

AN APPLICATION OF A PILOT PROJECT OF İSTANBUL URBAN INFORMATION SYSTEM FOR PLANNING AND PUBLIC WORKS OF DISTRICT MUNICIPALITIES

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ABSTRACT

The aim of this paper is to present a study which is the design of urban information system that includes in public works and planning activities of district municipalities of Istanbul (the largest metropolitan city of Turkey) and the application of a pilot project with the outlines and the results.

In this study, activities in the city, and how they are managed, and data, operations, products, problems in the activities, and expectations from system are determined and evaluated by system analysis. According to the result of analysis logical and physical design of the urban information system has been created. The logical design of operations and data have been transformed to a physical design by taking the available personal computer and PC ARC/INFO software into account. The designed application programs have been written in SML macro language of the software. This design and application programs have been tested and applied with the data of pilot project area that includes urban characteristics.

Besides that, in this paper, experiences in this study, some proposals for UIS, GIS projects which are available in the future are submitted.

1. INTRODUCTION

In the cities which are rapidly growing and developing in the world, GIS have been used as a tool for controlling of urbanization, taking decision to form and estimate of present, effectively executing of city activities. Local government has numerous, diverse uses for GIS, including tax assessment and collection, maintenance of property records, dispatch of emergency service vehicles, planning, zoning, permitting, traffic engineering, operation of public works and utilities, road maintenance, map production, and engineering design and drafting (Antenucci et al., 1991). In the cities of Turkey GIS projects have been produced and attempted since 1980's too. But in any municipalities and cities of Turkey the UIS which is working productively aren't used.

The aim of this paper is to present the study which is a design of UIS that includes in planning and public works activities of district municipalities in the Metropolitan Area of Istanbul and the application of the pilot project. In the study, activities are limited by data capture and analytic study stages of generating implementation plan, implementing plans executed by district municipalities, issuing building permit and settlement permit and inspect of existent constructions. Besides that, implementing the UIS should get execution of the activities works to be more rapidly, more economic and more productive and much more transparent anticipated from study. Also system should be cheaper, simpler and manageable by personnel computer (Batuk, 1995).

2. DEVELOPING OF THE UIS FOR PLANNING AND PUBLIC WORKS OF DISTRICT MUNICIPALITIES

In this study, for developing the UIS, following steps are determined by utilizing from various researches, projects, methods particularly SSADM (Batuk, 1995). These are:

- * Definition of the system,
- * Analysis and feasibility study; determination of existence status in the activities, definition of requirements, feasibility study,
- * Design; planning of establish and organization for the system, system design, data design, process design, physical design,
- * Implementation; selection and installation of hardware and software, installation of data base, creating of application programs, testing of system with pilot project, preparation of application,
- * Application and maintenance; following of events, adaptation of changes, enhancement, corrective maintenance.

2.1. Definition of UIS

Public works mean to change the nature of the earth or to rebuild the existence of it by people for their happiness and welfare. The public works, which are executed with share by the municipality and the district municipalities in the Turkey, are;

- * planning; generating of the base map, plan (master, implementation) and utility project, and implementing of the plan,

- * Building; recreational area, parks, facilities as healthy, social, economical, transportation,
- * Issuing and inspecting; the building permit and the settlement permit,
- * Controlling, preventing and destroying; officially unauthorized (unlicensed) buildings,
- * Keeping of benchmarks.

Planning activities are a part of public works in the municipalities. Implementation (local) plans have been generated by district municipalities according to master plan. Planning phase generally consists of data capture, analytic studies, synthesis and projection works, produce of alternative plans, selection of plan, approve and distribution.

2.2. Analysis of UIS and Feasibility Study

Activities in the city, and how they are managed, and data, operations, products, problems in the activities, and expectations from system are determined and evaluated by system analysis (Batuk, 1995).

Determination of existence status in the activities

The following studies were made for determination of existence status in the activities:

- * The questionnaire was created and applied to the municipalities and other organizations.
- * Interviews were conducted by the organizations which are effective in the activities.
- * Reports, correspondence files, map sheets, forms, existing building regulations, rules, plans, plan footnotes, researches, publications, municipality council and committee decisions were examined.

As a result, the followings are subtracted from these studies:

- * Organization charts were generated for municipalities.
- * Activities that are executed by the district municipalities were grouped. These are; generating implementation plan (stages of data capture and analytic studies), generating the program for the implementation plan, implementing of plans, determining the construction rights and generating the certificate, determining the changes on the parcel for implementation plan and generating certificate, determining the heights of ground floor for construction and generating certificate, issuing and inspecting the building permit, issuing and inspecting the settlement permit, controlling the buildings of officially unauthorized (unlicensed).
- * Data and process flow diagrams were created for each grouped activity.
- * The problems, which have been existed in the activities were determined.

