Energy Currents

ESRI • Winter 2008 GIS for Energy

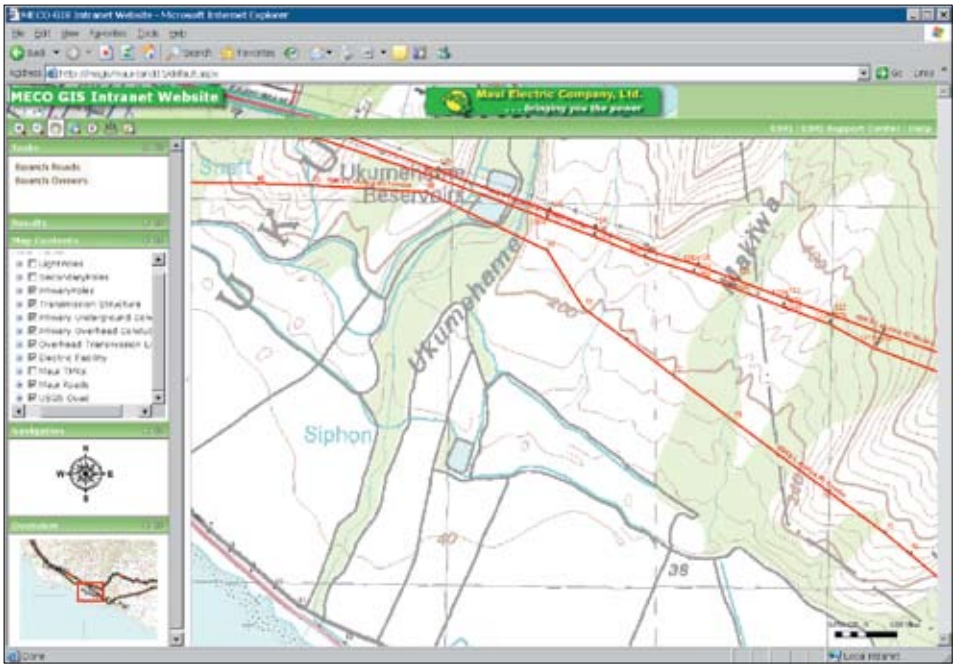
Web App. Design Is a Breeze for Island Utility

Maui Electric Company

Maui Electric Company, Limited (MECO), is using server-based geographic information system (GIS) technology, ArcGIS Server, to deliver applications for many people to use throughout the company. With support from Information Services supervisors, MECO's GIS shop implemented the in-house, online system and was soon delivering GIS applications and data to utility workers throughout the company, giving the company enterprise-wide access for use in daily routines as well as specialized analysis.

MECO's GIS assessment criteria included (1) functionality, (2) scalability, and (3) ease of use. Projects had to be manageable by the company's one-person GIS shop. This person needed a system that made it possible to create quality deliverables straight out of the box. For these reasons, MECO selected ArcGIS software. Initially, product outputs would include quality hard-copy maps showing MECO's transmission and distribution (T&D) systems and their relation to the surrounding geography. The application also needed to consolidate various available data sources.

In 2006, Eric Abe, MECO's GIS administrator, began using ArcGIS 9.1 to combine various types of data such as GPS-collected pole locations, county parcel information, county road information, CAD drawings, and aerial raster imagery. "The ArcGIS Desktop platform gave me the ability to take disparate pieces of spatial data and link and relate them geographically," said Abe. "I also used ArcGIS Desktop energy utilities data models that were available for download. These models provided a template in which I could store information about our T&D assets, which gave me a quick start in developing our geodatabases."



Using a browser, MECO field personnel access asset data about facilities along a transmission corridor.

Using the desktop implementation, Abe produced high-quality maps. These GIS maps helped staff in the Engineering and Operations departments visualize MECO's T&D assets and make better and faster decisions for designing and operating the system. The maps also helped MECO communicate better with customers and the community about future developments and improvements to the company's infrastructure.

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In This Issue

ESRI on the Road

Geospatial Information & Technology Association
March 9–12, 2008
Seattle, Washington
www.gita.org

ESRI Developer Summit
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Palm Springs, California
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Asia Power & Energy Congress
April 1–3, 2008
Singapore
www.terrapinn.com/2008/asiapower

UTC Telecom
May 4–7, 2008
Orlando, Florida
utctelecom2008.utc.org

PowerGrid Europe
June 3–5, 2008
Milan, Italy
pgrid08.events.pennet.com

APPA 2008 Public Power Expo
June 21–25, 2008
New Orleans, Louisiana
www.appanet.org/events

IRWA Annual International Education Conference
June 22–25, 2008
Austin, Texas
www.irwa74austin.org/events

Milsoft Users Conference
June 25–27, 2008
Orlando, Florida
www.milsoft.com/events.php

GovEnergy 2008
August 3–5, 2008
Phoenix, Arizona
www.govenergy.com

2008 ESRI International User Conference
August 4–8, 2008
San Diego, California
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2008 Electric and Gas User Group (EGUG) Conference
October 20–23, 2008
Indian Wells, California
www.esri.com/egug

To register for ESRI events, visit **www.esri.com/events**.

ArcGIS for AutoCAD Redefines Interoperability

For the first time, computer-aided design (CAD) users will have a simple way to connect to GIS enterprise data. They will benefit from the results of GIS analysis through georeferenced cartographic products inside AutoCAD's editing environment for context and reference without the complexities of conversion and translation.

CAD users can now leverage ArcGIS Server capabilities from within the AutoCAD application. ArcGIS for AutoCAD is a free AutoCAD application that allows CAD software users to visualize and query GIS information within the CAD environment without conversion. ArcGIS for AutoCAD accesses dynamic, georeferenced ArcGIS Server map services and displays them in the AutoCAD drafting environment.

The map service metadata is accessible in the standard AutoCAD Properties window, and the map feature attributes can be viewed via the Identify tool. All vector, raster, and imagery formats that ArcGIS Server supports can be viewed in the CAD environment.

With ArcGIS for AutoCAD, CAD users can

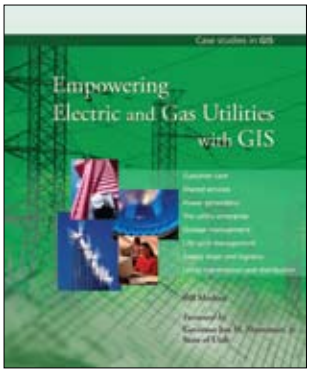
- Dynamically interact with live GIS maps, including GIS symbology and data structures, in CAD.
- Include the results of GIS analysis (performed by the GIS professional) in their CAD designs.
- Include GIS basemaps in their CAD products.

ArcGIS for AutoCAD requires ArcGIS Server 9.2 and AutoCAD 2007. The ArcGIS for AutoCAD download is now available. Visit www.esri.com/autocadapp for more information.

Gartner Gives ESRI's Products Good Review

ESRI received a rating of Positive in a recent report from Gartner, Inc., the leading provider of research and analysis on the global information technology industry. The report, *MarketScope for Energy and Utility Geographic Information Systems, 2H07*, by Bradley Williams and Jeff Vining and published October 17, 2007, was created for energy and utility customers so they may have a better understanding of the most appropriate GIS software products available on the market. This is the first publication of the report, which will be published annually. In 2007, ESRI made remarkable growth in the electric and gas markets as many companies turned to GIS integration and applications for smart grid management.

Enterprise GIS transforms information technologies for utilities. *Empowering Electric and Gas Utilities with GIS* is an easy-to-read book that presents scenarios and real-world case studies in a narrative illustrating how electric providers use GIS to improve operations, customer service, and business practices.



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ESRI Joins GridWise Alliance to Meet Electric Industry Challenges

To meet its goal of supporting developing technologies for the nation's energy system, ESRI has become a member of GridWise Alliance. ESRI will work with other GridWise Alliance shareholders to advocate change and promote new policies and technological solutions.

Founded in 2003, the GridWise Alliance is a consortium of public and private stakeholders who seek to integrate infrastructure, process, and information that supports efficient and cost-effective energy systems. GIS is listed among emerging technologies for integrating core business systems. GridWise Alliance members recognize that rising information technologies have the potential to radically improve the efficient use of energy among electric and transmission organizations.

"ESRI has been a strong supporter of integrated infrastructures in both its product design and advocacy efforts for standards and interoperability," says ESRI president Jack Dangermond. "We believe in the GridWise mission and look forward to working with members to advance technological solutions for the electric industry."

Gridwise Alliance chairman Guido Bartels notes, "The GridWise Alliance seeks to help the electric power industry achieve significant progress for developing energy reliability and protection of our nation's power infrastructure. This will ultimately lead to billions of dollars in cost savings and an increase in national competitiveness." The GridWise Alliance has developed a comprehensive action plan that "identifies challenges facing the electricity industry and proposes goals and actions to move the industry to the electric power grid of the 21st century."

"ESRI has aligned its products with other core information system technologies, thereby bringing asset management to a whole new level," says Bill Meehan, ESRI's director of utility solutions. "The system of the 21st century has the capability of producing modeling for risk management, customer analytics and behavior analysis, and work processes. Integration scenarios go far beyond traditional asset management. They also include real estate, environmental health and safety, project networks, inventory management, CRM [customer relationship management] and call center advancements, and more. By working with GridWise partners, we hope to revolutionize the way power companies do business, a way that optimizes the use of power resource and delivery systems."

Learn more about the GridWise Alliance at www.gridwise.org.

