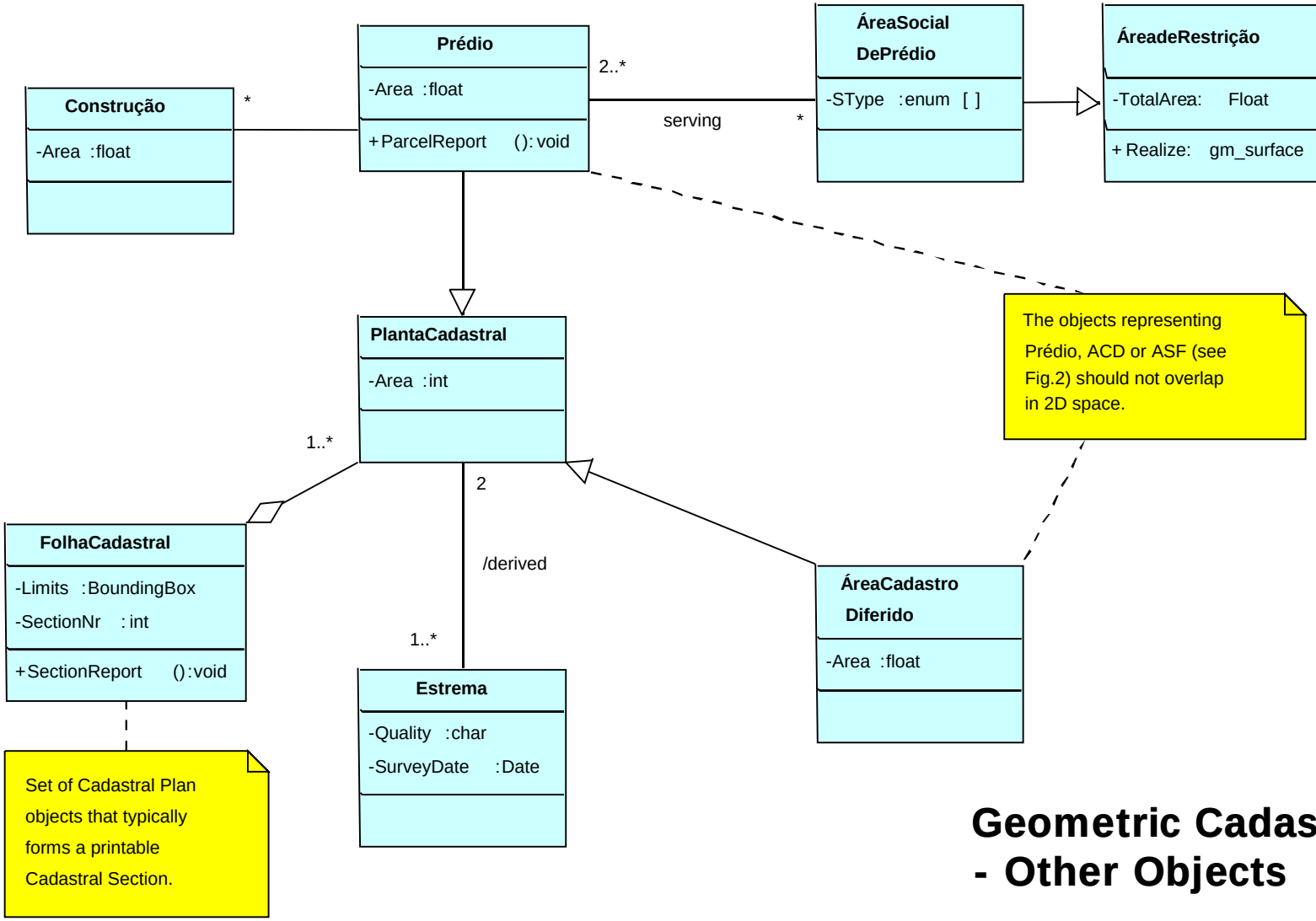
- ***Prédio*: a new method, *ParcelReport()*, was defined. It reproduces another deliverable of the present data model, which combines administrative and geometric cadastre attributes in a single formatted document.**

