

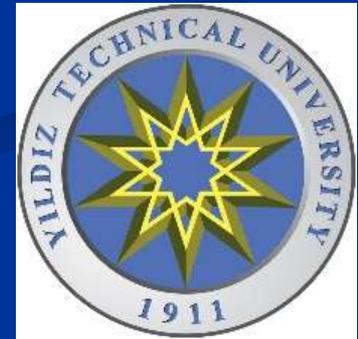
Presented at the FIG Working Week 2017,  
May 29 - June 2, 2017 in Helsinki, Finland

# DESIGN and DETERMINE THE SPATIO- TEMPORAL CADASTRAL DATA INFRASTRUCTURE FOR LADM

FIG Annual Week 2017, Helsinki - FINLAND

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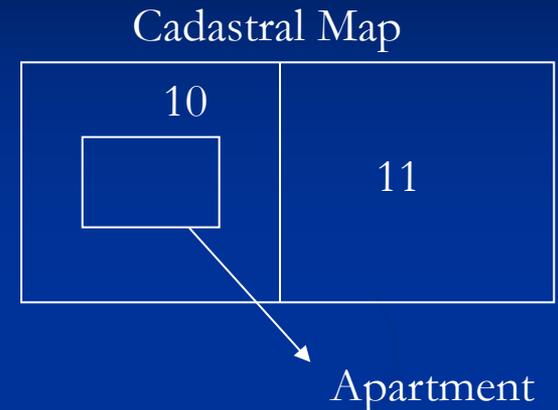
# Overview

- Current Land Title and Cadastral Systems
- Brief review of ISO 19152 Land Administration Domain Model (LADM) and its temporal aspects
- Model Design Based on ISO 19152 LADM
- Conclusion