Definition of Requirements

The expectations and the requirements from the system were determined. Some of these requirements are; coordination between municipalities, departments, data share, easy access to updated and accurate data.

Required data and processes were defined. The required data presented in both Table 2.1. and Table 2.2. Required processes are; generation of geographic data base, daily data entry, updating, querying.

The constraints on the design were determined. These are; hardware (PC) and software limited, PC GIS software-more complex than other platform, some requirements may not meet or meet for long time, team and time limited.

Feasibility study

The system configuration was selected by taking the constraints and the data sources, the requirements into account. These are:

- * Organization; the district municipality,
- * System architecture; distributed,
- * Hardware; PC and peripheral devices (meeting the requirements),
- * Software; a GIS software (meeting the requirements),
- * Communication with other municipalities and organization; floppy disk, magnetic band, compact disk, etc.

2.3. The Design of UIS

In this stage, the analysis and the feasibility study was evaluated and the system was designed (Batuk, 1995). The system installation plan was generated primarily. Hardware and software of the system were designed in the step of system design.

Data Design

In this stage, the required data (entities, attributes, relations), which are presented in the Table 1. and the Table 2., and the required processes for system were evaluated for design of layer and data base. The data, which consists of layers, attributes, tables of relational data base, relation attributes of the system were determined. Designed tables of the data base were illustrated in Table 3. Designed graphical data layers were illustrated in Figure 1. Designed attributes of some layers were illustrated in Table 4. The dark attributes were designed for relation in the Tables. Total numbers of coverages were 32. These coverages related with 30 tables of relational data base and 60 table of code. Symbols of features were determined in the physical design by taking the available GIS software into account.

Geographical Entity	Data Source *	Scale	Attributes	Attribute Resources
Parcel	SKH	1/1000 1/2000 etc.,	Group data: Parcel, Owner, Liability, Historical building, Building regulations, Inspects, Permits, Penalty, Settlement, Program, Conclusions of committee, Building. Two streets fronted, Area, State of street corner	Group Table " " " SKH
Building	SFH	1/1000 1/500	Group data: Parcel, Building, Owner, Historical building, Penalty, Inspect, Program, Building and Settlement Permit, Penalty, Program, Conclusions of committee	Group Table " " "
Administrative boundary (city, district, ward, municipality)	SIMH	1/100000	Group data: Population Area, Type, Name	Group Table SIMH
Boundary of the approved plan	PLANS	1/1000 1/5000	Plan data: Plan number, Plan name, Maker, Approval date, Scale, Area	Plans, District Municipality

Table 1. Some of the Required Data

Group Data	Attributes	Source
Parcel data	District name, Ward name, Cadastral sheet nr., City block nr., Parcel nr., Street name, Deeded area, Type, Price	SKH, Deed, Owner file (digital/DBF)
Owner data	Parcel data, Building data, First name, Second name, Year birth, Address, Father name, Type of owner, Percent owner, Irony, Nation, Acquisition date and type	"

