By Kevin P. Corbley

CDOT Unveils Automated Document Management

New System May Eventually Integrate with GIS

With urban populations growing at a record pace, state and local governments find themselves high on work and low on personnel. Government employees at every level are buried under the daily crush of paperwork involved in the expansion of infrastructure and services to keep pace with growth.

The Connecticut Department of Transportation (CDOT) has dealt with this situation by automating the record keeping and retrieval process in its Rights of Way office. The result has been a dramatic decrease in time spent on document management and a shift in related tasks to the clerical staff, freeing up professional personnel for planning functions.

"Automated document management allows us to make more efficient use of our limited staff," says Rich Allen, Administration Division Chief in the Office of Rights of Way. "It also gives us more flexibility in serving people outside our organization."

CDOT unveiled its new Image Records Management System (IRMS) late last year, after three years of development. IRMS offers three primary functions to personnel in the five divisions comprising the Rights of Way office:

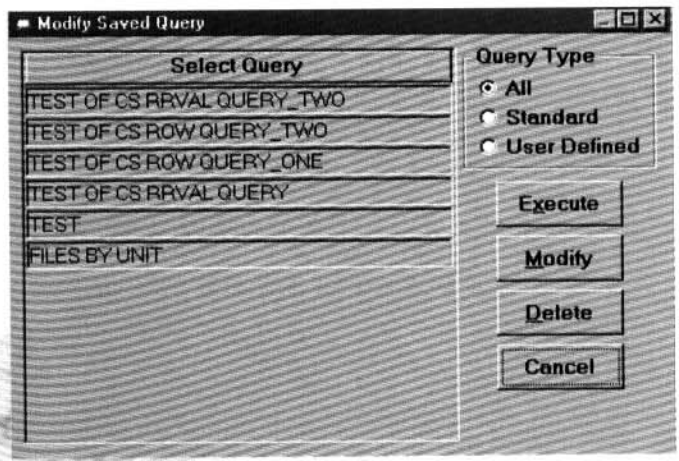
- Digital access to rights-of-way maps,
- Digital access to rights-of-way documentation,
- Availability of onscreen search, query and view capabilities for maps and documents.

Intergraph Corporation, the prime contractor, configured the IRMS to eventually accommodate integration with GIS. Looking long-term, CDOT sees significant advantages in using GIS technology to make the IRMS available online to agency contractors and the public. GIS may also be called upon in the future to build a state-wide land information database accessible by CDOT and other state agencies.

Running Out of Space

The CDOT rights-of-way groups are responsible for the acquisition, management and sale of properties involved in the development of transportation projects within the state. About 95 percent of these rights of way relate to highway projects, while the other 5 percent pertain to airport or railroad infrastructure.

"Our office oversees real estate transactions for 800 to 1,000 pieces of land every year," says Allen. "We were simply running out of room to store all the files."



For every property handled by the office, at least one survey map and numerous text documents must be saved. Rights of Way has its own Central Survey division that performs a field survey on each property prior to the transaction.

This survey produces a large format paper CAD map called a property acquisition or plat map. Additional CAD layers are often added to the map file in paper form as plans are made to build new roads, highways or clover leafs.

Although the plat maps are quite large, other papers comprise the bulk of the storage problem. Every transaction involves land deeds, title search records, condemnation documents, negotiating reports, and appraisal sheets. Other legal matters surrounding pieces of land can generate additional correspondences.

Storage space at the CDOT Bureau of Records Center in Newington, Conn., began to diminish in the late 1980s. Rights of Way put a temporary fix on the situation by microfilming many of the documents. Although space was saved, workers were dissatisfied because the microfilm quality was poor and it was difficult to find a document quickly. The maps still presented problems.

"Because of the odd sizes of the survey maps, we didn't microfilm them," says Allen. "So we were left with 100,000 paper maps, and a lot of microfilmed files and no efficient way to relate them."

The office examined ways to solve the problem, hoping to find a viable way to index the maps in the storage medium was selected so they could be retrieved quickly and associated correctly with the other documents.

At the time various storage techniques were being examined, digital imaging technology arrived on the scene with excellent performance and affordable costs. CDOT saw imaging with scanners as the solution and released a request for proposals in 1997 for a digital document management system built around imaging.

Intergraph Government Solutions group based in Huntsville, Ala., won the competitive bid and began work on the Image Records Management System in 1998. Intergraph has a long history in digital information technology and GIS development with many projects like Connecticut's under its belt.

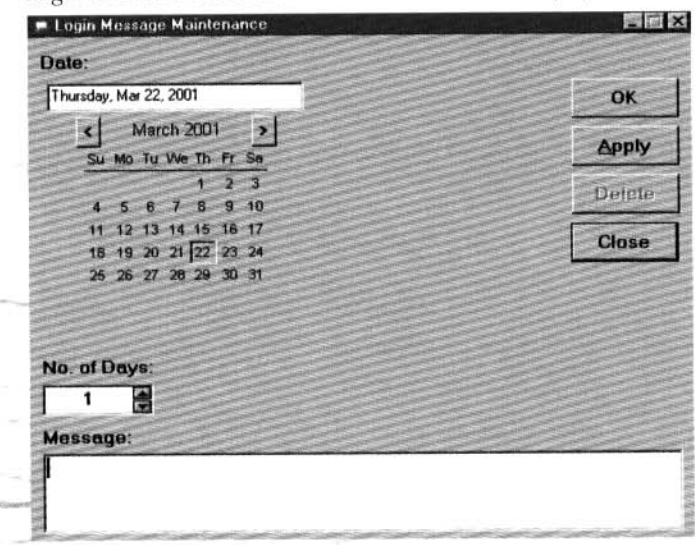
"Intergraph had been a technology integration and solutions company for more than 30 years," says Ron Long, Program Manager for Intergraph Government Solutions. "Although we have been best known for hardware and software development, we have always used the best commercial products to provide the best solution to our customer."