# Current Land Title And Cadastral Systems (Turkey)

**Land Title Data :** Parcel or apartment, owners, ownership rights information's.

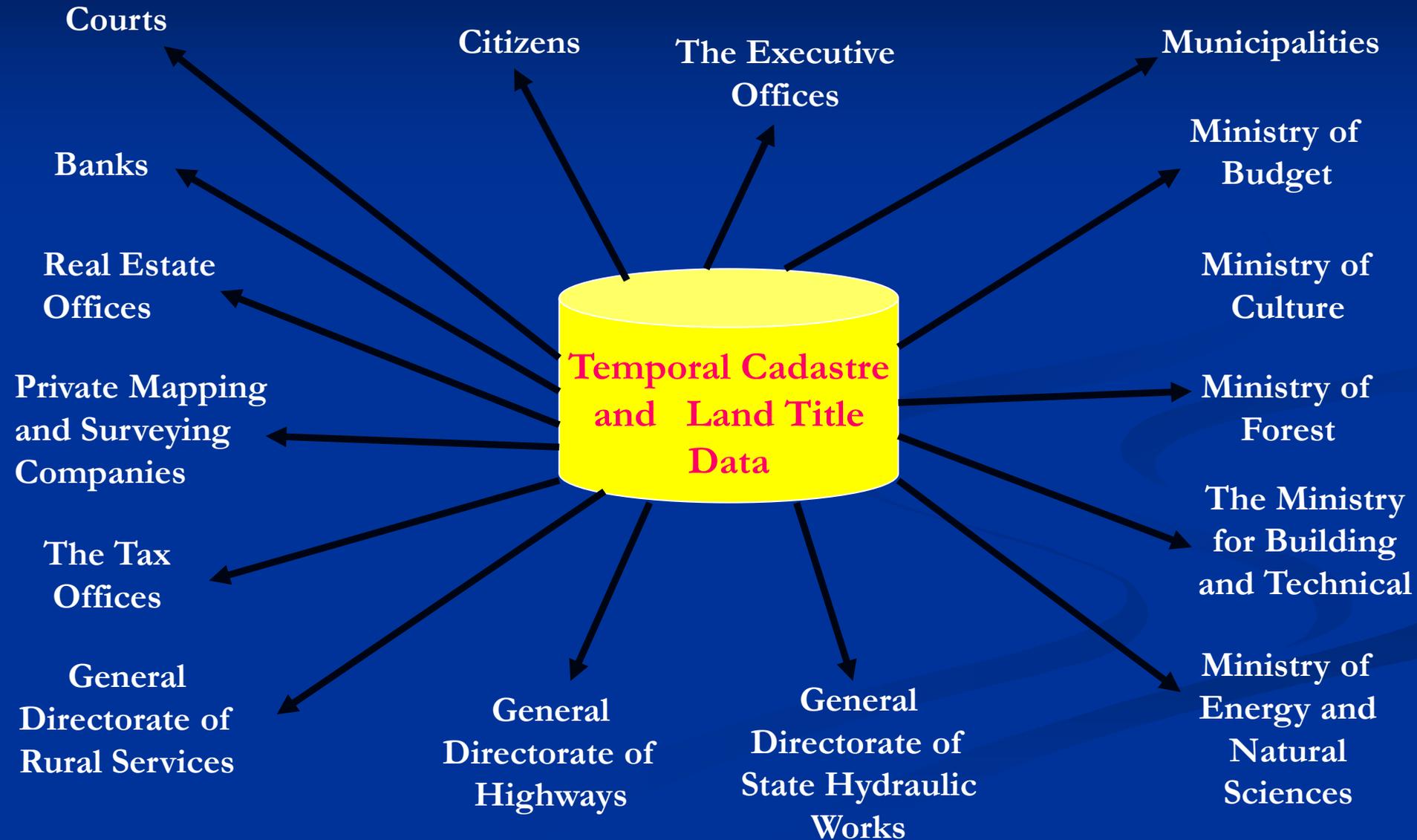
**Cadastral Data :**



## Land Title Registers

Main Registers	Auxiliary Registers
Land title register	Owners registers
Real estate(condominium) register	Representatives register
Transactions register	Corrections register
Legal documents	Public owned lands register

# The Need For Temporal Analyses Of Real Estate Data



# Classification of Temporal LTC Data

## 1. Analyses of a Certain Date

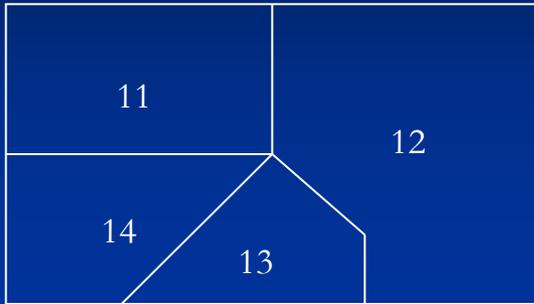
- All the real estates owned by an owner at a given time
- All the real estates meeting a certain condition at a given time
- The status of one or more real estates at a given time

## 2. Analyses of a Certain Period

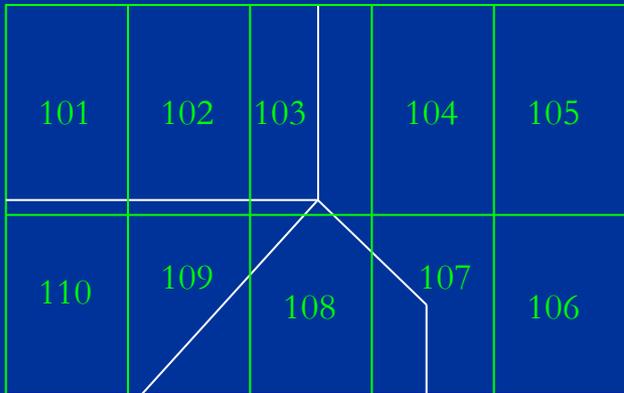
- All the real estates owned by an owner at a given period
- All the real estates meeting a certain condition at a given time

# Temporal Changes In Real Estate Data

05.05.2000



03.04.2002



Parcel id	Owner id	Time	Transaction
11	1	05.05.2000	Cadastre
12	2	05.05.2000	Cadastre
12	3	05.05.2000	Cadastre
14	4	05.05.2000	Cadastre
14	5	07.12.2000	Sale
11	6	03.03.2001	Sale
101	1	03.04.2002	Subdivision
102	1	03.04.2002	Subdivision
....	.....	.....	.....
110	5	03.04.2002	Subdivision
110	10	15.05.2002	Sale
103	11	18.05.2002	Sale
105	12	21.06.2002	Sale
105	13	29.06.2002	Donation
105	14	30.06.2002	Sale