Join ESRI and Transform Your Future

Are you looking for a career where you can apply your industry expertise in a new, exciting way? Join ESRI's utility team of sales, marketing, consulting, and project management experts. We are looking for talented professionals to share their industry knowledge, experience, and perspectives in these challenging roles:

- Utilities Account Executives
- Utility Technical Marketing Analyst
- Electric and Gas Industry Manager
- Consultant/Project Manager–Energy

Learn more about career opportunities with our utility team and apply online at www.esri.com/utilitycareers.

2007 EGUG Conference in Review

Nashville, Tennessee, was map happy when GIS users from the gas and electric industry got together at the fall Electric and Gas User Group (EGUG) Conference in October 2007. They came to learn about the latest trends in utility information systems and the move to smart grid technologies that are revolutionizing the way power companies around the world are doing business.

Hosted by Nashville Electric Service (NES) and sponsored by 14 ESRI business partners, the conference facilitated an environment of camaraderie and shared knowledge about best practices and successful applications for GIS. Exhibitors catering to the specific geospatial information needs of the utility industry were on hand to demonstrate long-standing and innovative technological applications, tools, and gadgetry for streamlining work processes in the office and in the field. Most important were the more than 400 attendees representing 119 utilities from around the world. They presented 35 papers and participated in panel discussions, workshops, and data model consortiums.

People from ESRI's utility management group, development team, and technical support staff were also on hand. They discussed new concepts, provided demonstrations of ArcGIS products in an electric and gas context, participated in panels and workshops, and talked one-on-one with conference attendees.

Michael Buri of NES, Tennessee, chaired this year's conference. "This has been the largest turnout for an EGUG Conference yet," noted Buri. "People truly appreciated the venue that made it easy to meet and network. NES was very happy to be able to host this year's event. One of the most impressive talks for me was the intelligent grid presentation, a concept which is shaping the vision for the entire utility industry worldwide. We all need to focus on this issue as we tackle critical related concerns such as security. EGUG is a wonderful place for people to gather and discuss these important topics."

EGUG president Larry Wilke of Burbank Water and Power, California, said, "The EGUG Conference is the most valuable industry meeting for me because it focuses specifically on my business needs. Whether it is talking with other users, asking ESRI technologists specific

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In addition, Southern California Public Power Authority will provide a representative for the fall 2008 conference.

EGUG Keynote Highlights

Smart Grid Technology Directs Future for Utilities

Smart grid technology seized the spotlight at this year's ESRI Electric and Gas User Group (EGUG) Conference. Keynote speakers suggested that the smart grid concept is the foundation for a new era of power system management. Moreover, they described how GIS technology is an essential component of this transformation technology.

The EGUG Conference was hosted by Nashville Electric Service (NES). The company's vice president of operations (engineering), Paul H. Allen, delivered the keynote address in which he explained many of the GIS applications being used in the company's enterprise system. He described cost-efficient benefits, such as how GIS has improved the company's outage management system, which has reduced outage durations by approximately half. He discussed the integration of automated vehicle location routing GIS applications that deliver real-time fleet management data, which also has resulted in significant savings in manhours and field costs for NES.

A second keynote speaker was CenterPoint Energy's GIS manager, Cindi Salas, who explained how her company is changing its approach in serving its approximately three million electric and natural gas customers in the Greater Houston metropolitan area. Salas noted that CenterPoint Energy is nearing completion of a limited deployment designed to test the effectiveness of smart grid technology. The company has been pleased with the results and is nearly ready to file a deployment plan with the Texas utility commission to seek approval for widespread implementation of the technology.

Salas stated, "The smart grid concept is a transformation opportunity for the industry. Individual utilities cannot opt out and still achieve the level of transformation required. Consumer demand for more reliable and faster response, improved performance, and better costs has driven CenterPoint Energy to adopt technologies that will help satisfy a full spectrum of communication needs. GIS technology will play a key role in the automation strategy in that it will provide the initial infrastructure data that will fuel the automated analytics. In addition, the results of analytics on the intelligent grid are best presented in

questions, or participating in the data model workshop, the conference has something for everyone on every level."

Conference attendee Allen Cousins, senior GIS analyst at Avista Utilities, said, "EGUG's electric and gas focus makes it one conference that I really look forward to attending because I can take the information back home and use it."

The 2007 EGUG PowerPoint presentations are now available online. You can also get information about the 2008 EGUG Conference in Indian Wells, California. The event will be hosted by the Southern California Public Power Authority. Save the date, October 20–23. Visit the EGUG Web site at www.esri.com/egug.

a geographic dimension."

In a video address to attendees, ESRI president Jack Dangermond spoke about the GIS trends utilities are implementing that support the smart grid concept. "ArcGIS Server, with intelligent technology standards for interoperability, leads to faster and improved performance needed for dynamic data representations," Dangermond explained. "This enables transitions from a static to a real-time environment that incorporates many different types of data. For example, weather information, truck tracking, and sensor device information can be quickly brought into an application with the smart grid to model the service network. This is changing the way utilities monitor their grids and manage their businesses."

"The utility of the future requires more than progress; it requires change," concluded Bill Meehan, ESRI's director of utility solutions. "GIS is breakthrough technology. It is integral to the call center for directing customer service, foundational for advanced metering systems, and essential for decision support."

Continued from page 1

Web App. Design Is a Breeze for Island Utility

Seeing how GIS benefited the enterprise, Abe decided to take the next step: share information through a Web browser. This meant implementing an internal Web application for the company. During this time, ESRI was releasing ArcGIS 9.2, an upgrade of its software that included a strong server GIS component. It would allow MECO staff to distribute maps, models, and tools that would fit into their workflows. Office and field employees would be able to query accurate, up-to-date data with minimal training.

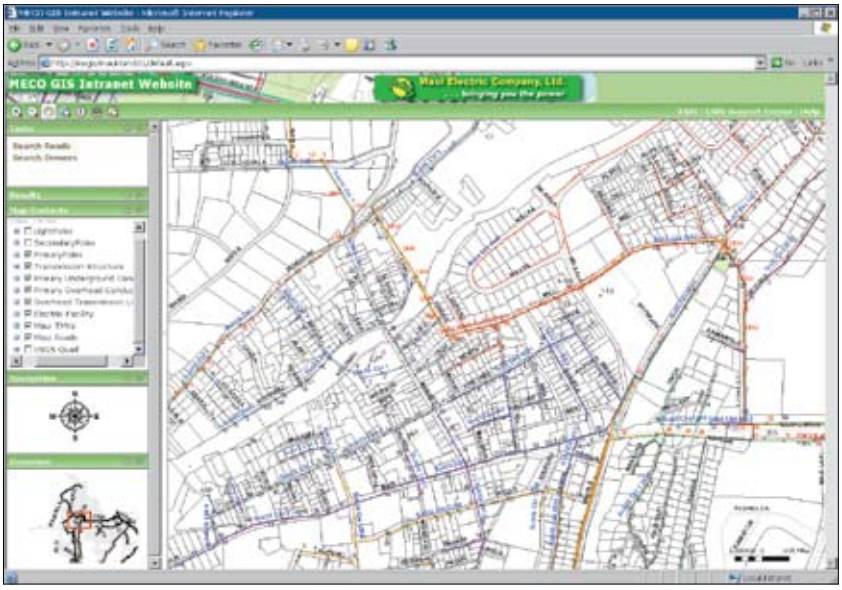
"I participated in several online ESRI seminars demonstrating the new capabilities of ArcGIS Server 9.2, and it piqued my interest," said Abe. By the beginning of 2007, MECO was using ArcGIS 9.2 on its desktop and server. "I was amazed at the ease with which I could create a Web mapping application on the 9.2 platform."

Using his basic knowledge of Microsoft Windows Server, Microsoft Internet Information Server (IIS), and Microsoft ASP.NET, Abe created an application for sharing mapped assets information on the company's intranet. He commented, "I like delivering applications through the Web browser because it eliminates the need to install client software. The user just needs to point the browser to a particular URL and is instantly connected to the map."

Using an application wizard, Abe created a simple mapping application in which, after taking a 15-minute training session, users could navigate through maps and data. He also customized the application to add a search-and-query capability for the underlying parcel and road GIS data.

Following the initial implementation of ArcGIS Server, the potential scalability of the product for storing and sharing GIS data within the enterprise was obvious. Abe explained, "MECO took a systematic approach in selecting a product and developing the deliverables in this pilot phase of our GIS. ArcGIS has worked out as the ideal solution. When I took on this project, I knew very little about GIS, but with ESRI training and support, I feel that we have made considerable progress in getting our facilities mapped. ESRI's Honolulu office, as well as ESRI's utility and tech support staff, have been instrumental in our success to this point. I know that ESRI has some very large electric customers, but they treat me as though I am just as important as the big guys."

MECO serves approximately 65,000 customers on the three islands that make up the County of Maui (Maui, Molokai, and Lanai) in the state of Hawaii and is a wholly owned subsidiary of Hawaiian Electric Company, a public utility.



Parcel information and circuitry map is served on MECO's GIS intranet Web site.

Utility Saves Costs of Call-before-You-Dig Program

PPL Electric Utilities

Like the roots of a forest, a nation's underground infrastructure supports its human landscape. Careless digging poses a threat to underground facilities and to people. Most states have established "one-call centers," which ensure damage prevention and increase excavation safety. Moreover, these states have made it the law for excavators to notify the system about their projects and for underground facility managers to confirm that the ground is free of assets before work begins. GIS is making it easier for excavator, facility manager, and enforcing agency to provide accurate data and to cut safety costs for compliance.

The Pennsylvania Underground Utility Line Protection law requires that all facility owners in the state locate their underground facilities within two full working days after receipt of a timely notification of excavation from Pennsylvania's One Call Inc. system.

