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## Our world and dynamics...

### Dynamics...

- Rapid population growth, migrations...
- Resource reduction, consumption...
- Development, globalization and competition ...
- political and social changes.
- Technological changes.

### Threats...

- Atmosphere, Climate...
- Environment, Biodiversity
- Natural protected areas...
- Security and continuity...
- Human health ...
- Droughts, disasters...



### Findings...

- ✓ The world population is 7 billion and the population will have doubled in the last 50 years.
- ✓ Urbanization rate: While 50% of the world's population lives in cities today, this rate will reach 70% in 2050...
- ✓ Today, the number of people living below the poverty line is 2 billion.
- ✓ Forest areas have decreased by 2.5 million km<sup>2</sup> in the last 12 years ... Every year, 6 million hectares of land in the world become deserts... 250 million people are affected by it..
- ✓ 70% of the world is covered with water, but 3 billion people have been suffering from water shortage in the last 10 years .
- ✓ About 100 million people are affected by floods every year.
- ✓ Environmental pollution such as air, sea and water is constantly increasing.
- ✓ Etc. etc....

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## Problems are looking for solutions..!

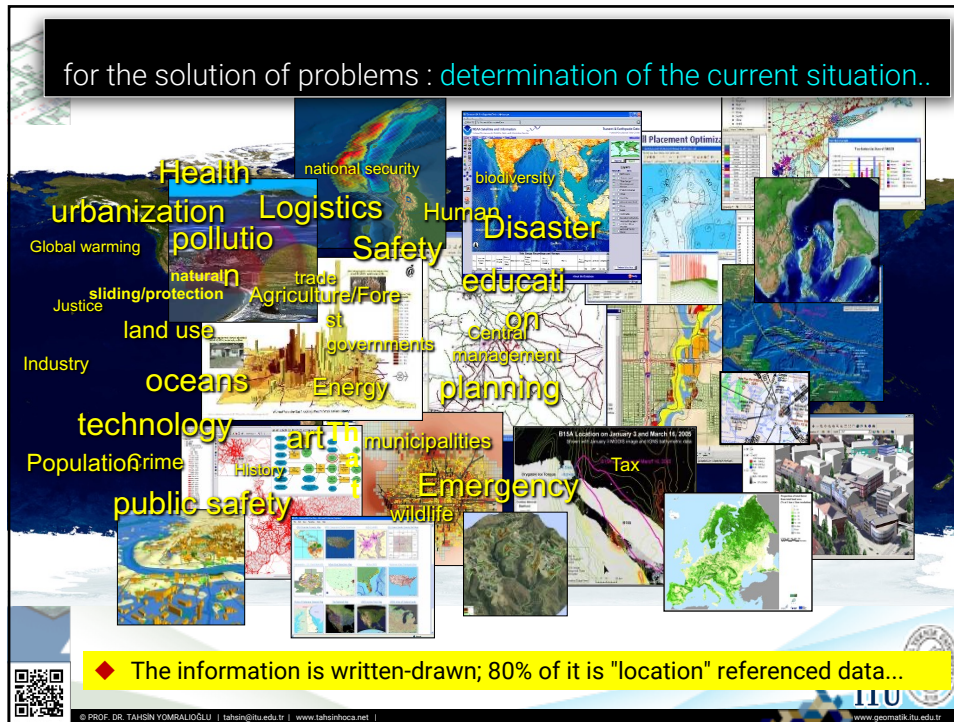


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## SOME OUTCOMES & FINDINGS...

- ✓ For an effective decision-making process, first of all, **quality data and information are needed.**
- ✓ Besides the availability of traditional data collectors and satellites, **information today is growing rapidly**, increasing **at least twice every year compared to the previous year...**
- ✓ Due to the **heavy information traffic** and **large data volume** around us, **information management** is becoming more complex than before.
- ✓ **IT - information technology** has a direct impact on the **social, economic and cultural development** of the countries of the world ... **knowledge has become a power** and resource for societies today ...
- ✓ The information is basically in **written (textual)** and **graphical (map, plan, etc.)** formats... **About 80% of the data is spatially (GEO)...**



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## INFORMATION SYSTEMS...

A system that helps collect, store, manage and present data...

*There are various types of information systems, for example: business systems, office systems, decision support systems, information management systems, database management systems and office information systems...*

Critical to most information systems is "IT (IT)-Information Technology", typically designed to enable the human brain to perform tasks for which it is not well suited ...

*for example: keeping large amounts of information in memory, storing, processing, performing complex calculations and many simultaneous control monitoring-supervision processes...*



The basic function of an information system; is to increase decision-making capacity.



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Introduction to geographic information systems...

...is it possible to model our world?



What?  
Where ?  
Why ?  
How ?  
Why is that?  
...

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Geography is important...

'EVERYTHING HAPPENS SOMEWHERE'



xyz  
enlem,  
boylam

All the events around us are related...

