

RESEARCH ON THE CONSTRUCTION OF URBAN SPATIAL DATA INFRASTRUCTURE

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ABSTRACT:

This paper discusses the construction of urban spatial data infrastructure, taking Ganzhou for example. First we set up a organization that manages and harmonizes spatial data, and design the total configuration of the USDI (urban spatial data infrastructure)of Ganzhou; Second we constitute the regulations of the producing and updating of spatial data, and probe in the technology of sharing data, and we also design the framework of data sharing in the USDI of Ganzhou ,then we build up the framework dataset. Finally we discuss the integrating of GIS and OA.

1. INTRODUCTION

USDI synthetically using the advanced communication network technology, GIS technology, remote sensing technology, global-positioning technology and the technology of data base management system, integrates, shares and utilizes the space data information of every department, trade, field in the city to the maximum extent to offer fast, systemic and various kinds of succinct data service, and promotes economic construction of the city and social development. Comparing with the "national spatial data infrastructure "being constructed in our country, the urban spatial data infrastructure has its particularity , for example ,the resolution ratio is high, abundant in content, the amount of information is large, the aging speed of information is fast, production and newer cycle are long and costly. The efforts of recent years have obtained the remarkable achievement in production of the data of urban space of our country. Now we take Ganzhou as an example, carry on the discussion to the construction of urban spatial data infrastructure.

2. ESTABLISHING THE MECHANISM TO MANAGE AND HARMONIZE SPATIAL DATA

The construction of urban spatial data infrastructure involves a wide range of departments, but most cities often entrust the urban planning or the construction department to be responsible for while building of the system and the corresponding powerful organizational leadership structure has not been established. Although the leading group, a kind of loose organization has been established in some cities, the influence on system construction is not very big, causing the system is unable to spread out construction or use in the large range, thus influencing systematic using value. Aiming at this situation we establish a space datum to coordinate the management organization in Ganzhou, It specially undertakes the spatial data infrastructure construction task in Ganzhou. This organization is a production unit of the foundation geographical information data of Ganzhou, and it is an authoritative service centre that is charge of upgrading, storing, dealing with and assigning the basic space data, and it is one of the components of the national spatial data infrastructure.

This organization, according to the need of producing, managing and servicing spatial data in Ganzhou, has designed the ensemble architecture of Ganzhou, as Fig. 1 shows.

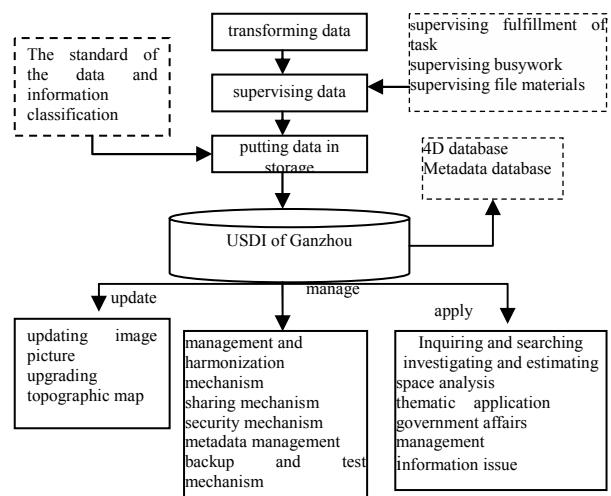


Figure 1. Overall structure chart of the USDI of Ganzhou

3. MAKING THE RULES OF URBAN BASIC SPATIAL DATA

Urban space basic data include mainly: the digital line vector graphic (DLG); the digital orthograph model (DOM); the digital elevation model (DEM); The digital raster graphic (DRG); the corresponding attribute data of various kinds of data, including attributive character information, social economic information, every department special use information etc. Each kind of data involves the data form of different scales.

In order to make the space data has effectiveness for a given period of time, authoritativeness and sharing, we have made the

rules of urban basic spatial data of upgrading , producing .and have researched the sharing technology and sharing mechanism .