Static Model Differences - 3

- **The 2D Partition of space (*Planta Cadastral*)**
  - **Definition (within the proposed implementation)**
    - **Set of non-overlapping polygonal object classes filling the whole area of any given Cadastral Section.**
    - **The following object classes participate in this topological structure: *Prédio*, *ÁreaSocialdeFolha* and *ÁreaCadastroDiferido*.**
- **Other Topological Levels**
  - **Overlapping 2D partition objects**
    - ***ÁreaSocialdePrédio* can overlap objects in the 2D partition, provided those objects belong to the class *Prédio.***
  - **Included in 2D partition objects**
    - ***Construção* is typically included within the boundaries of a *Prédio* object.**

Parcel Component Class Diagram





Geometric Cadastre - Other Objects

Dynamic Model Similarities and Differences

- **Modeled Transactions:**
  - **Annexation (Detachment) of Part of a Parcel**
  - **Urban Lot creation (w/ detachment)**
- **Comparison Transaction Models:**
  - **Denmark and England&Wales (Vaskovich, 2004), covering subdivision and sale of a Parcel;**
  - **Slovenia and Sweden (Sumrada, 2004), covering subdivision and sale of agricultural Parcel.**
- **General Similarity (all countries):**
  - **Regarding the sale / Urban Lot transactions, three common actors could be identified, namelly the Owner, the Land Registry and the Municipality.**

Other Dynamic Model (Partial) Similarities

- **With current Portuguese Practice:**

  The lack of a identifiable surveyor role and the presence of a Solicitor in subdivision / annexation transactions, make the England&Wales situation most similar to the current Portuguese cadastral practice.

- **With proposed implementation:**

  The surveyor role, as well as the decision and registration phases presented on the Slovene transaction models present many similarities with the proposed implementation.

Dynamic Model Differences - 1

- **The Surveyor's Role**

  Almost all countries define different roles (or no part in the play) for the surveyor. In Sweden, does the majority of tasks in a transaction, while in Slovenia (and proposed implementation) the focus is on the geometric update aspects.