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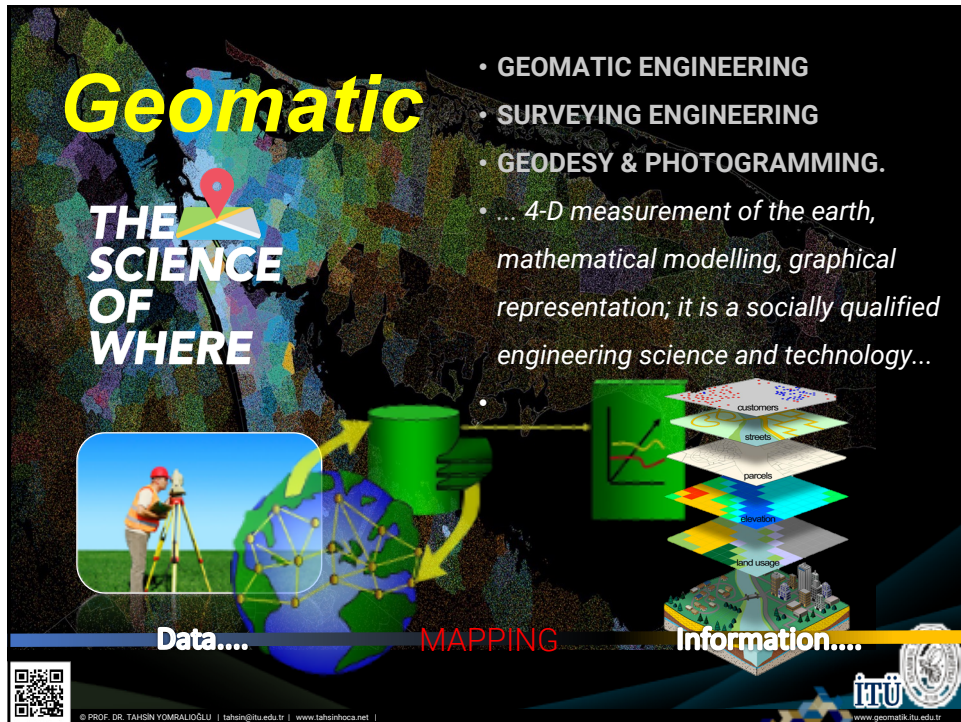
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**Geomatic**

**THE SCIENCE OF WHERE**

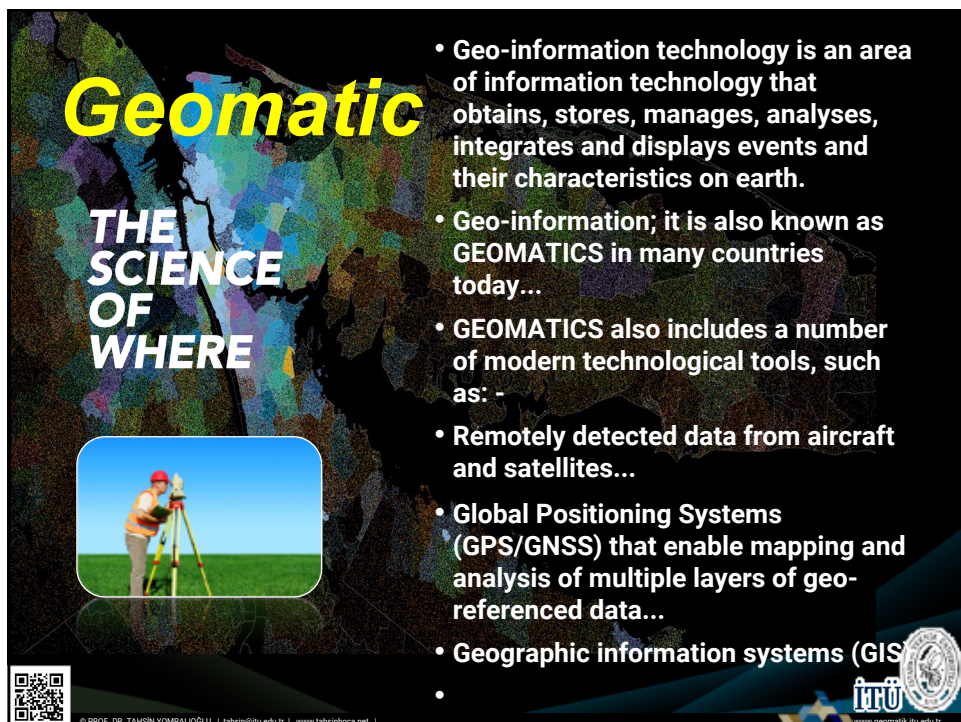
- GEOMATIC ENGINEERING
- SURVEYING ENGINEERING
- GEODESY & PHOTOGRAMMING.
- ... 4-D measurement of the earth, mathematical modelling, graphical representation; it is a socially qualified engineering science and technology...

Data.... MAPPING Information....

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**Geomatic**

**THE SCIENCE OF WHERE**

- Geo-information technology is an area of information technology that obtains, stores, manages, analyses, integrates and displays events and their characteristics on earth.
- Geo-information; it is also known as GEOMATICS in many countries today...
- GEOMATICS also includes a number of modern technological tools, such as: -
- Remotely detected data from aircraft and satellites...
- Global Positioning Systems (GPS/GNSS) that enable mapping and analysis of multiple layers of geo-referenced data...
- Geographic information systems (GIS)

