FIG WORKING WEEK 2017
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Trends and Expectations Towards to Three-Dimensional Property System in Turkey

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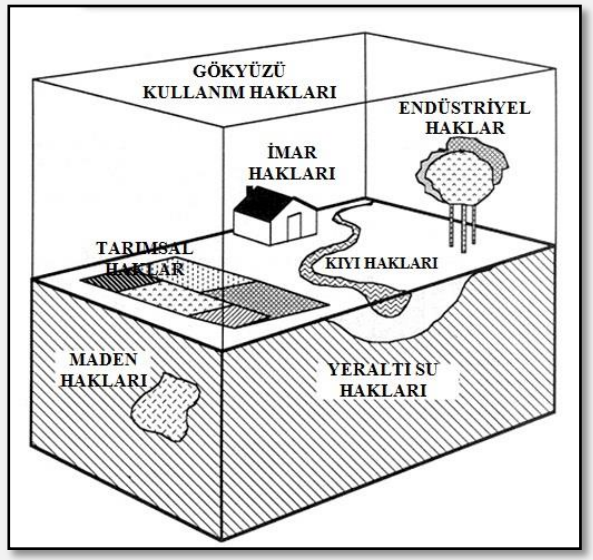
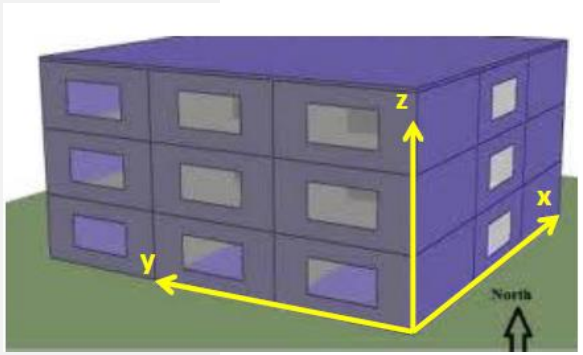
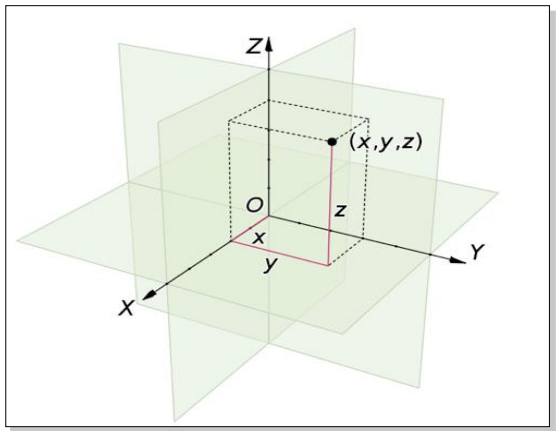
3D Property in Turkish Legislation

- land ownerhip extends downwards to the centre of the earth and upwards infinitely into the sky
- (1)Land parcel, (2)independent and permanent rights and (3) condominium unit s are registered as an immovable property to the land registry.
- 3D cartesian coordinates (x,y,z) of the spatial and location informations on the map should be collected in the national data exchange format that will be a basis for GIS. Besides, these informations should be visualized with information technology and cartographic techniques.

- **Article 718 of the Turkish Civil Law**
- **Article 998 of the Law**
- **Condominium Ownership Law (numbered 634)**
- **According to the Large Scaled Map Production Regulation**
- **According to the General Directorate of Land Registry and Cadastre Circular Letter (numbered 2011/3)**
- **General Directorate of Land Registry and Cadastre Circular Letter (numbered 2010/4)**
- **According to the Regulation for Title Deed Plans (Official Gazette, no: 26980)**
- **Acoording to the most of the jurisdictional decisions**

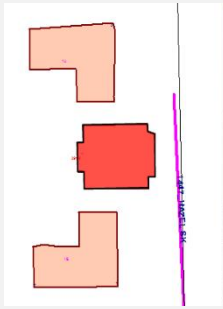






in practice…

- Existing land titling and property (cadastral) systems have developed around the concept of a two dimensional mapping system.
- Determination of these immovables have done in the geometry of point and area (block, parcel, point) by the Cadastre Agency, drawn to the 2D cadastral maps and registered by the Title Deed Agencies.



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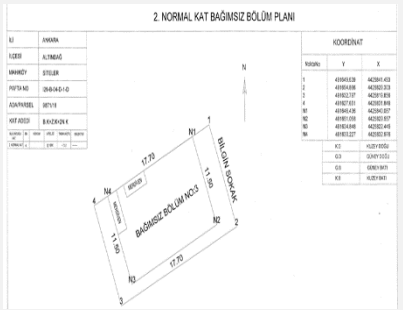

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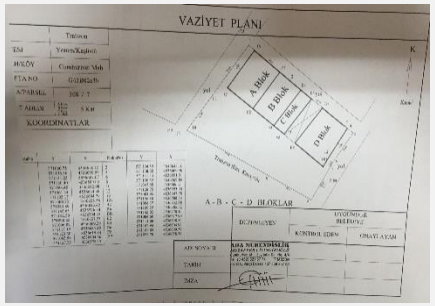

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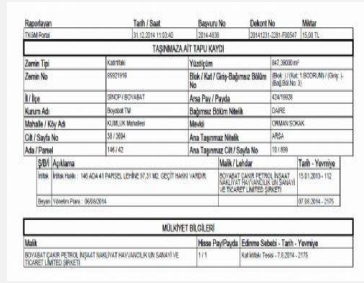
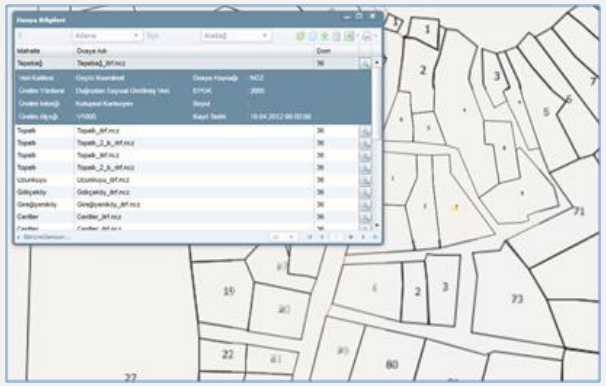


Buildings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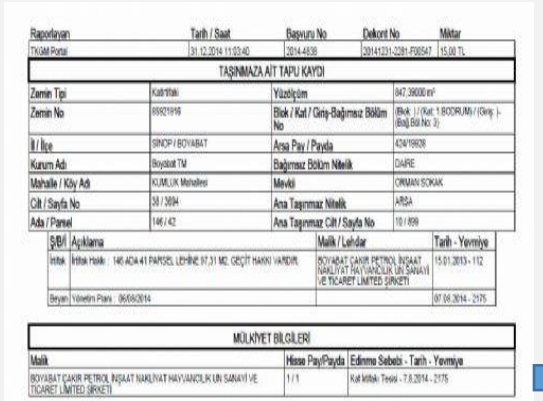
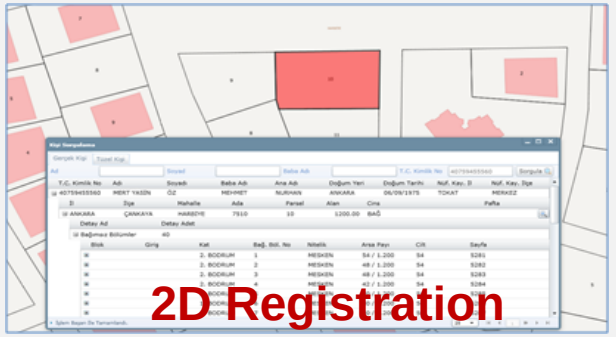


