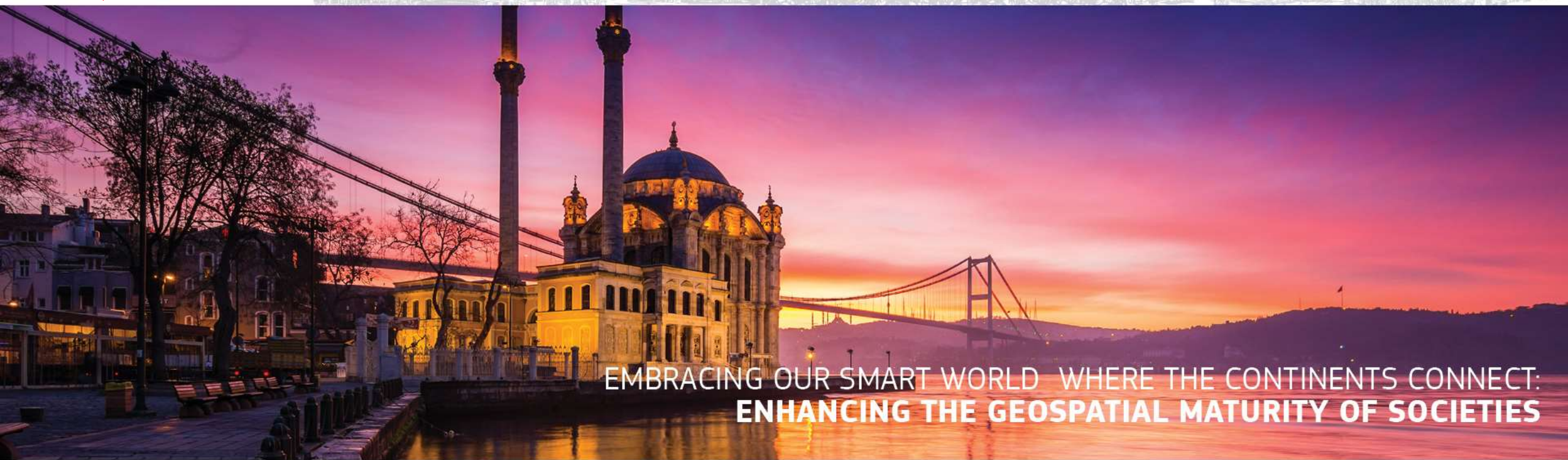
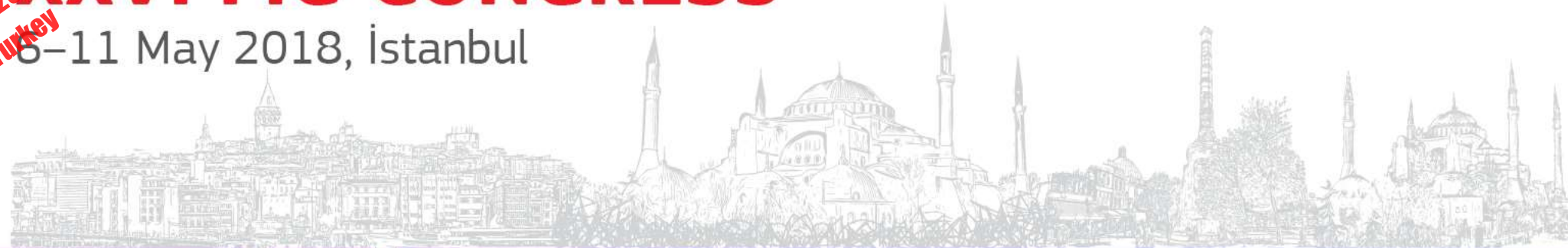


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How to be Created a New Terminology For 3- and 4- Dimensional Cadastre In Turkey