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**Solution...?**

**CBS GIS**

**Coğrafi Bilgi Sistemleri**

**Geographical Information Systems**

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**What is GIS...?**

**GIS is a system designed to**

- (1) collect,
- (2) store,
- (3) analyze,
- (4) display

**all forms of geo-referenced data.**

**GIS try to model things on the Earth..**

**> Production of smart maps...**

**GIS deal with the geographic data which describe objects from the real world in terms of their;**

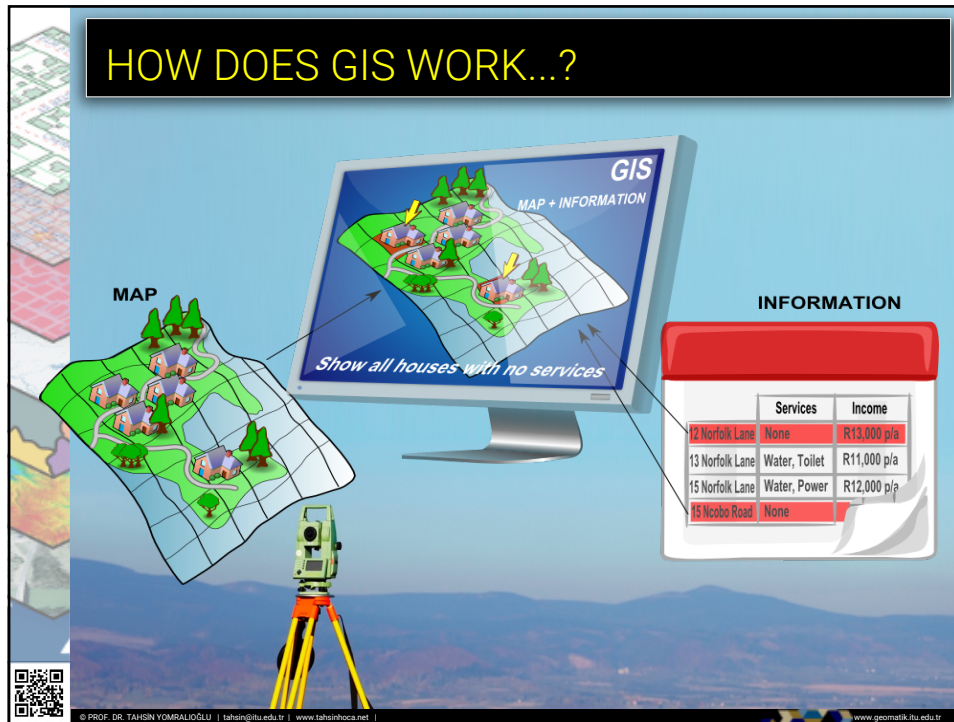
- (1) position within a known coordinate system;
- (2) spatial relationships with one another;
- (3) attributes.

