

Study on Urban Public Service Platform of Geographic Information and Practical Approach

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Abstract: The development of public service platform gradually becomes the work focus of departments such as urban planning, territory management and civil survey. This Paper first discusses the pattern and the structure of platform construction, and then introduces the preparing work, especially design of network connections for data security. It finally analyzes techniques such as data updating, service interfaces, rights management and reprojection through the case of Zengcheng's public service platform of geographic information.

Keywords: Fundamental geographic data, Public service platform, Digital city

Introduction

Currently, there are many problems in the urban GIS (geographical information system) construction, information isolated islands, standalone application systems, redundant construction and development etc. Against these problems, Academician Wang Jiayao points, the fundamental aim of digital city construction is to apply. Off this goal, digital project may turn into image project. Geographic information public service platform provides a new service mode for developing level of public service by city surveying, for supporting government and benefiting the public. Therefore, the urban surveying and mapping departments started to gradually fulfill the role of the transition from the data processors and data providers to geo-spatial data managers, servers and guardians.

1 The Mode of Public Service Platform Construction

1.1 Infrastructure

Urban geographic information public service platform is a urban geographical engineering which based on geographical data production and maintenance, bonded on data dissemination services and development of functions-customize service and droved by government application and public enquiries.

Traditional database management system is for the department itself, this is because differences of workflow and data stream expand the cost of data exchange and sharing between departments, thereby, departments shifted to system construction which is easier to implement in short term and can directly provide services for themselves. Urban geographic information public service platform is different from the past systems, it is requested to be able to seamlessly connect the provincial node, and faced with growing needs of geo-spatial information sharing and space analysis from different departments within the city.

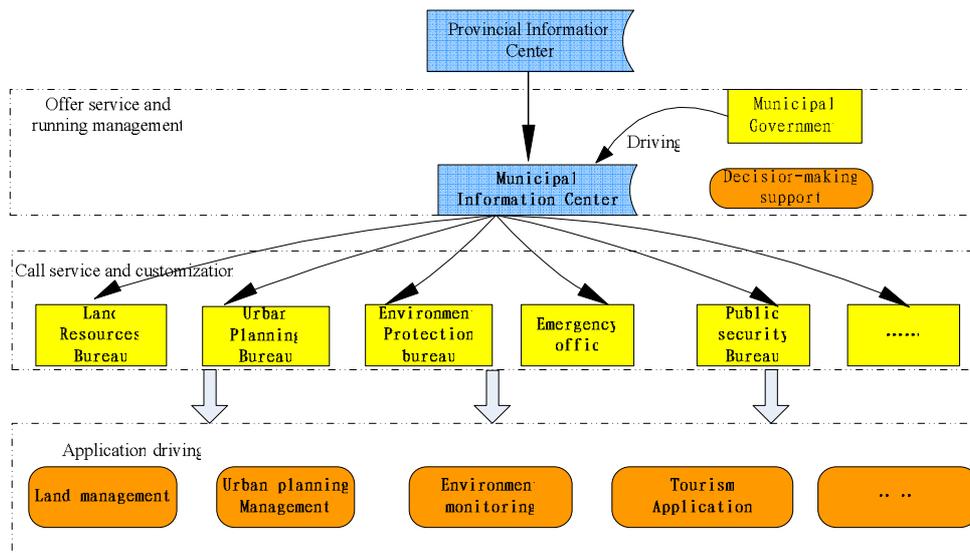


Fig.1 Structure of civil geo-spatial information service platform

Represented as the full-fledged member of public interest, the municipal administration plays the role of driving, planning, managing and supervising of the platform construction, which is benefit to clarify targets, overall planning, centralized utilize capitals and avoids duplication between different departments. Founded by city government, the information center has responsibility for data management and distribution and affiliated by various departments, in this way, geo-spatial data production and software development no longer come from the government, but come from the trinity of government, enterprises and the public, in which they can display their respective advantages and mobilizing all positive factors. Therefore, a digital city construction is fully promoted.