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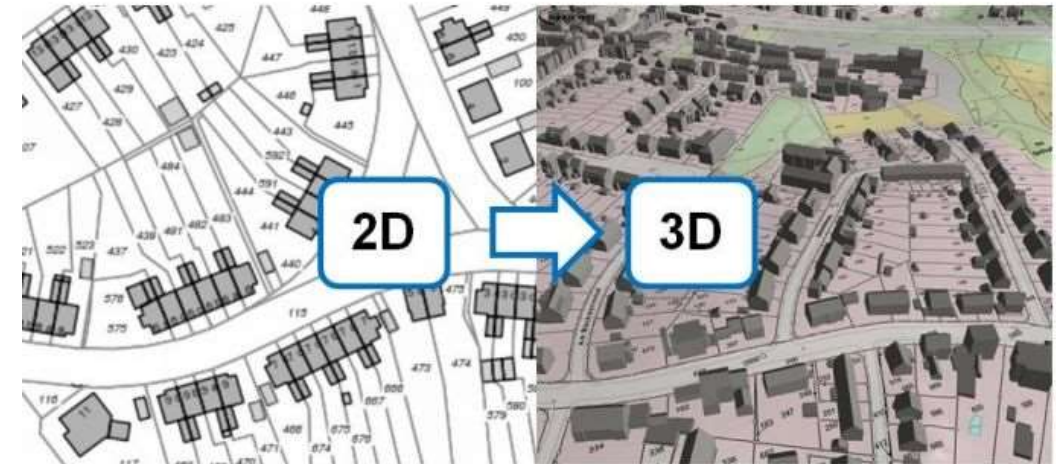
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The necessity of 3-4D cadastre

A standard cadastre has not been developed to date due to legal differences such as technical and economical impossibilities in every country. Various categorizations and definitions have been made for the cadastre taking into consideration criteria such as priority purposes, types of registered rights, techniques used for collecting data (FIG, 1995). However, the definitions of cadastre conflicts with existing surveying systems. Because the physical world is four dimensions. These are horizontal (x), (y), vertical (z) and time (t) dimensions. However, today's cadastral systems are defined as two-dimensional and parcel-based. Due to these shortcomings, a number of international studies have been done.



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The necessity of 3-4D cadastre

These include Bogor Declaration, Cadastre 2014, Bathurst Declaration, European Union Cadastre Congress and Cadastre 2034 Vision. These studies jointly emphasize the following issues.

- **To be a property owner and create a cadastral system that is managed in a sustainable way. In addition, modern cadastre related infrastructures should be developed.**
- **A cadastre system that is accessible, easily visualized, easily understood and used will be created.**
- **It is to establish a cadastre system linked to wider legal and social interests on the land. A cadastral system with knowledge of rights, restrictions and responsibilities related to registered or unregistered land will be established.**
- **A three-dimensional, dynamic and accurately measured digital cadastre will be introduced.**
- **An integrated cadastre system based on common standards will be established.**

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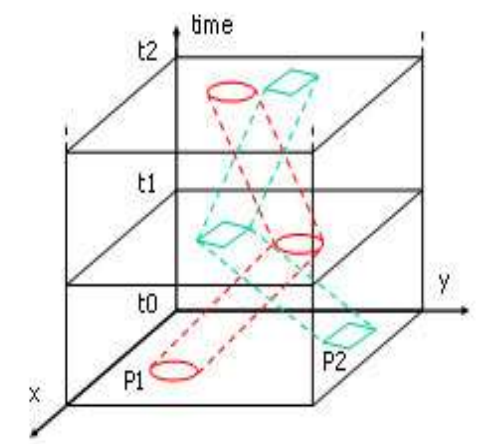
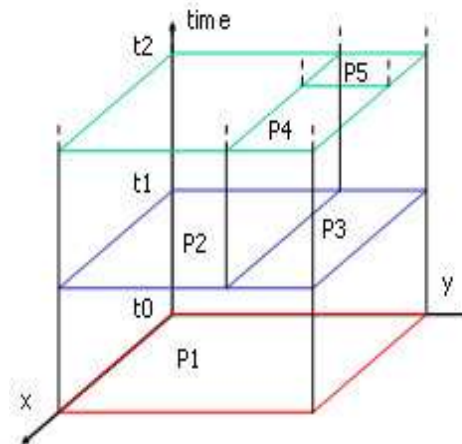


The necessity of 3-4D cadastre

As can be understood from these reports, two-dimensional cadastral systems cannot respond to users' requests. Because two-dimensional cadastral systems are used for underground structures (subway, underground market, underground car parks etc.), technical infrastructure facilities (pipelines, cables, telecommunication lines etc.).