PPL Electric Utilities, which provides electric service to 1.4 million customers in eastern and central Pennsylvania, recently upgraded its response capability by implementing an extract-and-upload process to Pennsylvania One Call's PHOENIX mapping system. The PHOENIX program screens all PPL Electric Utilities' one-call tickets and only forwards those that are within the buffered area where the utility has underground cables. Prior to the PHOENIX mapping program, all locate tickets within the PPL service territory required a site visit, even if no underground facilities were present. The system has been in place for one year, and PPL is seeing about a 22 percent reduction in the total number of locate requests that require site visits.

PPL Electric Utilities' primary concern is the safety of contractors and the public. Protecting underground cables from dig-ins is a significant responsibility for the company, which receives more than 130,000 cable location requests annually. The number of One Call requests has been increasing by about 8 percent per year. By using GIS data through the PHOENIX program, PPL Electric Utilities has saved thousands of unnecessary trips to the field where underground cables are not present, and has provided workers with more time to perform locates where underground cables are present.

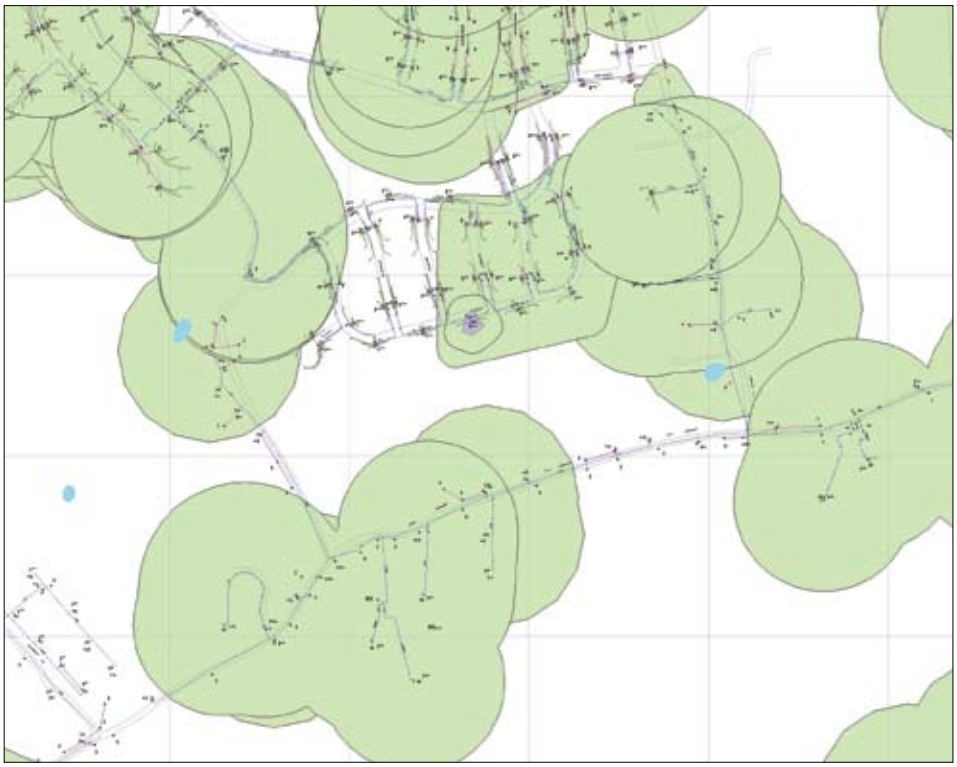
The challenge for PPL Electric Utilities was to develop a mapping process that would superimpose internal maps and objects onto a GIS system. Using ESRI's ArcGIS software, the company's technology support center created maps that showed the underground facilities and overhead transformers that included underground services, then placed buffers around those facilities according to the high-consequence area regulation standards.

To ensure accuracy, PPL Electric Utilities tested the credibility of the new process. Service coordinators were sent into the field to verify buffer accuracy in both urban and rural areas. The data was accurate, so maps were made for all areas served by the utility.

PPL Electric Utilities sent its underground facilities map with buffers to the Pennsylvania One Call System. When the system receives a notice of excavation, it checks the location against the map. If the excavator is digging inside a buffer zone, PPL Electric Utilities receives a request to mark the underground cable location. If the digging is outside a buffer zone, Pennsylvania One Call clears the job.

After one full year in operation, PPL Electric Utilities is very pleased with the results. One of the most important factors in the success of this program is the weekly uploading of data by the Technology Support Group at PPL. Updated buffers that are sent to Pennsylvania One Call go into effect the next business day. A sampling of cleared tickets is regularly field tested to ensure data precision. The result is more accurate data for both state and company systems.

Thanks to Kevin Ruggiero, PPL's consultant in Technology Support, for providing information for this article.



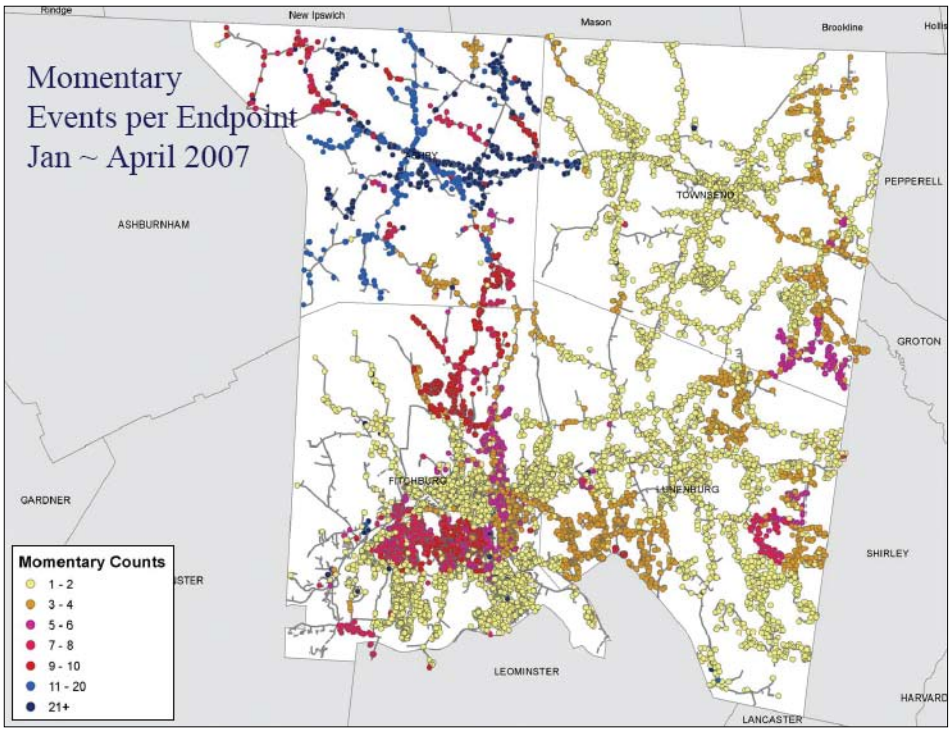
Underground facilities map shows buffers around dig requests that indicate if facilities are at risk and need to be staked.

Advanced Metering Infrastructure and GIS Generate Big Savings for Unitil

Advanced metering infrastructure (AMI) technology, combined with GIS software, has significantly cut operating costs for meter reading at Unitil's distribution operating subsidiaries in Massachusetts and New Hampshire. ESRI's ArcGIS has given the utility greater insight about the behavior of its customers, the integrity of its system, and the direction it should take for improved performance.

Unitil's AMI incorporates ArcGIS to process data captured from a bidirectional advanced metering system as well as data accessed from the customer information system (CIS). Based on the first year's success, Unitil anticipates a payback within five years in labor savings and process efficiencies.

In 2004, Unitil migrated from a CAD-based mapping system to ArcGIS with Telvent Miner & Miner's ArcFM software for asset management. Recently, the integration of GIS with AMI has extended the value of GIS for the company. "Suddenly, GIS became more to our people than making pretty maps," explains Beth Picardi, Unitil's GIS analyst. "The primary objective of the AMI project was to automate meter reading. In addition to those savings, we have gained a wealth of data on system performance that can be leveraged by integrating AMI with ArcGIS and other company enterprise systems."



Automated meter reading-GIS integration shows service interruptions.

In 2007, Unitil deployed a systemwide gas and electric AMI for 115,000 customers. Meters were retrofitted with endpoints from Hunt Technologies, LLC, which used power line carrier, fixed-network technology to monitor and receive daily usage data. AMI data layers are created by combining data from Unitil's CIS database with GPS meter coordinates. This information is the basis for a variety of analysis useful to engineering and operations within the company.

"Viewing this data in GIS has led to an intuitive understanding of system performance," notes Picardi. "Meters reporting a loss of communication have allowed us to research and better understand the need for an outage management system and how AMI can augment it. In addition to outages, GIS allows us to visualize momentary outages, end-of-line voltage readings, and reliability performance metrics directly from AMI."

Unitil continues to find new ways to leverage its AMI data in GIS, giving the company a better understanding of its customer needs and improving its ability to proactively meet those needs. One example is the enhancement of vegetation management strategies by overlaying historical tree trimming data layers with momentary outage data. Soon Unitil will also be able to evaluate the local system benefits of considering various demand-side revenue policies such as time-of-use billing or demand response.

"GIS and AMI integration is making GIS an enterprise solution here at Unitil," concludes Picardi.