As a result, the CDOT IRMS is a unique integration of off-the-shelf and customized scanning and database management products from a wide range of industry vendors.

Building IRMS

Development and implementation of the IRMS were complex tasks, but Intergraph addressed the project as two fundamental challenges: 1) establishing a scanning facility to digitize documents and 2) building a database with storage, query and retrieval capabilities.

Intergraph established a document conversion center onsite at the CDOT Newington headquarters. This facility was equipped with three Ricoh scanners and one ANAtech scanner. The Ricoh machines handled the digitization of text documents, while the larger-format ANAtech scanner accommodated the C, D, and E size



map sheets.

Scanning technicians were contracted to perform the digitization work. Over a period of one year, the technicians converted 76,000 project folders, each containing documents and maps pertaining to one property. An existing file numbering scheme called *Town, Project* and *Serial* identified each folder and was maintained as the key index for the documents within.

"The digitized documents were scanned into TIFF files as requested by the customer," says Long. "We converted approximately 1.1 million pages of text and 115,000 maps."

As each document was scanned, the technicians displayed the digital file on Windows NT workstations equipped with Intergraph Pixel Pro and AIM/Redline software. These packages enabled the workers to manipulate and enhance the images onscreen. In the case of the older paper documents, for instance, speckles and creases had to be removed from the digitized versions.

The contractor also obtained an image recognizing system so that any documents already in digital format, such as a property appraisal saved as a Word file, could be imported directly without going through the printing and scanning steps.

Throughout the document conversion process, Intergraph proceeded with the implementation of the hardware and software required to retrieve and view these digital files. Oracle was selected as the database server, and a Hewlett Packard Optical Jukebox was purchased for data storage. Intergraph TD 225 desktop workstations were set up throughout the CDOT office for personnel to access the information.

Creating Customized Software

At the heart of the IRMS is the customized software that allows the rights-of-way staff to search for and look at the information in the database. Intergraph used Sybase PowerBuilder software to develop most of the query applications. An Intergraph software called Aim/Redline manages the viewing and printing of documents.

Creating the query system was one of the most complex aspects of the project. Intergraph built two types of queries into the system – standard and user defined. Standard queries simply search the Oracle database for the folder, document or map desired by the user. The file index number must be input to retrieve information in this manner.

A legacy database called Q&A had to be linked to the new database, complicating the development says Long. Intergraph migrated this existing data into the IRMS because the Q&A system held valuable information about most right-of-way properties. It consisted of 150 fields containing details about the property, ranging from owner name and phone number to appraised value and location coordinates. Transferring this information into IRMS made more sense than trying to input it manually.

"We wrote custom codes in C++ or SQL Scripts to link the two databases using the Town, Project and Serial index," says Long.

Availability of the Q&A fields allowed the contractor to develop the user defined

query functions. If the user wants information on a property but doesn't know the index number, he or she can input a name, address, parcel identifier or any other piece of information in the 150 legacy fields.

Once the document has been located, a pointer to the Jukebox selects the appropriate storage platter, loads it into the server, and Aim/Redline displays the document or map on the client screen. A variety of regular- and large-format printers have been purchased and networked to the workstations for immediate generation of hardcopies.

IRMS initially went online for standard searches in August 2000, and the Q&A database was hooked into the system for use in user defined queries by December 2000. Right- of-way personnel in the Newington headquarters access it via an existing Wide Area Network.

Planning for Future Integration

Currently, 90 members of the right-of-way staff access the IRMS on a regular basis. According to Allen, the system has given the personnel more shortcuts and flexibility in their daily workflow, in addition to solving the paper storage and retrieval problem. The most significant advantage has been for professional level personnel.

"They no longer have to waste their time digging through paper files to find the information they want," says Allen. "And the contractors that deal with our division have noticed time savings too. Everyone seems to work more efficiently now."

Most engineering design and survey firms now work in the digital environment. They can transmit their design plans and property drawings electronically to the rights-of-way offices without the need for printing and copying. This has saved time for both parties.

In the future, rights-of-way may extend access to IRMS to other departments within CDOT. Many offices now share documents and maps when design and construction projects are underway. Transferring the information digitally will make this process much faster and simpler.

Sharing of data in this manner may spawn further development of GIS applications integrated with IRMS. Allen says the day is coming when GIS-based spatial data searches will be required for multiple departments to tie their databases together and link related data by one common element – spatial location coordinates.

GIS technology would also be needed if CDOT makes the IRMS, or some version of it, available to the public over the Internet. New online GIS packages would allow rights-of-way to limit the amount and type of information accessed online.

"We would give the public information on projects occurring in their neighborhoods or the status of transactions that might impact them," says Allen. "The IRMS is opening up doors to opportunities we haven't even thought of yet." ■

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