The key to the sharing of the urban spatial data is to set up information sharing and management platform. Every department can use the data platform to ask for the necessary data; can release one's own newest data or department's data to the data platform too. The platform of information sharing and management is in the charge of the administrative center of the information resources management. According to authorizing various kinds of data using and serving platform (the information application system of every department) can visit urban space basic data directly , can also receive data package which the center of information picks up from database according to some need. The information centre offers unitive management to the platform of the urban basic space data sharing and managing. The sharing frame of the urban spatial infrastructure of Ganzhou as Fig. 2 shows.

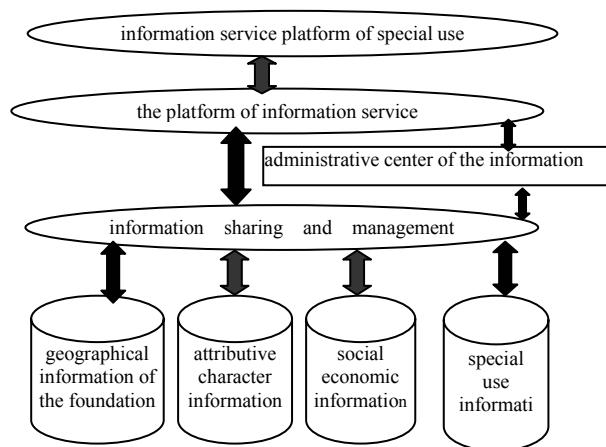


Figure 2. The sharing frame of the urban spatial infrastructure of Ganzhou

4. SETTING UP THE URBAN BASIC SPATIAL FRAMEWORK DATASET.

Under large scale, the framework dataset can describe the surface feature and physiognomy information of the natural and social shape of city completely (such as building, road, river system, green land), managing realm information (unit border of administration at all levels, for instance municipal or district, sub- district office, important unit circle land and geography dividing into area, etc.) and their basic attribute information. Here it not only includes various kinds of topographical information concerned by the city's surveying and drawing ,but also should include managing bourn information etc and basic attribute information corresponding to them. The main task of the spatial data infrastructure in Ganzhou is: Producing and offering the 4D (DRG, DLG, DOM, DEM) products of three kinds of basic scales. The basic scale of the map of Ganzhou is confirmed as three kinds: 1:10000, 1:1000, 1:500. The description of surface features is more macroscopical at 1:10000, the maps of 1:10000 scale cover the land of Ganzhou , mainly used in the macro-management and decision of the city; The description of surface features is more detailed at 1:1000, covering the planned urban area of Ganzhou , is mainly used in the daily planning management in the city; The description of surface features is the most detailed at 1:500, covering the

urban area of Ganzhou , is mainly used in the micro management , planning and design and urban construction of the city.

As regards "urban spatial infrastructure ", we, according to the spatial data rules, have confirmed the urban space framework dataset and the existence form of the dataset in Ganzhou. It includes two kinds, one is space datum, and another kind is non-spatial datum. These data also have the following characteristic besides most basic space attribute

(1)It is multi-level.

Divided into layers ,the spatial elements can easy to be operated and stored , and they can be divided into such a lot of levels as land type , road , river system , pipe network , administrative division ,etc, and can also be subdivide on this basis, even some non-spatial data, for example population , industry ,etc., can be shown in the form of dividing layers of maps as the special thematic data

(2)Multi-resolution ratio and multi-polymorphic type.

Generally, there are some sub-storehouses of various kinds of figures of resolution ratio to serve for different application types in every database, moreover the city is a complicated huge system, the space data and attribute data of the city involve every aspect of the city, its data come from different production, use unit, storing tools, so there are various kinds of forms of expression as shown in table 1.

	Form of expression of the data	Memory form of the data
Picture data	Various kinds of remote sensing, aerial survey photograph	TIF 、 JPG 、 BMP
Figure data	Various kinds of topographic maps and thematic maps	Arc/info 、 Mapinfo 、 AutoCAD Geostar ect
Attribute data	Such thematic statistical data as population ,economy ,description of the spatial entity ,etc.	Oracale 、 SQL server

Table 1. The type and storing form of the spatial data of Ganzhou

(3)Many time phases.

