

Towards Investigation of Integrating LADM, BIM, and CityGML for Cadastral Purposes: The Case of Turkish Cadastral System

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The 10th Land Administration Domain Model Workshop

Welcome to the homepage of the LADM 2022 workshop, Dubrovnik, Croatia, 31 March - 2 April 2022

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Introduction



- Land management systems provide a comprehensive framework for designing and implementing effective policies and strategies associated with the planning and development of land in line with sustainable development goals (Rajabifard et al., 2018). There are four basic concepts that form the basis of a modern land management system: Land Tenure, Land Value, Land Use, and Land (Aien, 2013; Kitsakis et al., 2016; Rajabifard et al., 2018; Van Oosterom et al., 2018; Gürsoy Sürmeneli and Alkan 2021).
- Currently, the above-mentioned these standards integrating is challenging, due to the difference in data formats used for these standards, hence the lack of interoperability between them (Kang and Li, 2017). In light of this information, the objective of this paper is to show the 3D delineation of condominium rights in Turkey, based on LADM and the integration of the IFC and CityGML schema. The study aims to bridge the gap by focuses on how to benefit from open standards in the framework that integrates 3D delineation of condominium rights scopes of 3D cadastre.
- It was recently proposed for Turkey by the authors of the integrated model by using CityGML and LADM for 3D cadastre. In this sense, this paper first proposes a conceptual model for 3D delineation of condominium rights, based on LADM, and then it shows an example by matching the features and attributes in this model with the IFC and CityGML schema.

Aim & Summary



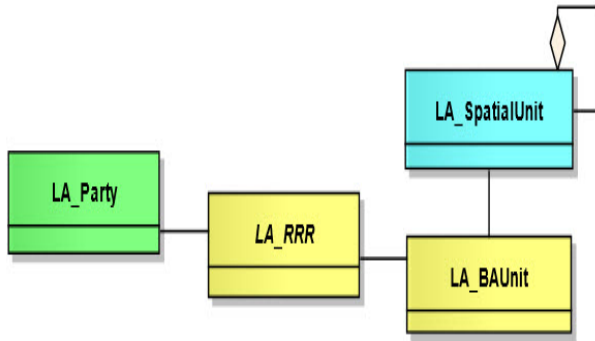
The aim of the current research,

- To develop a data model that supports the regulation and analysis of 3D land rights, restrictions, and responsibilities for the Turkish Cadastral System.

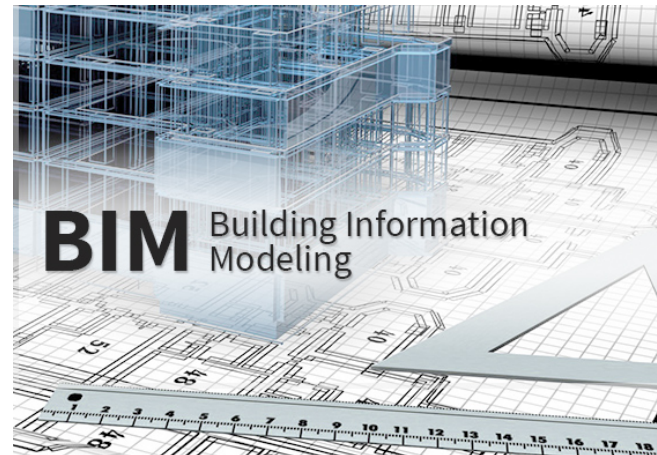
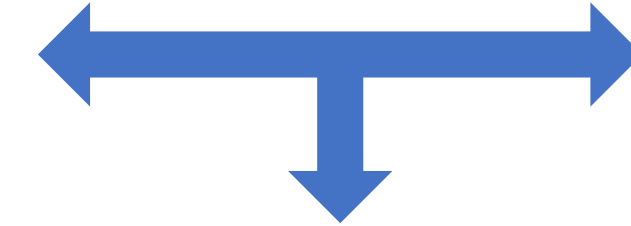
For this,

- We use the ISO 19152 (ISO, 2012), Land Administration Domain Model (LADM) that represents RRR on the real estate, and the CityGML that represents the physical side of this object for the conceptual model.

