ELECTRIC LIGHT & POWER

Power to the (GIS) Users

Jackson Energy GIS Users Take 'Show-Me' Approach When Choosing a New-Generation GIS.

by Jon Taylor and Teresa Irvine, Jackson Energy Authority

When Jackson Energy Authority (JEA) decided to migrate to an enterprise geospatial information system (GIS) with core mapping tools in the database itself, we told potential vendors to show us the goods. We created our own freedom petition, a document of 97 capabilities required by our utilities and businesses, and forwarded it to GIS vendors being considered. Then we asked them to address each statement during benchmark demonstration.

JEA is a community-owned utility providing electric, natural gas, propane, water, wastewater and telecom services to customers throughout Madison County, Tenn., including the city of Jackson. We had been using GIS products since the early 1990s, but the proprietary database and programming language involved required continual investment in customizations by third-party consultants.

Migrating to an enterprise GIS system with core mapping tools in the database would serve our five utilities more efficiently. We wanted several things: configurability that would allow access to all JEA business functions to improve operations and service; open architecture to accommodate common, off-the-shelf (COTS) applications and those developed in-house to future-proof our system; and to mitigate the ongoing cost of GIS maintenance and maximize the productivity of JEA's GIS users.

To accomplish JEA's multiutility initiative, we assembled an across-the-board project team representing each utility and business process, including design, drafting, engineering, plant asset location, maintenance tracking, outage management, IT system support, management decision support, business development and mobile usage. Giving voice to the system's intended users would minimize subsequent customization for specific functionalities and optimize ultimate acceptance across utilities and in the field.

A form focusing on each intended user group's requirements helped the groups evaluate candidate vendors objectively. After benchmark demonstrations, the project team—including recruits from JEA's field crew—visited user references to observe on-the-job GIS performance.

The project team selected the ArcFM enterprise GIS Solution developed by Telvent Miner & Miner on the ESRI ArcGIS platform. With this solution, we expect to implement ArcFM GIS, ArcGIS Engine, ArcFM Viewer for ArcGIS Engine with Redliner Extension, ArcGIS Server Standard, Network Adapter, Responder outage management system, and Fiber Manager fiber-optic solution.

The open technology of the ArcFM GIS facilitates integration with COTS software—giving us the forward flexibility to accommodate these electric applications and similar tools for tracking and maintaining JEA's gas, water and wastewater services:

- Pole loading/sag charting (such as PoleForman and SAG10),
- Cable pull to calculate pulling tensions for underground cable pulls through duct banks and manhole systems,
- Voltage drop for use with street lighting layouts,
- Power quality tracking for display and analysis of power quality problems, and
- Pole-treatment and tree-trimming tracking to aid in identifying the poles or trees scheduled for inspection and service.

Some of the desired out-of-box functionality we observed with this GIS included:

- **Simple-to-use "query to find" capability allowing cross-table query or single-table query.** JEA users want the ability to find any object that has a unique value.
- **User interface for quickly changing the on-screen display from one set of data to another.** We wanted to have control of the view, or the visibility of data, to configure the best functional needs of any particular user. For example, we wanted the ability to alter from an electric-only view to a gas-only view or a combined water-and-gas view.
- **Complex electrical modeling.** We wanted to better manage modeling of the internal working of devices such as switches, pad-mount switchgear, substations and transformers. This internal modeling will account for phasing and open-closed states. Further, our GIS needed to accurately model radial-distribution networks, looped-transmission networks and the transition between them in substations.

Figure 1: The GIS allows configuration of a primary display field, which users then key into the locator tool to navigate quickly to the specified feature.

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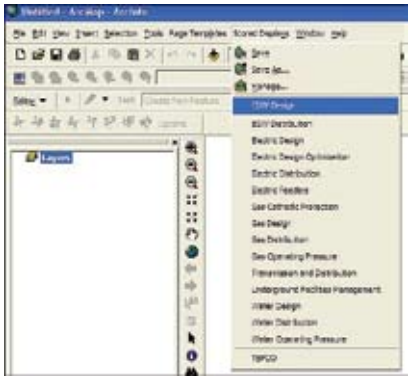

Figure 2: The GIS uses stored displays to quickly change views of the data. These views are stored in the database and available to all users.

- **Built-in circuit trace and circuit ID functionality.** We wanted to perform more intelligent traces that would allow easy selection of stop nodes, trace by conductor size, trace by phase, trace out specified distance, trace out to available fault current location, or trace out to a given impedance.
- **A gas-outage program and valve-isolation application.** Our system specs included special functionality that would ensure CIS data are inspected and that potential data errors are reported. The GIS required a customization to meet this need, but the architecture lends itself well to the adaptation. We saw the same traces available for water systems.

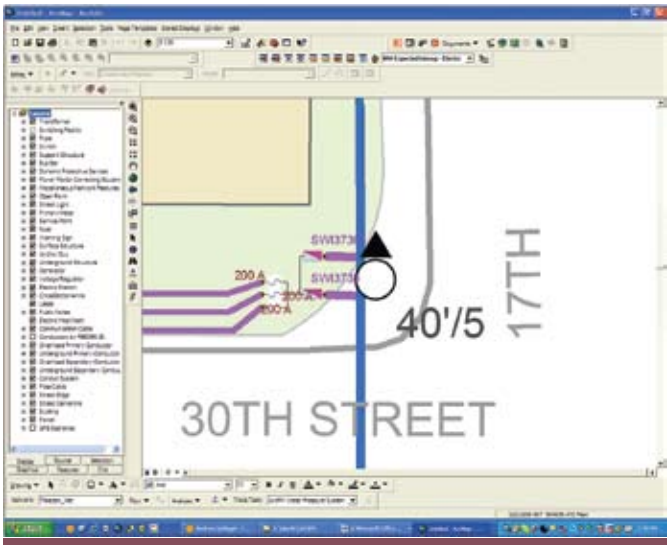

Figure 3: The GIS enables modeling of the internals of switch cabinets, as shown here, that include all of the various features pre-connected. Once configured, these composite favorites are placed at one time and can be used repeatedly.