- **Who initiates registration**

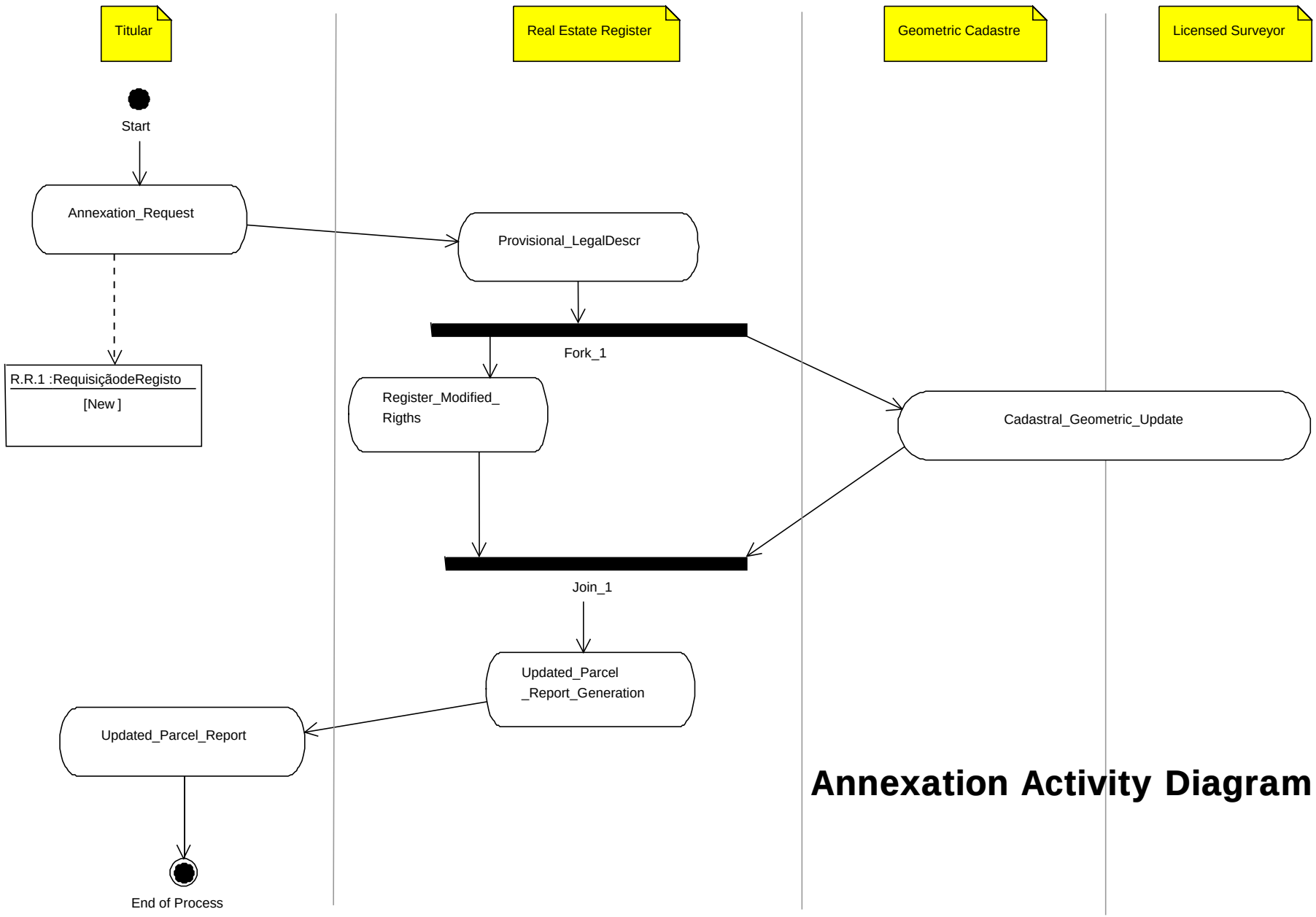
  Due to the different ways institutions are organized in each country, this phase can be initiated by a institution responsible for the geometric cadastre, for an (integrated) legal cadastre, or by the institution responsible by the Land Registry (England&Wales and proposed implementation). The request can be made by a surveyor (Sweden), a Solicitor (England&Wales) or a Lawyer (Denmark).