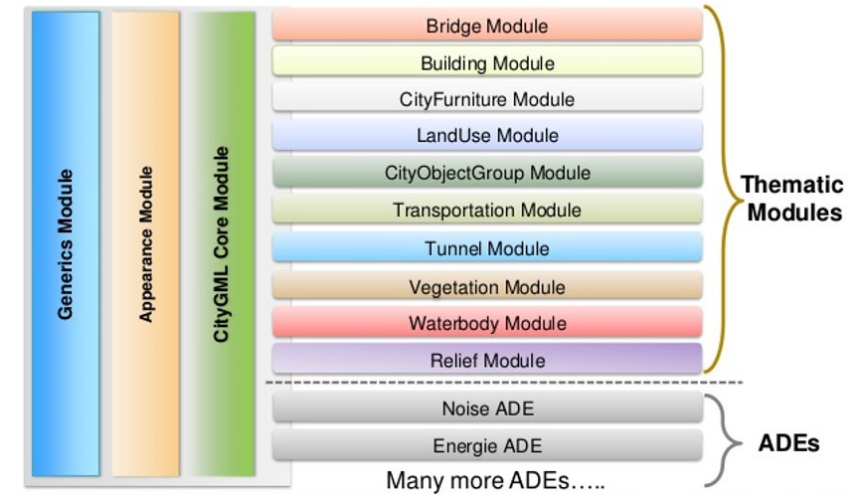
Methodology



Basic packages of LADM
(ISO19152)



