



SELCUK UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF GEOMATIC ENGINEERING

**A WEB BASED GEOGRAPHICAL INFORMATION SYSTEM
DESIGN FOR MONITORING URBAN GROWTH, CASE
STUDY BOSNA-HERSEK DISTRICT IN KONYA**

INTRODUCTION

INTRODUCTION



With the increasing population and growing cities, the need for proper management and planning techniques reveals for the urban centers. For providing vital functions in rapidly growing urban centers needs to decision-support systems for instant decisions. Because of this needing, the changing's and developments of urban cities over time must be monitored for deciding about new buildings area.



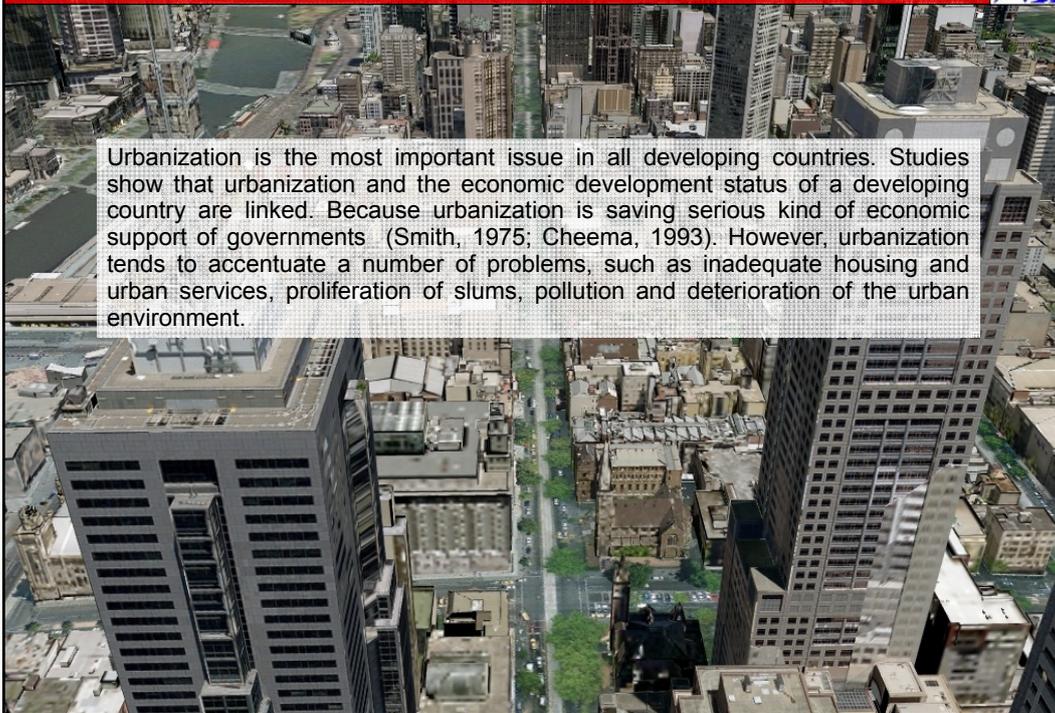
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INTRODUCTION



Urbanization is the most important issue in all developing countries. Studies show that urbanization and the economic development status of a developing country are linked. Because urbanization is saving serious kind of economic support of governments (Smith, 1975; Cheema, 1993). However, urbanization tends to accentuate a number of problems, such as inadequate housing and urban services, proliferation of slums, pollution and deterioration of the urban environment.



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Urban professionals can make significant improvement to the urban environment by adopting an integrated management approach, in order to resolve the conflicting interests of multiple-stakeholders and achieve equity, while keeping in view urban dynamics and uncertainties.



