GIS conversion improves asset management and system integration

Two small electric utilities approached ESC engineering, Inc. (ESC) to update, expand, and integrate their Geographic Information System (GIS) capabilities. One of these utilities serves approximately 3,000 members in rural counties throughout Wyoming, Nebraska, and South Dakota with nine substations. The other utility serves approximately 3,300 members in northwestern Colorado with twelve substations. An older version of an ESRI GIS platform was being used by one of these utilities. The other utility hosted a GIS database that had been designed and maintained by a third party vendor in an outdated data model that was unsupported in the utilities GIS marketplace.

SUMMARY:

GOALS:

- Design and implement a GIS platform for data management, planning, and analysis
- Develop an electric system database with enhanced Map Viewer capabilities
- Integrate the GIS with other business system applications
- Allow user edits and feedback to be easily updated into the master GIS

SYSTEM COMPONENTS:

- Mobile viewer and simple editor platform
- Mobile computer or tablet hardware
- Cloud-based file transfer for posting data to client machines

HIGHLIGHTS:

- Easy to update and allows for disconnected user input
- Full system GIS maintenance with focus on low cost, efficiency, reduced labor, and faster turnaround

APPLICATION:

Each of these utilities required assistance in upgrading outdated mapping systems for their electric distribution systems, while bridging the gap with existing system applications. The service territories for both utilities were also experiencing increased oil and gas activity which amplified the need to assess load balance and capacity of their electric systems.

ESC was retained to implement a solution using off-the-shelf GIS software, convert and migrate existing data into a newly configured geodatabase, update map viewing with simple editing capabilities, and develop an integrated interface with other business functions. This approach would result in a system that would be more intuitive and allow staff to focus on results, rather than trying to make outdated software work.

REQUIREMENTS:

- Update legacy work orders and make the GIS system current for field operations.
- Facilitate mobile map viewing and lightweight editing environment for desktop and tablet environment.
- Maintain the GIS remotely and allow cloud-based data transfers automatically to each device.
- Provide compliance with iOS tablets and Windows PCs.
- Simplify and enhance map viewing capabilities and user interface for editing.
- Provide network and tracing capability for the GIS system.
- Design the system as MultiSpeak-compliant for ease of integration.
- Meet client data security standards.

CHALLENGES:

The data discovery, update, and conversion phases at both utilities were impeded by limited internal resources and client staff with many other operational demands. The existing GIS and mapping skill sets, data, and workflows were inadequate to properly assess GIS system benefits and operability. The GIS was therefore insufficient to meet project requirements and timelines. Project budgets were also very streamlined and required close monitoring to stay on task and within budget.

Infrastructure constraints in each utility required ESC to provide a broad range of expertise and technical support to each utility's varied business functions to verify data accuracy and relevance from existing system applications. It was also necessary to obtain buy-in from pertinent client staff that were not familiar with a GIS and had to overcome learning curves.

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The process of getting maps up to date was very time consuming. ESC had to manually input into the electric distribution database a backlog of printed staking sheets. Field crews were also disconnected from the GIS since there was no application in place for near real-time or field accessibility.

SOLUTION:

A preliminary investigation with client staff laid the groundwork for converting source features and re-establishing connectivity within the ESRI platform. During this evaluation process, ESC identified the fundamentals of converting features from legacy data to a connected networked model required by ArcGIS and other mapping applications.

ESC developed a data migration specification matrix which identified the general structure of the source data and revealed pertinent details of the data structure and its relationships. The target database was a standard ESRI MultiSpeak-compliant data model that would ensure operability and application compatibility with minimal modifications in converting electric distribution features from existing data, while accounting for data items present in the source data. The new geodatabase platform was ODBC compliant and non-proprietary and would enable a seamless export of the GIS data to Milsoft's WindMil Engineering Analysis application, while minimizing any phasing discrepancies between the billing system and the engineering model.

A native iOS application for map viewing was developed and installed at each utility. This application integrates with the GIS and allows for point annotation in the field when conducting inspections and flagging outages while in disconnect mode. These updates are then synced up with the office GIS once within range of a Wi-Fi or data network. The application is simple in nature and transfers files for update in the GIS once QA/QC has been performed and edits vetted by ESC's GIS Specialists.

GISimply software, a product created by ESC on ESRI technology, was installed at one of the utilities as an automated process to keep the GIS current. *GISimply* provides easy-to-use editing tools, updated system maps, the ability to locate and inspect electric system assets, tabular data entry forms for field data collection, data management to support disconnected editing within an enterprise editing workflow, web services to read and update map applications, and AVL capabilities to track field vehicles. *GISimply* has provided the end users with simple tools to relay changes to ESC, enabling a quick turnaround on edits with the client having no posting or data management on their end to worry about.

ESC provided end-user training, allowing participants to understand the basic functions of the GIS applications. Remote support also addressed any enhancements and questions from each client during the initial stages of deployment and usage. The learning curve was overcome very quickly at both client sites, with immediate usability of the products and quick ownership of the GIS and toolsets.

A maintenance agreement is in place at each utility which entails posting work orders, enhancing geodatabase features, and general map and system updates through automated feedback to ESC. The mobile mapping solution generates faster and more accurate results and feedback, with near real-time system changes and updates.
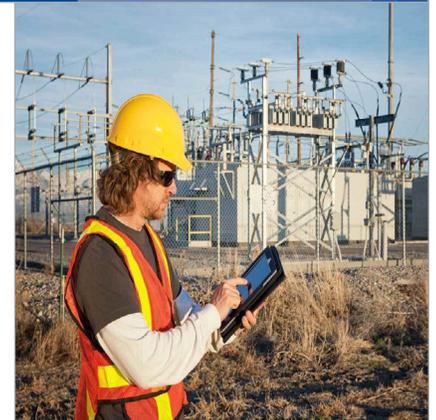
RESULTS:

The GIS software solution has improved individual and strategic decision-making by managing and broadcasting GIS data to all areas of each utility and providing a simple organization-wide solution for accessing important geographic data.

With the new GIS, maps are updated, data is maintained and continuously improved, customized Map Viewers enable direct client feedback, and each utility is able to reconcile against accounting, billing, inventory, and outage data. Customized tools for inputting staking sheets and work orders have also automated and streamlined data entry efforts. The GIS solution has allowed both clients to not burden themselves with additional staff, hardware, and software, and promotes greater ownership to the GIS.

FOLLOW-UP:

Both utilities are pleased with the augmented performance of the new GIS and its integration with other system applications and are exploring additional improvements to enrich their data. As each utility realized the potential for organization-wide system integration with the expanded GIS, they have purchased and implemented applications that would integrate with the GIS (Outage Management, SCADA, Interactive Voice Recognition, and Automated Staking).