**Geographic + Information + Systems**

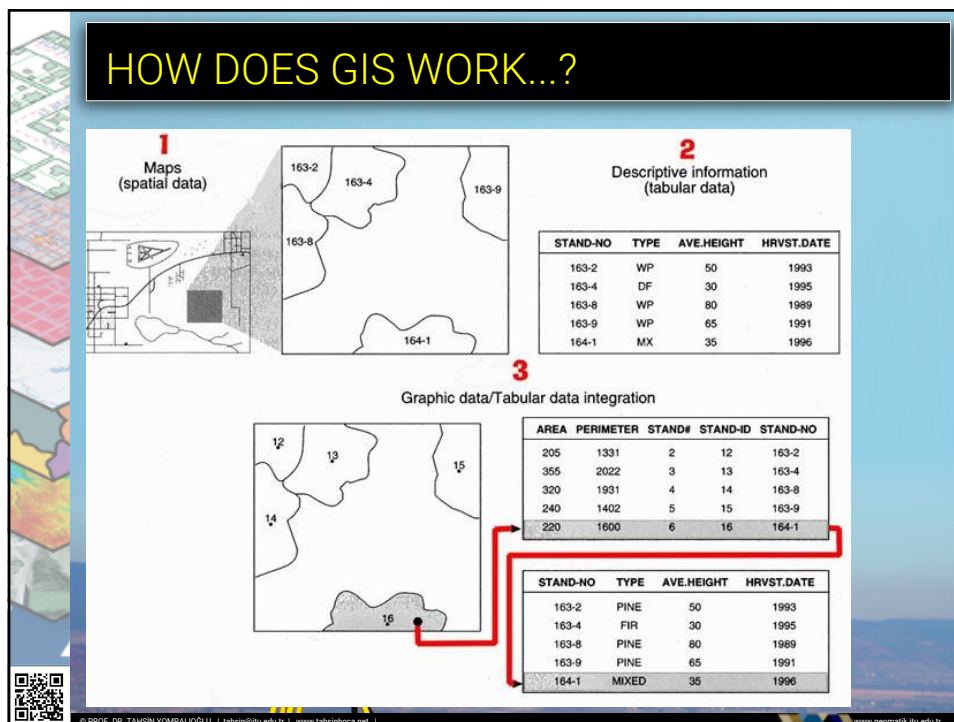
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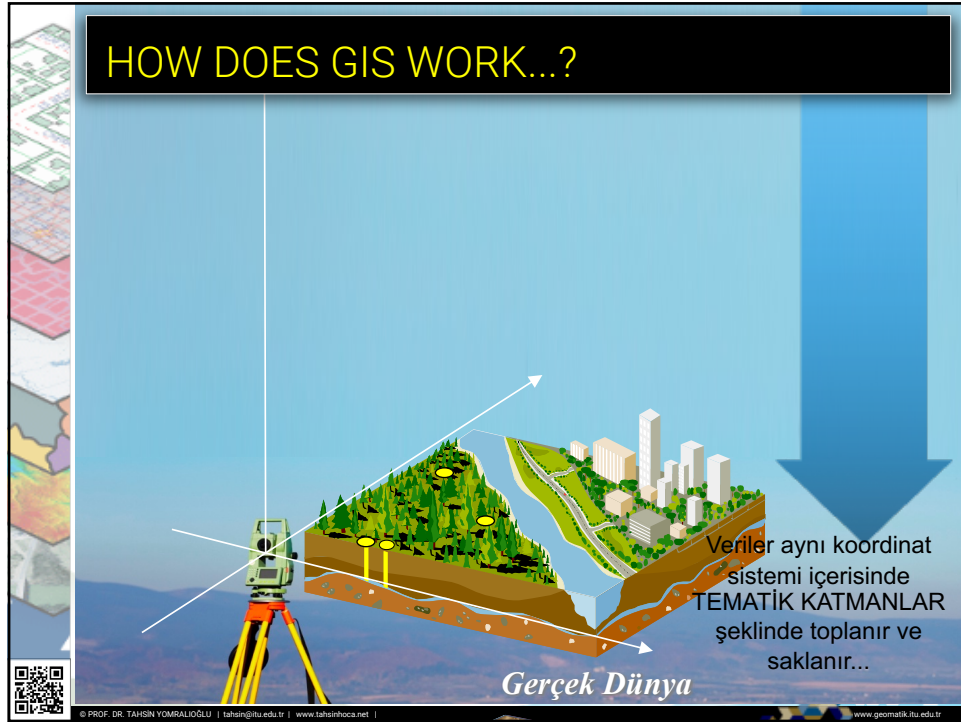
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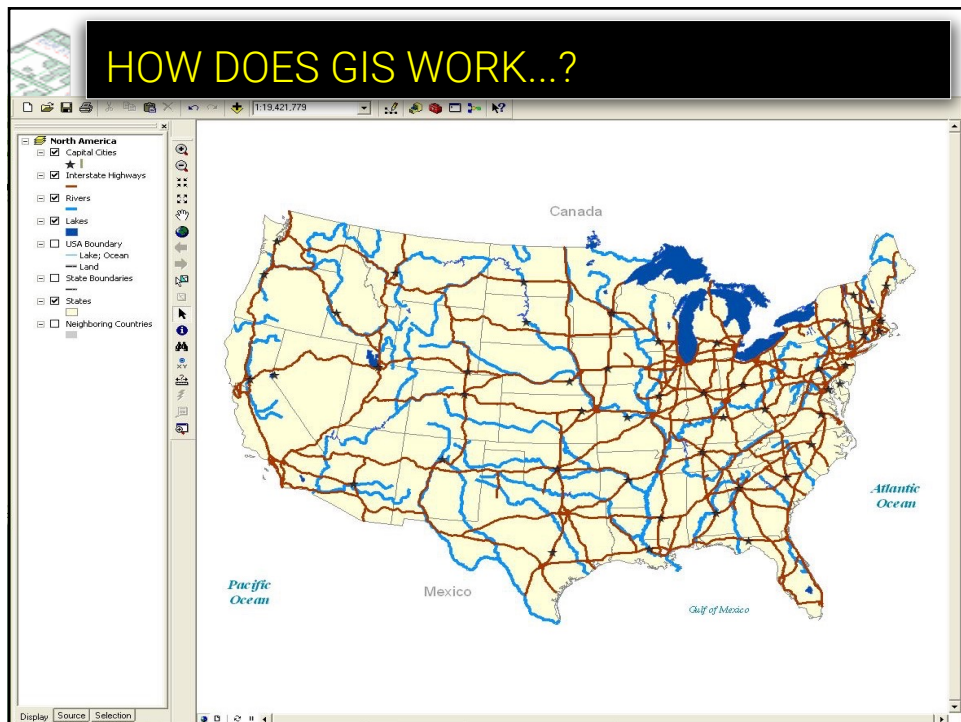
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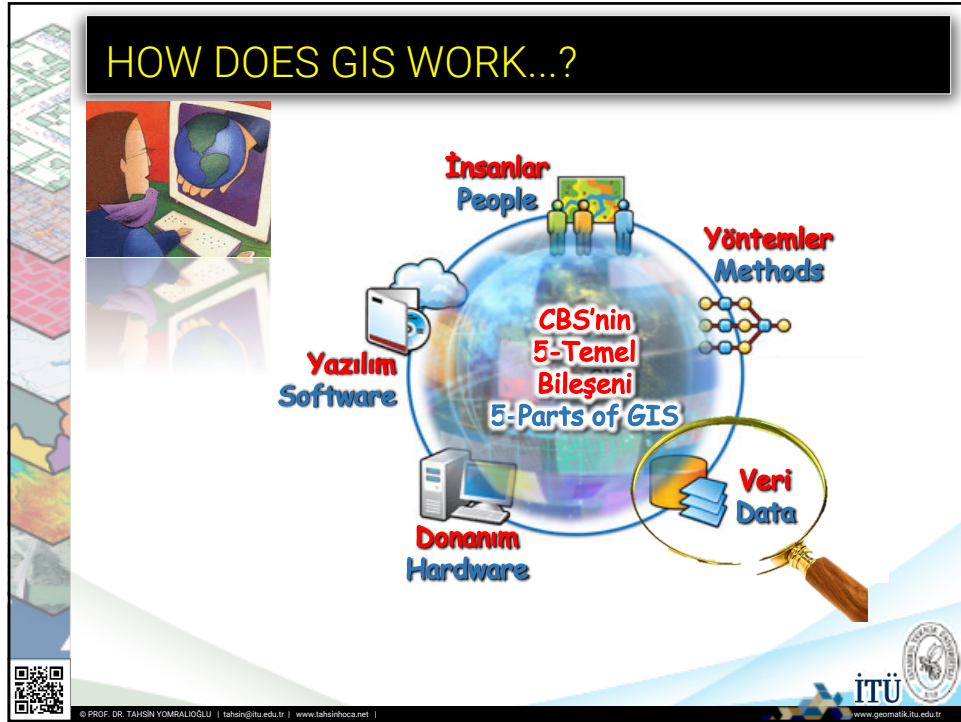