Phased Migration from CAD to GIS Maintains Currency, Minimizes Disruption for Georgia Power Company

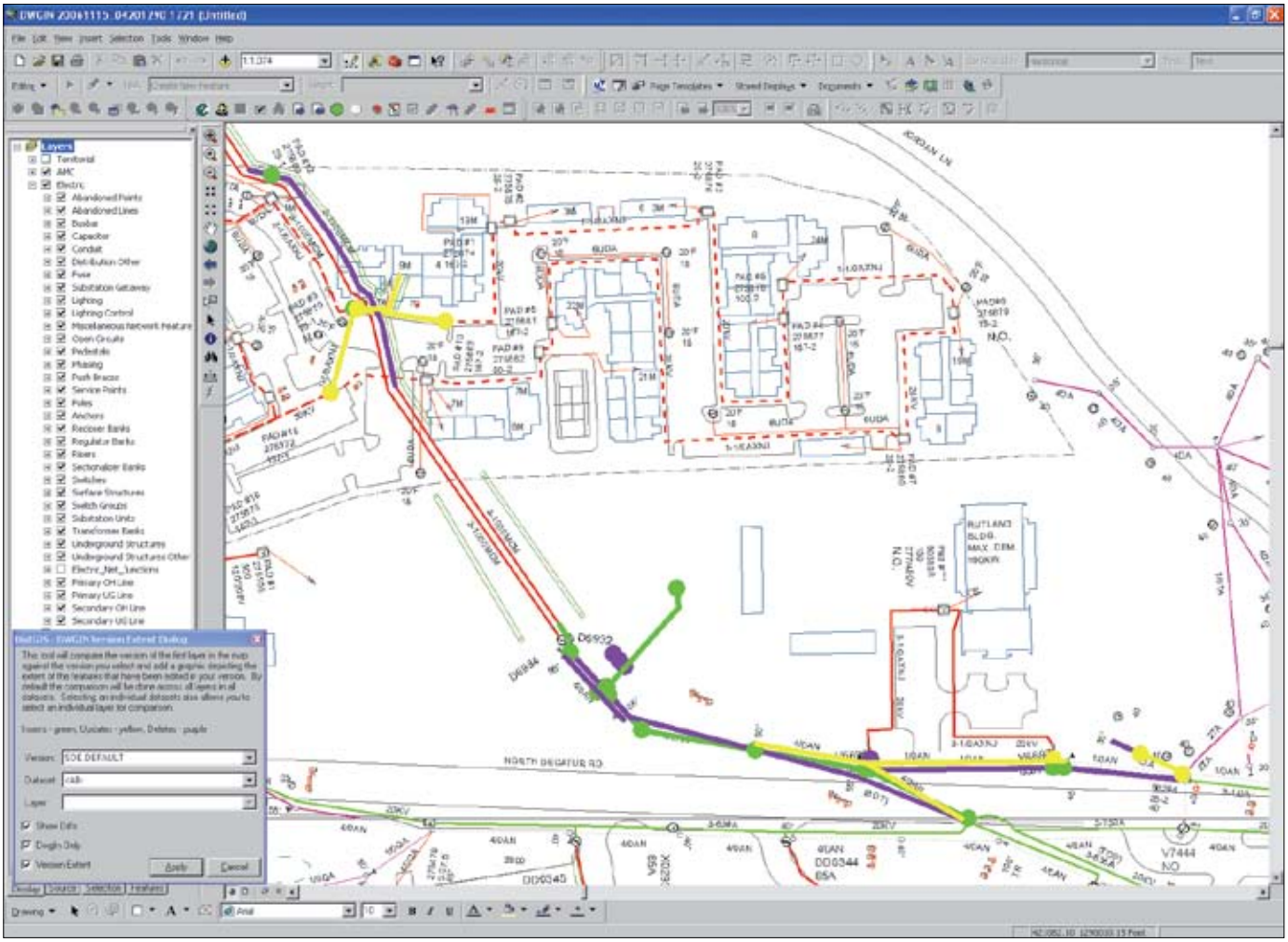
By Rich Faglier, Georgia Power Company, and Faye Hall, Enspiria Solutions, Inc.

When Georgia Power Company and its parent, Southern Company, weighed deployment options for a new enterprise GIS, they decided on a phased implementation. A phased approach meant maintaining two systems, CAD and GIS. However, adequate resources were not available to maintain two systems in a timely fashion. So, in addition to migrating data and implementing a new enterprise GIS with new tools and interfaces, staff embarked on the development of a utility application that would maintain the currency of the GIS data without additional resource requirements. This utility was a data synchronization tool called DWG In.

Georgia Power Company is a regional energy company in the southeastern region of the United States. It provides energy distribution services in 153 of Georgia's 159 counties to more than 2.2 million customers.

Southern Company decided to implement an enterprise GIS based on ArcGIS and ArcSDE, with additional functionality provided through ArcFM and Designer 9.1, two tools from ESRI business partner Telvent Miner & Miner. A new data model would be implemented to address core business needs and facilitate the implementation of new functionality provided by Telvent Miner & Miner's Designer product and ESRI ArcGIS Schematics as well as additional feeder management and tracing tools.

Prior to the enterprise GIS, Georgia Power maintained its spatial data in a customized AutoCAD Map 6 environment and had developed an extensive library of tools, interfaces, and programs based on this platform to meet its operational requirements. These software tools, however, were reaching the end of their life. At the same time, Southern Company was focusing on a single common platform to reduce costs, provide a more robust environment, and support a move to a mobile environment. The need to move to a new platform was evident.



Synchronization tool aids CAD-to-GIS migration process.

Southern Company and Georgia Power enlisted the services of Enspiria Solutions, Inc., a consulting and systems integration firm and ESRI business partner based in Denver, Colorado, to aid in the planning, migration, development, and deployment of an enterprise GIS environment. For Georgia Power, this project included the migration of approximately 120,000 AutoCAD drawings to ArcSDE; the deployment of the populated ArcSDE enterprise database, an ArcGIS environment with custom tools; and the deployment of ArcFM and Designer solutions. Interfaces for supporting outage management, system analysis, customer linking, and a Web-based map-viewing platform would be developed.

The data migration component of the project was to be performed over a 12-month period. Resource levels and the complexity of the environments, interfaces, and tools further extended the amount of time that multiple systems and interfaces would have to be maintained. Once the schedule was finalized, and assuming no delays, there would be more than 18 months between the beginning of data migration and the completion of the rollout of the GIS.

Georgia Power had to address migration concerns. Data migration would take several months, during which data updates would continue in the CAD environment. Also, regions would not be transitioned to the GIS environment until several months after deployment, when the system interfaces were complete. Finally, the data migration investment needed to be protected and the data not allowed to become stale.

To facilitate the transition and address its concerns, Georgia Power analyzed the following alternatives for maintaining the currency of its data:

- Double posting or posting updates to the existing CAD system and the new GIS system
- Posting updates to the GIS, then exporting the changes back to CAD
- Posting changes to CAD and importing the changes into the GIS using a custom tool

After deliberating and carefully considering the impacts of each strategy, it was decided that posting the changes to the CAD environment, then importing the changes into the ArcSDE database, was the best approach. The data synchronization tool DWG In was developed to maintain the data in the GIS based on edits made to the AutoCAD files. Data editors in the 54 regional operating headquarters could maintain the data in the existing environment until they were trained and transitioned to the new GIS tools.

DWG In was developed as an application that could be scheduled and run without user interaction. It compares the latest version of an AutoCAD file to its previous version to determine which features have been inserted, updated, or deleted. To limit the impact on the existing processes and systems, DWG In would be a separate, stand-alone utility that would run at a scheduled frequency. An additional utility was developed that identifies and copies any files that have been modified to a specific directory. Using the changed files, DWG In compares them to another set of files. Once the differences between the two files are detected, the remaining translations between the AutoCAD features and ArcSDE features are performed. The edits are written to a version so users can verify the edits and post them to default.

DWG In was developed in Microsoft's C# programming language using the ArcObjects API, Telvent Miner & Miner API, and the Feature Manipulation Engine (FME) from ESRI business partner Safe Software. The C# application manages the translation of each AutoCAD file and handles any errors raised by the translation process. Due to the relationships between the features, both spatial and attribute data, separate translations are performed so relationships are created correctly. For example, when anchor features that snap to poles are translated, the pole is written to the ArcSDE

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Phased Migration from CAD to GIS Maintains Currency, Minimizes Disruption for Georgia Power Company

database first so an anchor can then snap to it. Based on the features and relationships, DWG In performs four separate translations.

An obstacle in developing the DWG In application was that Safe Software's FME product did not write ArcSDE network features. The Georgia Power data model contained an electric network with many network features maintained in the CAD environment. To work around this, these features were postprocessed using FME to transfer them to a personal geodatabase. A custom tool was then used to move them from the personal geodatabase to the ArcSDE database.

Similarly, ArcFM added extensions to each feature and object class in the data model that allowed custom code and AutoUpdater to be executed whenever a feature or object was modified. The features and objects were written to ArcSDE through the FME translator using the ArcObjects API rather than through the ArcCatalog or ArcMap interface. The Telvent Miner & Miner extensions failed because a Telvent Miner & Miner license had not been appropriately checked out. Initially, a custom FME reader was written to check out a Telvent Miner & Miner license so the reading and writing of the features from the ArcSDE database could occur, invoking an error dialog. However, a Microsoft patch released in July 2006 resulted in the FME translation displaying a memory reference error at the end of every translation. Since DWG In ran as a service, there was no way for a user to respond to the dialog boxes, so DWG In would be on hold until someone cleared the dialog boxes.

In addition, it was not possible to control custom AutoUpdater from within FME readers—they could be disabled and failed to consistently fire. The custom AutoUpdater was not written for execution from a stand-alone application. In many cases, it was assumed that ArcMap would be running when the custom code was executed, but this assumption resulted in, among other issues, error message boxes being displayed. As with the previous license issues, with no user to respond to these error dialog boxes, DWG In would go on hold until someone was able to clear the dialog boxes.

