



Hitting A Moving Target

Pipeline operators must work rapidly right now to adopt system-wide geographic-information systems that track important data and put that data in the hands of users—even as the systems themselves rapidly change.

Staff Report

North American pipeline operators face an operational challenge: How can they best integrate advanced geographic information systems (GIS) into long-established policies and procedures? Meanwhile, the advanced GIS systems they want to adopt continue to evolve, offering ever-increasing usability options.

But despite the potential confusion, well-planned and well-applied GIS applications offer significant cost savings and operating efficiencies, Jeffery Puuri, lead applications consultant for GL Noble Denton, tells *Midstream Business*.

A key push behind the current effort comes because GIS serves as the logical repository for the maximum allowable operating pressure (MAOP) data mandated by

the Pipeline Safety, Regulatory Certainty and Job Creation Act that became law in the United States in 2011.

“Certain MAOP-reporting requirements dictate a ‘where’ component that is easily accomplished using GIS, Puuri says. “MAOP-related factors, along with numerous other characteristics of the overall pipeline system—including facilities locations and other descriptive attributes—are stored in a structured manner, also called a model, in the GIS database.”

The pipeline industry has come together to create standardized data models, such as APDM (ArcGIS Pipeline Data Model) and PODS (Pipeline Open Data Standard), developed to store critical right-of-way, operating and incident information.

"The advantage of adopting a standard model for storing pipeline data in a GIS is that software providing pipeline-specific operations has been developed by numerous vendors, but the software assumes the pipeline data to be in some structured format, such as that provided by one of the industry-standard models," Puuri says. That hasn't always been the case.

Right from the start

The potential time and financial savings can be significant—right from the start, even before a pipeline goes in the ground. Available technology now allows pipelines to reach beyond in-house data and access property records available otherwise only at the local county courthouse. Quickly identifying land rights saves immense time on pipeline-construction projects, Dan Liggett, communications manager for GIS software vendor geoAMPS, tells *Midstream Business*.

"One of the things we want to do here is talk about change," Tom Coolidge, pipeline and utility solutions manager for Esri (Environmental Systems Research Institute Inc.) said in his conference presentation. "You can do things today that you couldn't do yesterday. Compared to where the world was a year ago, we're in a very different place. We're seeing a paradigm shift ... it's very empowering."

Coolidge says pipelines' move in recent years from storing data on paper, to mainframe computer, to personal computer, to mobile device "is difficult, in part, because of the great volume of information that needs to be transferred" for a typical pipeline system. But the change is necessary—and helpful—he added, because all that data "has no true value until you make some use of it; get it to people where they need it."

An important sidelight to GIS adoption is the collaborative impact it has on an organization, Coolidge says. Most large companies are hierarchal organizations "and

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The geoAMPS software allows a right-of-way agent to call up property ownership records while on location "that might take four days to find at the courthouse. We can handle that in seconds," he says, adding the software also stores photographs, earlier landowner agreements and other key information. Since much of the work on a pipeline project may be at remote locations, the software stores newly entered data for retrieval later, even if the laptop, iPad or other hardware in use is out of the range of cellular telephone or an Internet link.

"Mobile technology is creating new opportunities to make the process of acquiring and monitoring right-of-way go as smoothly as possible," Liggett says. "Web-based software provides right-of-way agents the most up-to-date information on individual parcels, through GIS mapping and a project dashboard with access to a central repository for managing all land-rights information within the scope of the project. It's a paperless system that agents use in the field. It saves time and money."

GIS changes, and handling that all-important MAOP data, were major topics at the recent Geospatial Information & Technology Association (GITA) oil and gas pipeline conference in Houston.

computing changes that. Maybe you find that your priorities don't align very well. GIS is one of the contributors—it really is an enabler, a collaborative platform—to help you align priorities and improve coordination across silos."

GIS can vastly improve data management, collection, organization, planning and analysis, both in the home office and in the hands of an operator at a remote spot along a right-of-way, he says. Staff can work together "although they're miles apart. That's doable today because GIS now has many lightweight applications and mobile capabilities. It runs on virtually every device in the mainstream, you have lots of choices," he says.

Also, GIS "enables stewardship of data with the people who are best suited for keeping it. It puts the user at the center."

Two major pipeline operators discussed at the conference how their organizations are adopting GIS systems—and now view as essential in finding intuitive and user-friendly ways for rapid access to complex data.

Colonial's case

In an attempt to streamline its efforts, Colonial Pipeline Co. has teamed up with Critigen, an information tech-

Right-of-way agents working in the field can access geographic information system maps on mobile telecommunications devices, then review the status of property acquisition for individual parcels along a planned pipeline project.

nology services, GIS implementation and geospatial consulting firm, to create its own suite of GIS applications, or apps, on the iOS platform developed by Apple Inc. for its iPod and iPhone products.

In the past, according to Colonial Senior GIS Analyst Eric James, requesting GIS data from an analyst could, at times, be a prolonged process. But through Colonial's new iOS apps, which James noted, are still in the "proof of concept phase," users will have instant, mobile GIS access.

"We have instant access to our data. Requests can be delivered in just a few minutes," James said in his presentation. "There is greater use of available information, a greater adoption rate and greater exposure to GIS. All the apps integrate with Colonial's ArcGis Pipeline Data Model, and that made it more efficient to help assimilate the information to our company."

Choosing the iOS system, James said, was based on the increasing use of iPhones and iPads in the corporate environment. He noted that Colonial already has a fleet of employee iPhones, and there is a growing use of iPads within the company.