Urban geographic information public service platform construction can be divided into three patterns, centralized pattern, distributed pattern and mixed pattern (table 1). Centralized pattern requires strong government, which can effectively reduce cost, because all requests are processed in the server and a large amount of maintenance work in every department are no longer needed. In this way, it is not only greatly save time and human resources but also improve data uniformity. Distributed pattern fits to authority department has good data condition. All departments can not only be data provider but also data demander. The distributed pattern requires all departments have data storage, and provide the service in accordance with the data dissemination standards, which is benefit to professional data maintenance.

Mixed pattern, on the one hand, takes the department rich in geographical data resources as the main part, and on the other hand, take the package approach for data sharing in order to meet the database requirements. On the surface, mixed pattern starts from distributed pattern, but essentially it erects in accordance with a centralized framework. The three patterns have its pros and cons, and cities can choose the suited one to build in the course of their characteristics.

Tab.1 Pattern of platform construction

Patterns	characteristics	Applying to
Centralized pattern	Concentrated Data management, mechanism of data updating, to provide services	Surveying and mapping department Government rich in GIS data Some government information offices
Distributed pattern	Data distribution management, professional maintenance services are distributed to provide services gateway	Digital city construction City information offices

Mixed pattern	more conducive Than distributed pattern, more comfortable to data transition than to data package	Government rich in geo-spatial information Government that has strong GIS
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1.2 Procedures

Urban geographic information public service platform construction can be generally divided into five procedures. The first step is to strive for the government support, the second step is to establish the overall framework by investigation, the third step is to build fundamental geographical information database and geospatial framework, the fourth step is to apply and promote in the government and subordinate departments, the final step is to distribute public query and authorized access for geographical information.

The first step is the foundation of follow-up work and, the second and fourth steps are vital for the construction process. The second step is required to achieve "know your enemy, know yourself" objectives, thereby reducing future work on unnecessary things. On the one hand, information center of the city do a research on domestic geographic information public service platform to acquire patterns and experience with affiliated departments, on the other hand, try to get preliminary understanding of needs from all departments on geographical information resources and application. The fourth step is to guarantee urban platform viable. It is proposed that information center send technicians to tryout department do research, and tryout departments transmit official documents to support information center's work to improve pertinence and stability of geographic information services promotion and application.

2 Preparation Work

2.1 Study on policies and standards

No rules, we are nothing but savages, the geographic information public service platform must be strictly built in accordance with the relevant policies, regulations and standards. Policies and regulations refers to a series of regulations on geographic information public service platform development released by state, local government and municipality, and standard specification mainly refers to the data standards, software standards and network standards using in the construction process. Policies, regulations and technical standards research and application embody several aspects. Vertically, on the one hand, we can use the method that contrast old and new, to study trial standards and compare the new version of the standard with its used version and monitor standards that is in the establishment. On the other hand, horizontally, security and confidentiality, data quality, data dictionary and system development of all regulations and standards are tessellated in the course of implementation, which illustrates a refinement service specification of urban geographical information. Once city specification formed, it will be constantly supplemented and perfected in the public service platform construction, and it provides implementation guide for digital city construction.

2.2 Safe and Security Measures

The sharing and security of geographical data form a unity of opposites and more thorough security measures will help provide more in-depth data sharing. Security measures of the software system mainly rely on system test, and in the maintain stage, although there are not much measures can be taken for security, we can improve security by rationally design the network physical connections.