Table 2. Some of the Grouped Data

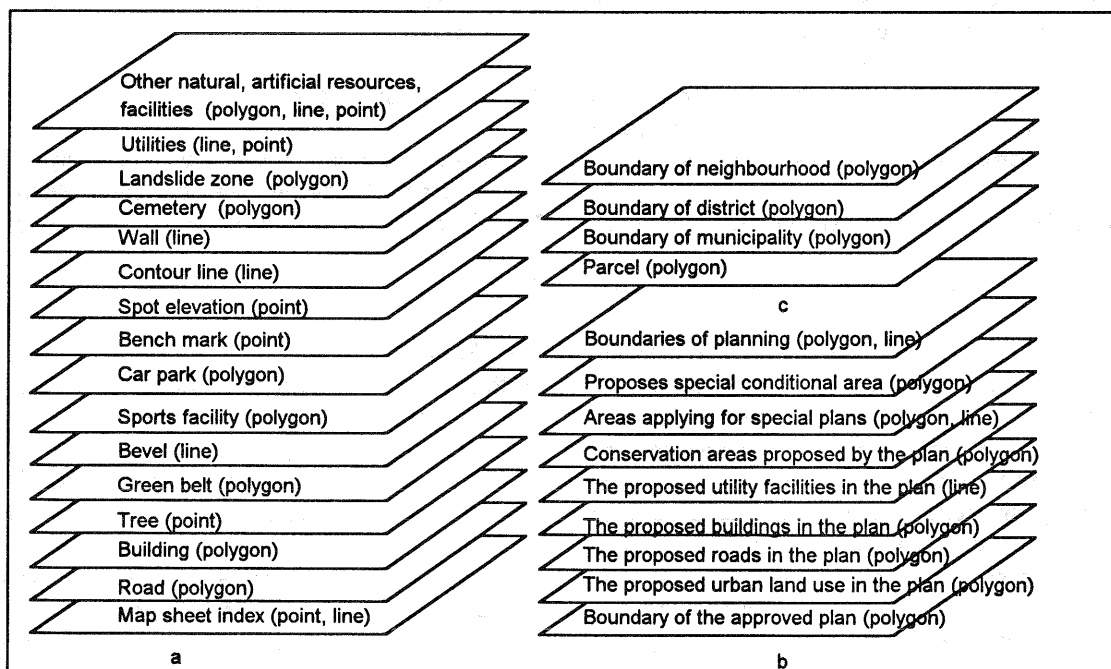


Figure 1. Designed Layers, Data Sources; (a) Base Map and Other Maps, (b) Plan, (c) Cadastral Map and District and Ward map.

* SKH; cadastral map digitized by Istanbul Municipality, SFH; base map generated by Istanbul Municipality with method of analytical photogrammetry, DGN; Intergraph graphical design file, SIMH; district and ward map digitized by Istanbul Municipality.

Table Name	Attributes
Parcel1	Parcel code, District name, Ward name, Cadastral sheet name, City block nr., Parcel nr., Street code
Parcel2	Parcel code, Deeded area, Type, Price, Numbers of buildings, Two streets fronted, State of street corner, Owner type
Parcel-Building	Parcel code, Building code
Owner	Parcel code, Building code, Apartment nr., Type, First and Second name, Year birth, Address, Father, Type and Percent owner, Irony, Nation, Acquisition date and type

Table 3. Designed Some of the Data Base Tables and Attributes

Layers	Attributes
Parcel	Area, Parcel code
Building	Area, Building code
Tree	State of historical
The proposed urban land use in the plan	Area, Density of residential area, Function, People/hectare, Structure of land area.

Table 4. Designed Attributes of Some Layers

Process Design

The processes which have been met to requirements with data together, were parted in six main groups. These are; data input, data update, daily data input, draw and query, geographical analysis and certificate generation, delete and output process. Process outlines were created for every group.

Physical Design

Hardware and software, which have been used for this work, certainly determined. These are:

- * Place: Photogrammetry Laboratory of Yıldız Technical University.
- * Hardware: PC 386 DX-25 MHz and 486 SL Notebook 25 MHz, Hitachi HDG 17"x17" Digitizer and HP LaserJet III Printer.
- * Software: PC ARC/INFO 3.4.D Plus, ARC/INFO SML Macro Language for application programs.

The data and process design (logical design) were transformed to the physical design.

- * The software was evaluated for the system. Consequently some problems were found. One of these problems; the process of determining the height of ground floor for constructions and generating certificate hasn't been supplied because the GIS software is not a 3 dimensional software.
- * The coverages, the symbols, the tables of relational data base, the attributes, the code tables, the symbol files which have been in the system, certainly were determined with their contents and the locations in the physical environment by taking the problems into account. Data dictionary for system was generated.
- * The application programs flowcharts were created for the processes.

2.4. The Implementation of UIS

Installation of data base

The tables of the relational data base and the code, and symbol files were defined in the hard disk. Data have been entered at the pilot project.

Creating of application programs

The programs were written with SML. The empty certificate forms were generated by ARCPLOT module of the software.

Testing of the system with pilot project

The area of pilot project was selected (Batum, 1995). Some characteristics of this area are:

- * Prototype of the city,
- * Availability of digital data,
- * The urban area; consist of buildings, squatter's house, green belt, facilities of sports and health, commercial area, private lands, etc.,
- * Availability of implementation plan.

The size of the pilot project area is to 1000 m. x 700 m. It is in the İstanbul/Beşiktaş district municipality. The project data supplied from the resources which are designed. The base map (8 sheets, 1/500, DGN), the cadastral map (2 sheets, 1/1000, DGN) and the boundaries of the district and wards (1 sheet, 1/100 000, DGN) were supplied from İstanbul Municipality. The implementation plan (2 sheets, 1/1000, paper) was supplied from Beşiktaş District Municipality. The plans digitized with Microstation software and transformed DXF format. These data which are in Intergraph DGN format at UTM coordinate system transformed in to the primary DXF format and secondary coverages of ARC/INFO. The codes of province, district, ward and population were supplied from the State Statistic Institute. Owner file

(DBF) was supplied from the Registry Office of Beşiktaş. Other data were supplied from the PTT map, building regulation in the İstanbul, the implementation plan and footnotes, base map and the others (the part of them assumed).