Land parcels



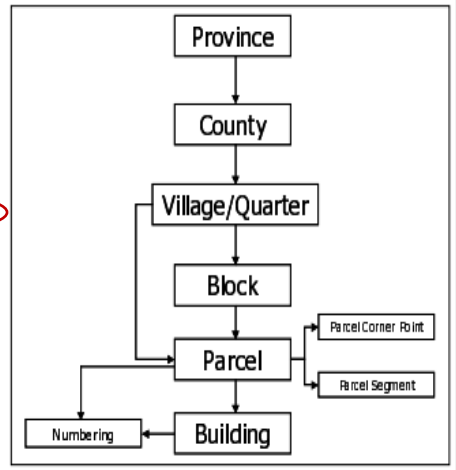
1. Land Registry and Cadastre Information System (TAKBIS)

- e-government project
- parcel-based Land Information System
- **land registry (ownership data) and cadastral (geometry) data are collected in the geo-database.**
- serves lots of public institutions…

The system is capable of forming a confidental geometry for the land management applications,

However, there is not enough geometric definition regarding with the management and representation of 3D physical objects like buildings or condominium units.

Data Sets	Feature Classes	Geometry
Administrative Boundary	Province	Polygon
	County	Polygon
Property	Village/Quarter boundary	Polygone
	Block	Polygone
	Parcel	Polygone
	Parcel Corner Point	Point
	Parcel Segment	Line
	Servitude	Polygon
	Ground Corner Points	Point
Project Area	Working Area	Polygon
Construction	Building	Polygon
	Numbering	Point



Data sets, feature classes, and relationships among them (Bank and Mataraci, 2004)

plan sample in TAKBIS

attribute values of condominium units in TAKBIS

İL: TRABZON | MAHALLE: GÜLBAHARHATUN | block no
İLÇE: ORTAHİSAR | ADA NO:
KURUM: Ortahisar | PARSEL NO: 1 | SORGULA | parcel no

Kat Mülkiyetine Tabii Taşınmazlar (Daire, Dükkan, Depo, v.b.)

	ZeminID	KisiID	ZeminTip	ArsaPayda	ArsaPay	CiltNo	IlceAdi	IlAdi	KurumAdi	BagBolNo	Blok	Giris	Nitelik
Seç	188	0	KatMulkiyeti	16.000	16.000	11	ORTAHİSAR	TRABZON	Ortahisar	1			Mesken
Seç	189	0	KatMulkiyeti	16.000	16.000	11	ORTAHİSAR	TRABZON	Ortahisar	2			Mesken
Seç	190	0	KatMulkiyeti	9.000	9.000	11	ORTAHİSAR	TRABZON	Ortahisar	3			Mesken
Seç	191	0	KatMulkiyeti	9.000	9.000	11	ORTAHİSAR	TRABZON	Ortahisar	4			Mesken
Seç	192	0	KatMulkiyeti	10.000	10.000	11	ORTAHİSAR	TRABZON	Ortahisar	5			Mesken
Seç	193	0	KatMulkiyeti	22.000	22.000	11	ORTAHİSAR	TRABZON	Ortahisar	6			Mesken
Seç	194	0	KatMulkiyeti	8.000	8.000	11	ORTAHİSAR	TRABZON	Ortahisar	7			Dükkan
Seç	195	0	KatMulkiyeti	6.000	6.000	11	ORTAHİSAR	TRABZON	Ortahisar	8			Depolu dükkan

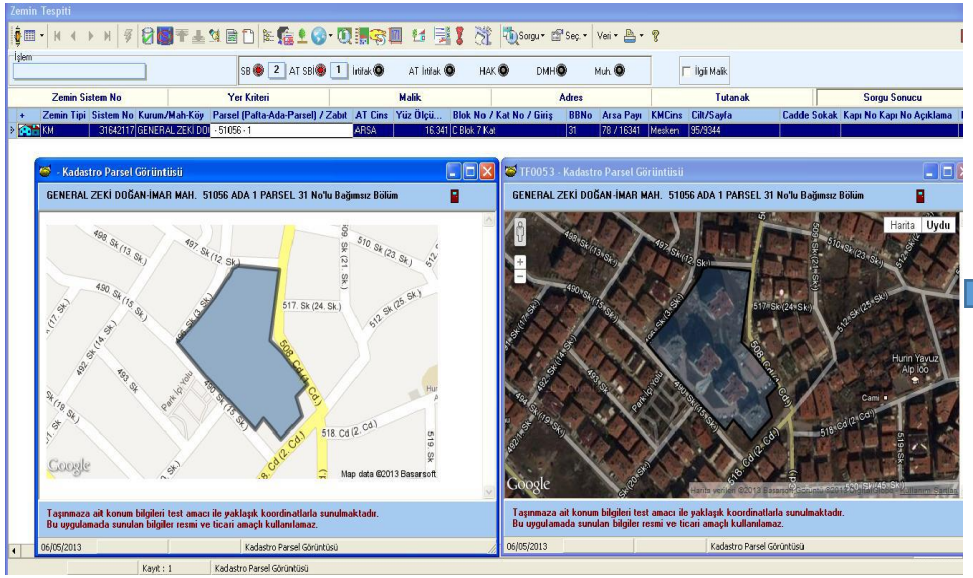
usage type

land share

condominium unit no

Seç	KisiID	ZeminHisseID	HissePayd	TCKimlikNo	Ad	SoyAdi	Ci
Seç	6864	111	1.000	1.000	095890		AN	0