We also saw demonstration of other significant JEA requirements, including:

- **Plotting and printing of on-screen views.** Having WYSIWYG plotting capability was a significant driver in our decision to migrate. The GIS creates page templates that can be saved within the database and made available to all users to quickly create a defined plot layout.
- **Seamless, fully functional integration with our utility analysis software and external information systems.** Our electric, water and wastewater analysis tools use a model built from GIS data, so the GIS will import and export data seamlessly with these applications. And our users will seamlessly access data residing on our CIS, ERP and other information systems. This feature allows tabular queries, spatial analysis and at-a-glance presentation that will support user decisions. We will also access streaming-Web weather data and other RSS feeds for enhanced real-time situational awareness.
- **A mobile product that allows a full cycle of pulling updates to and from the field.** In conjunction with an integrated, work-order management system, ArcFM Viewer for ArcGIS Engine will push a digital work order to mobile devices used by our field workforce, accept field markups of as-builts performed with the Redliner tool and pull from mobile devices into quality assurance and quality control for review and posting by drafters—all to reduce the time required for work-order posting and increase accuracy of posting changes. After an on-site user

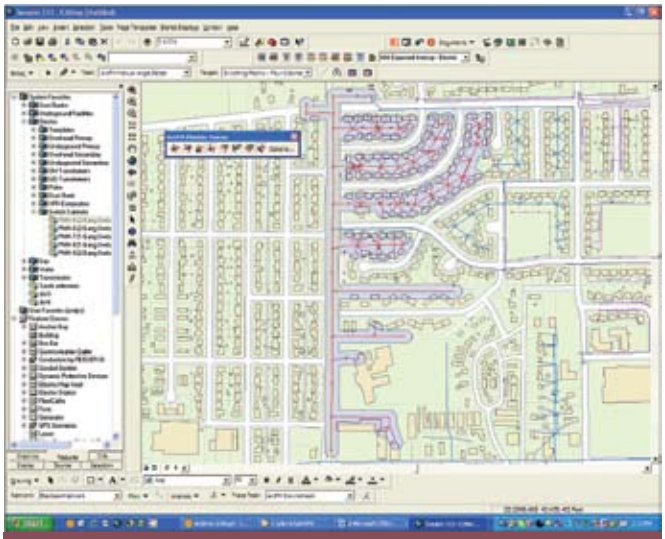

Figure 4: The GIS allows the user to perform traces upstream and downstream, to and from user-specified points, and traces of distribution equipment and feeders by phase.

Figure 5: The GIS provides gas isolation tracing, letting the user identify a service or main, then determining the valves that would need to be operated to isolate the area.

Figure 6: Additional traces are available for cathodic protection, pressure system and gas system.

visit, electric foreman Bill Gordon said, "Interestingly, the field troubleshooters we visited said they were scared to use this mobile GIS at first, but admitted during our visit that they now could not do their work without these tools."

- **User interface customization.** With a variety of intended JEA users, we expect to empower them to take on their own tools and relieve IT staff of necessary caretaking tasks.
- **Internal telecom world functionality.** The fiber manager application includes the connection manager tool for quickly establishing and inspecting many connections within splice enclosures, patch panels, optical network devices and passive optic network (PON) splitters.
- **Improved mapping capability.** JEA is part of a local consortium formed to encourage new industrial customers to consider location in western Tennessee. We look forward to improved spatial analysis and map compilation and thematic mapping tools that will allow industrial prospects to access JEA data as published maps via the Internet and visualize the geographic benefits of locating in western Tennessee.

JEA's personnel in the trenches asked GIS vendors real-world questions and explored how other utilities use GIS systems.

While not firm requirements during our search, these GIS capabilities promise significant advantages for JEA:

- **Web-enabled data sharing.** The GIS allows us to obtain via the Web geospatially represented information such as demographics, weather trends or census data and integrate that data onto our system maps for further analysis. This allows us to present selected GIS data to extended internal users and external audiences via the Web.
- **An SQL server database option.** We hoped to standardize on a single database platform, preferably Microsoft SQL Server, which offers scalability and high availability and would result in a 90 percent decrease in our maintenance and recoverability costs.
- **Integration capability with other ESRI business and IT systems.** We recently met with the city of Jackson, which also uses ESRI ArcGIS, to discuss opportunities and ways we can collaborate and share our GIS efforts to better serve our community. Planned meetings will include central dispatch (E911), the city of Jackson and emergency management authority.

In summary, the JEA team got tough but played fair. Our personnel in the trenches asked GIS vendors real-world questions and we saw for ourselves how other utilities use the systems. By having the intended GIS users share in the responsibility of evaluating and selecting a new system, we're confident we are implementing a GIS that will provide the functions needed by all of our utilities, businesses and initiatives, and return lower GIS cost of ownership and the best customer service. ELP

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