

BIOGRAPHICAL INFORMATION

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GIS Project Lead
Georgia Power Company

Specific Responsibilities

Joined Georgia Power Company in 1980. I am currently responsible for researching and implementing a new Distribution GIS system at my company. Also responsible for coordinating all GIS systems and applications such as web and mobile.

Past Experience

I joined the company as a clerk and have since held a variety of positions including Drafter, Cable Locator, Storekeeper, Information Systems Analyst and Distribution Support Supervisor.

Educational Information

B.S. Business Management – University of Phoenix Online

Professional Memberships

GITA
Society of Women Engineers
Society of Women in Business & Technology

Web-Based GIS

The Easier Solution

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ABSTRACT

Delivering GIS data to all levels of users can be a challenge for any utility. The data is very diverse and the user's skill sets are even more diverse. Recently, we implemented a web application that gives a wide variety of users' access to our distribution facilities data along with links into our customer, transmission, substation, outage management and many other internal and external datasets. Since this application is web based, it is a simple point and click tool that needs little or no end user training, even for the most technically challenged user. Users that previously spent hours searching various applications for individual pieces of data, now have all the data available to them in one place. This saves time, reduces their stress levels, and ultimately makes them more efficient. Currently we have users from departments such as Engineering, Customer Service, Marketing, Information Technologies, Forestry, Operations and Lighting. Our user base has continued to ask for more from this tool which has resulted in additional functionality being implemented on an on-going basis. Our "mini-GIS" will continue to grow as our users continue to show us additional ways the application can help them be more efficient.

Web-based GIS – The Easier Solution

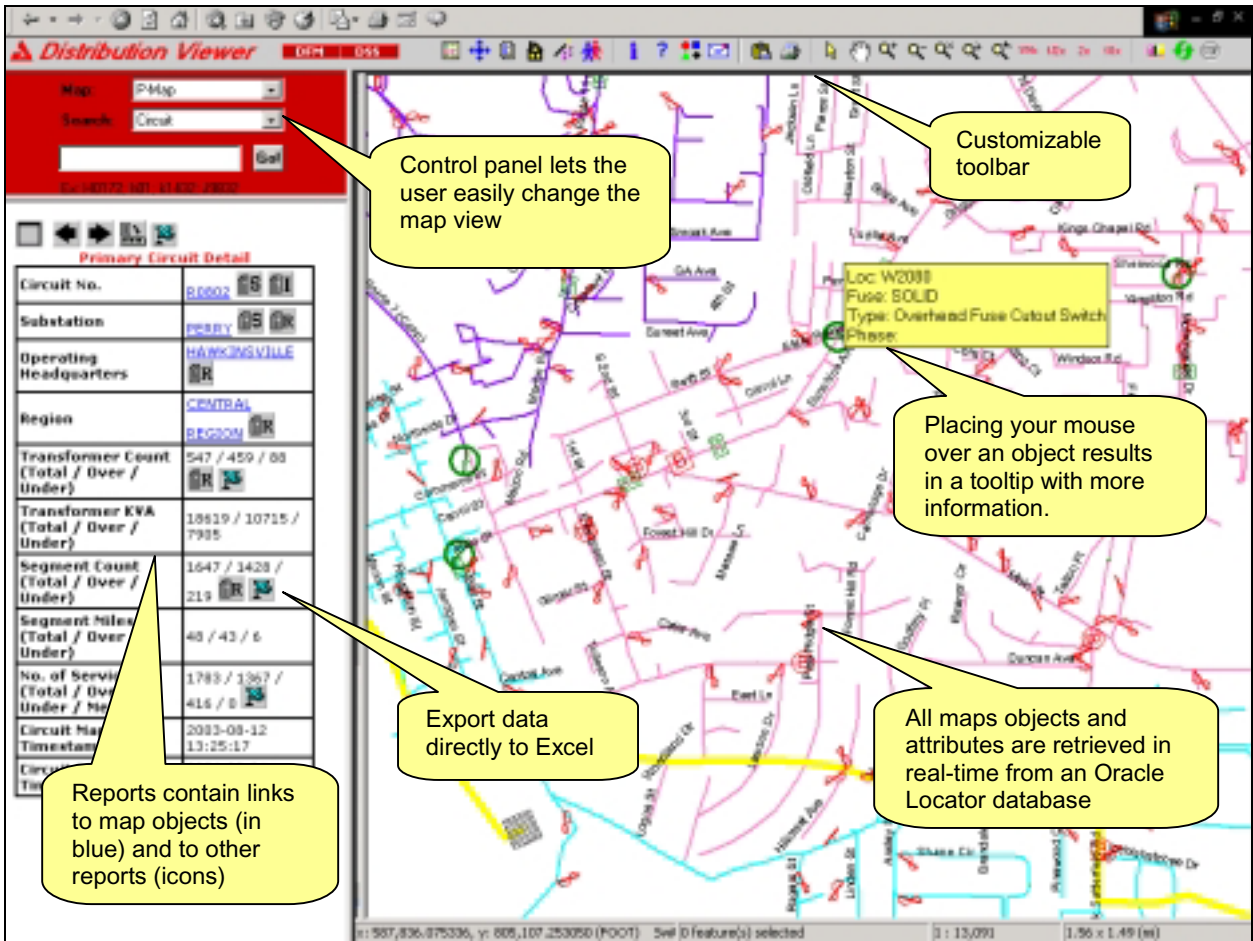
When engineers and operators at Georgia Power Company (GPC) need maps or reports about their electrical distribution network, they turn to our Distribution Viewer (DistView) web application. DistView provides a map-based window into a spatial data warehouse that contains information on every object in the distribution system, every customer and every abnormal condition. DistView also gives one-click access to detailed schematic drawings for underground distribution systems.

