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ABSTRACT

Land administration refers to a full range of issues dealing with land management. The holding of properties, guidance of construction policies, and enforcement of individual property rights, all depend on effective land administration. It is with this goal in mind that the Control Data Taiwan has developed the CADastral Information System (CADIS). CADIS is designed to manage and integrate complicated land records information such as cadasters, land value records, and land survey records. CADIS is currently employed by the Taiwan Land Administration Office and two largest municipal government, Taipei and Kaohsiung.

INTRODUCTION

Land administration is a very important function of government at various levels. Without proper land management, the social and economic activities of a society will be greatly impaired. Land management is to manage records information which is organized by relating geographic information to locations of physical entities on the earth.

With the advancement of computer technologies, demands for automating land management has dramatically increased. Applications for managing land records information are usually accomplished by the use of three referencing systems: 1) cartographic referencing systems; 2) coordinate systems; and 3) location identification systems.

Cartographic referencing systems are, for example, maps that define spatial relationships among cartographic features, which are physical entities on the earth. Coordinate systems define the positions of cartographic features in order to precisely represent them on maps. Location identification systems relate physical entities to their cartographic features. Therefore, an item of location-related data can be spatially meaningful to any land administrators only if all three types of referencing systems are used in a land records information system.

Information that is commonly used to describe cartographic features contains cadastral information or planimetric information, or both. Cadastral information refers to the legal information about properties; in other words, it is the basis upon which properties are conveyed, assessed, and managed in local government.

Planimetric information is the physical description of cartographic features and usually extracted from field surveys or aerial photographs.

The definition of legal information is more than just the legal ownership because there are many situations that some one other than the owner, an institution, or government has some legal claim of interest in the property that can restrict its use or conveyance, such as construction liens, mortgage liens, court actions, zoning laws, and utility easement. Conveying property, therefore, requires not only the legal description of the property, but also a methodology on which all the legal claims of interest in the property can be identified.

LAND ADMINISTRATION IN TAIWAN

The government in Taiwan has been consistently implementing the following objectives for her land administration affairs: 1) equalization of land ownership; 2) upholding the results of farmland reform; 3) management of land and construction; 4) effective use of urban land; 5) land acquisition for public uses; and 6) redrawing of cadastral maps. The Taiwan Land Administration office offers three types of services to her citizens: 1) land recordation; 2) land surveying and measuring; and 3) land valuation. Land recordation is designed to record information of land conveyance and land valuation is to record information of land transactions.

Land Recordation

Three types of legal information are required to be managed and maintained for land recordation services in Taiwan: 1) the legal description of the parcel; 2) the legal ownership of the parcel; and 3) other legal rights concerning the parcel. A typical land recordation procedure involves three processes: 1) examination; 2) registration; 3) verification and recordation.

Land Valuation

A new owner must register assest value information of a newly purchased property once the transaction is completed. The land valuation procedure involves two processes: 1) land value registration; and 2) land value verification and recordation.

CADIS

The hardware platform of the CADIS consists of CDC Cyber and CDC 4000 series computers, as well as peripheral equipment, such as disk drives, terminals, laster printers, and image scanners. The software platform of the CADIS can be either UNIX or NOS/VE environment and the ORACLE data base management system (DBMS) which manages and integrates various land administrative information. By using the DBMS as the core, a star-shape backup network system can then be designed to form a digital data exchange system.

The CADIS consists of three modules: 1) cadastre operation system; 2) land value operation system; and 3) file merger operation system. The system architecture of the CADIS is shown on figure 1.

Cadastre Operation System

Cadastre operation refers to the examination of submitted land record documents, registration, verification and recordation, certification, and enquiry of individual property rights.

When an applicant requests for cadastral registration, the cadastre operation system (COS) immediately retrieves the relevant information that is necessary for carrying out various types of verification and evaluation procedures. COS selects an appropriate registration classification which matches the registration type specified by the user, and then proceeds to initiate registration, verification, and recordation processes.

Documents such as land and building cadastral registers, ownership deeds, certificates of rights, and various types of reports, can be directed to a laster printer upon requests. COS allows applicants freely to view cadastral data through an on-line interactive interface. Land and building composite data, house number indices, original land values, and other important information are, therefore, open to the public without placing additional workload on the office workers.

Land Value Operation System

The land vaule operation refers to the process of assessing the land value. The land value operation system (LVOS) consists of five modules: 1) land value registration; 2) total land value verification and post-correction verification; 3) land value inquires; 4) land value update indices verification; and 5) report and certificate generation.