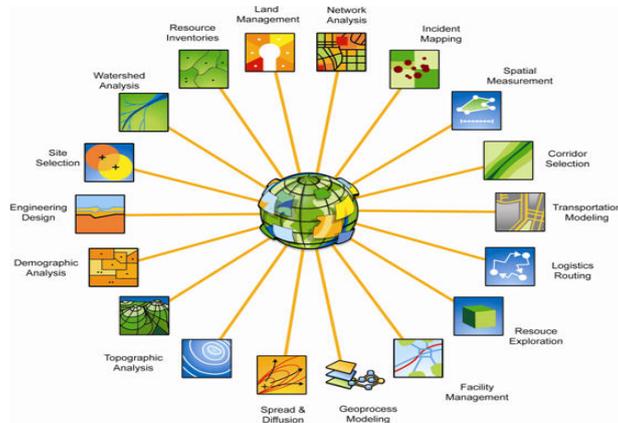
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Nowadays, local governments are using a variety of information systems for providing resource management, monitoring urbanization and provision of necessary infrastructure. However, systems that are used to provide sustainable urban management must be well designed according to needing. For the purpose of determining new resources and needing in rapidly growing urban areas, information systems are using widely in department of planning. Information systems, also called urban information systems are allows local governments in taking the right decision in decision making processes.



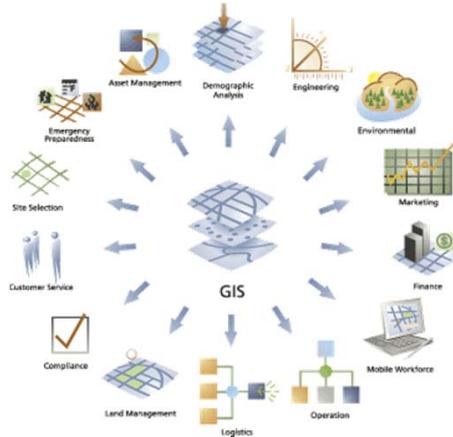
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INTRODUCTION



As a reflection of technological developments, the concept of information system has been adopted by many professional disciplines. As a result, vocational studies are planned in geographic information systems considering protocols that are required for spatial data management and sharing of information system is carried out within the concept of GIS. Thus, the capabilities of local governments and official institutions to manage data increased and with developing interoperability, needs to share and serving data began to be felt day to day more intensively.



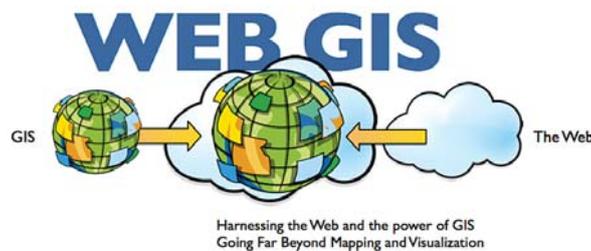
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At this point, the Internet is currently the most effective means of global communication and brought a different dimension to the process of sharing spatial data and presenting to the users. Thus, web based gis concept has started to use intensively in different kind of applications in our country. (Sari, F., 2012).



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INTRODUCTION

In this Study, for the purpose of monitoring urban management and urbanization, a web based geographical information systems is designed and an application is prepared in Bosna-Hersek district in Konya.



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DATA COLLECTION AND PLANNING CONCEPT IN TURKEY

DATA COLLECTION AND PLANNING CONCEPT IN TURKEY



In Turkey, there are some problems in data infrastructure which are used in management and planning activities. In Knowledge collecting, updating, sharing, etc issues a holistic approach has not been adopted. On the creation of a standard data base, although efforts are being made for many years, it is clear that we are still far away from the aim of creating an integrated information system.

Status of Information infrastructure also negatively affects the planning and management activities. It is become a difficult subject for planners to find the right, current and accurate information which will make it possible to decide. So planners started either collect the information or try to decide with general assumptions. Administrators are also experiencing similar problems in management activities.



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DATA COLLECTION AND PLANNING CONCEPT IN TURKEY



This situation is preventing the right decision making processes and also causing to the deficiency in urbanization monitoring. At the same time, local governments are facing with failures in right decision making. With this form, extraordinary circumstances such as earthquakes, climate, environmental disasters, and local governments are remaining insufficient in emergency responses. So, in extraordinary circumstances, wrong decisions will occur to fatal results and losing life standards.



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In this Study, the base aim is providing right and useful data infrastructures with integrating data which are produced according to different standards. For the purpose of helping to the planners, managers and decision makers, data interoperability tried to apply urban data.