The data accessible in DistView is extracted on a weekly basis from 103,000 base maps and stored in an Oracle Locator spatial data warehouse, together with data from many other data sources such as the Georgia Department of Transportation, summarized customer data from the Southern Company CIS system, topographic imagery from the USGS, and transmission system data. The DistView system also stores many kinds of summaries and cross-references in the data warehouse, adding value to the data extracted from the other systems.

DistView consists of Autodesk MapGuide software with the addition of several modules from Gatekeeper Systems. The DistView system uses the core system for map viewing and reports, a print module for high-quality engineering printing, a document manager for organizing and managing 37,000 detailed schematic drawings, and an Operations Visualization System for real-time display of data from Georgia Power's Outage Management System, Trouble Call Management System.

Distribution Viewer Fast Facts	
Initial Implementation Period	Three months, completed March 2001
Number of System Upgrades and Phases	Currently in Phase 5
Server Hardware	Two 1U Windows 2000 Servers (one primary and one backup/development) plus one file server for documents, imagery, and the data exported from DistView for use in GIS systems
Source of Realtime Distribution System Status Information	Centricity from CES International (two separate systems)
Basemap Mapping System	AM/C, a custom GPC application implemented in AutoCAD Map
Customer Information System	Custom, using Oracle on an IBM Mainframe

The following figure shows the basic layout of the *DistView* user interface. *DistView* is a Web-based application, and runs as a Java application in Internet Explorer.



DistView Sees Heavy Use Throughout Company

The Distribution Viewer System has become critical to the operations of the Georgia Power Company. The figures in the table below illustrate how widely used the system has become.

Distribution Viewer By The Numbers		
Usage Statistics	Number of Users	1200+
	Average Daily Logins	262
	Average Daily Distinct Users	141
	Peak Daily Users	257
	Average Daily Map Views	8368
	Average Map View Response Time (server)	0.934 sec
	Peak Daily Map Views	15,038
	Peak Daily Report Views	1572
	Monthly Average Number of Hardcopy Maps Printed	1538
	Number of Mobile Users of Document Manager Module	100+
	Facility and Mapping Statistics	Number of Input Basemaps Processed
Number of One-Line Schematic Drawings Processed		27,703
Number of Transformers		566,597
Number of Poles		1,692,676
Number of Circuit Segments		5,671,042

	Length of Circuits	117,846 mi
	Number of Primary Circuits	2357
	Number of Substations (including customer substations)	2281
Database Statistics	Total Number of Database Objects	28,139,355
	Database Size	12.45 GB

As you might expect, the Distribution Viewer system is used heavily by engineers, who use the system to access detailed facility, customer, and outage-related information. But the DistView system enjoys broad application throughout a number of different user communities at Georgia Power, as shown in the following table.