It then was decided that using a postprocessor to move the simple features from a temporary personal geodatabase to the ArcSDE database would help solve many of the issues. An empty personal geodatabase was developed with the same data model as the ArcSDE database except it did not have a network and none of the Telvent Miner & Miner extensions were applied to it. More columns were added to each feature and object class so the postprocessor was aware of the type of transaction to be performed with the feature.

By using the personal geodatabase with a postprocessor, the FME translations no longer required a geodatabase writer to access the database. This allowed the geodatabase reader to be changed to an ArcSDE reader that uses ArcSDE to access the features rather than the ArcObjects API. Because features were now being read from the database, a custom FME reader was not needed and any problems with ArcFM licenses were avoided. As an added bonus, this change resulted in a 66 percent improvement in the performance of DWG In.

Files that had been taking 20 minutes to process were being processed in less than 7 minutes. Another important design consideration was the ability to log inconsistencies or issues so that corrections could be made. With more than 100 feature classes being updated by DWG In based on edits in a relatively forgiving environment, it was possible that a translation could fail due to an invalid data type. Other possible issues arose when people moved or deleted features in the ArcSDE database without realizing the impact of these changes on DWG In.

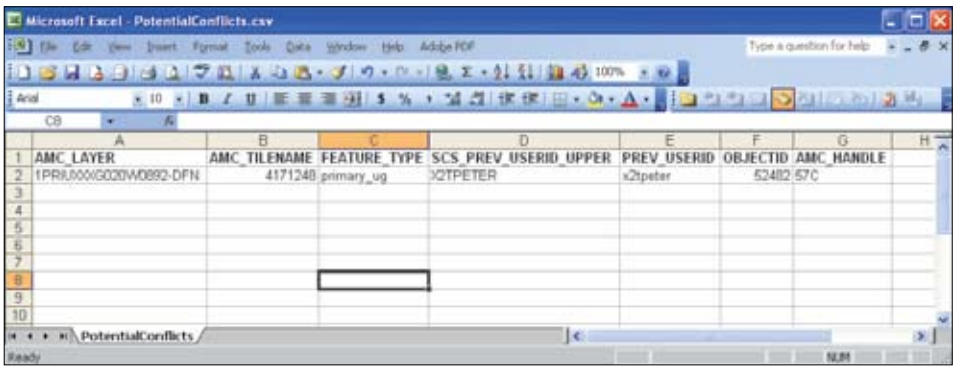
Fortunately, the new data model provided the ability to determine if and when the feature was modified so that potential conflicts could be logged for review. Log files, potential conflict files, failed features, and unmatched shapefiles were created to provide users and administrators with the ability to investigate potential problems and correct issues efficiently.

DWG In was deployed in October 2006 in the Georgia Power production environment only after stringent testing. More than 1,700 versions have been posted to the production database through DWG In. New processes, based on the number of edits, validation tools, and spot checks, have been implemented to ensure data quality.

The DWG In project has been a success. It enabled Georgia Power to maintain the currency of its data in the GIS during the 18-month migration process without the expense of additional resources. Further, DWG In reduces cost and resource impacts that would result from a delay in schedule.

For more information regarding DWG In, contact Faye Hall at fhall@enspiria.com or visit www.enspiria.com.

Learn more about Telvent Miner & Miner at www.miner.com and Safe Software at www.safe.com.

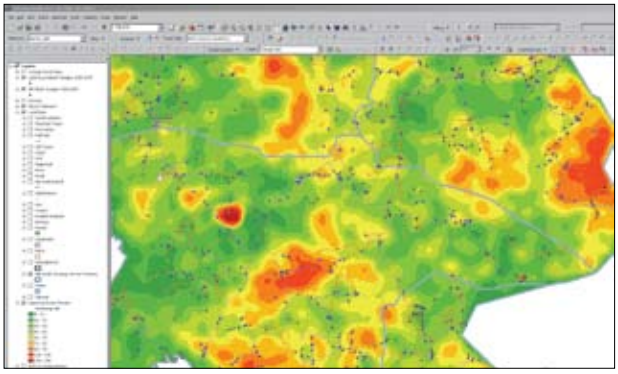


Potential conflicts are automatically logged for review and correction.

Moving from a Simple to Enterprise Mapping System—A Migration Success Story

By Comfort Manyame, Ph.D., GIS Manager, Mid-South Synergy Electric Cooperative

Mid-South Synergy Electric cooperative serves more than 23,000 customers in a service territory that spans six Texas counties (Brazos, Grimes, Madison, Montgomery, Walker, and Waller). In its seven decades since inception, the co-op has endeavored to provide reliable yet affordable electricity. One major step the co-op has taken to develop this mission is to implement an enterprise GIS.



Lightning-density map reveals the hardest-hit areas in relation to electrical assets. This information helps engineers see vulnerable areas in need of lightning arrestors and forecast the likelihood of outages during storms.

Previously, paper maps derived from a CAD mapping system were used for all the co-op's important geospatial functions. Growth within the service area made the CAD-generated paper mapping system inadequate and cumbersome, and the need for GIS was imminent. The co-op sought to centrally manage its data and make it available for a variety of uses by other departments within the organization. Staff experimented with a CAD/GIS connectivity plug-in but found it offered limited opportunities and lacked the myriad of functions a dedicated GIS application provides. A better solution was needed.

To begin its GIS project, Mid-South Synergy initiated a systemwide inventory of all company assets, an exercise that lasted about three years. Early in the project, the co-op's GIS team attempted to maintain GPS data using Microsoft Access and incorporated map data in a convoluted, multistep process that caused delays to system updates. To correct this, the team went on a yearlong search that led to Origin Geosystems' product Origin GIS, which is built on ESRI's ArcGIS software. The co-op immediately purchased one ArcSDE license, one for SQL Server 2003, and two for ArcEditor.

The next step was to convert all CAD data into the GIS format. The co-op hired Electrical Systems Consultants (ESC) from Colorado to make this conversion. At the beginning of the year, the co-op temporarily halted all its system updates and delivered its CAD model to ESC

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Moving from a Simple to Enterprise Mapping System—A Migration Success Story

for conversion. Fortunately, the old model had the ability to export shapefiles, which made the data conversion easier.

Using custom tools, ESC created the necessary geometric network and, by early spring, successfully completed the conversion. The new geodatabase was loaded into ArcSDE. Next, the GIS team resumed all system updates in GIS and spent a few weeks tweaking the geodatabase and implementing interfaces with staking software and the customer information system (CIS). By summer, the GIS was in place and working as expected. It communicated with the CIS and staking software and was exported to an engineering analysis model. Other departments within Mid-South Synergy, such as engineering and customer services, could access and see the co-op's GIS maps via a map viewer from Partner Software. It will not be much longer before ArcGIS Publisher assumes the map publishing tasks.

GIS has improved several of the co-op's operations. For instance, prior to the GIS implementation, updating the system map with GPS data had been a multistep process involving a consultancy firm and a monthly fee of close to $10,000. The new system now makes it possible for the team to do the GPS work and subsequent postprocessing in-house. Bringing the new GPS data into the GIS is an easy, single-step process.

Previously, all as-built features had to be manually drawn on the existing map, obviously resulting in positional error. The automated staking application seamlessly interfaces with GIS and eliminates the task of manually drawing lines and other network features. This means there is no more double data entry or data redundancy, and most of the associated human error is reduced. Staff can easily import plats of new developments into the GIS, facilitating the timely updates and easy management of the land base.

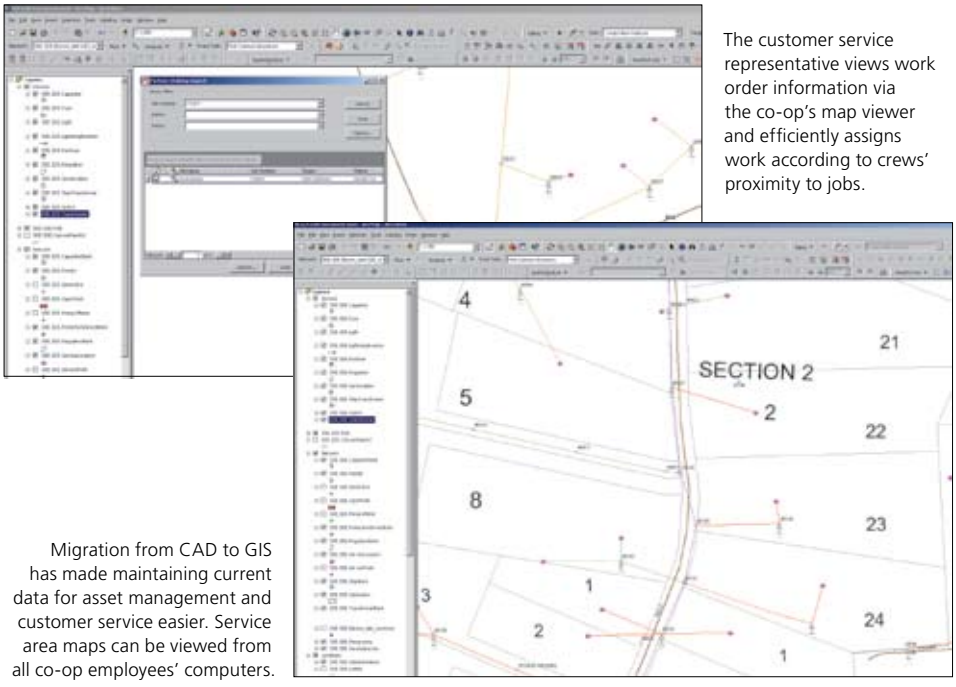
Using an Origin GIS engineering analysis model export plug-in, staff exports system geometric network model data for both the engineering analysis and dispatch outage management system every week. This is a great improvement and ensures that the dispatch department has the most up-to-date model for outage management.