2.5. Application and Maintenance of UIS

The menus of the application programs illustrated in Figure 2. In Figure 3. and Figure 4., the maps which are produced in the application was presented.

3. CONCLUSIONS AND PROPOSALS

In this paper, the study, which is the design of urban information system, that includes in public works and planning activities of district municipalities and the application of the pilot project, is presented. By means of the UIS for activities, which were created by this study, in the activities:

- * The accurately updated data can be acquired.
- * Time, cost and personnel can be saved.
- * Productivity, transparency, quality of the product and process can be increased.
- * Certain a standard and easing can be achieved.
- * A moral satisfaction for the user and for the citizen can be obtained.

The system which is created in this study, as presented in Figure 2., will use many aims in the city management and planning, public works activities.

Besides, the system can be used as node in the distributed UIS. The prepared design, application programs can be easily expanded for new requirements and converted to other platforms like workstation.

Some proposals for Turkey and for developing countries were acquired in the result of this study. These proposals are:

- * Generating of the large scale geographical data base catalogue, the exchange standard.
- * Unique coding of the parcels and the people.
- * Following of the specific steps, which are presented in this paper, for developing GIS/UIS.
- * Using of photogrammetric methods to produce base map in the cities.
- * Establishing of the data bank.
- * Setting the Committee of National GIS.
- * Powering the education.
- * Acquainting of managers, personnel.
- * Rebuilding the public organizations like municipality.

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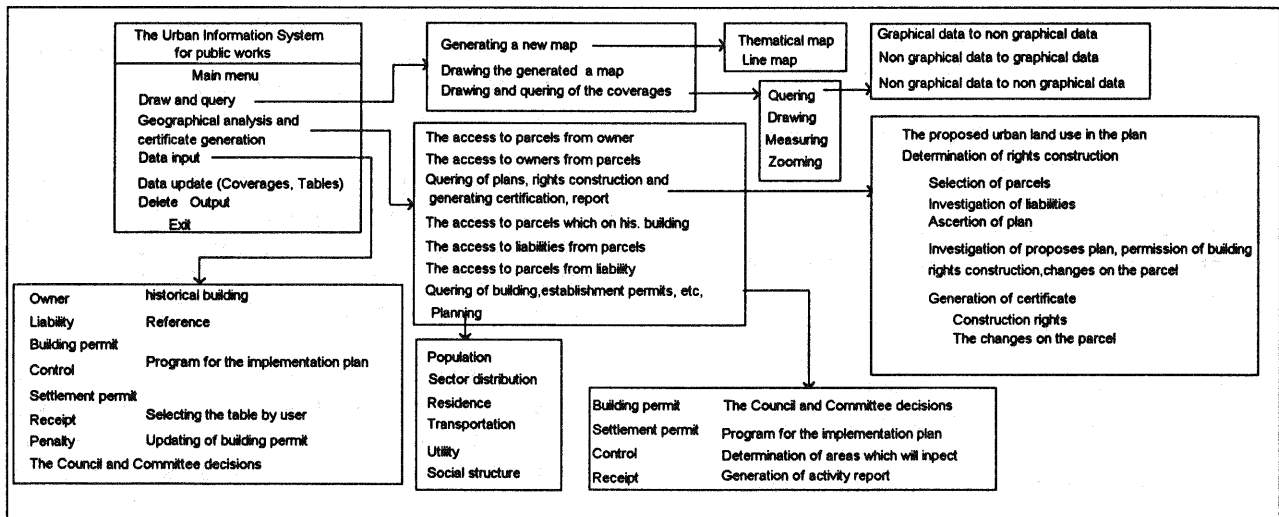
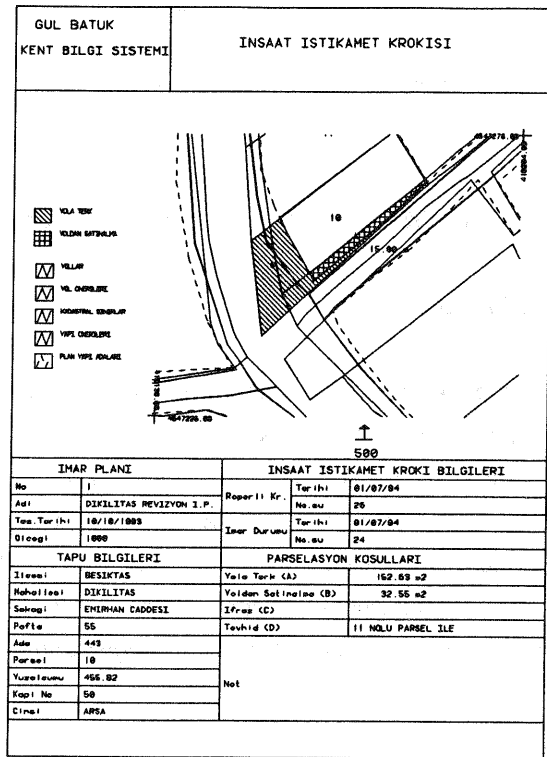
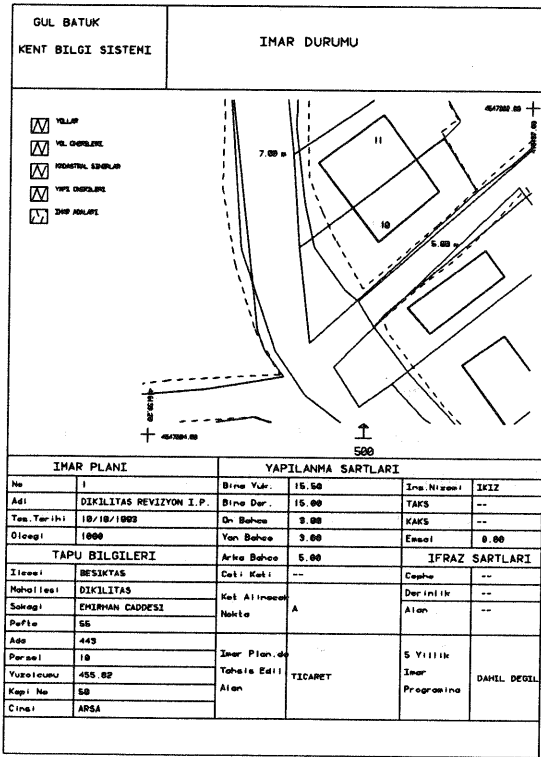