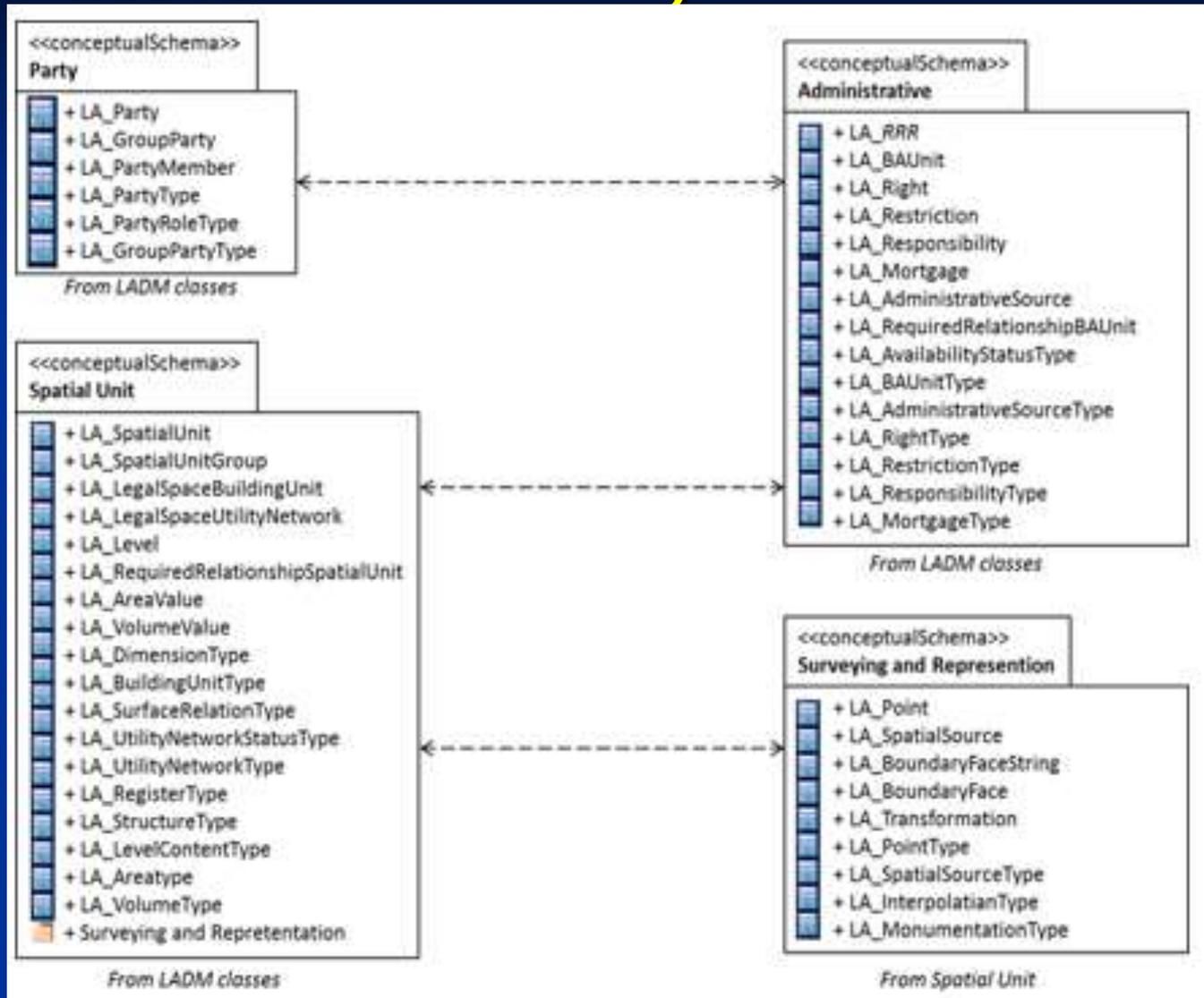
# Classifications of temporal changes in the real estate data

- *Ownership Changes*
- *Ownership Rights Changes*
- *Geometrical Changes*
- *Type Changes*