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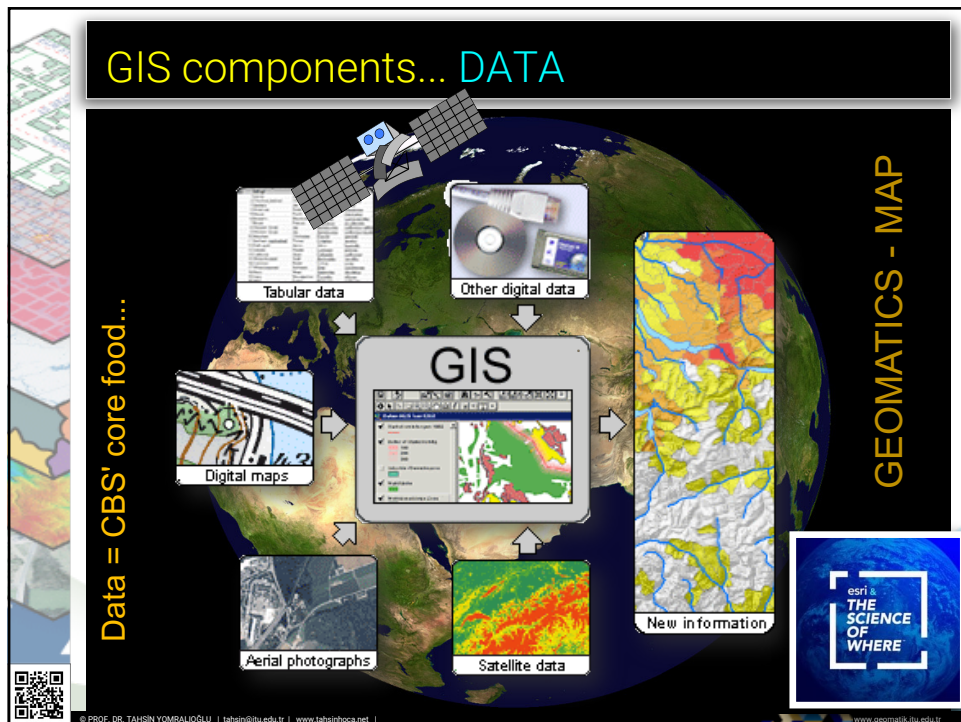


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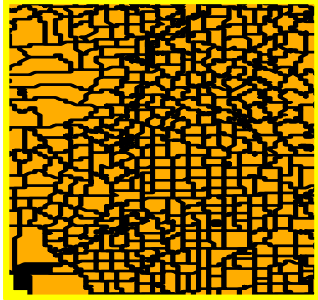




## GIS components... DATA

**MAP**

1- Points  
(ağaç, direk..)  
(x1,y1)



2- Lines  
(yol, akarsu, kanal...)  
(x1,y1-x2,y2-...-xn,yn)

3- Polygons,  
(göl, bina, arazi, orman)  
(x1,y1-x2,y2-...-xn,yn-x1,y1)





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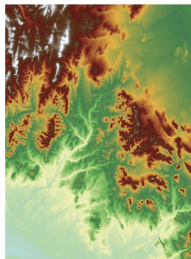
## GIS components... DATA

**Konumsal varlıklar ...  
Spatial entity**

*spatial objects can be shown on maps ...*

❖ Graphical – x y

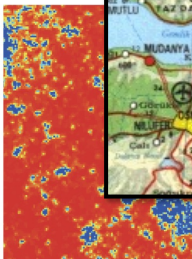
❖ Non- graphical - text



(a) Terrain



(b) Rainfall



(c) Population







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## GIS components... DATA

### Representation of geographic entities

The real world is shown on GIS in two ways...

Gerçek Dünya

Vektör Veri      Raster Veri

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## GIS components... DATA

### Representation of geographic entities

The real world is shown on GIS in two ways...

(1) REAL WORLD

VECTOR

RASTER

(2) RASTER REPRESENTATION

(3) VECTOR REPRESENTATION

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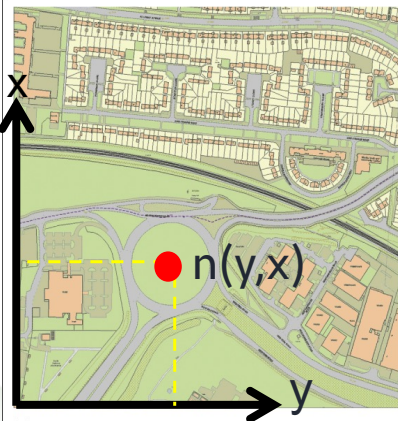
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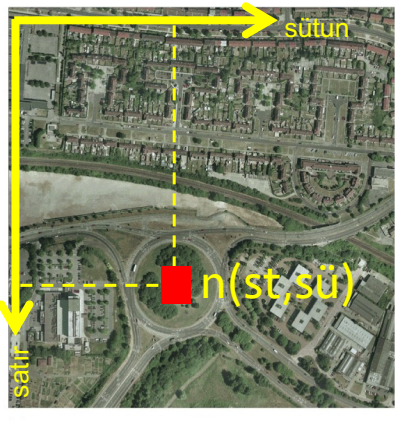
## GIS components... DATA

Spatial entity...