owner

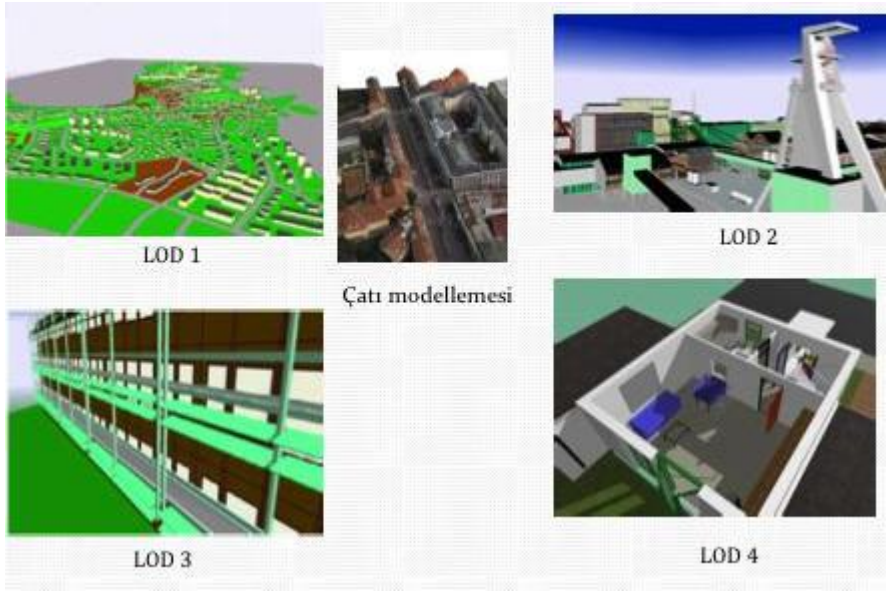


TAKBIS condominium right book

2. Turkey National GIS (TUCBS)

- e-government project
- Common-national data model
- Aim: establishing the infrastructure for Geographical Information System
- Content: defining national geo-data standards - geo-portal development analysis - determining institutional and policy requirements
- 5 basic geo-data theme have been developed (BI-Building, AD-Address, TK-Land Registry/Cadastre, IB-Administrative Unit and UL-Transportation)
- According to the TUCBS.BI data theme; Building information is represented in the surface geometry.
- contains INSPIRE extended 2D building features.

TUCBS.BI Samples

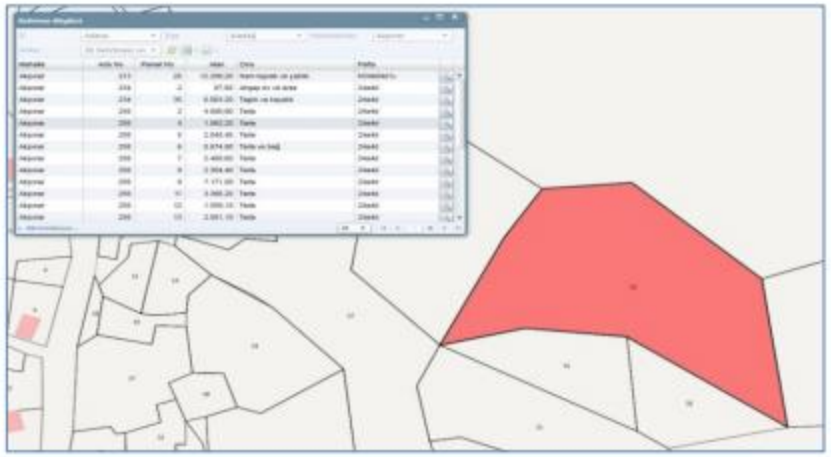


3. Spatial Property System (MEGSIS)

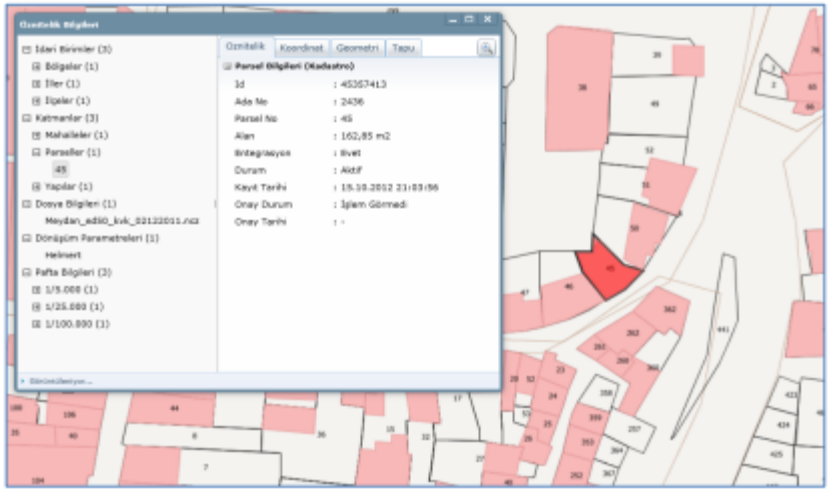
- ***cadaster data are collected by the center system from local users in the cadaster offices in digital .cad format***
- ***harmonized with land registry data***

in order to be submitted to stakeholder institution, organization, municipalities and citizens by e-government link (OGC Web Services)

- *Web-based application software (open source) ii) International standard map services iii) E-Government* Services iv) Orthophoto Services
- collected datas are used in a wide area and data quality is not in the desired level and data model should be updated.



Title deed query in MEGSIS



Attribute data query in MEGSIS

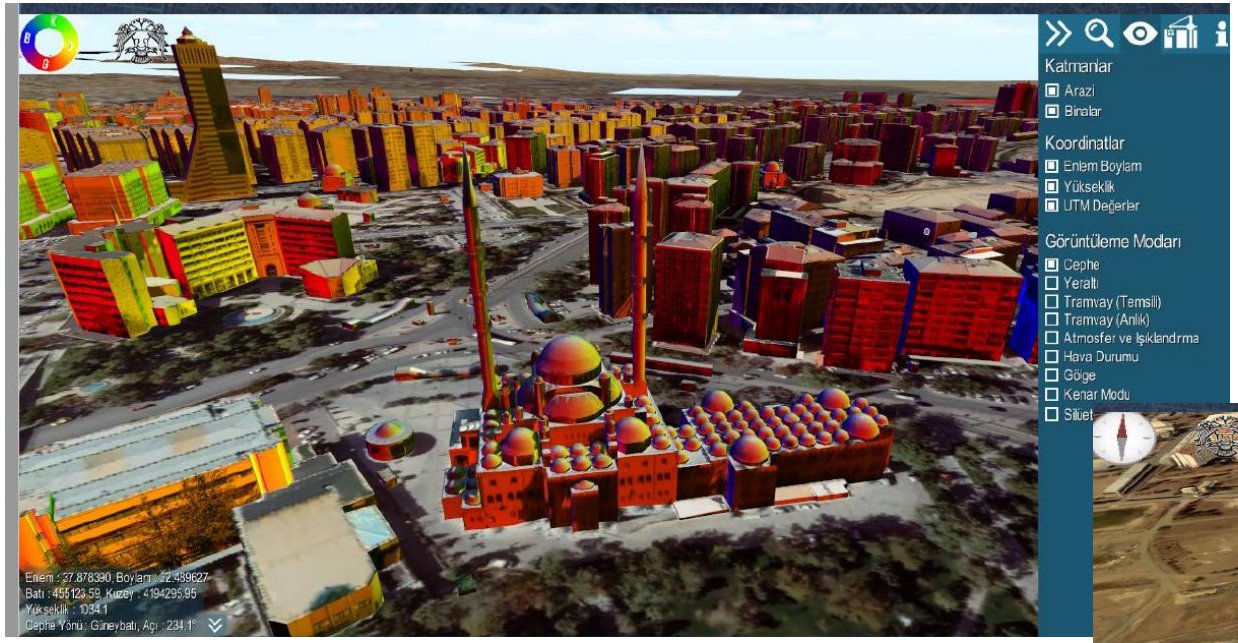
4. Development of the Urban Information System (UIS) Standards