# Brief Review of ISO, LADM and TGIS

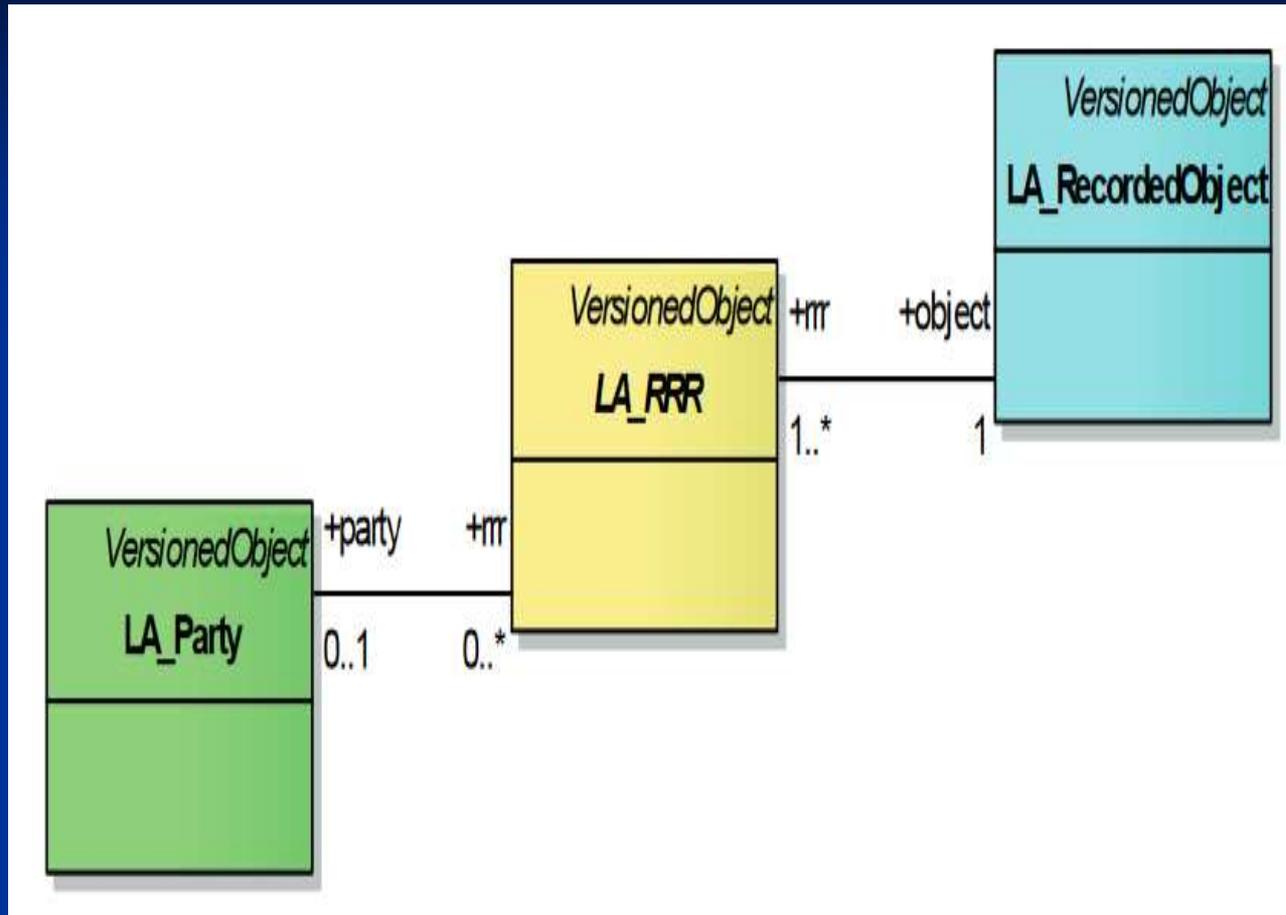
Traditional land registry and cadastral systems are unsatisfactory in meeting all land requirements. For this reason, need for sustainable land management model occurred in order to manage, present and archive land-related information and documents. Even though many scientific searches are made in order to provide standardization in land administration field, they were limited in many aspects (e.g. extensiveness, scope and content) because of the uncommon characteristics of Land Administration Systems (LAS) worldwide.