(a) Topography

Vektör



(b) Imagery

Raster

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## GIS components... SOFTWARE / HARDWARE



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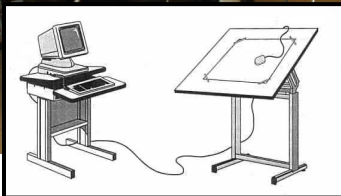
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## GIS components... SOFTWARE / HARDWARE



COMPUTER – PRINTER – PROJECTOR  
DIGITAL SCANNER – DISK  
NETWORK – POWER SUPPLY ...

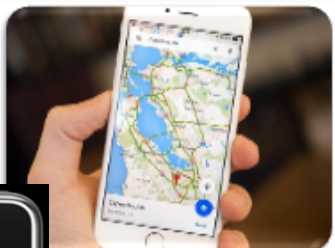





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## GIS components... SOFTWARE / HARDWARE



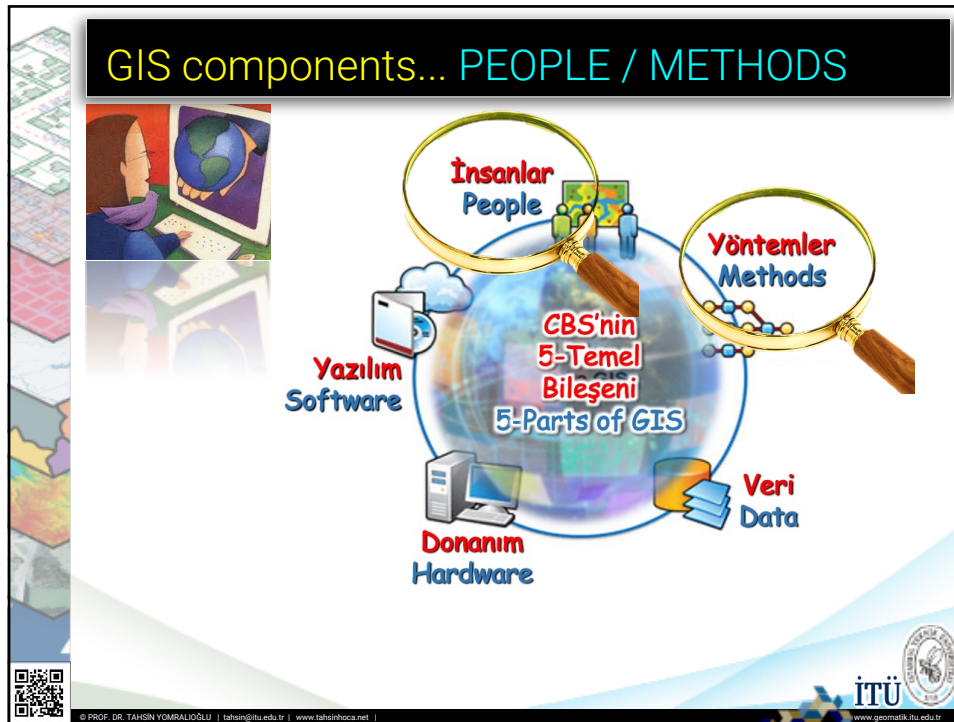

COMPANIES MAPPED FOR SPATIAL ENABLEMENT



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GIS components... PEOPLE / METHODS

Legislation / institutionalization ...?

Information sharing?

Id number?

personal property?

The price of information?

Is the information public?

Tax No.?

Who's responsible?

Standards ?

- LAW
- REGULATION
- STATUTES
- CIRCULAR
- ....

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**GIS** is focused on **Integration...**

Bringing Together Our Complex Data and Knowledge

collect > store > manage > display... and making it accessible

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**Functions of GIS ?**

**Supports Integration**  
Of all types of information

- Maps
- Apps
- Files, Spreadsheets Documents
- 3D Scenes
- Social Media
- Live Feeds & Sensors
- Imagery
- GIS Services

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## Functions of GIS ?

### Supports Information Needs

Across your organization & beyond it



Supporting new users  
Supporting public access

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## Functions of GIS ?

### GIS is an online platform

Complements traditional patterns with new



Cloud / Web

Desktops/Servers  
Enterprise

Public or Private Sharing  
Public Cloud or On-Premises

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## Functions of GIS ?

### This Changes the Discussion



Communicating and Collaborating using Maps

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## Functions of GIS ?