Dynamic Model Differences - 2

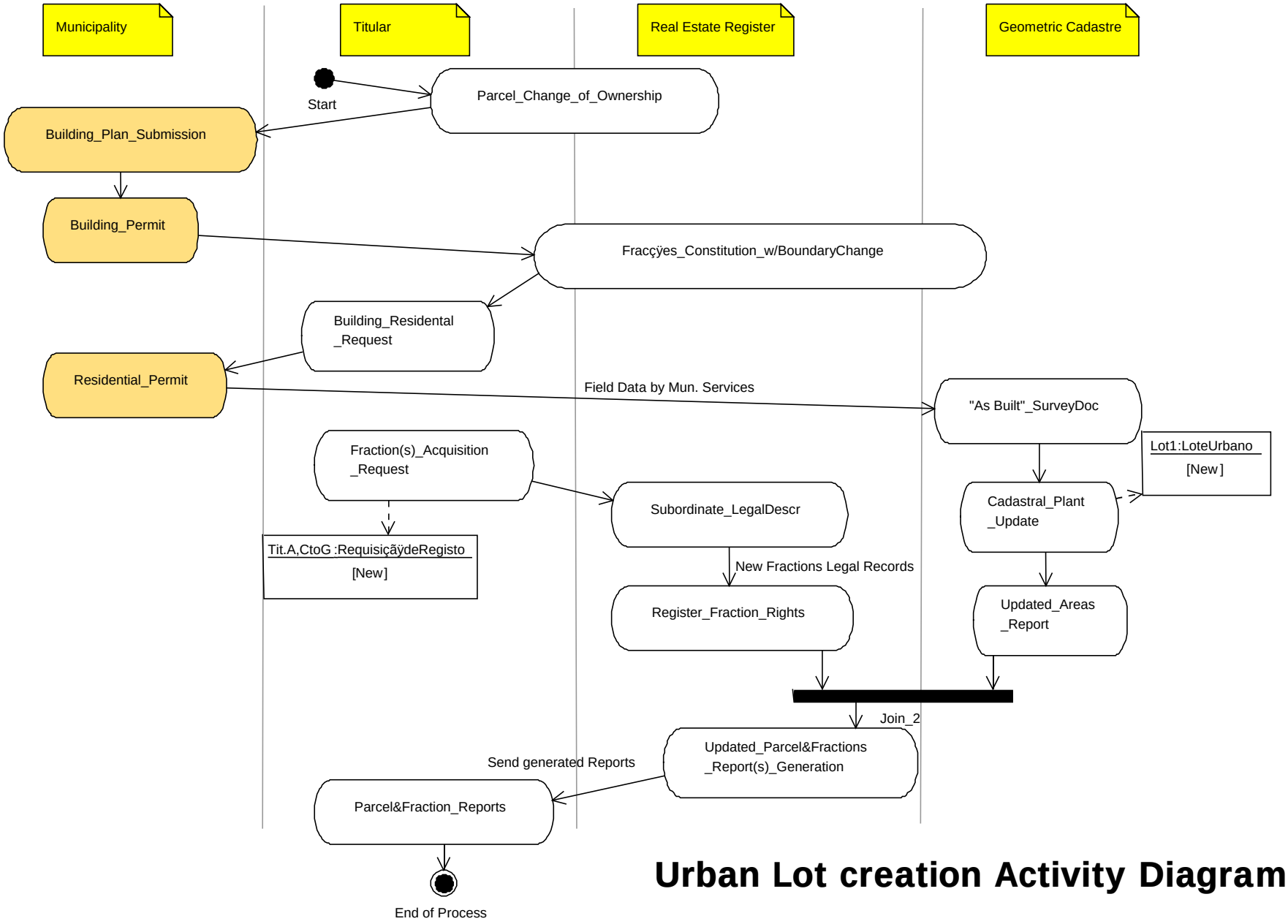
- **Different Modeling Approaches**
  - **Use Case Diagrams**

    In the proposed implementation, activity diagrams were not preceded by Use Case analysis, although actor's roles were identified as "swim lanes". Identified activities were instead based on the static, data model view of the system
  - **Land Policy phase**

    This phase was not modeled as such in the proposed implementation. Activity diagrams start with a request to Land Registry services, and this request has an (implicit) Land Policy phase, not shown in the following diagrams.



Annexation Activity Diagram



Urban Lot creation Activity Diagram

Legal and Administrative Aspects

- **Institutions involved**
  - **Civil Register: responsible for the maintenance of *PessoaSingular* specialization class;**
  - **National Register of Collective Persons: responsible for the maintenance of *PessoaColectiva* specialization class.**

    Both registers are already in digital format, kept in central databases which can be queried via Internet.
  - **Real Estate Register: reponsible for the maintenance of Rights or Restrictions (*DireitoOuRestrição* association class).**

    Digitalization has begun recently, consisting mainly of a database of scanned documents with some additional data.

    A list of rights and restrictions commonly stored in the register was produced; items were grouped into four classes (not corresponding to objects).

    RoR List **Class Diagram**

Conclusions

- Most of the classes and associations of the modular standard were preserved, although some adaptations were made;
- The way in which the modular standard was modified to suit the Portuguese data structures and specifications, is expected to be the fundamental contribution of this paper;
- Comparison with other implementations will be required to decide if new classes have a more generic nature and should be included in a new version of the modular standard;
- Also, further studies are needed in order to decide if dynamic models present enough similarity as to depict a generic behavior of the data model.