CIS information (customer name, address, telephone numbers, billing and usage information, and connect and disconnect dates) is imported from the CIS into the GIS using an API connection called OLE DB. Previously, this conversion had to be done in multiple steps outside the mapping system. This has proven to be very useful, especially for spatially representing growth in the service territory.

The new GIS technology has been fully embraced by both field-workers and company executives. The co-op's customer representatives use GIS technology every day. Some employees are not aware they are using a robust GIS when they view assets with their map viewers—they do not have to think about how it works. It is simply a tool for getting the job done. The ability for more staff to access valuable data is saving the co-op money and time. For example, all jobs that are ready to be scheduled can be accessed via the system map. If multiple jobs are located in the same area, the responsible customer service representative assigns them to staking technicians working in proximity to those work orders. Previously, a staking technician would most likely drive all over the territory from one job to another. Now the crews can work more efficiently.

Another step Mid-South Synergy's GIS department is taking to improve efficiency and decision making is to use the ArcGIS Spatial Analyst extension for analyzing lightning strike data. Lightning causes approximately 50 percent of all the co-op's power outages. Within the past year, more than 22,000 outages were attributed to lightning strikes. These outages left more than 20,000 customers without power for varying periods of time. High outage incidences translate to high costs for power restoration and therefore justify the need for this study. By bringing lightning strike data from the National Lightning Detection Network into GIS, the team is able to create lightning strike density maps for the co-op's service territory. The main objective of such a study is to establish lightning strike trends. Methodology includes using ESRI's ArcGIS Geostatistical Analyst extension software to analyze at least five years of lightning strike data within the co-op's service area. The outcome of the study will help engineers intelligently decide where to focus lightning outage prevention efforts such as installing lightning arrestors.

Learn more about Origin Geosystems at www.origingis.com.



The customer service representative views work order information via the co-op's map viewer and efficiently assigns work according to crews' proximity to jobs.

Migration from CAD to GIS has made maintaining current data for asset management and customer service easier. Service area maps can be viewed from all co-op employees' computers.

Load Demand Solutions for Mobile GIS Data Distribution

Rappahannock Electric Cooperative

Barbara Shields, ESRI

Rappahannock Electric Cooperative (REC) is able to deliver its full GIS and related data out to its field personnel for faster and better service to its members. Its new mobile GIS delivers applications, electric network data, and application updates to its field crews via a wireless system. Wi-Fi solutions are taxed by dense data and client/server traffic loads. REC worked with consultants to find a solution that not only accommodates current system demands but also presents a foundation for future growth.

In 2006, the cooperative standardized its GIS, which is based on ESRI's platform of GIS software. REC, headquartered in Fredericksburg, Virginia, finds GIS to be an invaluable tool for maintaining nearly 12,000 miles of power lines throughout a service area that includes 100,000 connections in 16 counties, from the Blue Ridge Mountains to the mouth of the Rappahannock River. REC selected Itron's Origin GIS for its utility application and worked with Lockheed Martin (REC's IT and strategic business partner) to integrate GIS and the co-op's outage management system as well as a variety of engineering functions. REC then implemented TC Technology's GIS mobile solution GO! Sync Mapbook throughout the utility's field operations.

Lockheed Martin provides a wide variety of IT solutions to the company, and TC Technology offers a mobile GIS solution based on ESRI technology and data formats. The configuration includes ArcGIS Desktop. REC chose this system because it was simple to deploy and maintain. Just as important, managers thought that field-workers at any stage of aptitude could easily learn and use the system. In addition, the co-op's multiple districts receive online database updates and GIS applications for work processes.

Prior to the mobile solution, REC's field service program had a 50-year history of working with paper maps. One district within the service area had map books weighing up to 30 pounds. Some field crews worked between several districts, so they were carrying two hefty paper map book libraries in the backs of their trucks. While on assignment, the field-worker would pull down the tailgate, prop up the map book, and locate the current job.

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Load Demand Solutions for Mobile GIS Data Distribution

This was particularly challenging when they had to deal with outage work orders during a rainstorm.

REC's goal has been to make its field personnel more efficient with a product that is easy to use and cost-effective. By doing so, management believed that the co-op could serve its customers better and faster. REC chose the GO! Sync Mobile GIS system to wirelessly deliver up-to-date data without complex user interaction to field users throughout the REC service territory. In the initial implementation, 27 service trucks were installed with laptops, quickly followed by 40 more. The goal is to install Panasonic CF30 Toughbooks in all 110 service vehicles.

Maximizing Pipeline Solutions

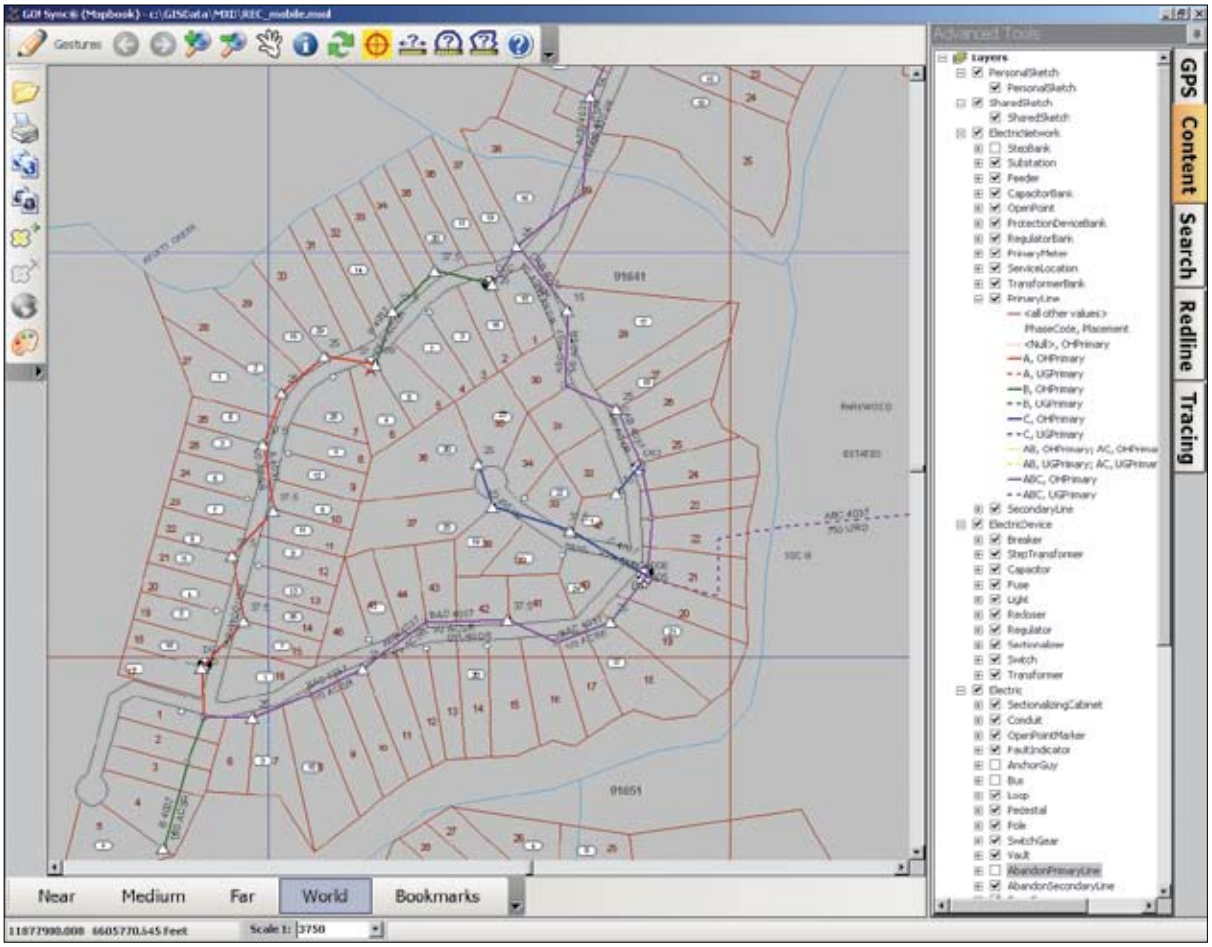
The microwave T-1 broadband communications pipe between REC's four offices is limited, and there is a large amount of data to distribute. TC Technology provided the foundation for the co-op's future initiatives to pull data down, use objects from all applications, and serve data and applications to several client/servers in the service area. Every day, 110 mobile laptops will be accessing the system through the T-1 network and Internet connections for home agents. The main office has to serve up several gigabytes of data through this small communications pipe, and testing revealed that the system would always be overloaded. A revised solution was needed to solve the problem.

Working with TC Technology consultants, Lockheed Martin implemented multiple staging servers, and the data was then distributed from each district office site. The staging server is also able to distribute the application and any updates to the application configuration files. Originally, the T-1 data connection transfer time was between three and four minutes, but the staging solution reduced transfer time to about one minute. An updated dataset is generated every few hours, one in the early morning and a second in the afternoon, to distribute daily changes made in the GIS.

Field users have been put on a regulated download schedule, which has improved the communication traffic. Another traffic management trick is that field-workers who take their trucks home can download data from the staging server using VPN through the Internet.

