

# Urban Planning Management Information System based on GIS

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**Abstract**—The urban planning is one of important public policy that government regulates the spatial resources, instructs the city and countryside development and construction, maintains social justice, safeguards public security and public benefit. It has an important position in the urban construction and development. This paper researches the construction of technical system in urban planning management information system, gives the construction method of system database and system function's implement method, analyzes every module's function in urban planning management information system and the characteristics of system. (Abstract)

**Index Terms**—urban planning; GIS; management information system (key words)

## I. INTRODUCTION

In the 21st century, city social economy will continue to develop fast, society's demand for the construction and management of urban planning is getting higher and higher. In order to use city spatial information fully and reasonably, provide information services for urban planning management and decision-making, raise the management level of urban planning administration departments, promote the urban management modernization, we must develop the construction of urban planning management information system and use the advanced technology fully to carry on the urban planning's scientific management and the decision-making.

The superiority of GIS technology lies in its data synthesis, the geography simulation and spatial analysis ability. Therefore using the GIS technology and the systems engineering thought to establish the urban planning management information system has become an inevitable choice for the regional urban planning departments to realize the office automation, the management modernization and the policy-making scientification.

## II. TECHNICAL SYSTEM IN URBAN PLANNING

### A. System Architecture

Because the management content of urban planning is enormous and diverse, business content and the examination procedure also have their own characteristic. The urban planning management information system involves the design of interface, man-machine interaction, planning data's organization, access, business data processing and so on, we design the planning management system in three-layer: user interface, business logic layer(middle-layer), data service layer. It is described as figure 1, user interface is responsible for the expression of interface and the man-machine interaction work; Business logic layer processes the core service logic; Data service layer is responsible for the management of spatial data and the attribute data.

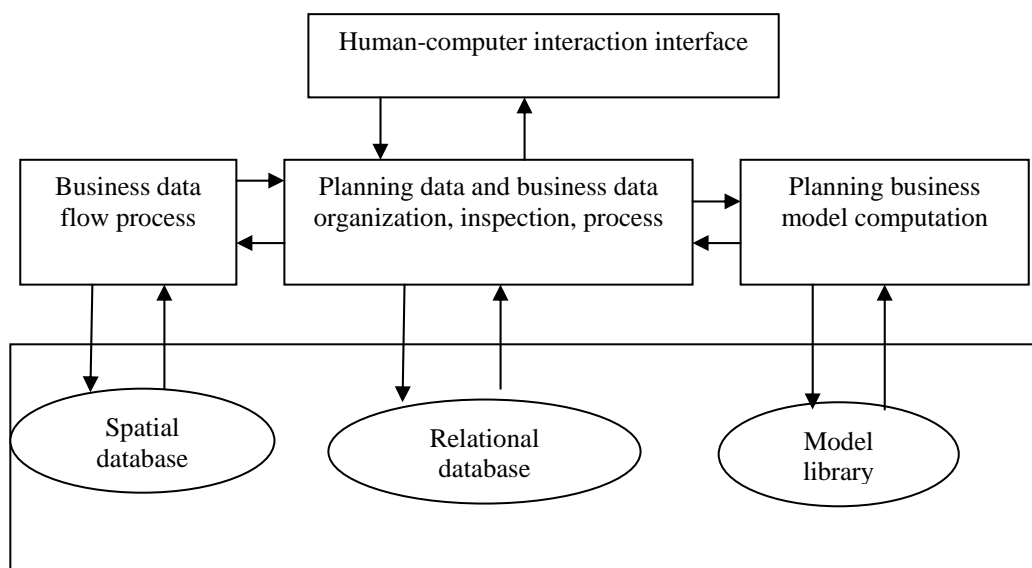


Figure 1. Structure of system

B. System running Environment

- Software environment

(1) Operating system platform: Windows 9X, Windows2000, Windows NT, Windows XP, etc.

(2) Development software platform: Visual Basic 6.0, Microsoft Office Access2000.

(3) GIS software platform: Mapgis.

- Hardware environment

Considering system's processing data quantity is enormous, and many businesses need to process graphics directly, so the basic requirement for hardware is high, specific as follows: CPU is P4 2.0G or above, memory is 512M or above, hard disk is 40G or above, monitor is 14" or above, CD driver is 52X or above.

III. CONSTRUCTION OF SYSTEM DATABASE

The data type of urban planning management information system is multiplicity, that is in the time it is multi-phases, in the structure it is multi-level, in the nature it has the "the space orientation" and "the attribute". There are not only the vector data based on the principle of graphics, but also the relational statistical data. According to the requirement of planning management information system for the datas, we must establish corresponding spatial database and attribute database.