MATERIAL AND METHOD

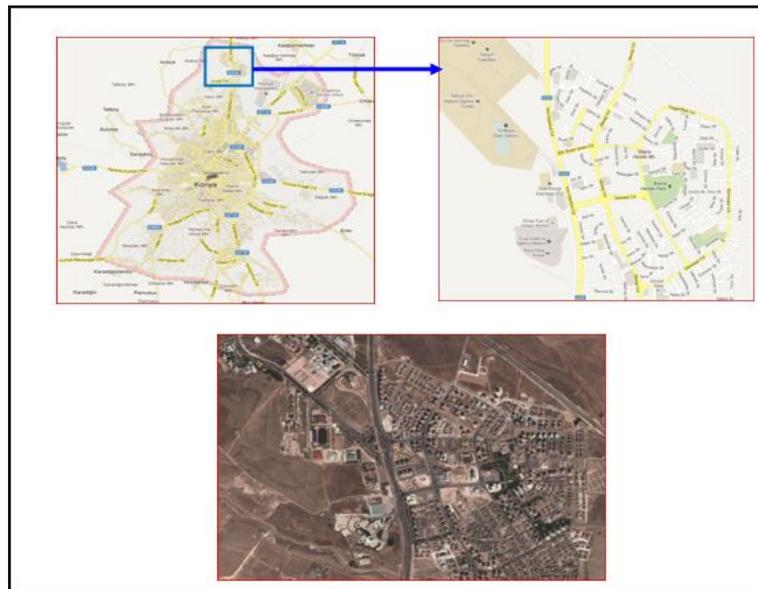
MATERIAL METHOD

As an application area, Bosna-Hersek district in Konya city is selected. Bosna-Hersek is the most rapidly growing district in Konya city. It's population is over 40.000 already and this amount is quite big for a district.

Because of this district is near to the Turkey's one of the biggest university, namely Selçuk university, it has a big population potential. With this Study, potential risky areas in Bosna- Hersek district will be determined by the reason of old stream areas exist in Study area.

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MATERIAL METHOD**STUDY AREA –BOSNA HERSEK**

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MATERIAL METHOD



With this Study, a web based geographical information system is constituted, for realize data interoperability of existing data and integrating global map sources as like Google Maps and providing instant data access.



Web based geographical information systems are used to process, storage, Analysis and serving data to the users by using internet protocols and concerned web services.

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MATERIAL METHOD



For the purpose of constituting web based geographical information systems, there are some components that we must have. These are;

- Server
- Client
- Web Server Components
- Geographical Data Server
- Web Browsers

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MATERIAL METHOD



Server: Server manages databases that geographical information stored in. Runs web server components and application data.

Client: Clients are the computers which request geographical information by using internet or intranet.

Web Server Components: Web Server Components are responsible to response the request which is coming from clients

Geographical Data Server: These softwares are responsible to build map images and serve on internet.

Web Browsers: Web browsers are the softwares that clients used to display web pages and web applications.