Data Security Solutions

Even though REC's data is going out via a server across Wi-Fi and LAN lines, the network remains secure. The system access is protected



ArcGIS delivers system data to field-workers. They can see facility information from the substation, locate streets and parcel numbers, and view primary lines color-coded by type and phase. In the field, workers can use applications that are specific to their tasks. Easy access to current data has made this an invaluable tool for REC's crews.

by passwords that change regularly. In addition, the laptops in the trucks are firmly bolted and battened down to protect them from robbery. Finally, the company is using disk encryption software on laptops so that data is secure in the event the laptop is stolen.

Future initiatives were considered when planning the current mobile data system. A network-based intrusion-prevention system (IPS) monitors the network for potential intrusion. IPS units are in place for every substation equipped with a wireless access point across the entire territory. The system is secure for the protection of all data including e-mails, work orders, and applications.

Growing Distribution Network Solutions

Field crews that are normally assigned to a specific operating district may need to travel to other districts in the service territory. When they do, they can reliably download data from that district's staging server. This makes it easy for workers to roam as needed and get the information necessary for that out-of-area job.

In the near future, substations will also be sites that transmit data. Another option is the ArcGIS 9.2 file base geodatabase format that offers functionality for compressing the geodatabase so that it can be served more easily across limited bandwidth connections. This will ensure network availability for use by a wide variety of additional business processes such as outage incident data and work ticket inventories. By monitoring network traffic, Lockheed Martin can evaluate performance during system growth using comparison of usage patterns, capacity, and download demand.

Rappahannock Electric Cooperative purchased servers to put in each district office and WAP (Wireless Access Points) technology in addition to the GO! Sync software. All the while, REC was thinking of the long-term benefits the system would achieve from efficiency and customer service to recuperate these costs.

The co-op's goal for having field-workers adopt the new technology was achieved. Its GIS analyst, Brent Hart, notes, "From a change management standpoint, ease of use combined with value to the user has been a huge asset for us. Our field-workers had been using paper map books for a long time, and some of them were reluctant to join the computer world. However, once we provided them with training and put laptops in their trucks, they readily saw the benefits of this conversion and were very happy with the results. The mobile GIS is really easy for them to use and helps them do their work more efficiently. This was our initial goal. It is the job of the guys in the field to keep the lights on, not to be GIS operators. This GIS tool is one that they have easily learned and are glad to be using."

Learn more about TC Technology at www.tctechnology.com. Learn more about Lockheed Martin at www.lockheedmartin.com. Learn more about Itron at www.itron.com.

Teen Workforce Generates City Revenue with Pole Inventory Project

The City of Safford

Data for this GIS map, which shows city-owned utility poles symbolized by attachment types, was collected by a teenage team in the city youth program (red: cable TV, blue: telephone, green: both).

The City of Safford, Arizona, utility division put teens enrolled in its Summer Youth Program to work capturing GIS data. Teenagers, who love all things techie, happily used GPS to grow the city's GIS database. The utility division put GPS in the hands of these eager workers to capture pole locations and joint use data. This was input into ArcGIS to create maps and reports that earned the city dollars.

Safford's Summer Youth Program was designed to encourage high school students to explore various occupations such as government jobs and engineering. Of the 60 participants, the city's GIS department employed 6 students to perform a variety of geocoding tasks and create maps including those for a utility project.

The outcome was a win-win situation. The youth had an opportunity to work with professionals, have respectable jobs, and get paid. The city had a low-cost workforce and accurate data with metadata attached and was able to increase revenue dollars from joint use rents.

Prior to the inventory, there was controversy between the telecommunications firm and the city about who owned assets, so billing was based on estimated rather than actual data. Revenue returns were much lower than they should have been. Joint use pole attachment rates had not been reviewed since the program's inception, and the city was charging $15 to $18 less than the market rate for attachments. The city's most recent pole inventory was 10 years old, and expansion of the system was not reflected in the pole use invoicing. In addition, there was disagreement about who owned the poles. It was clearly time to make a change. But quality assurance about the data had become an issue. The telecommunications company insisted on a report that included longitude-latitude points to verify the number of poles.

The Bureau of Land Management lent the city GPS units, and the utility division set up an out-of-the-box ArcGIS system to author and publish the data. Engineers remained undecided about using GIS to generate reports, so the department was not ready for a full-blown asset inventory. The success of the joint use project put a happy face on the technology. Raymond Brunner, Safford's GIS administrator, found the revenue-generating program as a means of justifying additional GIS investments for city operations, since revenue gained was a way of offsetting costs of growing the city's GIS.

Skeptics of the program were concerned that because these teens were temporary employees, they would be ambivalent about data accuracy. But they were not. An assignment area for one team would overlap with the assignment area of another and the results of that intersection were compared. The results showed few discrepancies. In this way, the project's manager was able to validate quality. Students looked forward to the daily outdoor work and thrived in a good-natured competition to collect the most accurate data.

"Youth were eager to learn the technology," says Brunner. "It was practically second nature to them. During training, they were zooming ahead of the talk, pushing buttons, and exploring the data. For example, I was explaining a satellite map, but some students had already checked it out 20 minutes earlier. Another advantage of using youth was that the labor costs were at a rate such that we could afford to allow students to make multiple passes to get the information right. We were able to sweep the system, and if we need to go back and do it again next summer, we can afford to do so."

The outcome was an accurate pole inventory that provided the final numbers needed for correctly renegotiating use charges and increasing revenues to the company. The documented count showed an additional 200 poles that had not been included in previous invoicing. GIS made it easy to generate a report that verified this data and cleared up claims of pole ownership. The return on investment more than paid for the project, and teens had an invaluable opportunity to explore career possibilities.

In addition to collecting pole data, the teens helped the city by collecting data about speed limits for a traffic control study. They also went to every building was the city limits and collected its house number to see if the addressing for the buildings was in code violation. That is, if the numbers were too small or not contrasted enough for visibility from the street, they were deemed substandard. Teens also worked to improve street centerlines for addressing and bus routing and collected library patron data to create a library patrons map. At the end of the summer, the youth gave a presentation to the city council to demonstrate the GIS applications and projects they had completed.

Transmission GIS Helps Korea Grow South Asian Power Hub

Korea Electric Power Corporation (KEPCO) plays a key role in the South Korean electric service. The company's workforce totals more than 34,000 employees, and it is one of the most profitable companies in the country. KEPCO has successfully implemented GIS technology to manage its extensive transmission and distribution network more efficiently.

The Korean government regularly issues a long-term power development plan (LPDP) to provide structure and direction for meeting the country's increasing demand for electricity, and the plan is a guide for additional power generation facilities as well as for the expansion of Korea's transmission and distribution network. The new plan projects an increase in the country's power-generating capacity to 88,150 megawatts (Mw) by 2020. Serving a population of nearly 49 million, KEPCO is the only provider of electrical generation and distribution in South Korea.

Because the company's legacy system was text based, KEPCO faced many challenges in managing that information and responding in a timely manner to power outage and other emergencies. As a result, managers researched methods that would bring about a more efficient means of administering its growing collection of spatial data. They chose GIS.

Sundosoft Inc., an affiliated company of ESRI Korea, worked with KEPCO to design and implement a system devised from ESRI's ArcGIS family of software. These professionals designed the Transmission Geographic Information System (TGIS) to manage KEPCO's transmission-related facilities. This system includes a spatial database and related applications that are integrated into all the company's electrical transmission data including maintenance history and available resources. The system has led to greater efficiency and cost savings. The installation included ArcSDE, ArcIMS, ArcInfo, ArcEditor, and ArcGIS Schematics software.

In the first phase of implementation, the existing paper-based facility information was transferred into a digital database. This data was separated into two categories: overhead transmission and underground transmission lines. This spatial database contains a variety of information determined to be critical in the development of TGIS including the country's national basemaps, substation attributes, field information related to individual facilities, transmission network information, maintenance history, and lightning strike data.

In the second phase, a decision support system was developed using the newly created digital database. Facility data from TGIS is extracted and forwarded to KEPCO's enterprise resource planning (ERP) system to better manage the company's business processes and distribute GIS services across the organization.

TGIS is composed of five primary applications for management of basemaps and overhead and underground transmission facilities, system management, and online facility search. The spatial database contains all electrical transmission infrastructure and facilities information including implementation and

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Online GIS helps KEPCO engineers review and analyze operations with information about assets, maintenance history, and inventory.

Underground transmission line location gives detail for compliance with Korean regulations.

Utility Asset Management GIS Built for Growth in the UAE

By Atif Ahmed Karrani, Engineer, Sharjah Electricity and Water Authority

Sharjah Electricity and Water Authority (SEWA) is a government-owned utility agency providing electricity, natural gas, and water services to the communities of Sharjah Emirate, including Sharjah city, Khorfakan, and Kalba, in the United Arab Emirates (UAE). The agency provides electric services to approximately 250,000 customers, water to more than 220,000, and natural gas to approximately 100,000. Other than supplying the three services mentioned above, SEWA founded Sharjah Technical Institute in 1991, which is responsible for imparting technical education pertaining to the generation, transmission, and distribution of utility services. Another major achievement is the founding of Zulal Water Factory, which was established to produce bottled drinking water in different packages as per the most advanced international standards and specifications.