Thus, within the scope of Cadastre 2034 vision, it was aimed to provide basic services expected from the cadastre such as knowing all rights, restrictions and responsibilities related to the real estates with these components, access to property and positional content and to direct the future cadastre with the developed policies, models and standards (Aien, 2013; Stoter, 2004)

As a result of all these studies, cadastral data reflecting the real world shows the necessity of creating a new 3-4 dimensional cadastral model containing x, y, z and t components.



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Brief review of Turkish cadastral system

Legal aspect

The basic regulations in the field of land registry and cadastre in our country are included in the Land Registry Law No. 2644 and Cadastre Law No. 3402. Apart from these laws, there are more than 40 laws and regulations, directives, directives and circulars in which provisions relating to title deeds and cadastres are included (Çete, 2008).

Also it described how the use of the right to property boundaries can be drawn with Article 35 of the Constitution. According to this; **"Everyone has the right to ownership and inheritance. These rights may be restricted by law for public good purposes only. The use of the right to property cannot be contrary to the benefit of society."** It is stated that if the public interest is revealed in the expression, it may interfere with private property or right of use.

There is no clear statement about the third dimension, namely vertical rights, in the Constitution. There are a number of rights (easement right, floor ownership right, right of passage etc.) in our Constitution concerning the implementation of these rights in three dimensions.

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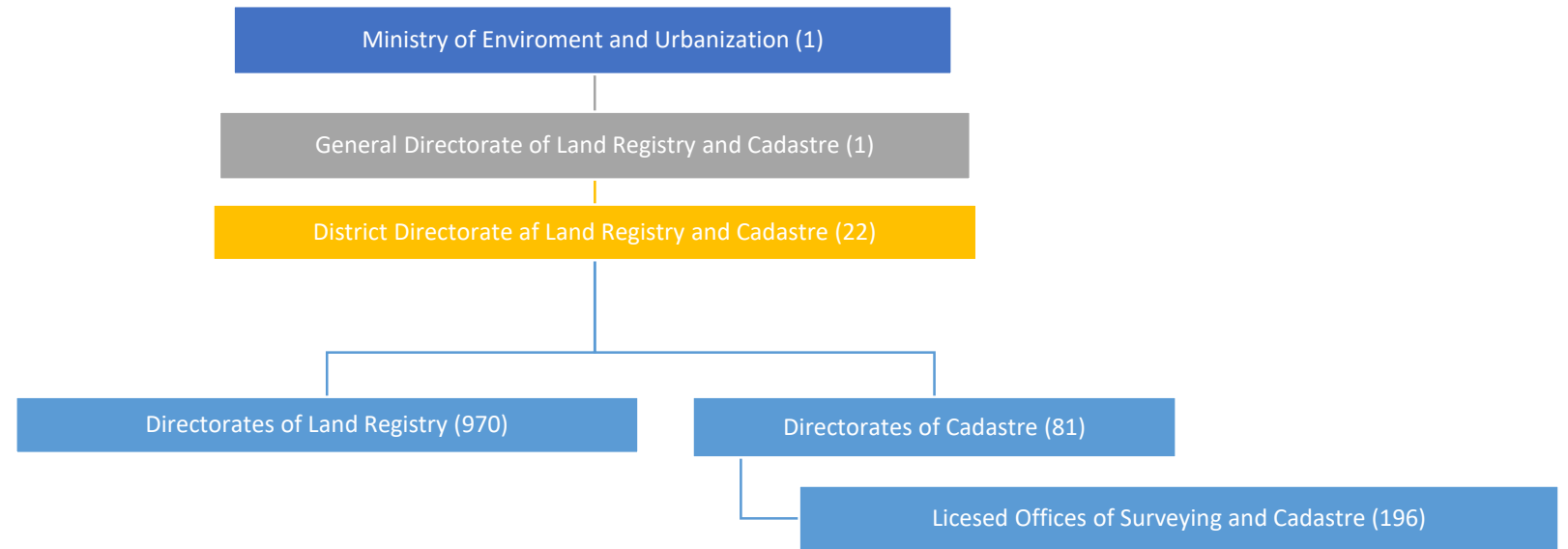