The traditional space database is the description of a certain instantaneous space and attribute state, lacking description that record time changed, the space-time modeling ability of the semanteme is weak, unable to offer the tense to analyze the function, so known as static space database often, therefore it is difficult to suit modern city fast-developing demand. the importance of urban historical data demands to set up one high-efficient database system to organize , manage and operate space-time of datum .the most important thing is to set up the suitable datum model ,in order to manage three kinds of key elements of time , space , attribute simultaneously. The USDI in Ganzou can offer multi-moment data and multi-time slot data, and offers the horizontal current data and vertical historical data. Comparing, analyzing, monitoring and predicting the database is important for management of the urban information of some regular changes.

5. GIS AND OA INTEGRATING

Office automation(OA) system as modernized office system, turns handle official business to electronic official business. The data content dealt with is mainly electronic file , electronic form , especially customized, standardized electronic file , electronic form in advance. In the daily work, the 80% of things that we contact are relating to space geographical position, that is to say , people will rely on the space geographical position data more and more, namely the data of the map and relevant types to carry on our work . In this case, the traditional office automated system has lost the important visual function without the support of geographical information system (GIS); we need to introduce the function of GIS, in analyzing and processing the figure, picture data.

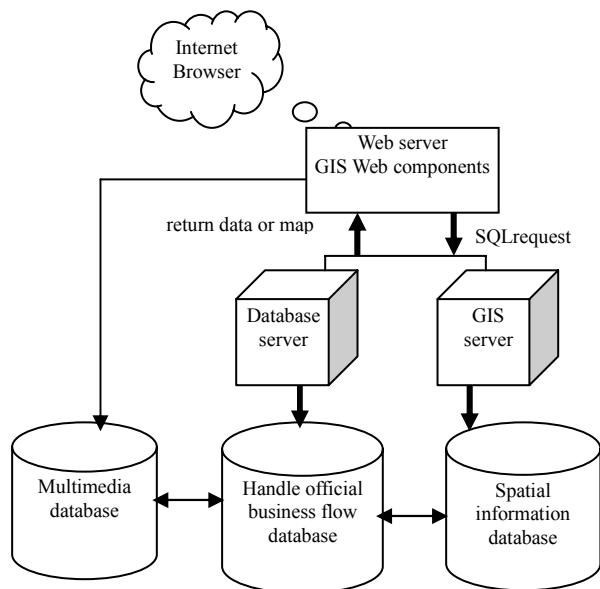


Figure 3. Integrated schemes based on GIS of Internet and OA

The geographical information system has already been known very well by everybody, its strong point lies in dealing with, analyzing the geographical data of space, namely figure, picture data. But traditional geographical information system is used narrowly because of failing to integrate with the office automation, having weakened the influence of GIS to a certain extent, for this reason, we have realized the integrating and integrating of GIS based on Internet and OA system in Ganzhou. First of all, classifying and integrating the information that will be involved in the integrated system, according to the picture and text information involved in the handling official business, we classify them into three kinds: dynamic official working business information, static multimedia information,

geographical space data information, they correspond to three databases separately: Handle official business flow database, multimedia database and spatial information database. Having studied data relation of them, we can draw the mutual relations among Handle official business flow database, multimedia database and spatial information database. These data information is integrated by way of interface of the database. Then, according to Web-GIS technology and OA technology, taking Web browser as the workbench unity, we draw the integrated scheme based on GIS of Internet and OA system, as Fig. 3 shows

6. CONCLUSIONS

Based on high-speed network, USDI is regarded as the data foundation of the digital city, and it will inevitably give play basic enormous role in the digital city. In fact, "urban spatial data infrastructure" taking urban space data and service based on data as the core, not merely to the urban planning, it is essential to build and manage the digitized project, it is the main body of geographical information industry of city of our country developing rapidly at the same time. The urban space data infrastructure in Ganzhou offers the basic space geographical basic data guarantee for " digital Ganzhou ", involve such all respects as space orienting , geographical frame , economy , humanity , society's feeling of the digital city ,etc., it is the foundation of building " digital Ganzhou ".

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