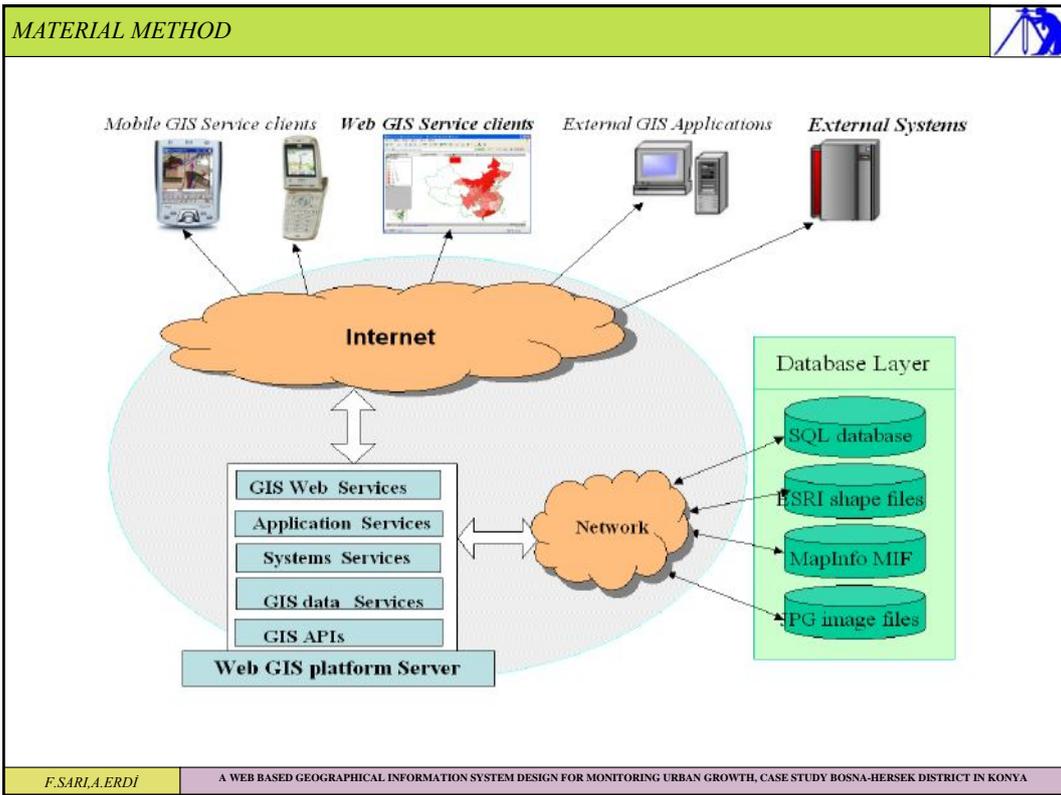
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MATERIAL METHOD



<p>SERVER</p> 	<p>WEB SERVER</p> 	<p>WEB BROWSER</p> 
<p>CLIENT</p> 	<p>GEOGRAPHICAL DATA SERVER</p> 	

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APPLICATION

APPLICATION 

With this web based GIS application, it is aimed to detect data up to date situation and monitoring urbanization. With this application without using any GIS software urban monitoring can be realized. Existing applications can be easily modified to new applications.

The most important object in urban monitoring is data and data up-to-dateness. Because of this in Analysis processes up-to-date data must be used for specifying urban situation. Comparing data objects (as like satellite images, vector maps, etc.) must be up-to-date for monitoring latest situation of urbanization.

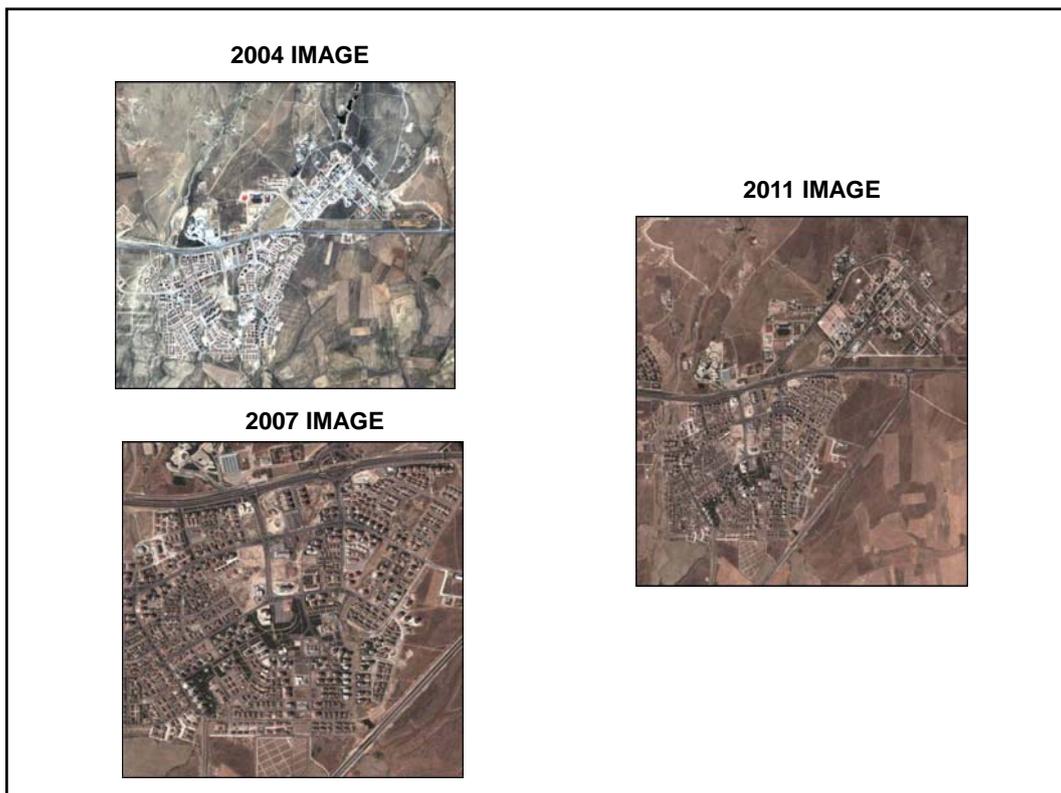
Table 1 shows the dates of data and data types. There are 3 satellite images in different dates.