Figure 2. The Main Menu for Application Programs.



a

b

Figure 3. The map was Produced by Query Which is Generation of The Construction Rights (a) and The Changes on The Parcel Certificate.

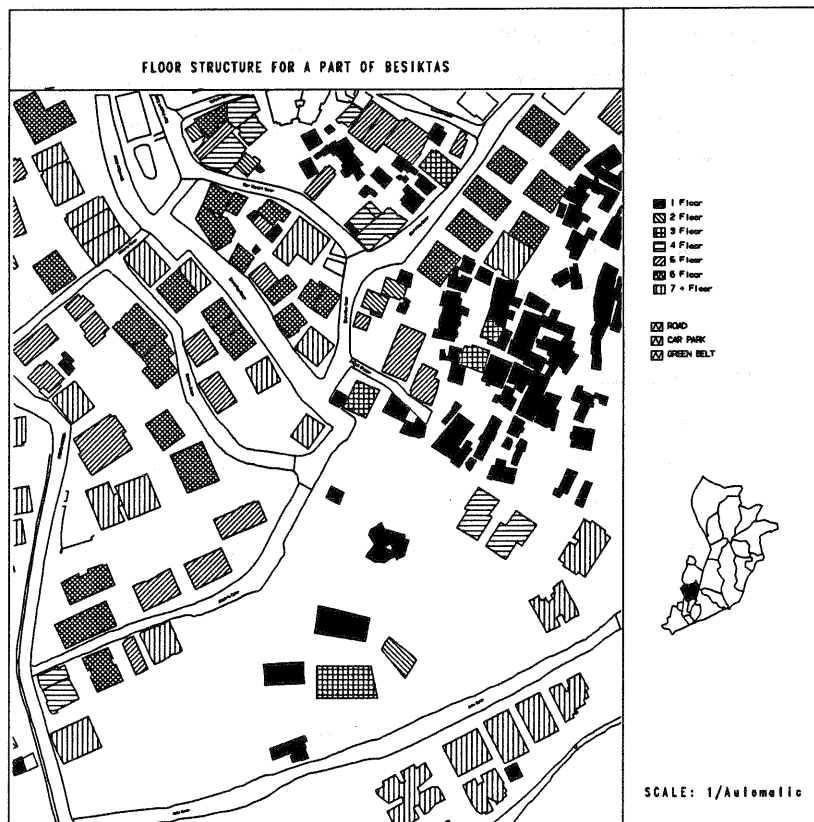


Figure 4. The Map was Produced by Query Which is Floor Distribution of Planning/Residence Query.