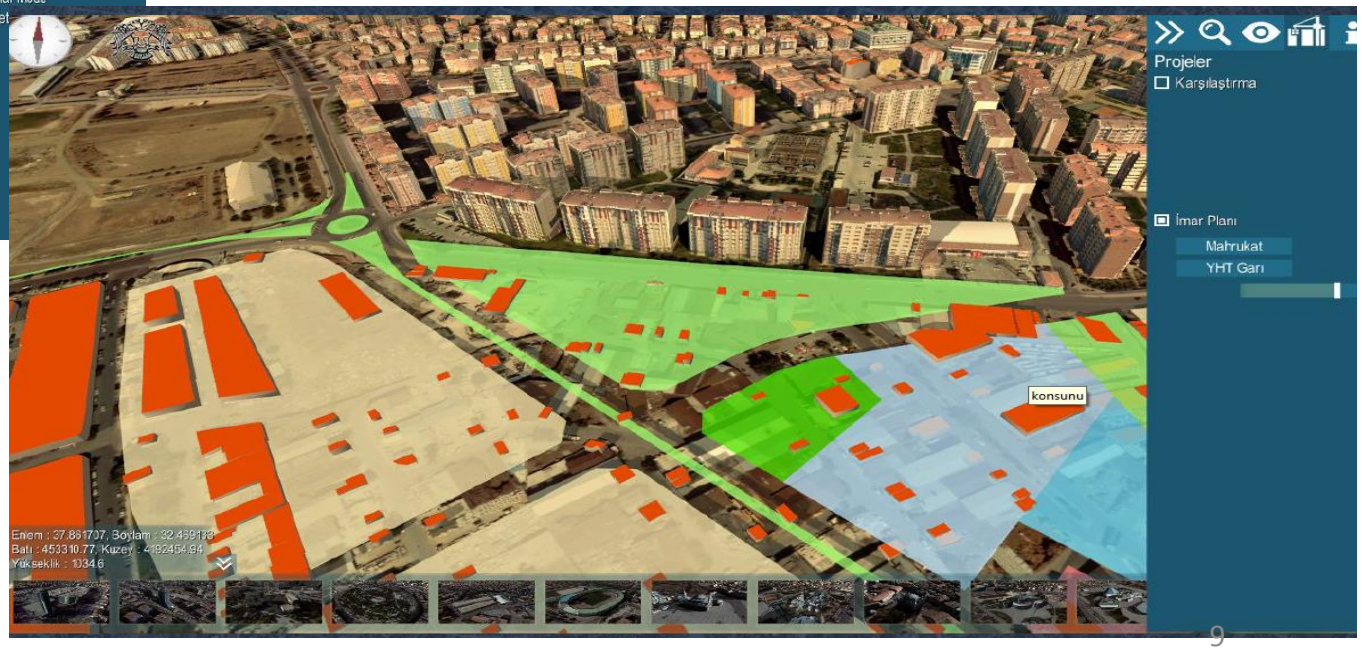
- Aim: Composing a common platform for the local governments across the country.
- Content: nine work package; legislation, institutional, data/user requirement, international standards analysis, conceptual data model design, determination of the spatial data standards, developing UIS data exchange format, documentation/ dissemination, administrative and finacial modelling and preparation of the draft legislation.
- Current Standards:
  - geo-data management → ISO/TC211 and OGC
  - detailed building features → INSPIRE Buildings data specification
    - For 3D requirements → feature data type and definations (based on BuildingCore3D profile) will be used. (LOD1+Core2D).
  - city furniture, topography and transportaion objects → cityGML

- Current situation: UIS standards have been tested with pilot implementations.