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DATA	DATA DATE
Google Map Image	2011
Aerial Images	2007
Satellite Images	2004
Vector Maps	2007
Buildings	2007

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APPLICATION



In this situation, latest satellite image for Konya city is Google Map image. Because of this, in addition to the other satellite images, Google Map Satellite images used in application. Google Map provides users to use global images in their web applications. By using Google Map API, satellite images can be use in web applications and layers can be display on it. Google Maps API is a JavaScript library allows users to modify and integrate with global images.

For Konya city, Google Map has up-to-dated images in 2011 year. Also aerial images are present which has gathered in 2007 year. Ikonos image which has produced in 2004 year is also used in this application. Thus, provide 7 year time interval for urbanization monitoring.



APPLICATION 

For serving geographical data on internet, geographic data server softwares must be installed on server. These softwares are producing a map image of layers to serve users. In this application, GeoServer software to serve data as Web Map Server (WMS). GeoServer is supporting ArcGIS database software and file formats with their attribute data

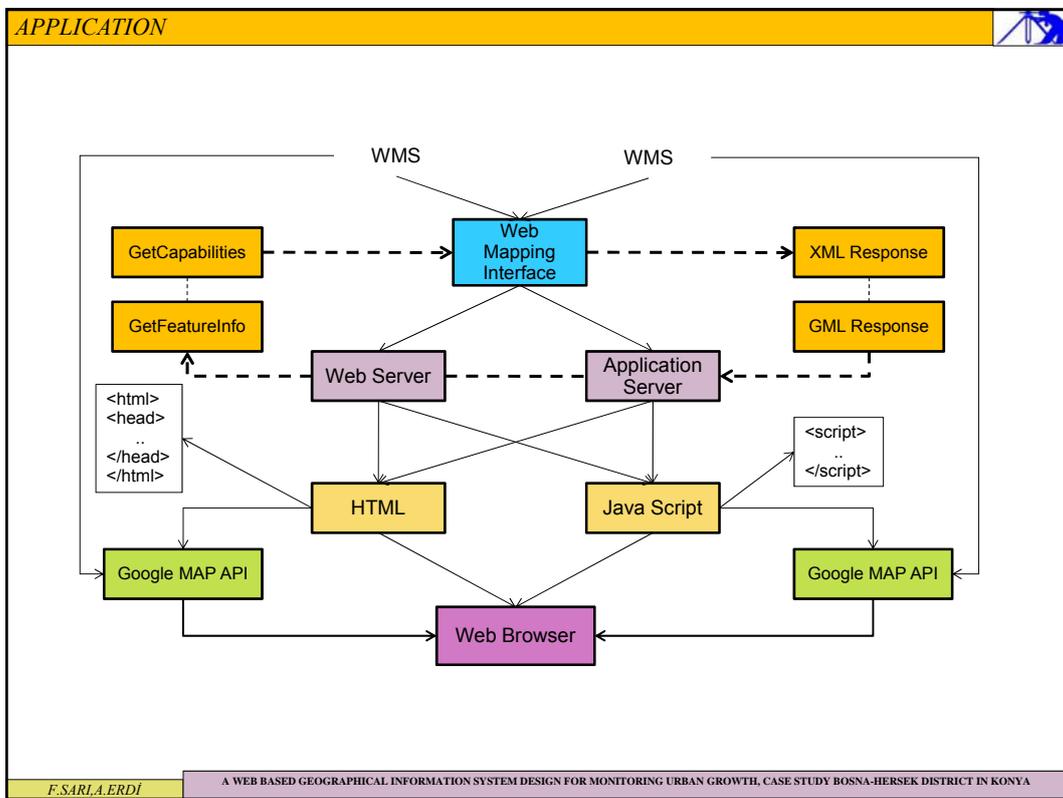
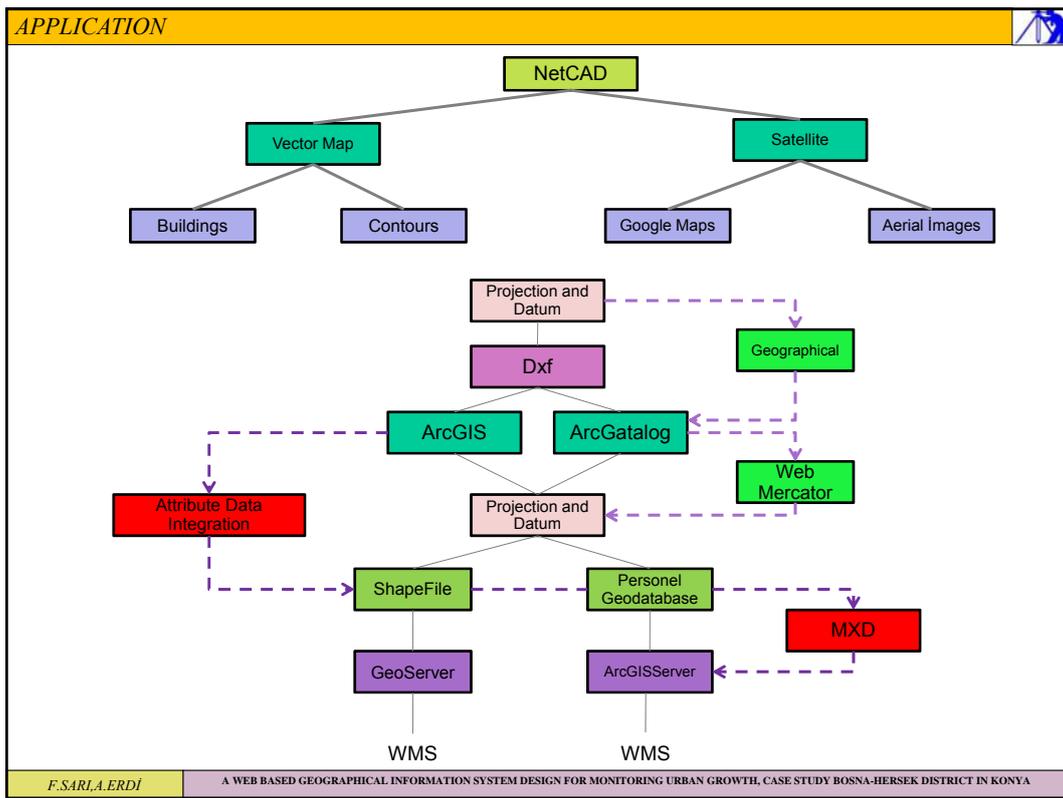


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APPLICATION 

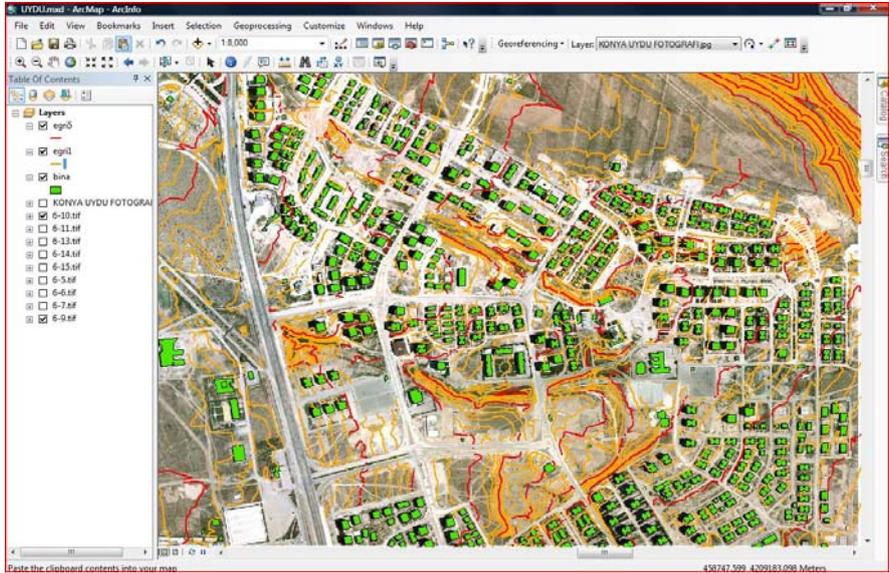
Data	Web Service
Building	WMS
Contours	WMS
Points	WMS
Satellite Image 2004	WCS
Aerial Images 2007	WCS