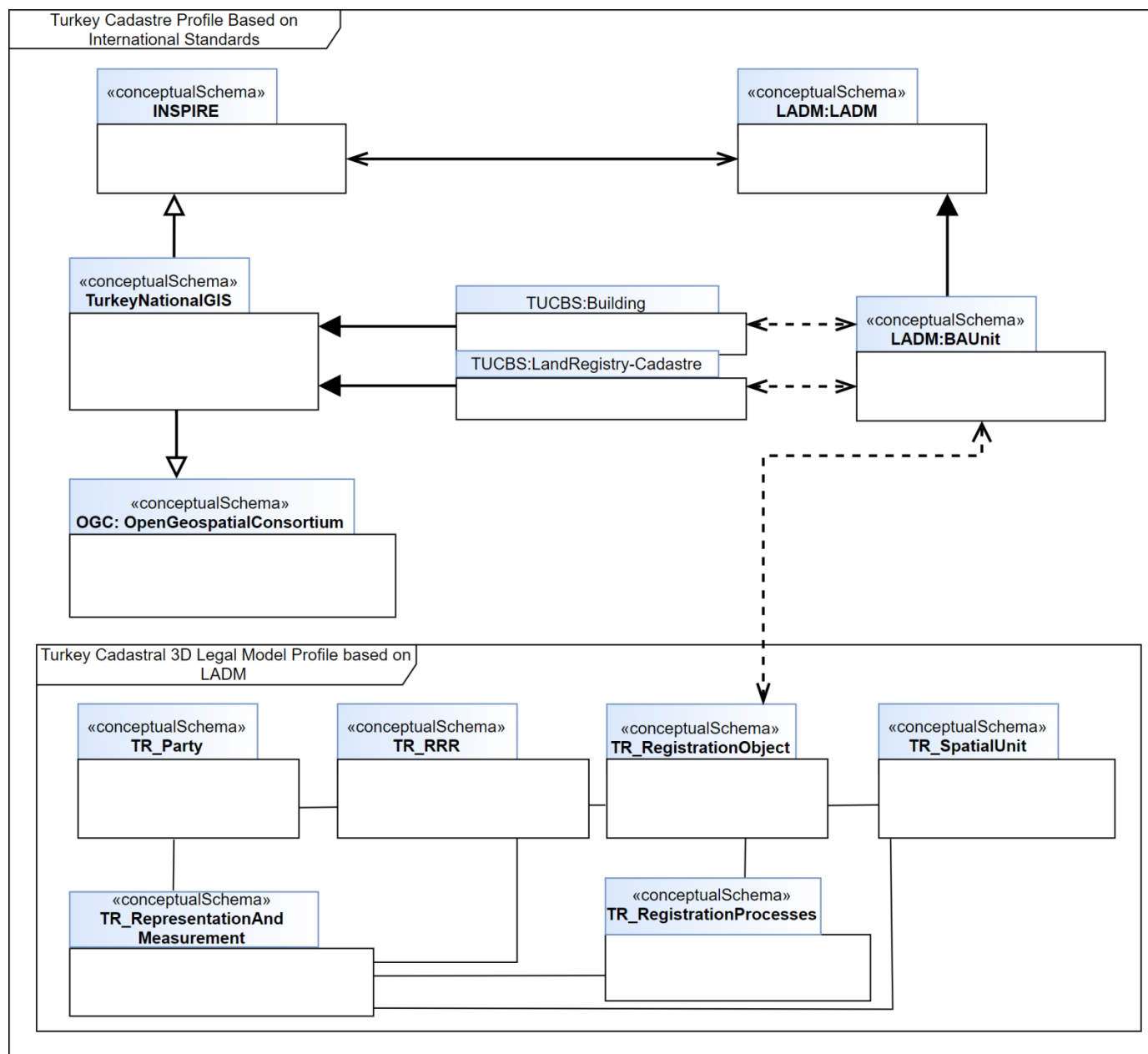
CityGML is a Modular Standard



General overview of CityGML

Results

Turkish LADM based on International Standards

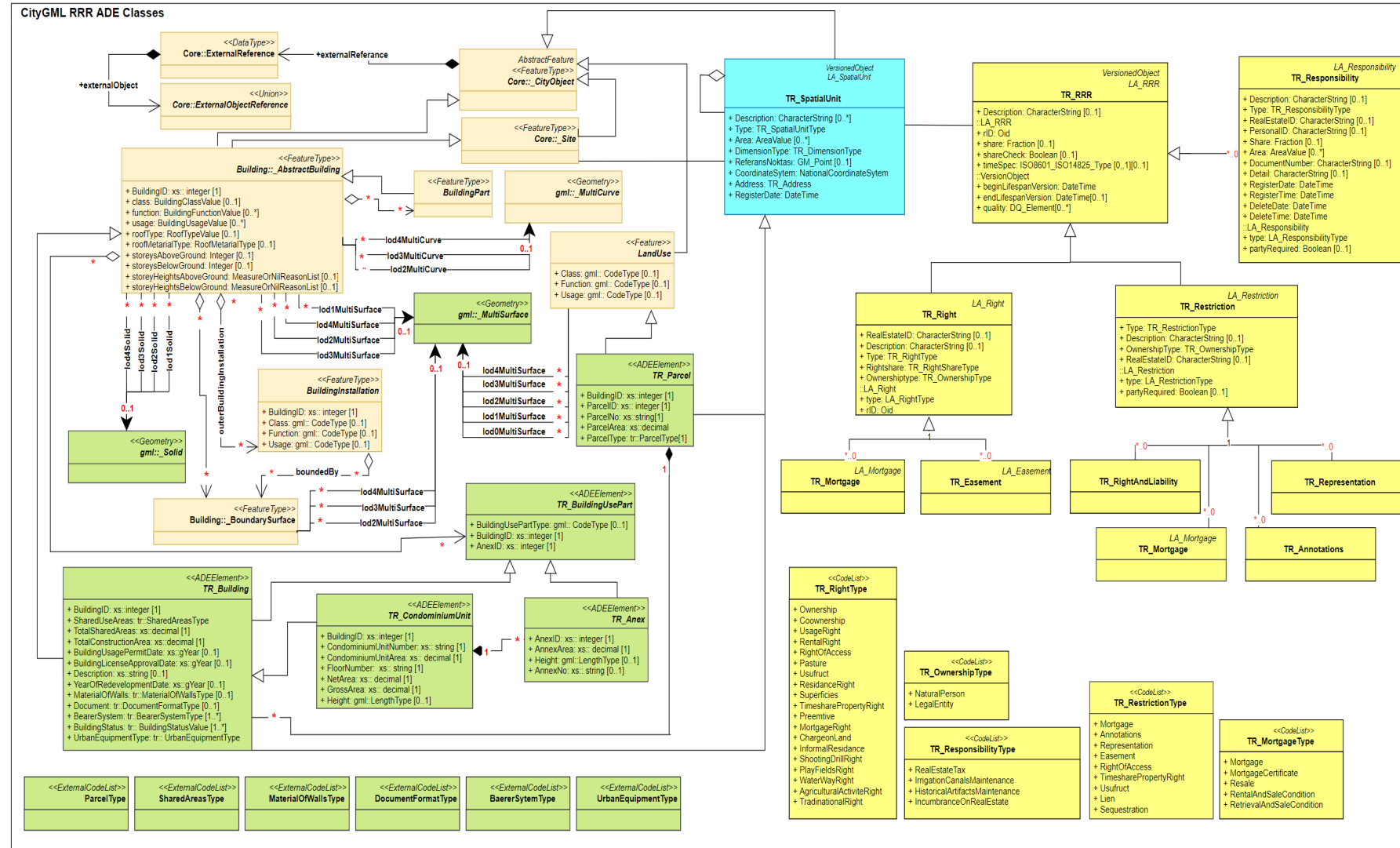


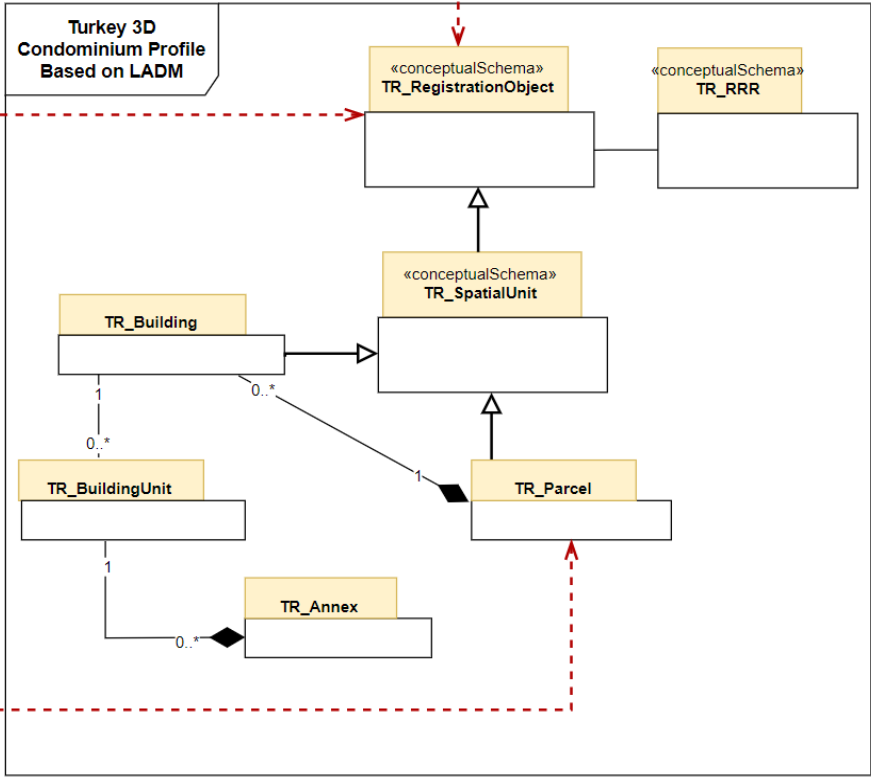
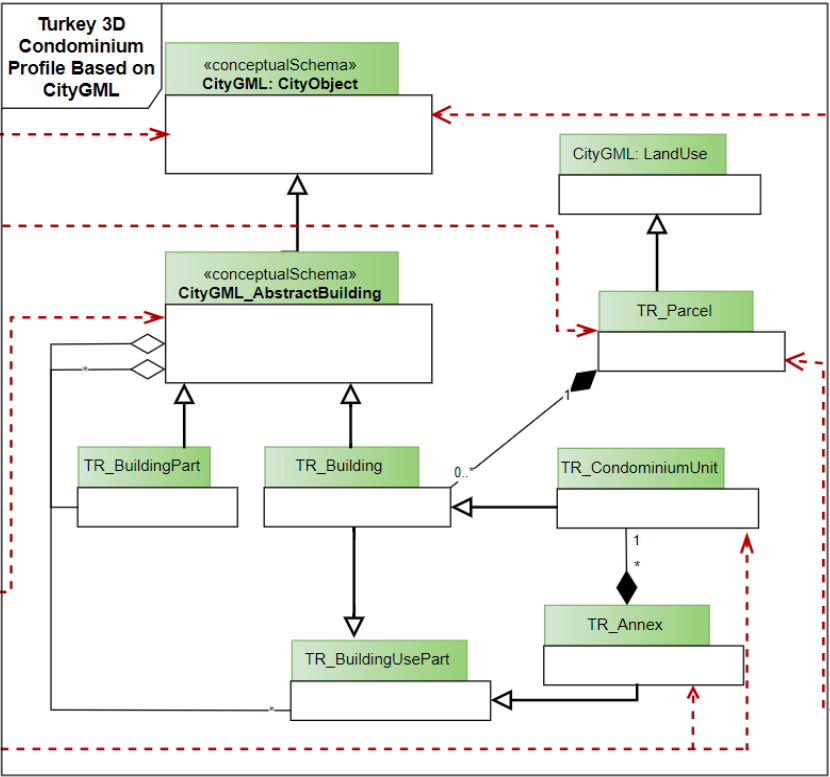
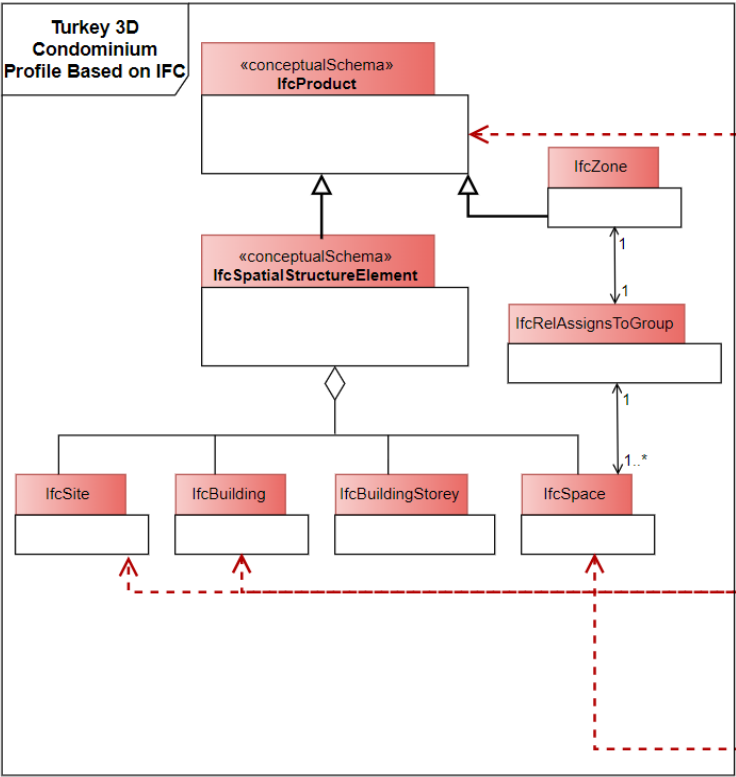
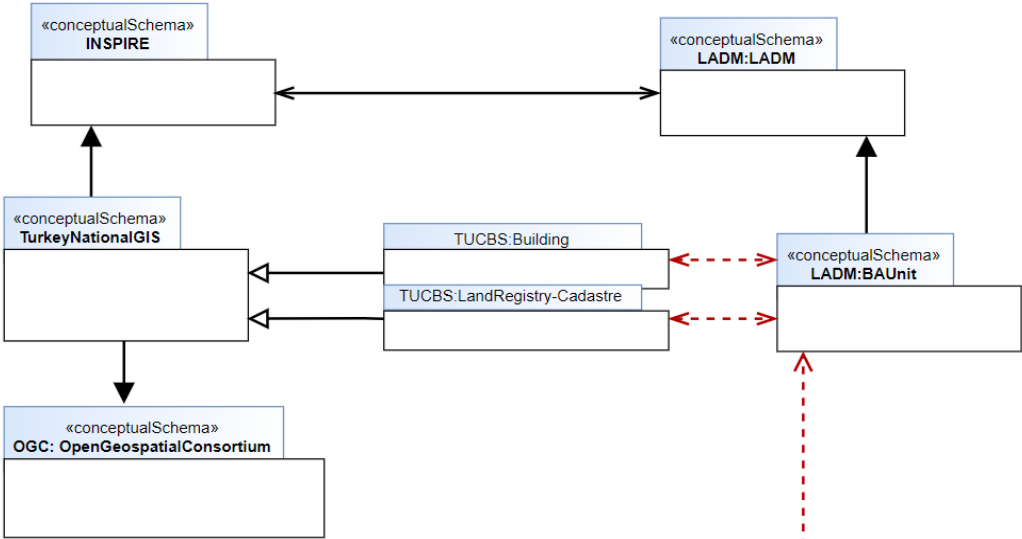
Turkish cadastral system based on LADM

Proposed model (integration of LADM and CityGML)



New proposed model for the Turkish cadastral system using, LADM and CityGML combining legal and physical model





Results



Table 2. The general semantic mapping of IFC, CityGML, and LADM entities in the proposed 3D condominium registration model.

LADM	CityGML	IFC
RegistrationObjects	CityObjects	IfcZone
Building	AbstractBuilding	IfcBuilding
BuildingUnit	Condominium	IfcSpace
Annex	Annex	IfcSpace
Parcel	LandUse	IfcSite

Conclusion



This paper proposes a general framework for integrating cadastral information containing a 3D presentation of apartment rights and update of 3D city models, and with LADM on the legal objects and CityGML and IFC on physical objects.

- **Particularly, it proposes an integrated model for the 3D delineation of condominium rights scope of 3D cadastre in Turkey.**
- **Basic requirements for generating a 3D condominium rights scope of 3D cadastral model for Turkey are presented from current cadastral objects with legal and physical perspectives.**
- **Further investigation is needed to show that will focus on the applicability of the proposed model to fulfill the requirements and the general framework in practice.**



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