Brief review of Turkish cadastral system

Institutional Aspects

The cadastral works in our country are carried out by the General Directorate of Land Registry and Cadastre (GDLRC), which is based on the foundations of 1847 and whose current structure was determined by Law no. 2997 in 1936. The provincial organization of GDLRC, which operates under the Ministry of Environment and Urbanization, consists of 22 regional directorates, 81 cadastral directorates, 970 cadastral directors, and 196 licensed maps and cadastral offices. Thus, GDLRC has a strong organizational structure and the execution of land registry and cadastre activities under one roof.



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Brief review of Turkish cadastral system

Technical Aspects

- Land Registry and Cadastre Information System (TAKBİS)
- Spatial Property System (MEGSİS)
- Land Registry Archive Information System (TARBİS)
- Civilian and Updating and Digitization of the Administrative Border Project (MIDAS)
- Land Registry and Cadastre Modernization Project (TKMP)
- Turkey National Geographic Information System Project (TUCBS)
- TUSAGA-ACTIVE (Cors-TR)
- Map Information Bank Project (HBB)
- Agricultural Reform Application Project (ARIP)
- Completion of the installation cadastre and 2/B cadastre.

The common point of the projects is to manage and share the cadastral data in the digital platform.

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Brief review of Turkish cadastral system

The Data Recorded Within the Scope of Cadastre in Turkey

Cadastral map should show the current status of the land. The data recorded in the cadastral maps are listed below.

- 2D location information for property boundaries
- Ownership information
- Structure subject to property
- Surface Area
- Block and parcel information
- Roads, rivers, etc. non-registered areas
- Field of study border
- 2D graphics of a set of rights and restrictions (Yildiz, 2013).

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The necessity of 3-4D cadastral terminology

There are different applications in each country. These differences can be attributed to many factors such as legal backgrounds of the countries, levels of development. But one of the reasons why unity can not be achieved in practice is that a common standard and terminology can not be developed.



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Implementation of the study

- Firstly, legal regulations related to Cadastre have been issued. Then, within the scope of 3D cadastre, the above mentioned concepts were researched in the legislation of our legislation. But these concepts may not exist in individual laws. For this, cadastral terms related to concepts have been established.
- Secondly, These terms are categorized under each concept. It is shown that the terms are related to cadastral concepts in Table 1.
- Finally, the legitimate assets of these terms were searched according to the quantitative research method. As a result of evaluation, a matrix of concepts and laws was established.

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Qualitative research methods

Qualitative research is one of the processes of producing information by examining individual's lifestyles, life stories, behaviors, organizational structures (Strauss and Corbin, 1990). Unlike quantitative research based on statistical data analysis, qualitative research seeks to answer the question of what people mean to events, in other words how they describe events (Dey, 1993).



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Concepts Related to the 3-4D Cadastre

There is a need for an effective cadastral system to ensure that all these activities can be carried out in a sustainable way. In this context, the cadastral studies (2014 and 2034 cadastre vision) emphasized the necessity of 3-4D cadastre. There are basic concepts that have emerged for an integrated and sustainable cadastre system. These basic concepts can be listed as **Ownership, 3-4D Cadastre, Real Estate, Real Estate Registration and Land Management.**