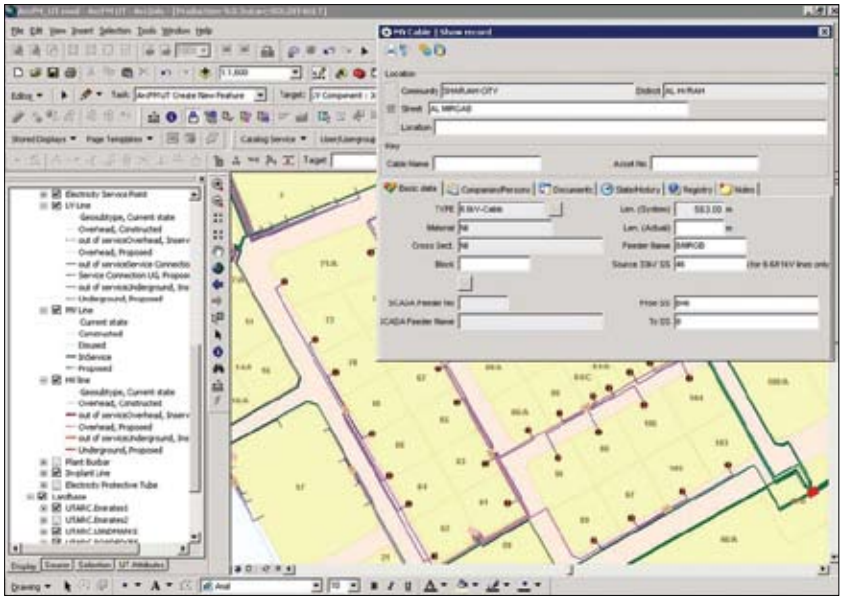
SEWA recently implemented and launched an enterprise-wide asset management GIS solution across the three utilities by using ESRI technologies at the core. The project was implemented as a triparty solution covering customer relationship management (CRM) efforts; GIS; and the Application Integration Solution, which is an addition to the enterprise asset management solution that SEWA had already implemented some years before. GISTEC, the GIS consultant and official local distributor for ESRI, implemented the GIS solution consisting of AED-SICAD's ArcFM UT. Built on ESRI's ArcGIS and Telvent Miner & Miner's ArcFM technologies, the solution provides SEWA with a collection of rich toolsets for the complete management of the utility networks. Furthermore, the Web component of SEWA's GIS solution, based on ESRI's ArcIMS/ArcGIS Server products, disseminates information throughout the enterprise.

Major workflow systems have been integrated with SEWA's GIS for improved systemwide usability. This includes the authority's emergency response system and Network Operation Center (NOC). The government's e-GIS information is also integrated with other systems such as SCADA, for visualizing system performance, and InVinsu Flow, for monitoring natural gas pressure-regulation stations. To improve business operations, the system leverages GIS with the billing database as well as the customer database systems.

The consultant, working together with SEWA's technical staff, analyzed departmental workflows and performed needs assessments to best understand and prioritize the utility's requirements. This resulted in the robust data model for the local utility services, which is based on AED-SICAD's data model for the said utilities. All the existing GIS datasets were migrated to the new ArcFM UT data structure.

SEWA's new and updated centralized GIS warehouse, Web mapping services, and distributed client solution is in place to improve many of the utility's operations including emergency response, connection services for new customers, and a variety of other customer services. With the foundation in place for growing its system, it will not be long before GIS moves into the workspace of many of SEWA's employees.

For more information, contact Eng. Atif Ahmed Karrani at Atif.Karrani@sewa.gov.ae and visit www.sewa.gov.ae/.



Facilities management map created with ArcInfo helps SEWA employees locate lines and see descriptions.

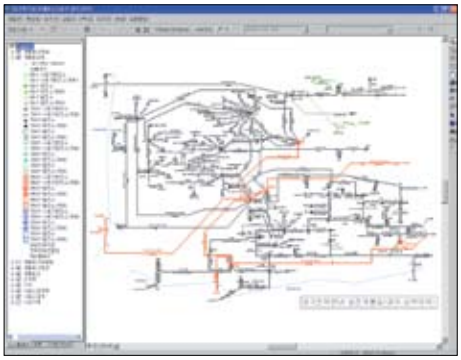
Continued from page 17

Transmission GIS Helps Korea Grow South Asian Power Hub

modification history and connection information. The system also maintains details regarding the availability of nearby resources for maintenance and repair projects. TGIS has facilitated the integration of all KEPCO's transmission-related data, which has led to major cost savings for the company.

TGIS applications are helping the company's managers make much better day-to-day and long-term decisions. For example, they use the system to help them determine when an existing facility should be replaced, what is needed to supply stable electricity to a region, or how many transmission lines will be required in an electrical supply plan. ArcGIS is supplying systematic knowledge, supporting an integrative framework, providing analytic methods, and outputting understandable visualizations about operations.

The Korea Electric Power Data Network, one of KEPCO's subsidiaries, has developed links from TGIS to other systems for facility planning and maintenance as well as construction and operation management. In addition, the spatial database is available to other government agencies for a nationwide geographic information-sharing project.



Schematic map of network lines, substations, and vital asset information helps engineers maintain and build the nation's massive electric system.

A third phase of implementation, still in planning, grows the system into a true enterprise GIS that will meet diverse business and engineering needs now and in the future. The plan includes more integration with management systems, Web-based GIS services, and TGIS data and applications available on the Web via ArcGIS Server technology. The result will be an open, scalable, and standards-based GIS architecture that integrates and leverages existing information technology resources. All staff members needing transmission data will be able to easily find, review, and edit that data from their local computers without the need to install additional software. Senior managers at the company anticipate that the Web-based GIS will lead to significant cost savings and make KEPCO's work processes more efficient and seamless.

TGIS is a key component in managing the transmission facility and has helped KEPCO streamline its business processes by providing more accurate asset and network data; increasing data access; and facilitating analysis, modeling, reporting, better regulatory compliance, and improved customer service.

Jae-ho Park, general manager of the company's transmission division, notes, "TGIS has enabled KEPCO to more efficiently manage its transmission and substation information with the integration of facilities asset data into the GIS, the automation of certain maintenance procedures, and the implementation of a GIS-based site selection process. As a result, the company has been able to save costs and make better and quicker decisions."

GIS and APDM at the Core of Questar's Integrity Management Program

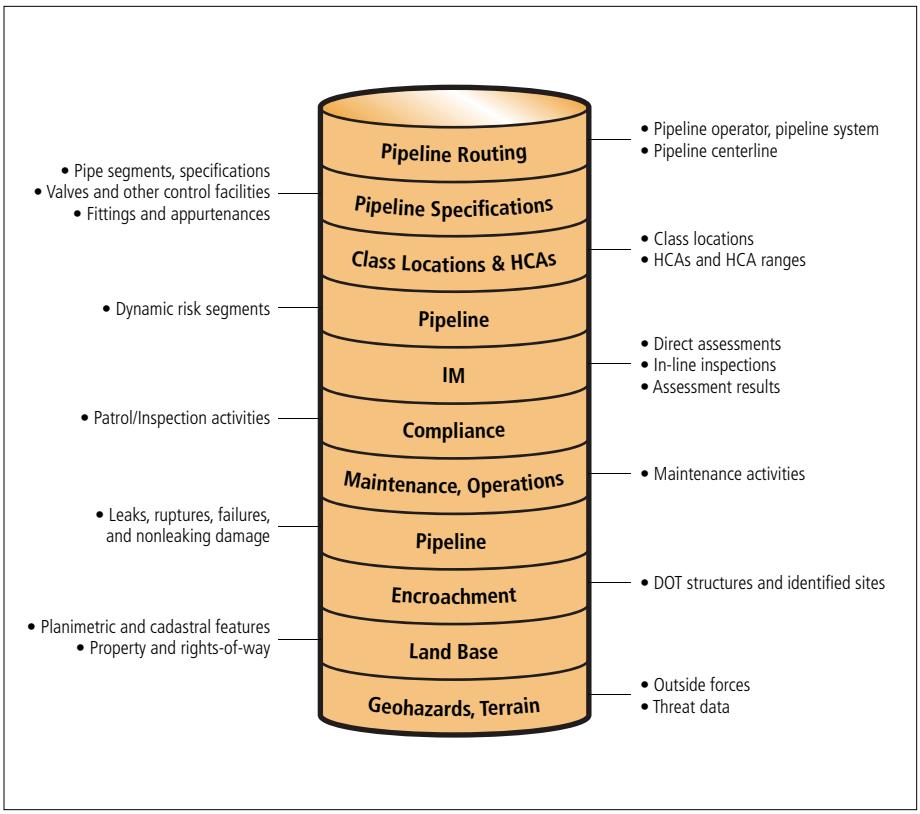
By Mark Warner, Questar

Pipeline titan Questar is required to manage ever-increasing amounts of data about its natural gas pipelines including the threats, risks, and consequences of failure. Managing all this data, providing the analysis tools, complying with regulations, and supporting integrity management are challenges all pipeline companies face. The industry's preferred technology for effectively meeting these goals is a combination of GIS, a robust geodatabase, and specialty software applications designed specifically for pipelines and pipeline corridor maintenance.

Questar Corporation, a natural gas-focused energy company, chose the ArcGIS Pipeline Data Model (APDM) for the blueprint for its core repository of transmission pipeline and integrity data. This repository and the APDM structure allow Questar to easily store, manage, and analyze the data with standard ArcGIS tools as well as those provided in specialty applications.

Using risk algorithms provided by Kiefner & Associates, staff can analyze each potential threat and consequence of failure along its transmission lines utilizing pipeline data from the APDM repository. GIS is used to calculate and determine high-consequence areas (HCA) based on pipeline, structural, and identified site data from APDM.

Questar migrated its transmission pipeline data into APDM and went live with the integrated system in 2005. APDM has proven worthy of handling this data challenge. The model continues to change and improve as experience and industry involvement increase. The APDM technical and steering committees constantly move this model forward to provide a standard industry data template for the pipeline industry. All pipeline operators and other interested parties are invited to join the APDM user group by contacting Rob Brook, ESRI pipeline industry manager (rbrook@esri.com). Learn more at www.esri.com/apdm.



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