4.1 UIS Pilot Projects in Municipalities

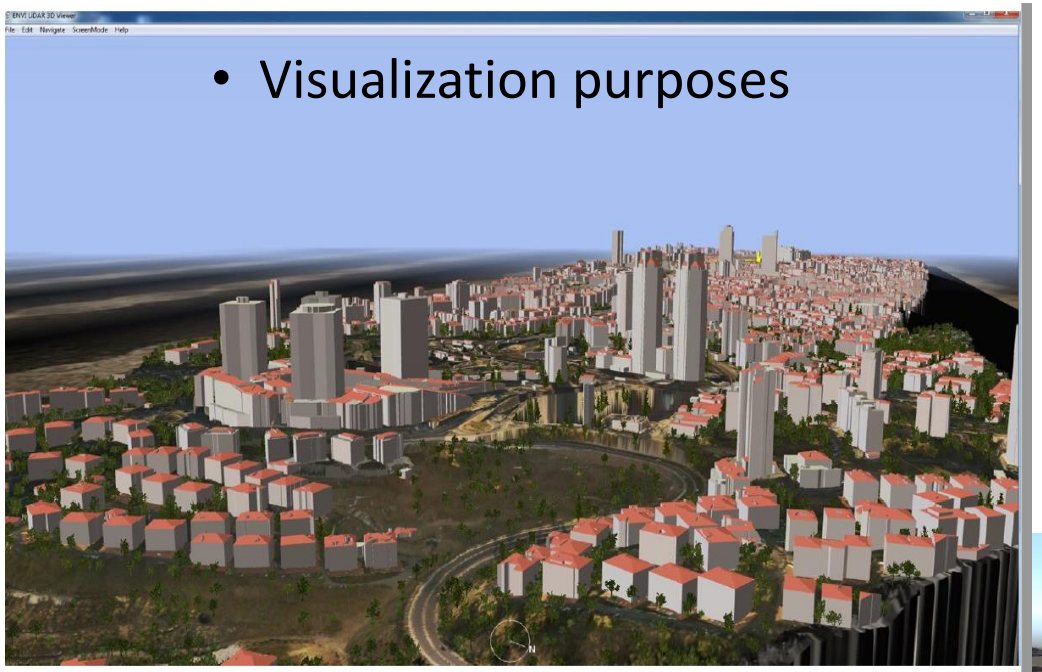
3D City Models in Konya Municipality

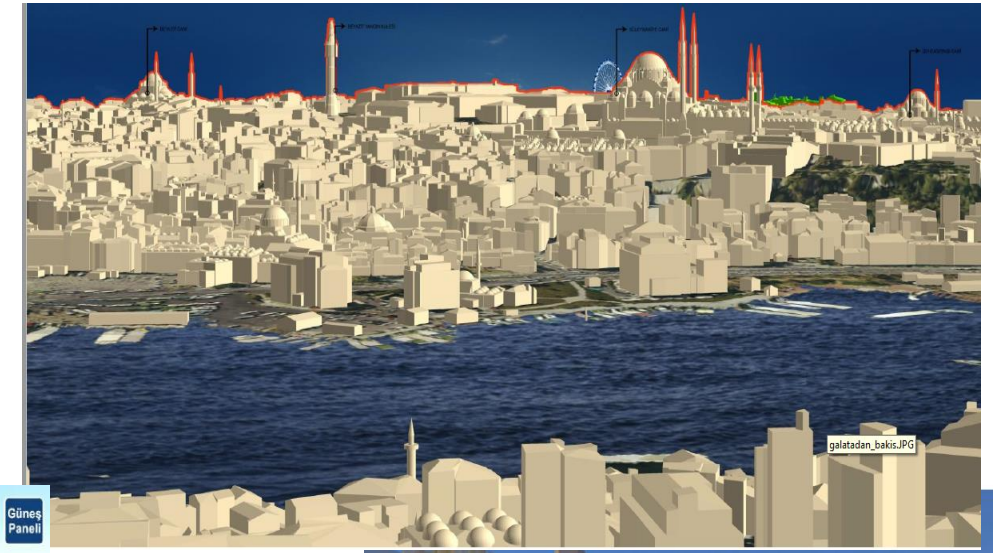


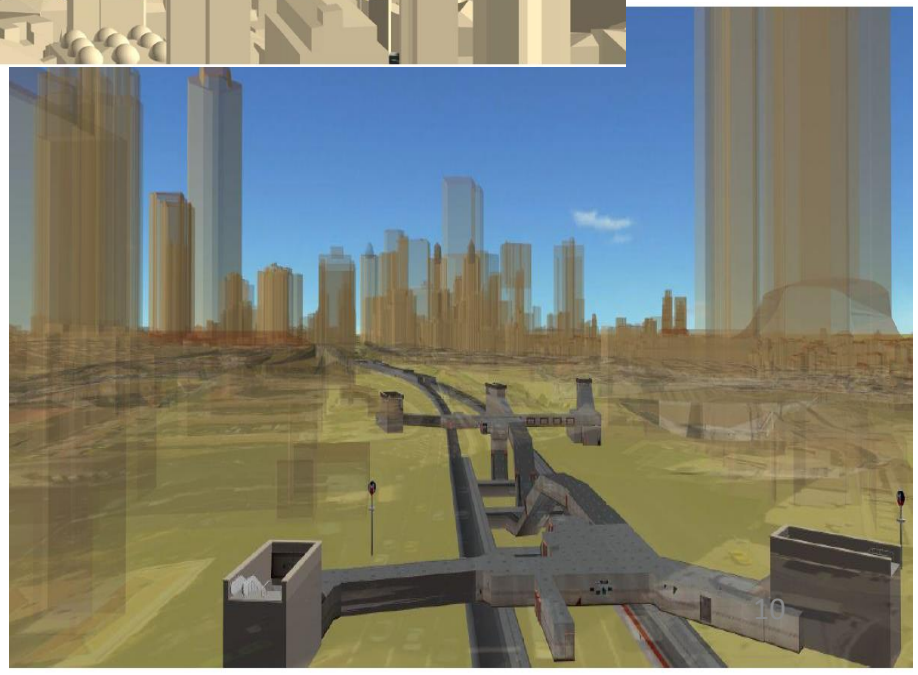


4.1 UIS Pilot Projects in Municipalities

3D City Model/Implementations in Istanbul Municipality-BIMTAS)