# Brief Review of ISO, LADM and TGIS



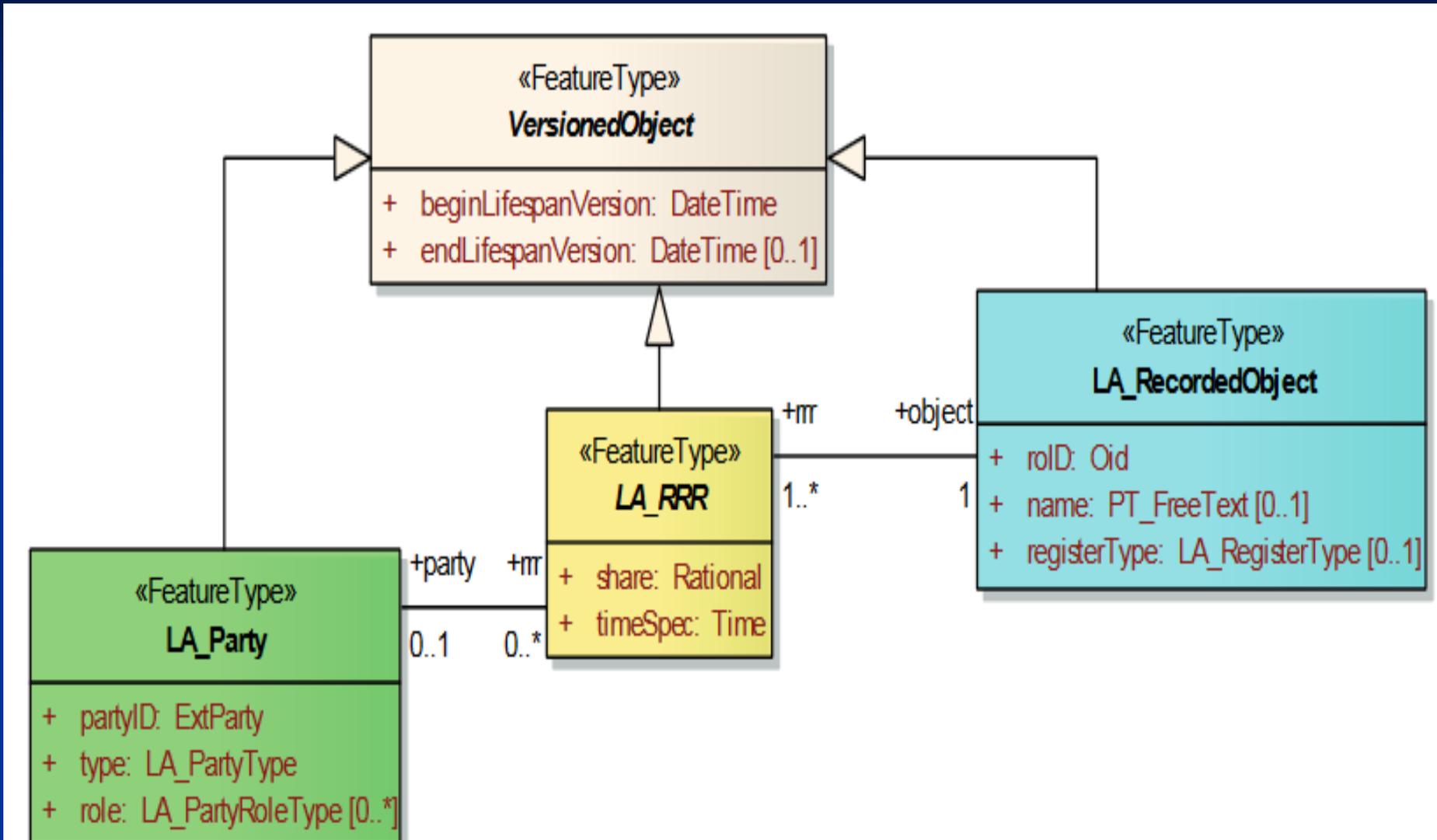
**Figure 1:** The LADM overview of (sub) packages (with their respective classes) (ISO, 2012).