Strategic Framework

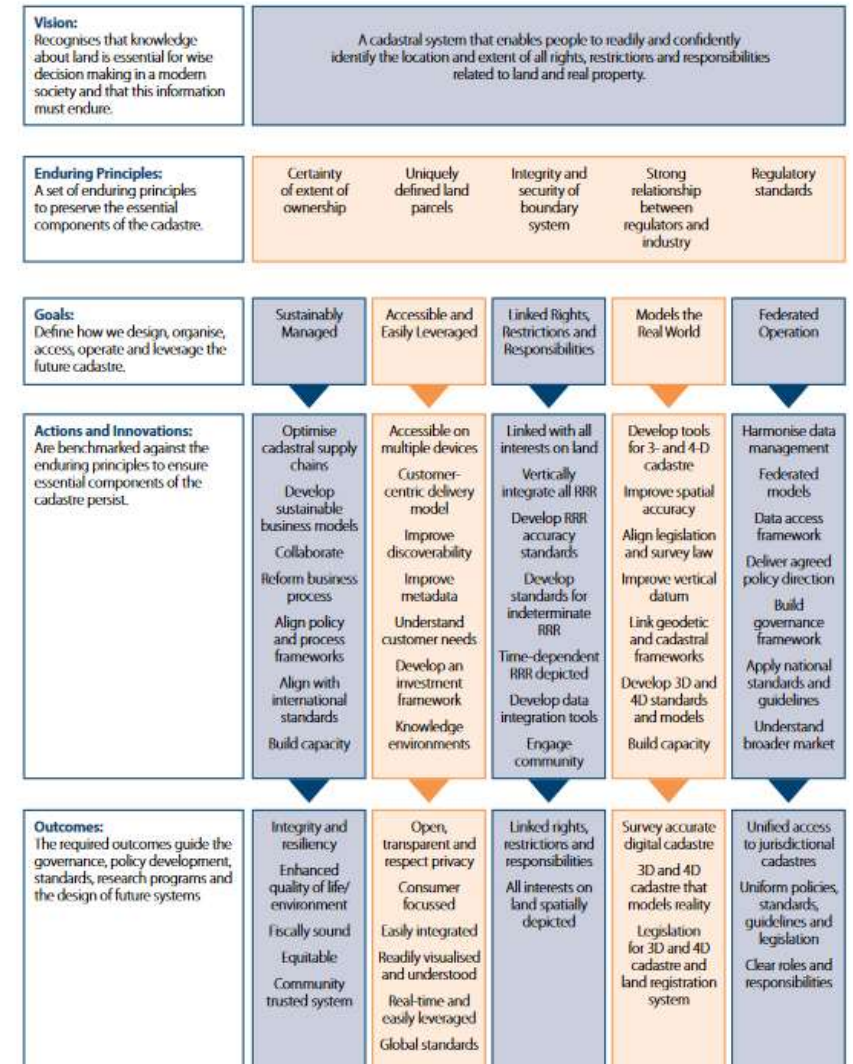


Figure 3. The Cadastre 2034 Framework

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Concepts Related to the 3-4D Cadastre

Ownership: It is a right, and international declarations and contracts are also guaranteed. In Article 17 of the Universal Declaration of Human Rights (UDHR); "Everyone has the right to own property on his own or with others. No one can be arbitrarily deprived of his property." (Doner, 2010).

Terms related to the concept of Ownership in Turkey

Mülkiyet hakkı (**Property right**)
Hisse (**Share**)
Kamulaştırma (**Expropriating**)
Ayni haklar (İrtifak hakları) (**Servitudes**)
Kısıtlılıklar (**Restrictions**)
Sorumluluklar (**Responsibilities**)
Geçit hakkı (**Right of passage**)

Üst hakkı (**Right of superficies**)
Yararlanma hakkı (**Right of usufruct**)
Devremülk hakkı (**Right of timeshare**)
Şerhler (**Annotation**)
İpotek (**Mortgage**)

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Concepts Related to the 3-4D Cadastre

3-4D Cadastre: According to FIG Cadastre 2014; "A cadastre is a systematically arranged public inventory of property-related data of a country or region that is bordering on a measure. Such properties are systematically defined by nomenclature with some distinctive features. The shape and parcel numbers of the property are normally shown on large-scale maps. These maps are integrated with records showing the structure, size, value and legal rights of each parcel "(Kaufmann and Steudler, 1998).