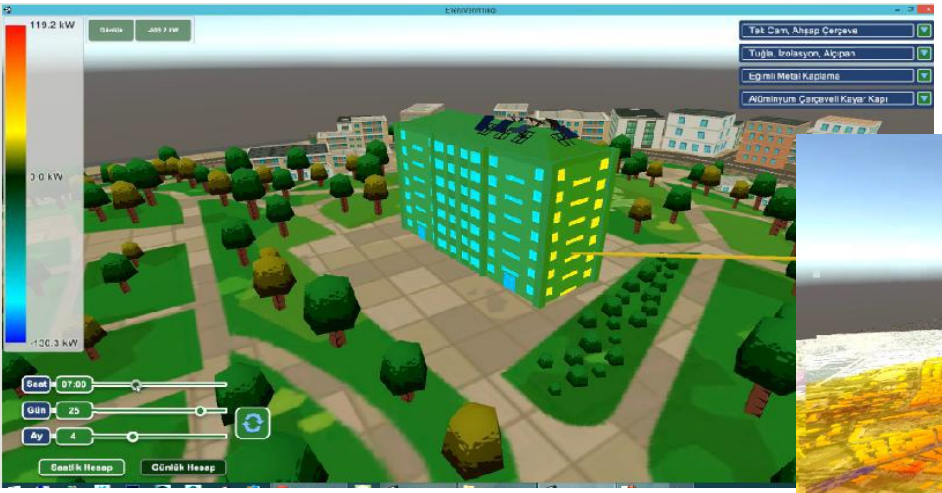


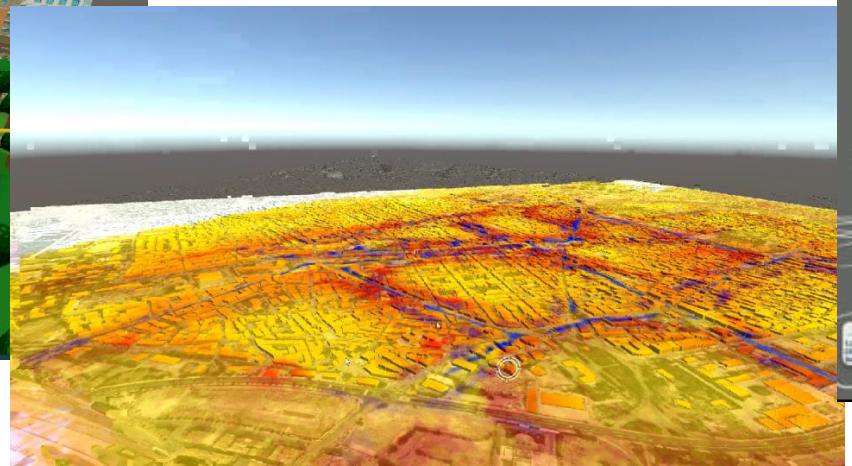


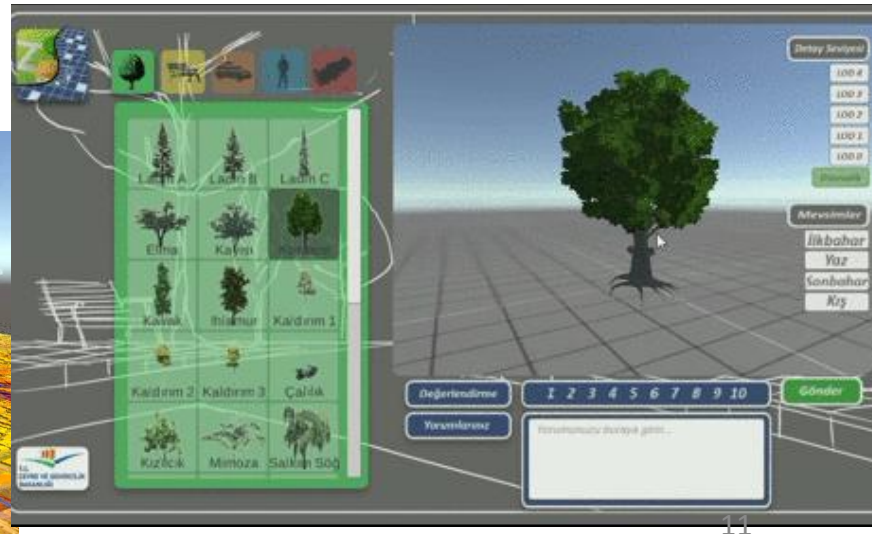


5. 3D Topography and Urban Data Modelling Research and Development Project

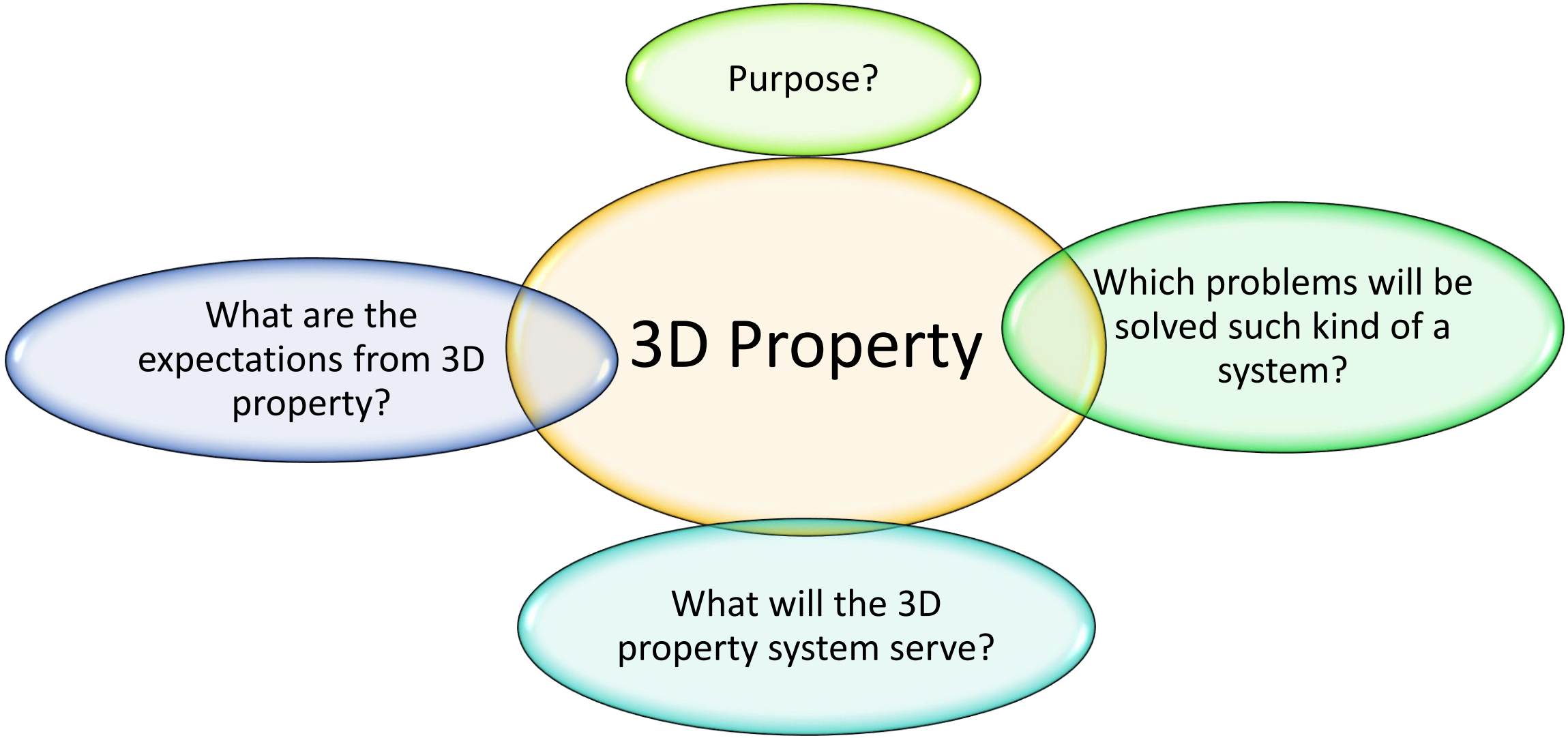
- Aim: Development of the 3D city data model and sample analysis tools in order to contribute of the improvement of urban analysis, planning, design and decision-making process.
- Project deliverables: Data preparation module, visualisation module, quality control module, analysis module, energy efficiency module, urban regeneration and planning module, geological layer and visualization and analysis of mine galleries module, 3D model library and 3D city Model. Some of these modules have been completed such as energy efficiency module and 3D model library and some of them are still in progess.



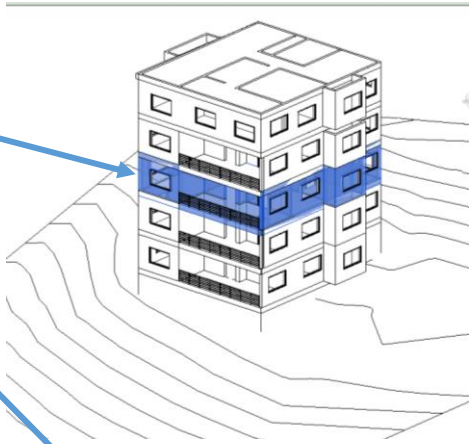




Trends…. Expectations?….



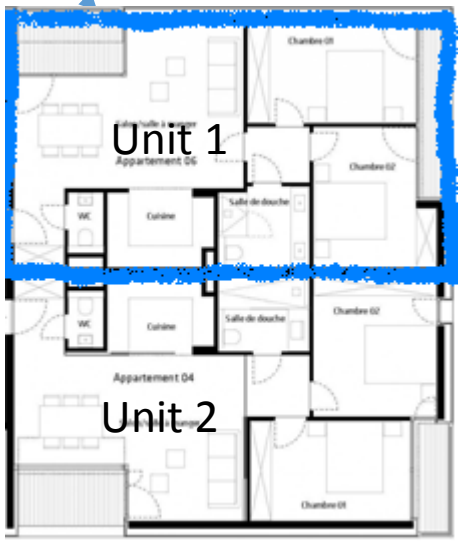
One of them is vertical ownership ➡ condominium units



- We have some problems regarding with establishing condominium ownership accurately!!!
- Condominium right: co-ownership on buildings
- Registration process of condominium units

Architectural Project
1st Phase

- Measurements of the condominium unit, annexes and common spaces
- Land shares of the condominium unit
- Number of the apartment, office, shop, cellar or warehouse
- Total building construction area, Floor plans, sections, views, heat insulating project…



Management plan+construction permit
2nd phase

1. establishing easement/ servitude right → interlocutory registration

Occupancy permit+Condominium unit plan+Layout plan
3rd phase

2. establishing condominium right → Final-permanent registration

Land share determinations!!!