# Brief Review of ISO, LADM and TGIS



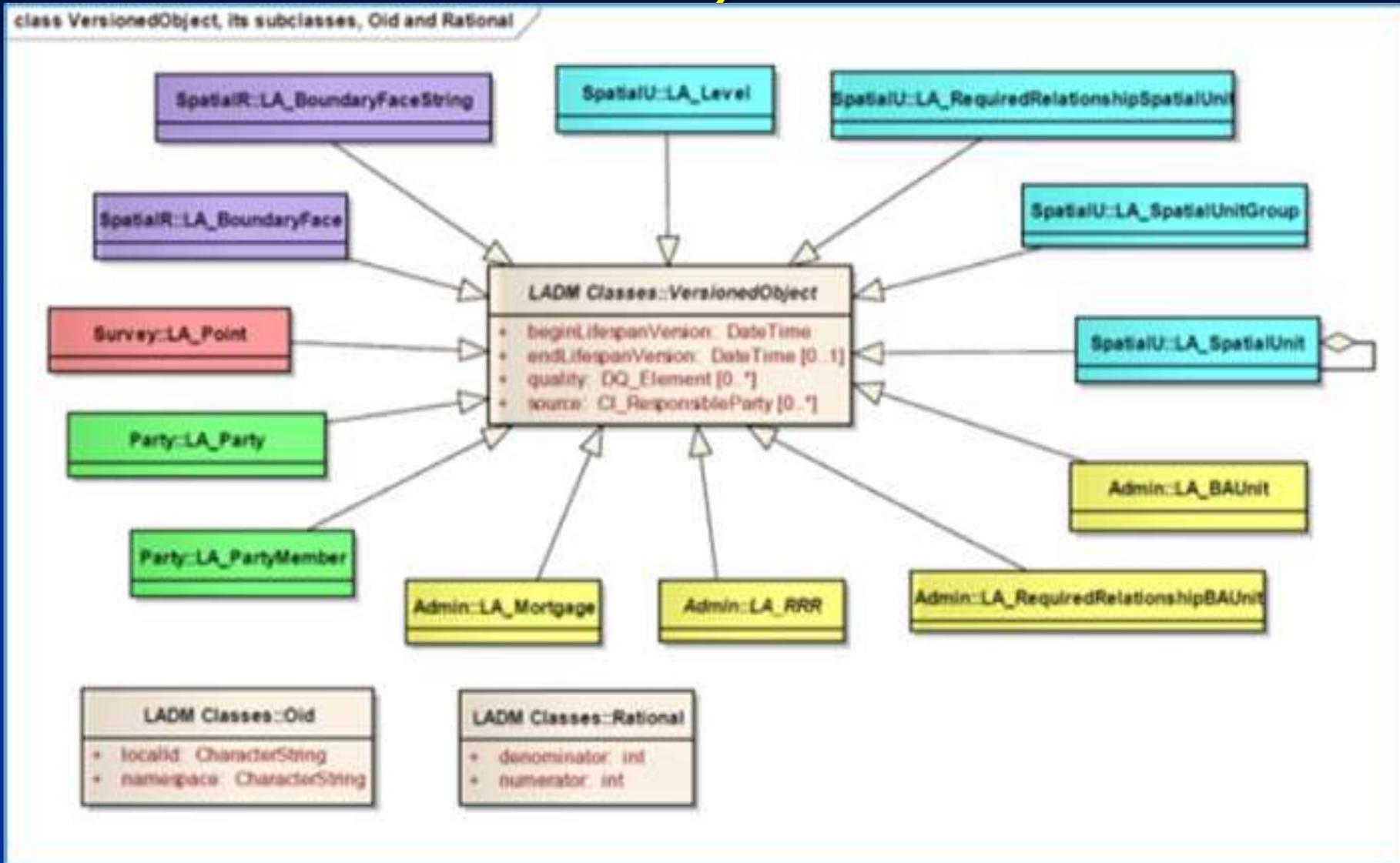
**Figure 2:** Core classes with temporal aspects of LADM

# Brief Review of ISO, LADM and TGIS



**Figure 3:** Class version objects for Spatio-Temporal data

# Brief Review of ISO, LADM and TGIS



**Figure 4:** The representation of spatial temporal elements using LADM (Leksono et al. 2011; Babalola et al. 2015).

# Model Design Based on ISO 19152 LADM

In this study, conformity of LADM for modeling easement rights in terms of temporal cadastre situations in Turkey was evaluated. For testing the designed model, the easements registered in the land registry were examined. The main types of recorded easements can be listed as follows (the Turkish terms are added in *italic*, in brackets).