User Community	Typical Uses
Engineers	View facilities data
	Link from transformer to customer information system to obtain customer load and usage data
	Verify that customers are connected to proper transformer to assure proper load distribution and in support of automated outage analysis
	Examine circuits for basic load analysis
	Locate affected customers when line work may interrupt service
	Access Underground One-Line schematic diagrams when underground work
	View Outage Management System data
	View current abnormal device configuration when planning new work
Forestry Department	Calculate line miles to be trimmed
	Print paper maps for vegetation management crews
	Identify potentially affected customers to contact when work may affect customer service
Control Center	View detailed facilities data during trouble restoration
	Use customer search to identify customer connectivity during outages
	Use equipment search to find detailed equipment data during outage restoration
Lighting Department	Print maps of customer lights to give to customers
	In response to customer inquiries, find customers from customer information system and locate customer's facilities on map
Marketing Department	Find distribution equipment serving Priority Customers, Critical Customers, Key Accounts, and other special-needs customers
	Verify accurate customer-to-transformer links

Window Into Outage Management Systems

Georgia Power operates a pair of very sophisticated outage management systems (OMS), one for the Metropolitan Atlanta area and one for the rest of the company's service territory. These systems maintain detailed databases of real-time electrical system status, including the status of every active device (switches, breakers, reclosers, etc.). The systems also continuously track customer outages, using data from trouble call reports and field crews to monitor

exactly which customers have been affected by a network failure or repair operation. In addition, the systems maintain a database of detailed notes about devices, recording, for example, which switches cannot be operated because of equipment failure or local conditions.

The OMS systems are critical tools the electrical system operators, especially during storm conditions, to safely operate the network. However, the OMS systems require special training to use, and because system performance is critical (especially during large outages) the number of users of the system must be tightly controlled.

The data in the OMS systems is also of critical importance to many other users in the organization, both during outages and during normal operations. DistView uses a bridge to the OMS system databases to retrieve this valuable data from the OMS systems and make it available to hundreds of DistView users. Instead of using the special-purpose OMS system to see this data, users employ the familiar DistView tool to view outage information such as abnormal status devices and notes from field crews. In addition, DistView aggregates this data from the two separate OMS systems and displays it in a single, easy-to-use summary format. The Area Browser provides for hierarchical searching and “rolled up” summary reports of operational data throughout the system.

The screenshot shows the DistView Area Browser interface. On the left is a hierarchical tree view of the system structure. On the right is a data table showing abnormal devices. Three callouts provide instructions on how to interact with the interface:

- Placing your mouse over an object in the Area Browser results in a tooltip with more information**: A tooltip is shown over the 'DUBLIN' node in the tree, displaying details like 'Bypass: 17', 'Inop: 7', 'Note: 65', and 'Tag: 3'.
- Click on column headings to sort data**: A callout points to the 'Currently' column header in the table.
- Select objects for reporting or to locate the object on the map**: A callout points to a row in the table, specifically the row for ID 'C2002'.

Area Browser Tree View:

- ATLANTA REGION
 - CENTRAL REGION
 - DUBLIN
 - ALA: CENTRAL REGION
 - BLL: Bypass: 17
 - CAD: Inop: 7
 - CHI: Note: 65
 - CHI: Tag: 3
 - DAL: Abnormal: 69
 - FER
 - ERICK CHURCH ROAD PM
 - FIRE TOWER ROAD
 - GARNER PM
 - GRAHAM FARM PM
 - GUM CREEK PM
 - KOWTKO PM
 - L. C. WHIGHAM PM
 - LITTLE OCMULGEE ESTAT
 - MCRAE #1**
 - MCRAE #2**
 - NORTHWEST DUBLIN
 - PARKENSON CHURCH ROAD
 - PRINGLE ROAD

Abnormal Data Table:

ID	Type	Ckt	Currently	Normally	Last Operation
5P004-CE5	breakers	5P004	OPEN	CLOSED	2004-04-12 18:13
XFM: 2289	open_points	C052	CLOSED	OPEN	2004-01-22 13:32
XFM: 2287	open_points	C052	CLOSED	OPEN	2004-01-22 13:31
C0569	switches	C0569	CLOSED	OPEN	2003-09-09 20:39
C0942-BXJ	breakers	C0942	CLOSED	OPEN	2003-05-15 08:05
741901	transformers	C0942	OPEN	CLOSED	2004-04-11 14:58
C2002	markers	C2002	OPEN	CLOSED	2004-02-17 12:28
C2002	markers	C2002	OPEN	CLOSED	2004-02-17 12:26
XFM: 743027	open_points	C2002	CLOSED	OPEN	2004-02-17 12:26
C0567	switches	C2002	CLOSED	OPEN	2004-03-08 20:47
S0945	switches	H0500	CLOSED	OPEN	2003-10-16 10:32
H0309	switches	H0500	OPEN	CLOSED	
NN3063	switches	H0552	OPEN	CLOSED	2003-07-15 11:50
NN3355	switches	H0552	OPEN	CLOSED	2003-07-15 11:50
	open_points	H0700	OPEN	CLOSED	2003-08-04 14:20
	switches	H1300	OPEN	CLOSED	2003-08-04 14:20
	switches	H3300	OPEN	CLOSED	2003-08-04 14:20
	open_points	H3300	OPEN	CLOSED	2003-08-04 14:20
XFM: 65680	open_points	H3332	CLOSED	OPEN	2003-08-23 21:10
XFM: 74251	open_points	H3332	CLOSED	OPEN	2003-06-18 14:37
NN2700	switches	H3512	OPEN	CLOSED	