Terms related to the concept of 3-4D Cadastre in Turkey

Harita (**Cadastral map**)

Yatay sınır (**Contour**)

Düşey sınır (**Vertical limit**)

Orman (**Forest**)

Sular ve Madenler (**Waters and Mines**)

Tarihi kültür ve tabiat varlıkları

(**Historical cultural and natural assets**)

Koordinat (**Coordinate**)

Zaman (**Time**)

Yerüstü yapıları (**Superstructure**)

Yeraltı yapıları (**Underground structures**)

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Concepts Related to the 3-4D Cadastre

Real Estate: Land; together with water-covered areas and seas, cover all things related to the fixed point of the earth (Kaufmann, and Steudler, 1998).

Terms related to the concept of Real Estate in Turkey

Arsa (**Parcel**)

Arazi (**Land**)

Bağımsız bölüm (**Condominiums**)

Vakıf taşınmazı (**Foundation real estate**)

Hazine taşınmazı (**Public real estate**)

Ulaşım ağı (**Transport network**)

Yeraltı şebekesi (**Utility network**)

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Concepts Related to the 3-4D Cadastre

Real Estate Registration: Land registration is official registration of the property rights on the land in the form of deed or title deed. This means that there is an official record of the rights of the land. That is, it is a deed containing changes in the legal status of the identified units of the land. The land register responds to who and how to inquire as a parcel relation (Kaufmann and Steudler, 1998).

Terms related to the concept of Real Estate Registration in Turkey

Tescil (**Registration**)
Miras (**Inheritance**)

İntikal (**Transfer**)
Tapu (**Deed**)

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Concepts Related to the 3-4D Cadastre

Land Management: Land management, while involving many social and environmental goals, gives priority to economic objectives in most of the developing countries. Today, land management for the public regulation and securing of property rights related to land is regarded as the main component of the free market economy and as a priority step in access to improved living standards (FIG, 1995).

Terms related to the concept of Land Management in Turkey

Vergi (**Tax**)

Değerleme (**Valuation**)

Kullanım türü (**Type of use**)

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Investigation of the existence of the concepts in the current legislation related to the cadastre in our country

Expropriation = Compulsory purchase

Time = Date = Period

Independent section = Condominium

Shares = Percentage

CONCEPTS RELATED TO THE 3-4D CADASTRE	TERMS RELATED TO THE CONCEPT OF 3-4D CADASTRE IN TURKEY
Mülkiyet (Ownership)	Mülkiyet hakkı (Property right), Hisse (Share), Kamulaştırma (Expropriating), Ayni haklar (İrtifak hakları (Servitudes), Kısıtlılıklar (Restrictions), Sorumluluklar (Responsibilities), Üst hakkı (Rightsofsuperficies), Geçit hakkı (Rightofpassage), Yararlanma hakkı (Rightofusufruct), Devremülk hakkı (Righthoftimeshare), Şerhler (Annotation), İpotek (Mortgage))
3-4B Kadastro (3-4D Cadastre)	Harita (Cadastral map), Yatay sınır (Contour), Düşey sınır (Vertical limit), Orman (Forest), Sular ve Madenler (Waters and Mines), Tarihi kültür ve tabiat varlıkları (Historical cultural and natural assets), Koordinat (Coordinate), Zaman (Time), Yerüstü yapıları (Superstructure), Yeraltı yapıları (Underground structures)
Taşınmaz mal (Real estate)	Arsa (Parcel), Arazi (Land), Bağımsız bölüm (Condominiums), Vakıf taşınmazı (Foundation real estate), Hazine taşınmazı (Public real estate), Ulaşım ağı (Trasnport network), Yeraltı şebekesi (Utility network)
Taşınmaz kaydı (Real estate recording)	Tescil (Registration), Miras (Inheritance), İntikal (Transfer), Tapu (Deed)
Arazi yönetimi (Land management)	Vergi (Tax), Değerleme (Valuation), Kullanım türü (Type of use)

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Table 1 Terms are related to cadastral concepts



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Investigation of the existence of the concepts in the current legislation related to the cadastre in our country

Sometimes it can be a subordinate relationship between some words. Real properties can be land, land and structures on it. All of these can be considered as real property separately. But for buildings, the term real estate is also used. The use of different terms that have the same meaning in the law can be a problem in terms of terminology.