Importance:

- using rights in common places,
- restoration +maintenance+protection costs,
- executive decision-making in building,
- board of management meetings ,
- in case of the expropriation of the whole building,
- management appointments,
- in the case of demolishing of the building,

based on LAND SHARE

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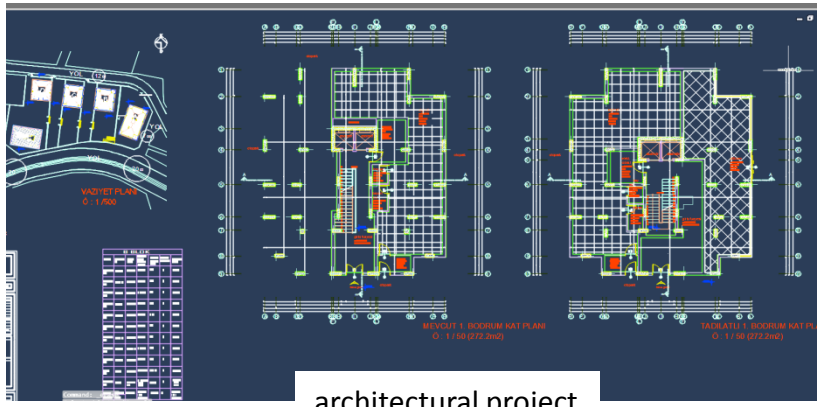
According to the Condominium Law (no:634);

- Land share should be determined by means of containing the value differentiation between the condominium units,
- Land share revisions are made by court decisions,
- Land share have to be determined in establishment easement/condominium date.

The problem;

1. Architectural projects are prepared when the building is not physically on the land surface and projects prepared in design phase don't include valuation determinants and are not meaningful for cadastral/registry purposes.

2. It is not easy to show their value on a 2D architectural project (in the digital cad format). However in the project phase land shares are determined over the project documents lacking of scientific determinats.

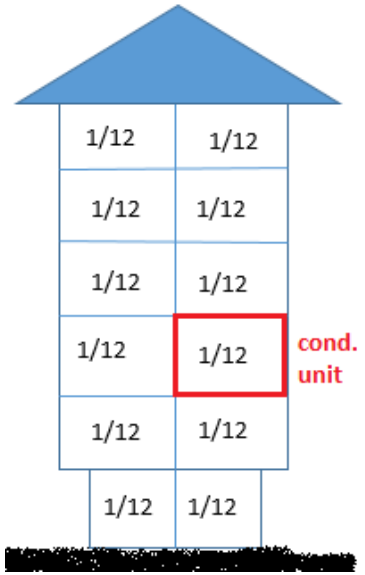


architectural project

Example for determination of the land shares with different methods

Condominium number	Floor Area (m^2)	Unit value ($)	Land share (based on area)	Land share (based on equal rate)	Land share (based on value)
1	120	100.000	12/70 (0,17)	1/5 (0,20)	10/61 (0,16)
2	120	110.000	12/70 (0,17)	1/5 (0,20)	11/61 (0,18)
3	140	120.000	14/70	1/5	12/61
4	150	130.000	15/70	1/5	13/61
5	170	150.000	17/70	1/5	15/61
Total	700	610.000	1	1	1

→ different land shares for the same unit



How could we determine the accurate land share??

- According to the regulations;
- Land share should be determined **value based** (Cond. Law no:634)

FACTORS

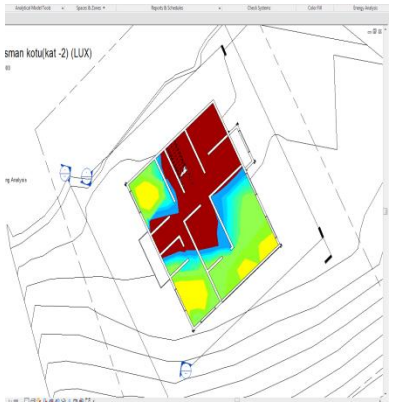
- Area, location, type
- Floor number
- Heating system
- Fabrication cost per m2
- Environmental features;
  - Solar energy potential
  - Wind
  - Lighting
  - View
  - Orientation
  - etc.
  - ……..

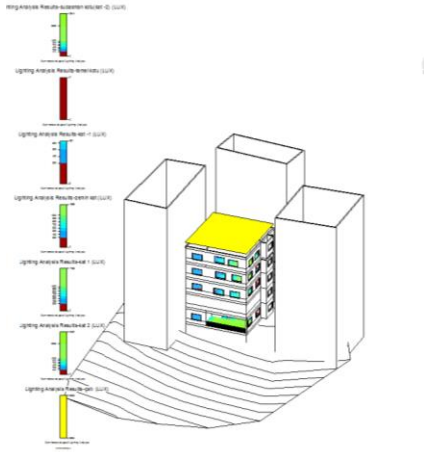
(according to the Supreme Court practices)

So, a new valuation process which analyze these factors should be accelerated!!!!!

Determination of the Land Share with BIM Process

- 3D BIM models can provide important approaches for the valuation problems in the determination of the land share…





<_Lighting Analysis Room Schedule>

LEED v4 EQc7 opt2Whole Building Results - 9am: 44% within, 3pm: 30% within

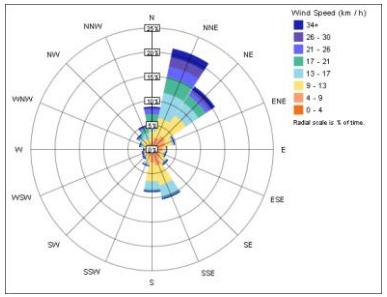
9.16 9 GHI: 529, DNI: 672, DHI: 89 W/m2

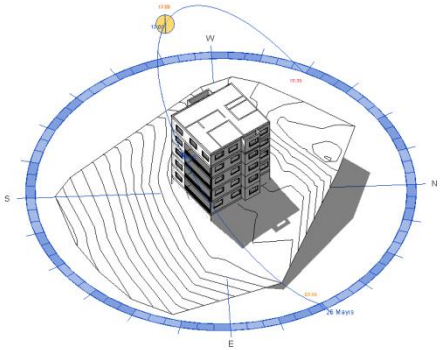
9.16 3 GHI: 308, DNI: 507, DHI: 79 W/m2

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
						9am threshold results						3pm threshold results					
Level	Name	Number	Area	Include in Daylighting	Automated Shades	within threshold		above threshold		below threshold		within threshold		above threshold		below threshold	
						%	Area	%	Area	%	Area	%	Area	%	Area	%	Area
kat 1	Room	kat1	143 m²	☑	☐	47	67 m²	7	10 m²	47	67 m²	33	47 m²	0	0 m²	67	97 m²
kat 2	Room	kat2	130 m²	☑	☐	85	110 m²	3	3 m²	13	17 m²	51	67 m²	0	0 m²	49	63 m²
kat -1	Room	kat-1	143 m²	☑	☐	7	10 m²	0	0 m²	93	133 m²	2	3 m²	0	0 m²	98	140 m²
subasman kotu(kat	Room	kat-2	143 m²	☑	☐	37	53 m²	19	27 m²	44	63 m²	40	57 m²	0	0 m²	60	87 m²
zemin kat	Room	zeminkat	144 m²	☑	☐	47	67 m²	2	3 m²	51	74 m²	28	40 m²	0	0 m²	72	104 m²