File Merger Operation System

Because of voluminous cadastral and land value information must be produced, it is, inevitably, that a number of data entry subcontractors are required. The evaluation, conversion, and verification of these outsourcing data are, therefore, vital to a land information management system.

The file merging operation system (FMOS) provides the integration function of cadastral and land value data, data exchange function to the none CADIS platforms, and various statistical functions to assemble information for decision makers.

Other Modules

In addition to the three modules, the CDT also offers a desktop Land Administration Information System, a Land Value Directory, and a Digitized Cadastral Survey and Land Measurement System. All these modules can be integrated to the main core of the CADIS depending upon user requirements,

EVALUATION

The CADIS has clearly demonstrated that it improves the quality of services to the public, the speed of processes, productivity of the office workers, and data sharing between different government offices or agencies.

Quality of Services

Applicants are freely to inquiry information at their finger tips for which was not available to them before or which would take hours to compile. When inquiring information, they do not have to wait in lines, fill out applications, and wait for another few hours, sometimes even days, to receive a simple answer.

Information contained in each application must be reviewed and released by clerks at three different stops. Each cleark at each stop shares different portion of the responsibility to maintain the principle of check and balance. Data entry occurs only once during the whole process. Certificates are printed automatically through laser printers. Human errors are, therefore, eliminated to the least extent.

Speed of Processes

On average, there is about 50% of time saved using the CADIS
versus the manual operation (see table 1.) Most of the workload occurs at the Verification and recordation process is to make sure all the jobs done for an application is legal and accurate. Therefore, most of actual work hours occur at this process has little to do with automation. For the other two modules, time saved by using the CADIS is tremendously larger (about 60%.)

In general, the more complex or computable the processes, the more time can be saved for such processes if they are automated. The time saved as shown in table 1 exclude the time which must be spent for finding relevant information in order to process an application; particularly, in a situation that a clerk must composite several items of information from different sources.

Productivity

Time can be a factor for measuring productivity, so is profit or number of completed jobs. It is, however, very difficult to quantify productivity using intangible measurements, such as the inner side of employees, good-will, or atmosphere of work places. For public services, time and number of completed jobs are properly the two most frequently used measurements for estimating productivity. With these two indicators, the CADIS have certainly improved the productivities of workers at the land administration office.

Data Sharing

Geomatics is more and more an acceptable term for those who need to see relationships and make decisions based on geography. It is properly about 80 per cent of decisions made by central and local government involve a spatial component either directly or by implication. Therefore, data sharing is a very important subject in the design of public geographic information systems.

Currently, CADIS is capable of exchanging data with other CADISs; however, it is necessary to build interfaces for importing and exporting data between CADIS and non-CADIS systems.

DISCUSSION

CADIS is a system that automates land recordation and valuation processes. However, it deals with only cadastral information; i.e. legal information or the textual part of the cartographic information. Currently, a geographic component is incorporated into the CADIS to store and manage planimetric inforamtion (raster and vector data sets) of the land administration information system.

Demands for geomatic applications have dramatically increased on a yearly basis since geographic information systems were introduced to Taiwan marketplaces two years ago. There are a number of problems yet to be resolved in Taiwan geomatic market. One such problem is the lack of standards.

Establishing a standard (or, in fact, should be, a set of standards) is usually a very difficult and evolving process. Most of developed countries has been establishing standards for geographic information systems used in their countries. These standards continue to evolve over time. Without standards, there will be disasters for all users several years from now if we review the history of hardware and software problems. It is unfortunately that there is no methodology and expertise to coordinate the standards development activities in Taiwan geomatics community. The CDT is committed to participate and be fully cooperated in the standards development process in Taiwan and contribute her resources to the establishment of geomatics standards in Taiwan.

Table 1 :Comparsion of actual minutes used between manual and computerized operations

Operation / Process	Manual			CADIS			Comparsion (time Saved) of manual and CADIS				
	1 Examination	2 Registration	3 Verification / Recordation	4 Examination	5 Registration	6 Verification / Recordation	1 : 4	2 : 5	3 : 6	1+2 : 4+5	1+2+3 / 4+5+6
Transfer of ownership	20	20	10	15	7	5	25%	65%	50%	45%	46%
Liens Registration	25	28	12	15	10	7	40%	64%	42%	53%	51%
Fist time construction registration	15	35	10	10	15	10	33%	57%	0%	50%	42%
Land dividing	10	30	15	5	6	12	50%	80%	20%	73%	58%
Replacement Certificates	10	16	10	5	5	5	50%	69%	50%	62%	58%

Figure 1 CADIS System Architecture