### GIS Changes How We Think and Act

Integrating Geographic Science into What We Do



Plan  
Prepare  
Predict  
Analyze  
Measure  
Design  
Evaluate  
Decide  
Act  
Manage

*We Need to Embrace This Approach . . . Making It Pervasive  
Involving Our Organizations and All of Us*

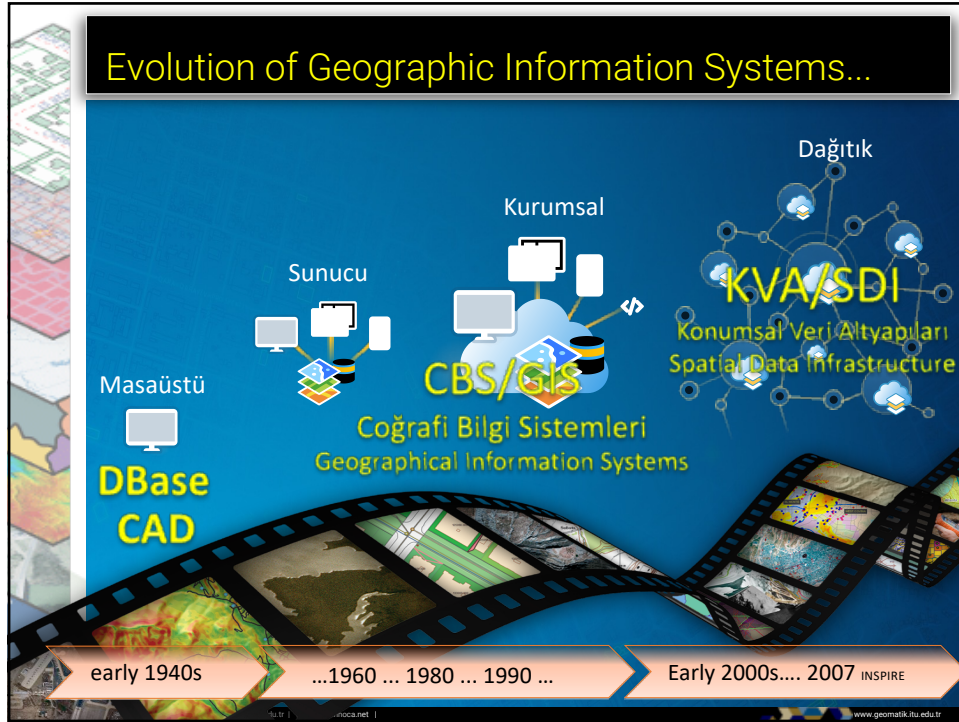
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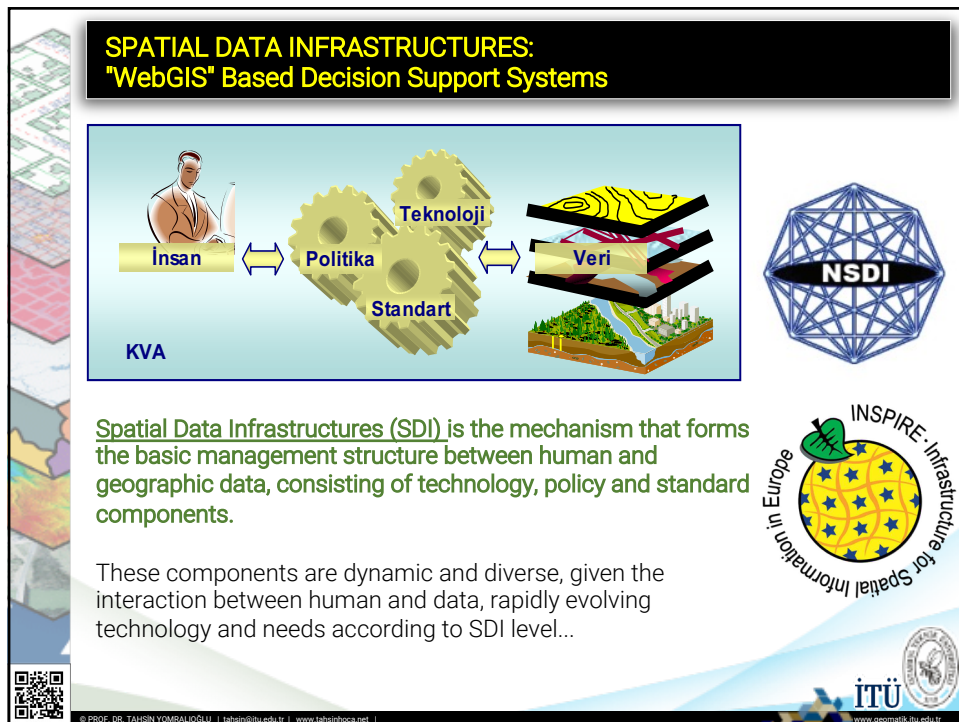
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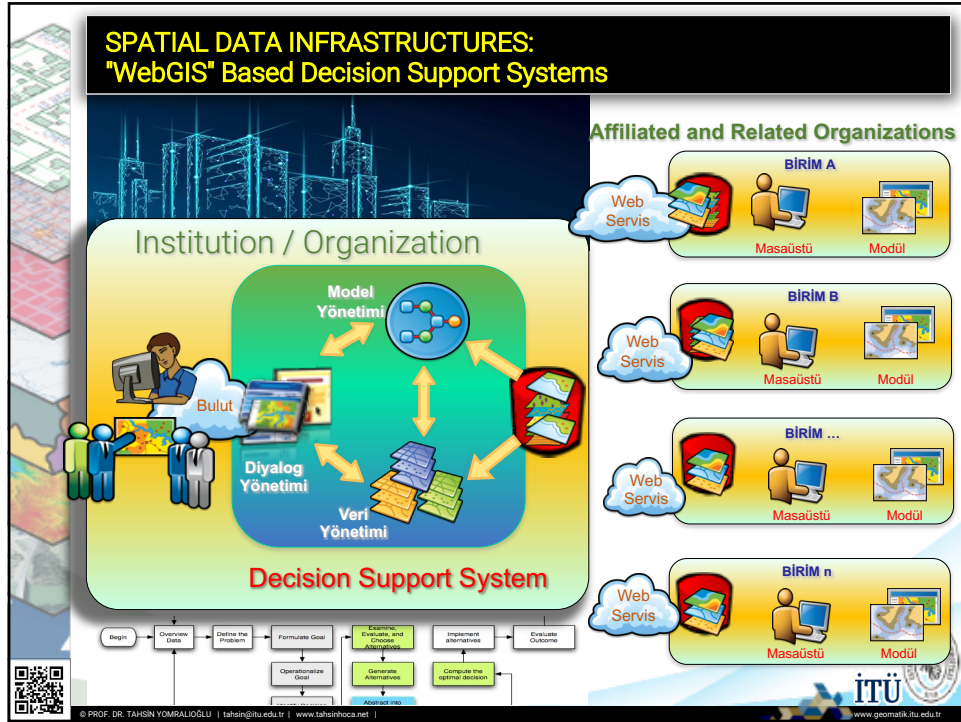