- Right of superficies (*üst hakkı*)
- Right of usufruct (*yararlanma hakkı*)
- Right of passage (*geçit hakkı*)
- Right of residence (*oturma hakkı*)

# Model Design Based on ISO 19152 LADM

Turkish model original class name	Name in the Turkey's profile	Corresponding LADM class	Corresponding LADM subclass
TK_İrtifakHakları	TR_Easement	LA_Right	-
TK_Kısıtlılıklar	TR_Restrictions	TR_Restrictions	-
TK_Sorumluluklar	TR_Responsibilities	TR_Responsibilities	-
TK_ÜstHakkı	TR_RightOfSuperficies	LA_Right	LA_EasementRightType
TK_YararlanmaHakkı	TR_RightOfUsufruct	LA_Right	LA_EasementRightType
TK_GeçitHakkı	TR_RightOfPassage	LA_Right	LA_EasementRightType
TK_KaynakHakkı	TR_RightOfWater	LA_Right	LA_EasementRightType
TK_OturmaHakkı	TR_RightOfResidence	LA_Right	LA_EasementRightType
TK_ResmiBelgeler	TR_AdministrativeSourceType	LA_Source	TR_AdministrativeSourceType
TK_HakkınıİlgiliOlduğuTaşınmazTipi	TR_TypeOfRealPropertyRelatedToRights	LA_Right	LA_EasementRightType
TK_İrtifakHakkınınSüresi	TR_DurationOfEasement	LA_Right	LA_EasementRightType
TK_İrtifakHakkınınBedeli	TR_CostOfEasement	LA_Right	LA_EasementRightType

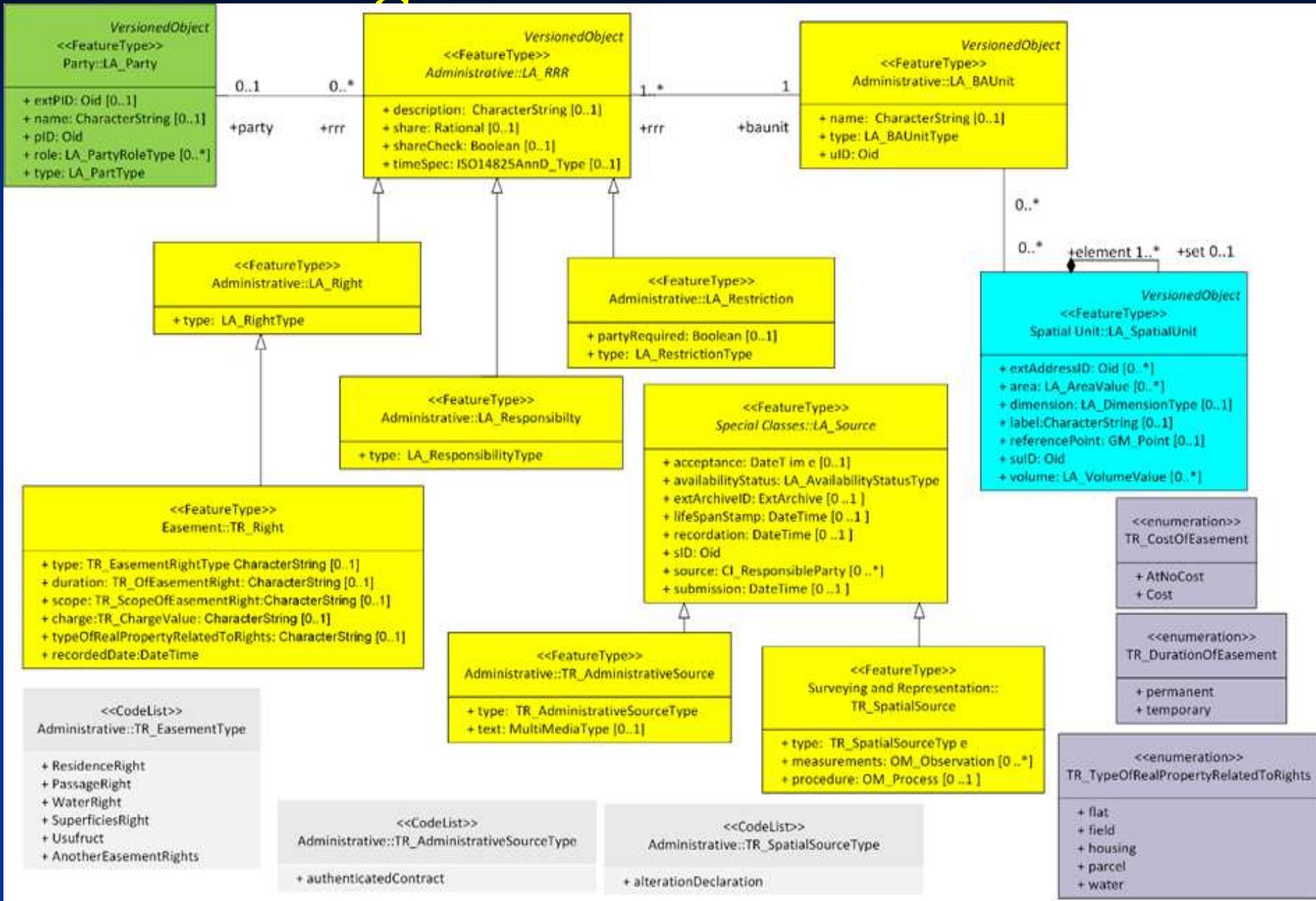
**Table 1:** The main classes of Turkish temporal cadastral data model classes of Turkey's country profile and related ISO 19152 LADM classes.