The design guideline of State Bureau of Surveying and Mapping orders to build two sets of networks, including secret one and non-secret one. What's more, coupling with the date management LAN of the Municipal Information Center, there will be at least three sets of networks. Center use for data management, there are at least three sets of network. Follow the national network management rules, it must have physical segregation between the intranet of information center, the government backbone intranet and the internet, and there are configuration data server for each set of network (figure 2). In

order to ensure data security, geographical information is at least sorted into three editions corresponding to each set of networks. City topological map maintained by the information center contain all geographical information. The non-secret geography data facing the public and enterprises needed to process by following the established framework of the geographical data standards. The secret data for various departments' application is between topological map and non-secret data. For example, topographic map contains contour line and elevation, such information is not allowed in the network and must be filtered. In addition, the difference of information needs between departments may give rise to more versions of secret data that based on the government application; this situation can be solved by assigning software permissions to control the layer and related fields in the information center.

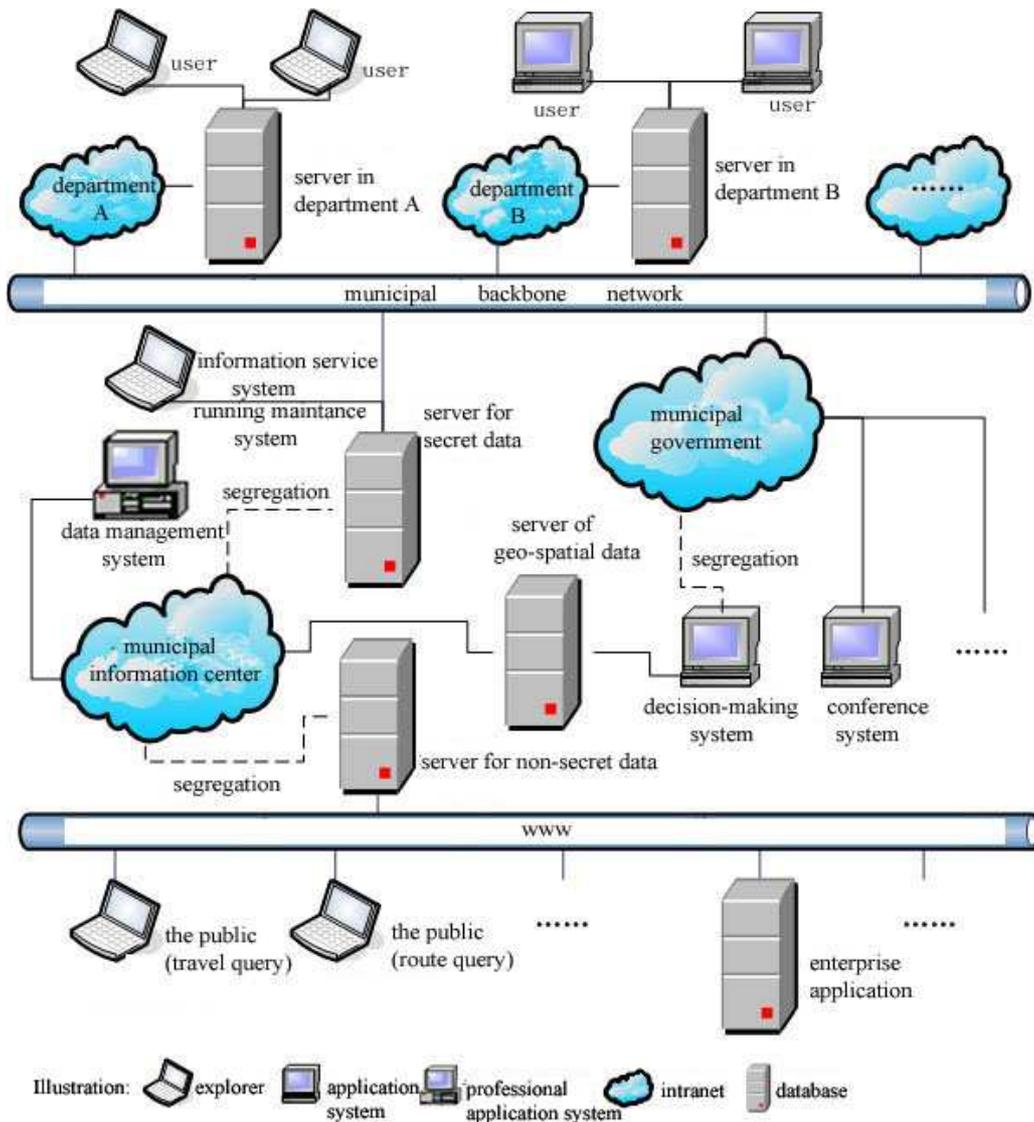


Fig.2 Design of network connections

3 Construction of Zengcheng Geographic Information Public Service Platform

Zengcheng geographic information public service platform is the core contents of "digital Zengcheng" construction. The city was ranked to the ninth 2009 county economy competitively and scientific development evaluation report. The platform designed a "1+4+3" mode with the testing guideline of digital city geographic information public service platform issued by State Bureau of Surveying and Mapping (Testing guideline for short below, a platform-Zengcheng geographical information platform, Four subsystem-data management system, information application system and running management system and three applications direction, leadership and decision-making supporting application, data sharing application between different departments and public service applications. Platform uses mixed pattern, the main contents are built according to the guidelines, to ensure the completion of the platform, the actual situation is added to choose the action.