The planning management spatial databases system uses the concept of 'level' to save the different graphic information separately, that is, each "level" stores one kind of special information, and has a group of corresponding data file, the processing object of this system is each kind of graphic information: foundation topographic diagram, planning achievement chart, project pipeline chart and so on.

The planning management attribute database system uses relational database model, each table is described by

certain data items which will express the attribute item and attribute value of every associated graphic information. The processing object of this system is each kind of table's information.

IV. THE IMPLEMENTATION OF SYSTEM FUNCTION

From the system function, the planning management information system based on GIS is divided into four function modules: the planning reference, the result management, the implementation tracing, the system maintenance. It is described as figure 2.

A. The Planning Reference Module

The planning reference module mainly includes the graphic file management, the planning reference, the planning basic data, the auxiliary planning tool four aspects. the graphic file management can open, close and save graphic file, transform the graphic file format and other basic file operating function; the planning reference realizes the technology standard reference, the work program choice, the indicator system analysis, planning model contrast reference functions and so on; the planning basic data realizes annual statistical bulletin, economic profile, infrastructure, social undertakings, population profile, physical geography, yearbook, local code and regulation and so on text browsing functions; the auxiliary planning tool realizes SQL query, fuzzy inquiry, precise inquiry, spatial analysis, statistical graph analysis, thematic map manufacture and basic data retrieval and so on.

B. The Result Management Module

The result management module mainly includes the planning investigation and study result management, the planning research result management, the planning result, the essential data inquiry four aspects. The planning investigation and study result management realizes the investigation report and the questionnaire collection; The

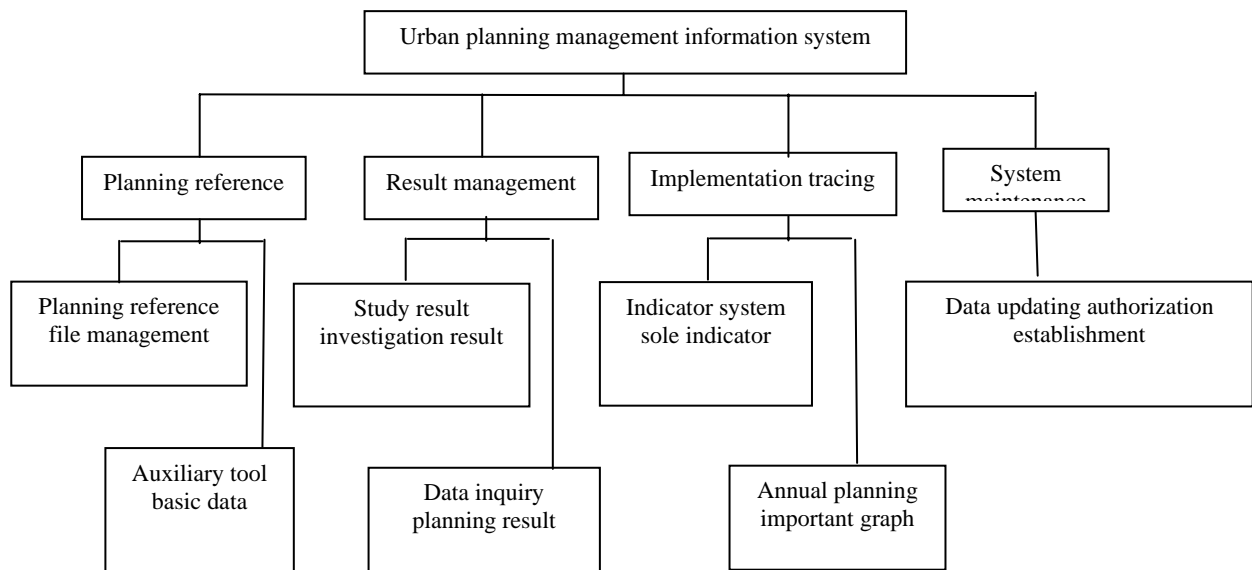


Figure 2. System function

planning research result management realizes the special study and the overall research; The planning result realizes the overall planning summary, planning attached figure, planning instruction booklet, key region special planning, key department special planning, common department executive regulation, villages and towns planning and so on result managements. The essential data inquiry realizes text inquiry, table inquiry, map inquiry functions and so on.

