Pioneers in the Industry - Public Ser
Enterprise-Wide Network Mana

Using a strong behind-the-scenes infrastructure for both back and front office applications, Public Service Company of Colorado (PSCo), now a part of Xcel Energy, has kept their competitive edge through the innovative use of advanced spatial technology. They have successfully implemented a true enterprise-wide engineering solution that provides support to numerous business systems at a corporate level.

"A lot of utility companies are striving to leverage their GIS into a comprehensive network management system," states Pete Gomez, Manager of Data Analysis and Maintenance at PSCo, "but we've made it a reality." PSCo relies on their system to make sound business decisions, and it is used on a daily basis by a team of nearly 1,500 people. From mailing labels to dispatch, from billing to network design and planning, the system provides the central network data source.

The forward-looking utility company, which serves 1.7 million electric and 1 million gas customers throughout Colorado, Texas, New Mexico, Wyoming, Kansas, and Oklahoma, has seamlessly incorporated a wealth of new technologies to provide services to their users. Combining system capabilities with their operating knowledge has ensured consistent improvement and increased efficiency and customer service.

GIS Technology Pioneers

PSCo were pioneers in the GIS industry. In the late 1960s, they began working with IBM to develop an AM/FM/GIS system to track their distribution network. The software eventually became known as GFIS, which was distributed as a product in 1977. PSCo implemented a version known as DFIS (Distribution Facilities Information System), and had fully implemented it for nearly 80% of their customer base by 1991. As luck would have it, just when the utility was fully utilizing the system, in 1992 IBM announced they would no longer support GRIS. In December 1993, the utility selected GE Smallworld technology and began a data migration program. It took over a year to redesign system improvements, develop routines, format replication and establish a basis for the new system. By the end of 1995, all of PSCo's GFIS data had been migrated over to GE Smallworld Core Spatial Technology. The total migration took only one and a half years. The utility has just recently thrown away its old GFIS files, confident that they will no longer be needed.

Mergers and Acquisitions

In 1996, PSCo merged with Southwestern Public Service out of Amarillo, Texas, and became New Century Energies. The Texas utility still uses paper records for storing their distribution information. Earlier this year, the company merged with Northern States Power, who utilizes another AM/FM/GIS system within their service areas. While it is understood that the Texas data will need to go digital, the direction in which the GIS will move is currently under review. PSCo's integrated solution has offered excellent flexibility and expansion options.

Lessons Learned

Having moved between systems, PSCO has learned several important lessons, from which other utilities can benefit:

- Keep the data model design static. Changes can be made globally after conversion or migration is completed, but changing mid-stream is costly and ineffective.
- It is extremely critical that data is correct. The data in the system, and its integrity, is the basis for an effective system. If the data is wrong, serious costly problems will occur. "We've developed extensive internal processes to double check data accuracy and flag errors," notes Gomez. "This includes such things as nightly verification reports, and data tracking processes."

Integrated Network System Interfaces

PSCo's network management system provides the infrastructure for numerous operations within the utility. Its foundation is the customer-tie relationship. Customer locations are established through State Plane coordinates, along with the address of each meter location. Currently, the system stores data for approximately 1,700,000 meters.

While PSCo calls their network management system "the GIS," it offers much more flexibility, expandability, and possibilities than a typical GIS. Operational links have been developed to these systems:

(1) Customer Information System (CIS). The system provides a geographic component for billing and outage reports.

(2) Asset Management System for oil-filled equipment. This system has been moved to an Indus Passport work management system, which links to the GIS.

(3) Non-metered service (NMS) and street light database. The system is used to maintain accurate billing and location information for several metropolitan areas, including over 150,000 facilities in the Denver metro area.

(4) Outage Management System. PSCo has installed GE Smallworld's PowerOn™ product, which allows the utility to automate its emergency response system. The system offers IVR (interactive voice response), allowing verification that outages were fixed, and analysis. All 35 of PSCo's trouble trucks have MDTs (mobile data terminals) installed, allowing them to provide technicians with current operating information out in the field.

(5) Construction Activity Tracking System (CATS). Through this system, all gas and electric work orders are tracked.

(6) The State's "call before you dig" entity. The basis for locating PSCo facilities is the GIS.

(7) Work Order Design and Engineering. Cook Hurlbert's (Austin, Texas) CH-Expert Designer tool is used to estimate project costs, generate a materials list and conduct what-if scenarios.

(8) Network Analysis and Planning. The utility uses an electric analysis tool from Stoner & Associates (Houston, Texas) with the GIS to plan for growth.

CIS System and GE Smallworld's PowerOn

PSCo was the first utility in North America to automate its emergency response system with PowerOn. Implemented in December of 1998, the software links to PSCo's Customer Call Center. PowerOn allows them to geo-locate customers through their GIS file tie with the customer information system. The system is quite effective. For example, when a customer calls in with an outage, the software allows the dispatchers to quickly display a geo-referenced map of the customer's location, perform an analysis of the potential problem, submit a work order to correct it, and relay the potential length of the outage back to the customer.

Cooperation with Municipalities

Coordination with municipalities and city departments has proven beneficial for PSCo. A good example of this is their interaction with the Colorado Department of Transportation. "For example, when the DOT is going to be conducting work in a particular area, such as digging up a street and repaving it," notes Rick Goodwin, Manager of Energy Services Support at PSCo, "We use our GE Smallworld system to locate and analyze equipment in that area for replacement purposes and future scheduled work. By coordinating our engineering and maintenance functions in this way, we minimize inconvenience to our customers."

"We also have used the system to notify customers should there be an outage due to construction," continues Goodwin. "We developed a query system utilizing polygon technology that allowed corporate representatives to generate mailing labels and send out form letters."

Business Planning and Decision-Making

The GIS provides important input to PSCo's business decision process. It allows them to be proactive. For example, they can use it to run operational efficiency studies, allowing them to better maintain current facilities and plan for future growth. They can make informed decisions on where to geographically position new facilities and service centers. Typical scenarios include:

- Tagging cables that have failed. Reliability uses these flags to conduct predictive cable failure analysis to identify potential failure areas. These are the cables they will work on replacing next.

- Growth trends are analyzed. For example, PSCo can run queries to look at dates of meter installation and replacement, and look at demographics. They want to be located where growth is and where their customers are. They look at growth patterns and work with their internal marketing research group to help understand where the demographics are actually shifting. This helps them ensure their service centers are situated in the most appropriate locations.

- Ad hoc queries from other departments. For example, they can look at distribution facilities by dates, identifying older equipment that is likely to need replacement in the near future. They can then perform analysis on the costs to replace them.

Xcel Energy

> "We developed a query system utilizing polygon technology within the GIS that allowed corporate representatives to generate mailing labels and send out form letters."

Rick Goodwin, Manager of Energy Services Support at PSCo

Rick Goodwin and Peter Gomez

- Tree trimming plans. The system allows them to maintain their tree trimming schedules by feeder route.

Looking to the Future – GE Smallworld Internet Application Server

PSCo plans to implement GE Smallworld's Internet Application Server, a recently released product for enabling companies to access GE Smallworld Spatial data over the internet, reducing licensing costs and increasing data availability to 24 hours a day. PSCo construction offices will then have access to the system at night, or during storms, on a 24x7 basis.

Gomez and Goodwin are constantly coming up with new ideas for leveraging the information stored within the GE Smallworld system. Their goal is to continue automating as many manual systems as possible at PSCo, and thus add to the cost benefits already recognized through the network management system. Their view is that using the same toolkit across the utility will inevitably result in cost savings and increased efficiency.