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APPLICATION

ArcGIS Interface with Data

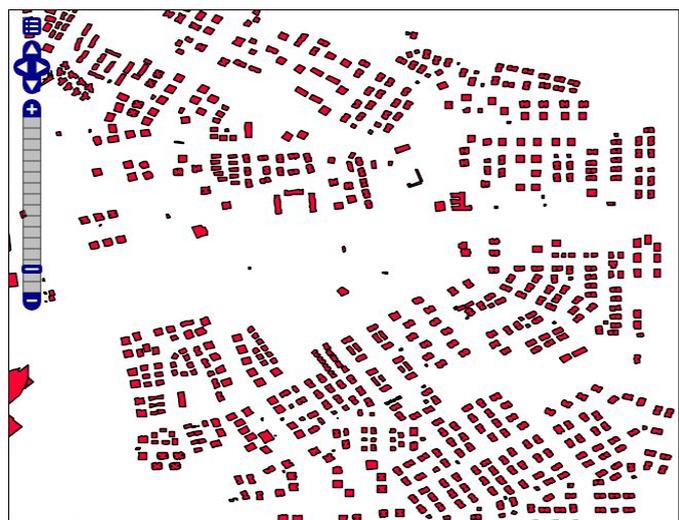


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APPLICATION

Buildings Web Service



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APPLICATION

Building and Contour Web Service



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This slide displays a web service interface for monitoring urban growth. It features an aerial photograph of a residential area where buildings are highlighted in green. Overlaid on the image are contour lines in red and yellow, indicating elevation changes. The map is presented in a clean, focused view without a complex interface.

APPLICATION

Building and Contour Web Service in OpenLayers Interface



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This slide shows the same map data as the first slide but within a full OpenLayers web interface. The map displays buildings in red and contour lines in yellow. A legend on the right side of the map lists the following layers:

- Base Layer
 - SATELLITE
 - NORMAL
 - OpenStreetMap
 - HYBRID
 - 3D
 - Bing maps
 - Yahoo
- Overlays
 - Editable Vectors
 - BINALAR
 - EGRI1M
 - EGRI5M

The interface also includes navigation tools on the left and a copyright notice at the bottom right: "Data © By-SA OpenStreetMap contributors" and "Penmalink 9609663.34321,4581115,49060".

APPLICATION



Building and Contour Web Service in Google Maps



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APPLICATION



Differences Between Two Satellite Images



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CONCLUSION 

Cities are constantly changing and evolving, characterized as a dynamic phenomenon. Managers and planners face a continually changing new expectations and demands.

The main source of information infrastructure to meet the expectations and demands. Information plays a very important role in decisions made on the nature of property and infrastructure. Clustering data which are obtained by different institutions, in decision making process will play an important role for planners.

Developments of information systems have become sufficient to realize this kind of projects. These developments are making easy to work with different kind of data and multi-disciplinary data interoperability for planners, managers and decision makers.

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CONCLUSION 

In our Study, it has cleared that possibility of serving data which are different time interval, scale and various standard catalogs. One of the useful objects of this Study is make it possible to monitor the urbanization dynamically and detect the prevention techniques and methods. Similarly, with large datasets such as earthquakes, climates, geological surfaces, water resources and other data sets, before and after disaster situations can be determined or urban security. The scale is depends to the data sets and number of layers.

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