# Model Design Based on ISO 19152 LADM

In this context, the connections between main classes of easements section of Turkish temporal cadastral data model were identified. The relationships between classes like LA\_Party, LA\_RRR, LA\_BAunit, LA\_SpatialUnit, TR\_EasementRight, TR\_AdministrativeSource and TR\_SpatialSource were presented in Figure 3.

**Figure 5:** Schema of relationships between classes concerning Parties and Rights (Easements) to Properties of Turkish temporal cadastral data model.

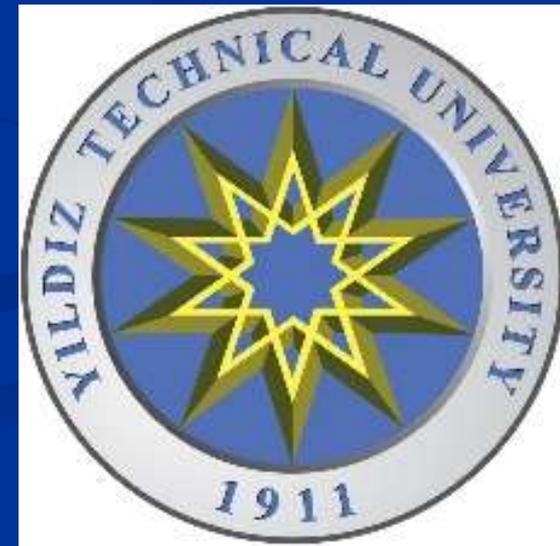
# Model Design Based on ISO 19152 LADM



# Conclusions

- This paper proposes a spatio-temporal cadastral data model based on the LADM, ISO 19152, than described in the current standard the LADM's 'right', 'restriction' and 'responsibility' (RRR) class and associated code lists.
- As in LADM, spatial temporal database are formed by defining the geometry of land parcels together with its creation date and its removal date, the hierarchy of land parcels including the attributes that attach on them which are presented in cadastral maps, map plans and land books.
- Most recorded easement rights in Turkish Land Registry Sistem have been selected for the implementation this model. Due to designed model, it was proven that all easement cases could be represented very well in standard LADM.
- Finally, a standard temporal cadastral information model establishment plan using ISO 19152 (LADM) has been suggested for efficient connection and integration between systems, information sharing, and smooth provision tovarious fields as cadastral information management.

**Thank You For Your  
Patient**





*Let's Meet in Istanbul*