### C. The Implementation Tracing Module

The implementation tracing module mainly completes the sole data tracing, indicator system tracing, important graph tracing, auxiliary annual planning and so on. The sole data tracing module realizes data tracing functions about GDP, total industrial output value, urban per capita disposable income, rural per capita net income, investment in the fixed assets, total import-export value, foreign investment in actual use; The indicator system tracing module realizes data tracing functions about the planning indicator system, the modernization standard, well-off standard and so on; The important graph tracing module realizes the planning attentional region graph synchronization contrast tracing and the asynchronous contrast tracing function; The auxiliary annual planning module realizes planning data target synchronization tracing and asynchronous contrast tracing.

### D. The System Maintenance Module

The system maintenance module mainly completes authorization establishment, user management and data updating and so on functions, the authorization establishment may give the different user different analysis and use function. The user management function may add and delete users for the system. The data updating may authorize different user to carry on the revision operation for the multiple source data (including text data, graphic data and so on). The average users can only use data, but cannot revise the data in order to guarantee the data's accuracy, security and uniformity.

## V. SYSTEM CHARACTERISTICS

Comparing with the traditional planning system, this system has the following characteristics:

### (1) Seamless integration between OA and GIS

A perfect urban planning management information system will process the documents data related to the flow examination, and will involve to the magnanimous map storage management consequentially. It will not only carry on the browsing, the inquiry statistics, the analysis computation to these graphic data, but more importantly is how connect the graphic data with the daily processing documents data, realizes the close union of office automation and the GIS, this is one of technical difficulties which this system needs to solve.

We use the advanced graphic processing technology of GIS platform fully, adopts the project management method, partitions graphic datas into several levels according to its project characteristic. Each level graphic data has its own attribute, the document datas related to

the graph are bindinged through establishing the same field. Develops one whole set according to its work service flow which corresponds with it, and achieves the joint connection between the graph, the flow and the project. So the user can inquire the documents related to graphic data and the project progress through the graphic data promptly, and also browse the graphic regions and their attribute, current condition and other information through document datas conveniently. This has facilitated the user daily work enormously, and has realized the seamless integration between OA and the GIS.

### (2) High-efficiency data organization

The datas of planning management information system have many categories and the information is vast, the quality of data organization is one important key which can decide the system's success or failure. Regarding the base map data, we can divide into different levels according to the national standards, the designed data organization also supports the relocation analysis, the road widening analysis, site selection analysis and so on spatial analysis ways; The attribute datas of land controlled planning chart include each kind of planning information such as the control planning target; The pipeline datas design different level according to different specialized pipeline, each level has its own attribute. According to pipeline's space position and its attribute, may examine the pipeline's cross section, longitudinal section, three dimensional diagram and so on, and may carry on the pipeline collision analysis, the pipeline burial depth analysis, the pipeline influence area analysis and so on; The path red line chart includes the information of road name, road width, length, cross section form, path type, turning radius and so on, it is advantageous for the daily inquiry and handling a case in the planning work.

### (3) The flexible inquiry, statistics, analysis mode

The planning system daily work often needs to inquire, statistics and analyzes the related graph and the documents data according to certain specific planning information, and serves its macro-scientific policy-making based on these data. Because the mode of the inquiry, the statistics and the analysis is more complex, it is different to format, so the designed mode of inquiry, statistics and analysis need to be flexible enough. According to this characteristic, we design a set of inquiry and statistics mode that can be defined by the user from the condition to the result, the users can customize nimbly the condition of inquiry and statistics, as well as needing obtained result field according to their own needs. The users can not only carry on the operations of difference, and, cross, superimposition, discriminate, the distinction, inner cut, outside cut and so on spatial analyses for each kind of graphic data managed by the system, but also carry on the corresponding analysis for the graphic data produced by any layer data or any one or many land parcel according to the project management. During guaranteeing flexibility, we also note the common way that user usually use in inquiry, statistics and analysis mode, then have established the special quick key, enable the user to gain the science auxiliary decision information expediently and quickly.

## VI. CONCLUSION

With the development of science and technology, using the GIS technology may synthesize many kinds of advanced information technologies, this system simplifies the tedious routine work for the urban planning management work, improves the work quality and the work efficiency. And enhances the scientificity, standardization and the automated level of urban planning management immensely.

The digital construction of small and medium-sized cities has already gradually launched along with the economical development, many urban planning management departments have already established their own planning management information system. This paper designs and realizes the planning construction management information system based on the GIS technology, and proposes one kind of solution way to establish this kind of system. This system model has applied in many small and medium-sized cities, and the results show it is effective. Along with the city essential data's gradual perfection and the development of network service technology and the GIS technology, the urban planning system based on the GIS technology will have a broader development prospects.

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