High Quality Printing

The Georgia Power mapping data is maintained in over 103,000 CAD drawings. This approach has worked very well for the company, allowing them to very cost effectively maintain extremely detailed drawings. However, prior to DistView, if an engineer or operator wanted a hardcopy drawing to use to study the distribution network, they would have to “piece together” some number of maps (possibly many) and print the drawing. It was difficult to print a useful map from a dozen CAD files, and there was no way to incorporate other data such as GIS, USGS maps, or data from the OMS.

DistView provides a powerful printing tool to address this critical need. Using this tool, DistView users can choose any geographic area, at any scale, and print it to any hardcopy device. Users routinely print on devices ranging from laser printers and desktop inkjet printers to E-size (24”x36”) engineering plotters. The DistView software also lets users customize their printed map view, selecting the layers and annotation appropriate for their specific usage.

Since the system has been installed, DistView users have created over 15,000 hardcopy maps using the system, saving Georgia Power’s engineers countless hours and immeasurable frustration.

Enterprise Spatial Database Yields Other Benefits

The DistView database is always complete and up-to-date with the most accurate mapping information. Since it is an Oracle Locator database of all the Company facilities plus a large amount of land base information (streets, political boundaries, etc.), the DistView database is extremely valuable to Georgia Power for applications outside of DistView.

For example, each year Georgia Power is required to compute the number of poles and the total length of wires in each of hundreds of tax districts in the GP service area. The company pays taxes based on this data, so getting it right is important. In the past, performing this calculation was a multi-month process that involved running AutoLISP scripts in each of the 103,000 CAD maps that make up the company’s facility basemaps. A variation of the process was to extract all of the data from the 103,000 maps and then do the calculations externally in a GIS system. This process was also very lengthy, complex, and resource-intensive for both computer resources and staff time.

Since all of the facility data and the tax boundaries (basically city and county boundaries) are stored in the Oracle Locator-based DistView database, this process was greatly simplified for the 2003 Year End. The tax computation process was changed to use the Locator database. Instead of processing 103,000 map files, the calculations were performed against a seamless extract

built from the Oracle Locator database. The result was a savings of hundreds of man-hours and weeks of elapsed time.

For the upcoming Year End, the computation will be even further simplified. The count, measurement, and assignment of facilities to tax districts can now be computed using a few lines of standard SQL using Oracle Locator's spatial functions. The tax reports can now be calculated in only a few hours of elapsed time.

Field Mapping

Georgia Power maintains a variety of special-purpose maps and drawings in addition to the facility base maps. These drawings include schematic drawings of underground facilities, drawings of lighting projects, and other types of documents. These documents can be viewed in DistView. Users can locate the documents by viewing the extent of the document on the DistView map, or by searching for information from the document such as a project name or switch number.

Georgia Power uses the Document Manager Module to allow operators and engineers to take these drawings into the field. The Document Manager Module maintains a cache of documents on the user's laptop, allowing the user to conveniently take these documents into the field. Documents in the Document Manager Module are organized by mapping district, which allows users to choose a district, quickly download all the documents for that district, and then take those documents into the field. Over 100 users routinely take these documents into the field on a daily basis.

Future Phases to Add Further Capabilities

Georgia Power plans to implement additional features in the future. Features currently planned or under study include:

- Application of a Joint Use Module to maintain data about other utilities who attach to Georgia Power's utility poles
- The Distribution Control Centers (DCC) are responsible for operating the electrical distribution system, and they manage all of the switching and maintenance activity in the network. The DCCs make heavy use of DistView during both normal and storm conditions. In a planned upgrade to DistView, DCC operators will get their own special DistView site tuned specifically to their needs, with custom search and reporting capability, special capabilities for viewing on multi-screen displays, and a separate system for improved reliability.
- Georgia Power's distribution engineers are responsible for maintaining detailed information about the capacity of the electrical network. Future

enhancements to DistView will allow engineers to maintain and view device capacity and demand directly in DistView, greatly improving record keeping, convenience and accuracy.

Because of the broad success of DistView, Georgia Power managers say this system will remain the company's platform for deploying new distribution system applications.