Wall Material Takeoff

Family and Type	Material: Name	Material: Area	Material: Volume
Basic Wall: Foundation - 1' 5" Concrete	Concrete - Cast-in-Place Concrete	11353 SF	15673.94 CF
Basic Wall: Foundation - 3' 0" Footing	Concrete - Cast-in-Place Concrete	1177 SF	3118.74 CF
		12530 SF	18792.68 CF
Basic Wall: Exterior - Brick on CMU	Concrete - Precast Concrete	3754 SF	1084.31 CF
Basic Wall: Exterior - Brick on CMU - Entrance	Concrete - Precast Concrete	44 SF	13.14 CF
		3798 SF	1097.44 CF
Penthouse Screen Wall: Penthouse Screen Wall	Finishes - Exterior - Metal Panel	13166 SF	11520.28 CF
		13166 SF	11520.28 CF



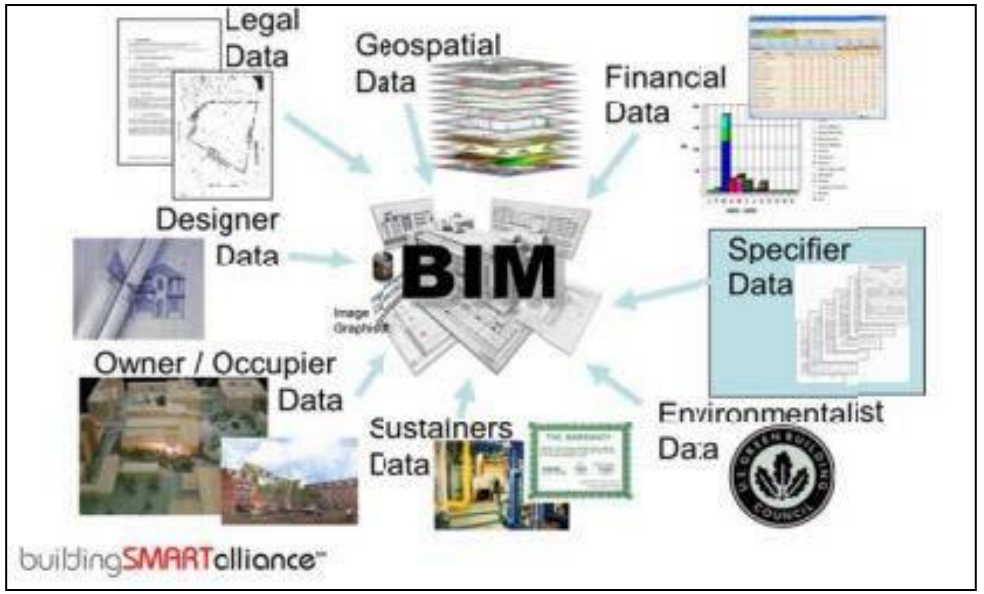


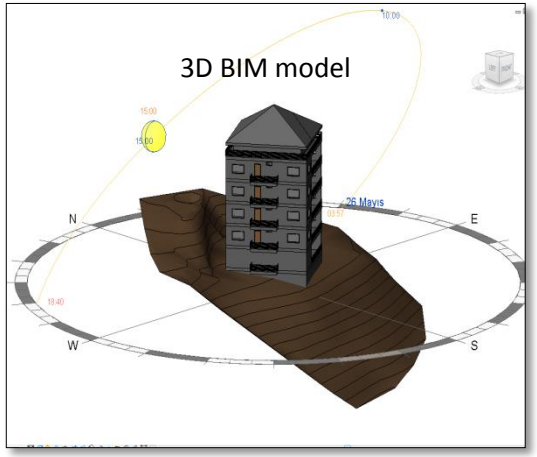
Calculated Results	
Peak Cooling Total Load (W)	2,168
Peak Cooling Month and Hour	August 16:00
Peak Cooling Sensible Load (W)	2,133
Peak Cooling Latent Load (W)	36
Peak Cooling Airflow (L/s)	106.2
Peak Heating Load (W)	3,393
Peak Heating Airflow (L/s)	179.1

Cooling Components	Total (W)	Percentage	North (W)	South (W)	East (W)	West (W)	Northeast (W)	Southeast (W)	Northwest (W)	Southwest (W)
Wall	685	31.57%	0	0	0	0	216	238	33	197
Window	516	23.82%	0	0	0	0	30	0	151	336
Door	0	0.00%	0	0	0	0	0	0	0	0
Roof	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	0	0.00%	-	-	-	-	-	-	-	-
Lighting	444	20.46%	-	-	-	-	-	-	-	-
Power	444	20.46%	-	-	-	-	-	-	-	-
People	80	3.69%	-	-	-	-	-	-	-	-
Plenum	0	0.00%	-	-	-	-	-	-	-	-
Total	2,168	100%	0	0	0	0	246	238	184	533
Heating Components	**Total (W)**	**Percentage**	**North (W)**	**South (W)**	**East (W)**	**West (W)**	**Northeast (W)**	**Southeast (W)**	**Northwest (W)**	**Southwest (W)**
Wall	2,676	78.88%	0	0	0	0	822	576	496	782
Window	717	21.12%	0	0	0	0	143	0	287	287
Door	0	0.00%	0	0	0	0	0	0	0	0
Roof	0	0.00%	-	-	-	-	-	-	-	-
Partition	0	0.00%	-	-	-	-	-	-	-	-
Skylight	0	0.00%	-	-	-	-	-	-	-	-
Infiltration	0	0.00%	-	-	-	-	-	-	-	-
Total	3,393	100%	0	0	0	0	965	576	783	1,069

Conclusion

- When we look back at all of those stages, it can be concluded that 3D buildings have been evaluated in the concept of Urban Information Systems and used for an underlay for municipal requirements (such as; energy simulation, urban design, urban regeneration scenarios, flooding analysis,virtual tours, etc.) by the CityGML based national standards.
- The management of the 3D buildings and its components (like condominium unit) have not been considered in highly detailed level.
- Even if the building is not physically on the land surface, valuation should performed with the real measurements and datas from the 3D virtual building model.
- This kind of a valuation system is not supported by the current land administration system.
- BIM can be used for solving the problems regarding with the vertical landownership (condominium ownership).
- BIM world seems far away from the geospatial world, its functionality and detailed models containing geometric, semantic information can provide usefull informations for the surveyors in the management of 3D physical objects (buildings and condominium units).





Thank you for your attention

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