

Georgia Power Makes a Smooth Move to GIS*

Utility achieves system migration in 18 months, reducing costs and resource impacts

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What is the best way to move from a legacy computer-aided design system to an enterprise-wide geographic information system (GIS) deployment? When Georgia Power Co. (Atlanta, Georgia, U.S.) and its parent Southern Company (Birmingham, Alabama, U.S.) weighed deployment options, they decided a phased implementation would be the best solution.

A phased approach meant maintaining two systems: a computer-aided design (CAD) system and a 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 application was a data-synchronization tool called DWG In.

DECISION TO MOVE

When Southern Company decided on an enterprise GIS, a new data model was to be put in place to address core business needs and facilitate the implementation of new functionality provided by Telvent Miner & Miner's (Fort Collins, Colorado, U.S.) Designer product, ESRI's (Redlands, California, U.S.) ArcGIS Schematics, and additional feeder management and tracing tools.

Prior to the enterprise GIS, Georgia Power maintained its spatial data in a customized CAD 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 lifetimes.

At the same time, Southern Company was focusing on a single common platform to reduce costs, provide a more robust environment and support the move to mobile applications. The need to move to a new platform was evident.

THE PROCESS

Southern Company and Georgia Power enlisted the services of Enspira Solutions Inc. (Denver, Colorado), a consulting and systems integration firm, 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 CAD 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 would be developed for supporting outage management, system analysis, customer linking and a web-based map-viewing platform.

The data-migration component of the project was to be performed over 12 months. 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 GIS rollout.



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PROJECT CONCERNS

Georgia Power had to address three concerns. Data migration would take several months, during which data updates would continue in the CAD environment. Regions would not be transitioned to the GIS environment until several months after deployment when the system interfaces were complete. During the intervening months, updates would continue in the current CAD environment. 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, and then exporting the changes back to the CAD system; or posting changes to the CAD system and then importing the changes into the GIS using a custom tool.

After deliberating and carefully considering the impacts of each strategy, Georgia Power decided that posting the changes to the CAD environment, then importing those 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 CAD files. Data editors in the utility's 54 regional operating headquarters would maintain the data in the existing environment until they were trained and transitioned to the new GIS tools.

THE SOLUTION

DWG In was developed as an application that could be scheduled and run without user interaction. It compares the latest version of the legacy CAD 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 program 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 CAD file features and the 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, the Telvent Miner & Miner API and the Feature Manipulation Engine (FME) from 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 database first so an anchor can then snap to it. Based on the features and relationships, DWG In performs four separate translations.

EXCEPTION PROCESSING

Another 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 post-processed using FME to transfer them to an



intermediate 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 AutoUpdaters 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.

Since DWG In was a stand-alone application that used Telvent Miner & Miner extensions, the application was required to check out the appropriate licenses from the license manager. Initially, a custom FME Reader was written to check out this license so that the reading and writing of the features from the ArcSDE database could occur. 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 go on hold until someone cleared the dialog boxes.

In addition, it was not possible to control custom AutoUpdaters from within FME Readers — they could not be disabled and failed to consistently fire. The custom AutoUpdaters were not written for execution from a stand-alone application. In many cases, it was assumed that a user would be operating ArcMap when the custom extensions and AutoUpdaters were executed so that, if errors occurred, the user could respond to error messages. Unfortunately, since DWG In was a service that was not run by any user, when the application would display error messages, no response to the messages would occur. Therefore, DWG In would go on hold until someone was able to clear the dialog boxes.

It then was decided that using a post-processor 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 post-processor was aware of the type of transaction to be performed with the feature.

By using the personal geodatabase with a post-processor, the FME translations no longer required a geodatabase writer to access the database. This allows 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% 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 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 for 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 shape files were created to provide users and administrators with the ability to investigate potential problems and correct issues efficiently.

SUCCESS

DWG In was deployed in October 2006 in the Georgia Power production environment only after stringent testing. More than 1700 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 with a delay in schedule.



About the authors

Rich Faglier is a distribution support supervisor at Georgia Power Co. He has been at Georgia Power for more than 25 years. During that time, he has worked in the engineering and test sections at Plant McDonough and has been in the industrial marketing and distribution departments. He moved to the distribution support department, where he works with new technology strategy, development and deployment. Faglier has a BSME degree from Georgia Tech and is a member of both the Society of Mechanical Engineers and GITA.

Faye Hall researches, designs and develops software systems to integrate legacy applications with GIS. Her 10 years of consulting and system integration experience have included utilities and public-sector work. Her background also includes engineering experience in the manufacturing industry as well as software design and development experience in the telecommunications and railway transportation industries. She holds a bachelor's degree in systems design engineering from the University of Waterloo, Canada.