Authors & Contacts

Eng.º João Paulo Hespanha; Eng.º Gonçalo Paiva Dias
ESTGA – Technology and Management Polytechnic School of Águeda, University of Aveiro
Rua Comd.te Pinho e Freitas, 3754-909 AGUEDA
Águeda
PORTUGAL
Tel. +351.234.611536
Fax +351.234.603838
Email: hespanha@estga.ua.pt; gpd@estga.ua.pt
Web site: www.estga.ua.pt

Prof. Dr. Ir. Peter van Oosterom; Mr. Dr. Ir. Jaap Zevenbergen
OTB – Research Institute for Housing, Urban and Mobility Studies
Delft University of Technology
Jaffalaan 9, 2628 BX DELFT
Delft
THE NETHERLANDS
Tel. +31.152786950
Fax +31.152782745
Email: oosterom@otb.tudelft.nl; j.zevenbergen@otb.tudelft.nl
Web site: www.gdmc.nl/oosterom; http://www.otb.tudelft.nl/uk/onderzoek_advies/geo_information/text.php

Modular Standard Equivalents; English names

- ***ObjectoCadastroPredial*: Real Estate Object**
- ***Titular*: Person**
- ***DireitoOuRestrição*: Right or Restriction**
- ***Prédio*: Parcel**
- ***PlantaCadastral*: Partition Parcel**
- ***ÁreaSocialdeFolha*: Serving Parcel**
- ***Estremas*: Parcel Boundaries**
- ***Fracção*: Apartment Unit**
- ***LoteUrbano*: Apartment Complex**
- ***Subdivisão*: Part of Parcel**
- ***Loteamento*: Parcel Complex**
- ***ÁreadeRestrição*: Restriction Area**
- ***ÁreaSocialdePrédio*: Social area (part of a parcel) New**
- ***ÁreaCadastroDiferido*: A deferred cadastre area New**
- ***Construção*: A building of permanent nature New**
- ***FolhaCadastral*: A (printable) Cadastral Section New**

Classified List of Rights and Restrictions

Means of Acquisition
Acquisition: a Titular gets its Ownership registered;
Donation: a free Transmission of Rights from a registered Titular to a new one;
Financial Location[1]: legal contract between the Titular and a third party. Assumes that a building or habitation permit already exist;
Concession (long lease): legal contract that allows a third party to use the Parcel for an extended period in time (typically, several years);
•**Legal Rights**
Ownership: the basic Right. It must be registered for every Parcel;
Usufruct: a Right for someone (not the Titular) to use facilities within a Parcel;
Time Share: the Titular has the right to use this particular type of Fraction for a defined period in time throughout the year;
Urbanization Lot Permit: a Permit to split a Parcel for Urbanization, typically issued by a Municipality;
•**Legal Restrictions**
Servitude: a Restriction to full private ownership of a certain part of a Parcel, like in a right-of-way. There are several different types of Servitude;
Pledge of Receivables: the Titular assumes to pay a certain rent for the Parcel (which can be a factory, for instance) to a third party;
Economic Rent: details of the Rent to be paid under state controlled residential building construction, and related subsidies.
Can work both as Rights or Restrictions
Legal Action: Register of a Legal Action taking place, which can modify existing Rights or Restrictions. If a Legal Action is pending in Court, over a certain Parcel, then it should be referenced in the Registry.