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Investigation of the existence of the concepts in the current legislation related to the cadastre in our country

CONCEPTS	OWNERSHIP		3-4D CADASTRE				REAL ESTATE				REAL ESTATE RECORDING		LAND MANAGEMENT												
	Property Right	Share	Vertical Limit	Parcel	Land	Foundation Real Estate	Public Real Estate	Condominiums	Transport Network	Registration	Inheritance	Transfer	Deed	Tax	Valuation	Zone of Use									
TERMS	AYNI HAK	Expropriation	Cadastral Map	Waters and Mines	Forest	Historical Cultural Land Natural Assets	Coordinate	Time	Superstructure	Underground structures	Parcel	Land	Foundation Real Estate	Public Real Estate	Condominiums	Transport Network	Registration	Inheritance	Transfer	Deed	Tax	Valuation	Zone of Use		
TURKISH LAW																									
Türkiye Cumhuriyeti Anayasası																									
Türk Medeni Kanunu																									
Tapu Kanunu																									
Kadastro Kanunu																									
Endüstri Bölgeleri Kanunu																									
Gecekondu Kanunu																									
Gelir Vergisi Kanunu																									
Harçlar Kanunu																									
İmar Kanunu																									
Jeotermal Kaynaklar ve Doğal Mineralli Sular																									
Emlak Vergisi Kanunu																									
Kamulaştırma Kanunu																									
Kat Mülkiyeti Kanunu																									
Kıyı Kanunu																									
Köy İçme Suları Hakkında Kanun																									
Köye Yönelik Hizmetler Hakkında Kanun																									
Kültür ve Tabiat Varlıklarını Koruma Kanunu																									
Kültür Yatırımları ve Girişimlerini Teşvik Kanunu																									
Maden Kanunu																									
Milli Parklar Kanunu																									
Petrolün Boru Hatları ile Transit Geçişine Dair																									
Petrol Piyasası Kanunu																									
Sular Hakkında Kanun																									
Boğaziçi Kanunu																									
Taşınmaz Mal Zilyedliğine Yapılan Tecavüzlere																									
Önlenmesi Hakkında Kanun																									
Telgraf ve Telefon Kanunu																									
Turizm Teşvik Kanunu																									
Doğal gaz Piyasası Kanunu																									
Türk Petrol Kanunu																									
Yenilenebilir Enerji Kaynaklarının Elektrik Enerjisi																									
Üretimi Amaçlı Kullanımına İlişkin Kanun																									
Yeraltı Suları Hakkında Kanun																									
Yıpranan Tarihi ve Kültürel Taşınmaz Varlıkları																									
Yenilenerek Korunması ve Yaşatılarak Kullanılması																									

Figure 1 Matrix of concepts and laws

■ It shows the existence in law.

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Conclusion

Some concepts and terms related to 3D cadastre have been investigated. In addition, the legal assets of these terms have been investigated. As a result, it is seen that our legislation does not adequately support the studies about 3-4 dimensional cadastre.

- **First of all Turkey is also necessary to determine the 3D objects that need to be recorded.**
- Secondly, existence of underground structures such as car parks is not related to the cadastre. In most legislation there is no application for these structures.
- **Cadastral studies on underground and surface waters are missing. There is also no explanatory information in the laws.**
- There are no explanations about the third dimension in the law.
- **Rights and restrictions are represented in two dimensions in cadastral maps.**
- Another important issue is that the synonyms of some terms are used in the law.

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Recommendations

- We need to determine three dimensional cadastral objects in our country.
- The designated objects must be supported by the law in practice in our country.
- Legal regulations must be made for this.
- Further more study on how to record 3D cadastral objects should be done.
- Guidelines should be drawn to show workflows.
- Last but not least a new terminology should be established in our country related to 3-4D cadastre.

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