3.1 Data managing system

Data management system is the professional client that manage and maintain the secret and non-secret data at the server, it mainly include six modules, the vector data management, image data control, caches data control, characters management, metadata management, which faces geographical information database management application. Vector data management, image data and control caches data management and administrative functions and the space database management system, laid particular stress on providing support for distributing data services. For example, to keep security you can delete the layer to prohibit the dissemination of contour data. Map cache configuration and symbols to take the strategy of exchange space for time and to improve the user experience, as graceful and efficient on-line map leads user to read their contents, stimulate user's interest. The design of data management system generally adopts c/s mode, which can increase speed of data processing and the overall security of the platform.

Quick and efficient data updating management is the actual carrier of the data distribution. Different cities, according to their own circumstances, adopt different updating methods, some use comprehensive approach (rich in information) and some use the incrementing the way (lower costs). Zengcheng, as a county town, can use the low-cost incremental method, to track the urban area change in different years. It can be effectively achieved to manage changing urban area effectively through space model, and to guarantee the accuracy of geographical information services.

Metadata management is essentially the maintenance of directory service in the information service system. Metadata updating comes after data updating cannot be ignored. It is proposed that when updating data at the same time updating metadata, and extract metadata from map that loaded in the database to reduce the burden of metadata maintenance. Also, the data updating is related to image updating, generally speaking, real-time data is not suited to the tiles manner, for example, some poi data. Between there are physical segregation between different networks, it is needed to pay a price for updating the data while maintaining the consistency of the data. This can be released by two ways: one is to buy a backup server, putting new data on the internet by the rotation, another way is to increase staff for data processing, produce different versions of the updated data and uploaded to the server.