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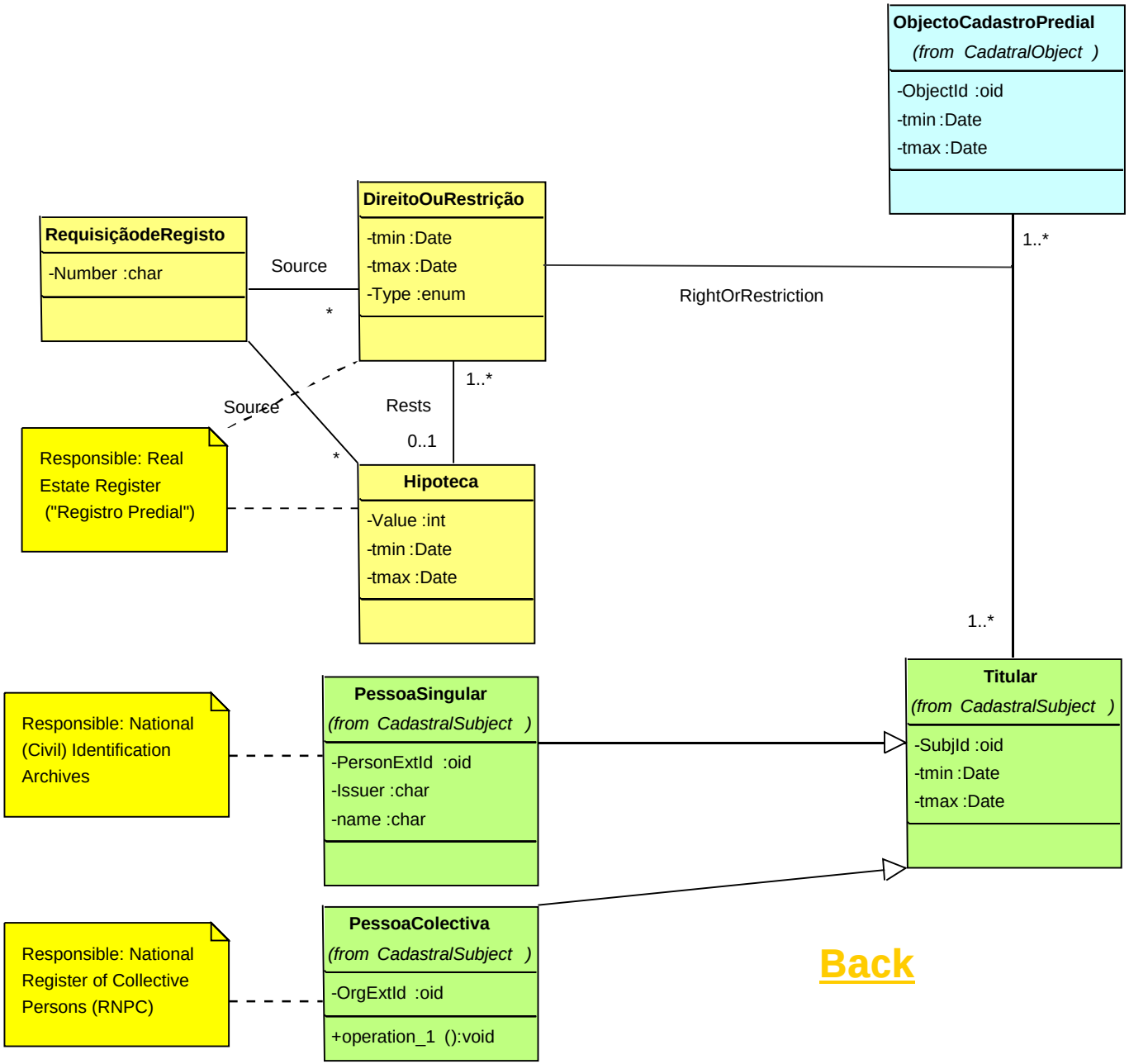
[1] It is a type of leasing which can involve movable or immovable goods. E.g. a Titular can preserve his Superficio rights while allowing a firm to build a new building on its Parcel, according to a Financial Location contract.


ObjectoCadastroPredial
(from CadatralObject)
-ObjectId :oid
-tmin :Date
-tmax :Date
DireitoOuRestrição
-tmin :Date
-tmax :Date
-Type :enum
RequisiçãodeRegisto
-Number :char
Source
*
1..*
RightOrRestriction
1..*
Source
Rests
0..1
*
Responsible: Real Estate Register ("Registro Predial")
Hipoteca
-Value :int
-tmin :Date
-tmax :Date
1..*
Titular
(from CadastralSubject)
-SubjId :oid
-tmin :Date
-tmax :Date
Responsible: National (Civil) Identification Archives
PessoaSingular
(from CadastralSubject)
-PersonExtId :oid
-Issuer :char
-name :char
Responsible: National Register of Collective Persons (RNPC)
PessoaColectiva
(from CadastralSubject)
-OrgExtId :oid
+operation_1 ():void
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