"Eighty-five percent of employees who have a company smart phone have iPhones," he said. "Another reason for using iOS: It is intuitive. It is a recognized interface that has a closed and secure platform, and it is increasing in popularity as well. Also, rapidly maturing software kits are another reason for utilizing the platform."

Colonial, which is one of the largest carriers of refined petroleum products in the U.S., has developed, with the help of Critigen, three apps: The "Where am I?" app, which is a location application that utilizes global positioning system (GPS) technology; an asset-inventory app called "Marker Cam;" and the "Incident Responder" app, which, Eric Klein, client service manager and senior consultant at Critigen, describes as a "rapid-response app" targeted for use within the first 24 hours after an incident occurs.

Klein told the conference that all three apps are being developed with three set requirements in mind.

"Each of the apps is in a different phase of development," Klein said. "Each of these apps is targeted at a specific user group with limited functionality and with the intent that it meets three requirements: intuitive, fast and easy to use."

James noted that with the help of Critigen, Colonial has created a centralized desktop application that allows access to non-iOS based users. With this, he says, desktop users can utilize this application and track incident locations, staging areas and other features. There is also, James said, a centralized administration tool that provides Web access to manage users roles and privileges.



Source: geoAMPS



"We also set up a tool similar to the iTunes store where users can download the apps," James said. "It is the Colonial version, and it is called the app zone. It is internal only and not shown publicly, so users that have access to this can download the apps through the Colonial App Zone."

Creating these applications, Critigen and Colonial were tasked with challenges involving distribution, device and user management and, most importantly, security.

"As with all security decisions, it's a balancing act; you have to decide how easy and user-friendly the app can be and the inverse relationship of how secure it is to a certain degree," Klein says. "We have been able to strike a nice variable balance depending on the nature of the app. And we've chosen, depending on the app, to implement multiple levels of security."

"We've got in-app security through the use of a PIN [personal identification number], we've got distribution restrictions through the use of the Colonial App Zone, and we've got on-device security through the use of expiration dates," he continued. "Not only can we control the distribution of the app, the use of the app and the expiration of the app, we can also control, most importantly, access to data, which is what most organizations are concerned about."

Other considerations the company has had to wrestle with are application governance, workflow and administration. "As you start managing users, devices, roles and security, it creates an administrative burden, and we are doing the best we can to consolidate this where possible. The fact is, it is still a chore that somebody has to take ownership of," Klein says.

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Colonial has high hopes for the future of GIS access. "What are the next steps for the apps?" James asked. "We hope for additional functionality with these apps, adding to the app zone if there is a need for new apps and, of course, creating more apps."

Chevron's challenges

Chevron Pipeline Co. has faced its own challenges to ensure all relevant information is recorded in a timely and efficient manner. Nathan Marx, GIS project manager with Chevron Pipeline, told the conference attendees his company has been among those wrestling with how to best utilize its data-management system. For years, Chevron grappled with a host of problems.

Sometimes, its GIS group wasn't contacted about a new pipeline until that line had already been in service for months. In other cases, the GIS team didn't receive advanced notice about pending construction projects or design routes.

Chevron has since found a way to improve the management and storage of its pipeline information and records.

Marx shared the company's proposed new pipeline as-built integration process at the conference. Before finding a solution, however, Chevron's GIS team looked to find a way to deliver as-built surveys and drawings in a way that allowed pipeline data to be efficiently integrated into an enterprise GIS.

In the past, Chevron would receive hard copies of as-builts at the end of a project, which would be stored internally in file cabinets. "Maintaining that information over the life of a pipeline was difficult," said Marx. The system later evolved to the point where Chevron was receiving electronic as-built drawing files from survey contractors. The drawings would arrive in AutoCAD (computer-aided design) format and were stored in a FileNet document management system. However, this, too, had its issues.

"Part of the challenge was that we didn't have any standardized drawing format, so for us internally, being able to keep that information up to date required us to keep a very large drafting staff," says Marx. "There were challenges there, just in terms of the resources and personnel required in order to keep that information up to date."

Today, Chevron has discovered a process that allows it to involve GIS from the beginning. It stores as-built information as tabular records inside its PODS database. It uses PODS as its record system and for generating its alignment sheets, which are used throughout the company, from its PODS database.

Chevron worked with a drafting group to develop a new as-built alignment-sheet preparation and management process. Its new system specifies the roles and responsibilities of all players and lays out what its team would provide to surveyors and contractors. It documents what it would expect back from them, as well.

The company created pipeline-specific domain codes and values, too, which are given to survey companies during a project. Importantly, Chevron's project manager provides contracts with the company's pipeline data interchange system (PDIS) templates which were supplied by Chevron's GIS group. This ensures there is standardization upfront. Meantime, the survey contractor uses that information to build its GPS data dictionary.

"Everything they collect from the beginning is based on those codes and done in a way that is preparing it to load into the PODS database," said Marx. "Just as before, after they finish conducting the GPS survey and load the as-built data. They'll create as-built drawings using AutoCAD, but as a second step, will also export populated PDIS database and deliver it to Chevron Pipeline. This time it goes to GIS group, which gets a chance to [review] data, and then the GIS group notifies the project manager that they've received the data and it's approved."

"This is where they really streamline the process. Before we had all those manual steps for converting the data. Now the data is prepared in such a way that it's ready to load right into the PODS database. So there's lots of time savings that occur in this step."

"And then from there we generate our alignment sheets directly from the database. We've added a new system into the process. We are at the very early stages of this, but the idea is that we have an electronic-drawing management system that's going to be the repository for all our core documents. Once we've loaded it [documents] into there, the project manager reviews and approves that data again, we've closed that loop on the data," Marx added. ■