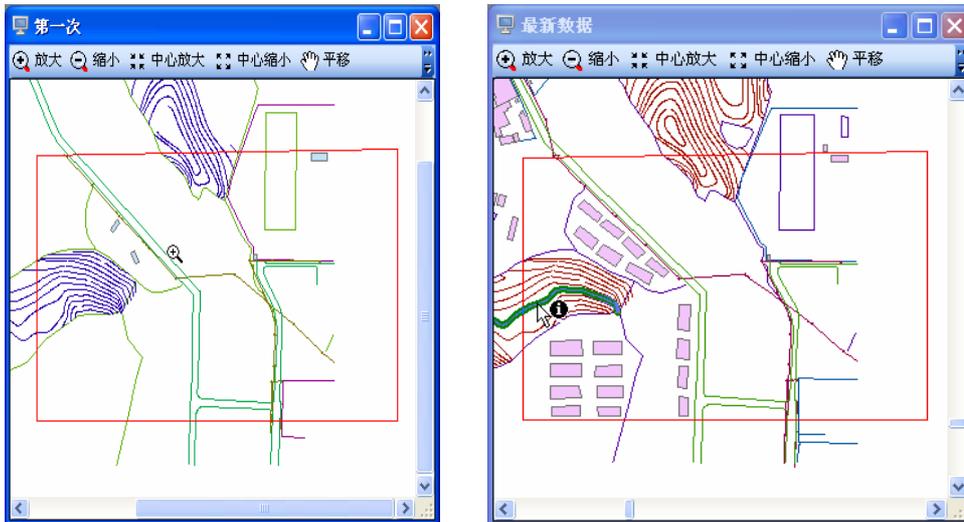


Fig.3 Incremental update of topological map

3.2 Information service system

The biggest difference between geographic information public service platform and the map platform is that the front one provides customized services. Information service is a series of services based on map service. Different user has their own understanding for the information services. To the developers are concerned, information services subsystem composed by many network application interfaces, it accepts client request, for example, query directory, display map, enquiry, statistical analysis etc. The system administrators only see the list of service such as map service enquiry services, the users do not need to know anything about the details of the information services, but they can feel it existed by terminal operation.

To a certain extent, the construction of information services achieves integration of calculation resources, and effectively reduces cost of the terminal deployment. The old conflicts and also had new contradictions, the most striking is a partial sacrifices in performance. Therefore, there are many solutions for information service optimization. In technology practice, we recommend that you'd better use server software that have better performance, a map engine and network tools that has good interactivity, And then focus on the implementation of geographical information dissemination and application. This is because the user needs to quickly feel fairly the worth growth brings by the platform. It better to improve data sharing the business logic than to build a "beautiful vase" by using the limited time and resources. For example, the query result needed to add to the three-dimensional online service, usually get the standard network service, Common query result returns JSON, GEORSS and KML and query for poi can get result in binary form.

3.3 Running and maintenance management system

Running and maintenance management system includes authority management, monitor, and customized visualization, in a few word, it is a solution to who came in, and how to solve. The authority management of Zencheng geographic information platform has the character of integrated user-permissions- map – interface. Old database management system controls the specific features through landing, for different levels of the map of the view of access control level. The public service platforms different users have permission to use a feature that is the service level of the map and map and functions of the resources available as service for different user. For example, use the space capabilities to find land, urban planning bureau can get land code, and water board bureau could only see the land outlines. The system monitors data flow, visit capacity, real-time speed and users, which on the one hand

provides security for system safety, and on the other hand provides proof for server configuration optimization. If Zengcheng geographical information platform is successfully promoted to application, we can charge for customized service to expand our platform construction. And it is important to monitoring at this stage. Zengcheng geographic information platform construction fits for the demand of geographical data from departments, and not covers all needs. Visual customization provides flexibility for different departments to realize their own required application and reduces maintain pressure from the server. The visual customization needed to build in the existing framework, and is not unconditionally extended.

3.4 Supplementary application system

Supplementary application system is the direct media that users invoke information service. The information service itself has generality, B/S or C/S infrastructure will not affect the interface for secondary application system communication with information service system. In the interface design we can use asynchronous interactivities to improve user experience. With map load it is also needed to resolve various sources of data have different projections, this is because different data provider, especially business data producer, the coordinates of their data is still indifferent, if the data are not accurate projected, they are needed to reprojected when loading to match the existing maps services, this can be reached by using GDAL, GEOS tools. The geographic information platform we finally get are shown in figure 4.



Fig.4 The typical application of Digital Zengcheng fundamental geographic information Platform

4 Conclusion

This paper explores a new way of sharing geo-spatial information online that can face different users in the city and satisfy multi-level application requirements in the construction of geo-spatial information platform. In practice, the author's experience is: with the platform construction, the soft factors (government coordination, department communication and interaction between the public) will play a bigger and bigger role, construction of the platform brings not only data distribution and sharing but also simple work-flow and promotion of services.

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