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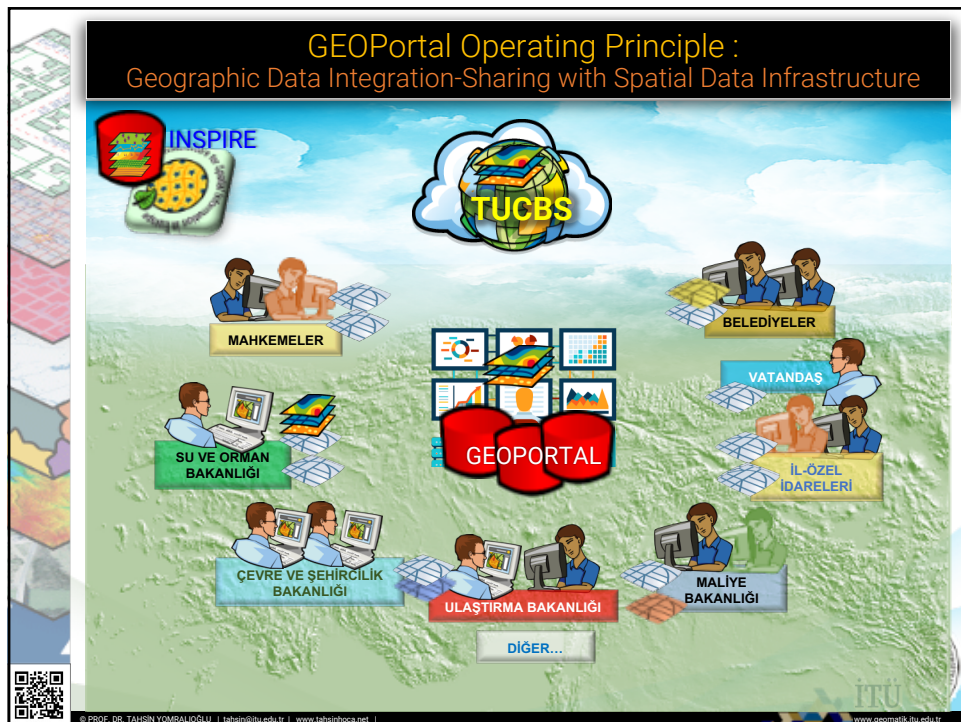


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### GEOGRAPHIC INFORMATION SYSTEM APPLICATIONS ...

- Local government
- Geology / earth sciences
- Region/City Planning
- Electricity/Gas Operating
- Mining/Oil exploration
- Safety/Security
- Telecommunication
- Trade
- Transportation
- Water and wastewater
- Medicine / Health
- Retailing
- Military/Intelligence
- Map making
- Land use
- Environmental management
- Zoning and cadastral
- e-Government/ Public
- Agriculture / Agriculture
- Forestry
- Risk management
- ..... and others



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### Classification of Spatial Information System

| SPATIAL INFORMATION SYSTEMS                                                    |                                                                                                  |                                                                                                |                                                                                 |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| LAND-RELATED INFORMATION SYSTEMS                                               |                                                                                                  |                                                                                                | GEO-SPATIAL INFO SYSTEMS                                                        |
| ENVIRONMENTAL INFO SYS.<br>SCALE < 1:10.000                                    | INFRASTRUCTURE / URBAN INFO SYS.<br>SCALE > 1:10.000                                             | LAND / PARCEL BASED INFO SYS. (LIS)<br>SCALE > 1:5.000                                         | SOCIO-ECONOMIC INFO SYS.<br>SCALE < 1:100.000                                   |
| SOIL<br>CLIMATE<br>GEOLOGY<br>MARINE<br>LAND COVER / USE<br>FOREST<br>WILDLIFE | PUBLIC SERVICES<br>ROAD NETWORKS<br>BUILDINGS<br>STREETS<br>ADDRESS<br>COMMUNICATION<br>SEWERAGE | CADASTRE<br>PROPERTY<br>LAND OWNERSHIP<br>LAND VALUE<br>LAND RIGHTS<br>REAL-ESTATE<br>TAXATION | HEALTH<br>CENSUS<br>ELECTION<br>CRIME<br>DEMOGRAPHIC<br>EDUCATION<br>STATISTICS |
| Aimed to land                                                                  |                                                                                                  |                                                                                                | Aimed to people                                                                 |
| Point and area referenced                                                      |                                                                                                  | Parcel referenced                                                                              |                                                                                 |

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