GIS ENHANCES ELECTRIC UTILITY CUSTOMER CARE

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ABSTRACT

This paper examines how a geographic information system (GIS) can dramatically improve a number of customer care processes. The new customer connect process is an example of how GIS and integrated information, both within and outside the utility significantly improves customer service, shortens cycle time and reduces costs. Other processes where spatial data can improve processes are meter reading, including rollout of automated meter reading systems, credit and collections, customer analytics, billing and customer communications. An enterprise GIS fully integrated within the mainstream of utility IT infrastructures helps utilities understand customer behavior and their transactions.

THE CUSTOMER CONNECT PROCESS

How It Should Work

BankWorks of Garden Grove decides that it needs a new drive up automated teller machine (ATM) at the corner of the recently opened Eastgate Mall. BankWorks would like the ATM operational in six weeks. It hires a general contractor to design and build the ATM. The general contactor hires a small time local electrical contactor, Jim Palmer to do all the electrical design and construction.

Jim applies for an electrical permit from the city's inspectional services department. The city permit office reviews the plans. They issue the permit, noting that the contractor must contact the local electric utility to install the service and connect it to the grid. The city's electrical permit web service publishes the newly issued electrical permit. The city's web service notifies the utility of the new permit.

Jim calls the utility's toll free number. The utility call center representative, Frank Martin asks for the city's electrical permit number. The utility's permitting system validates the permit. Frank initiates the electric service work order. The automated work order system captures data about the general contractor, the electrical contractor and the ultimate owner from the city's web service. Jim supplies some basic electrical demand data and location information to Frank. Jim tells Frank that he needs the service in three weeks so that he will have time to complete all of the electrical work to meet the general contactor's six week total construction time frame.

Frank pulls up the data on his on line GIS. He does a quick load analysis. Since the GIS is integrated with the Customer Relationship Management and billing module of the company's Enterprise Resource Planning (ERP) system, the data is current up to the last billing cycle. The GIS design module calculates the total demand on the supply transformer. The results of the analysis show that the demand for the ATM will exceed the transformer's capacity. Therefore the utility will have to install a larger supply transformer. Frank verifies that they can complete the service in three weeks as requested. Frank calculates a service fee for the connection at 250 euros. Jim pays the fee via credit card and gets the work order confirmation number. Frank publishes the work order confirmation number via a web service to the city's inspection department. The city sets the inspection at 9:00AM the day after the utility plans to complete the service connection.

Frank notes that the GIS shows the closest service point is across the federal highway. He publishes a permit request web service to the federal highway department. The highway department issues an automated permit to the utility electronically. The federal system immediately posts the permit details to their GIS. The utility's trenching detail from the automated design in the utility's GIS is accessible on the highway department's engineering GIS. Their GIS is the primary source of data for the highway department's maintenance system including all repaving projects. They have plans to repave that section of the roadway as part of the overall improvement of infrastructure of the roads that services the new mall. Since the department will repave the new road soon, they allow the utility to use inexpensive cold patch for its pavement repair after the utility competes the trenching.

The utility's automated work management system orders all material for the new transformer and service. It generates an underground locate mark-up request using data from the GIS. The system assigns the crew based on the human resources module of the ERP, accounting for vacations, vehicle maintenance schedules and current scheduled work.

Three weeks later, the crews receive the GIS based construction work order on their mobile device. The crew supervisor notes that the mark-up contactor indicated the location of the underground utilities below the street. The crew trenches the street, installs the transformer and the service. The crew reports that they had to install a new handle on the pad-mount cabinet and they had to move the service one meter south. They capture this information on

their GIS mobile device as a red line to the work order design. The data from the mobile device populates the GIS and the maintenance management system. All as built data for this project becomes part of the GIS from the mobile device. The crews install the meter. The city completes its inspection. The ATM goes into service.

The integrated accounting system adds the financial value of the work to the utility's asset base. The GIS shows the new service and upgraded transformer. The accounting department closes the work order. The customer billing system reflects the new load. The federal highway department repaves the road on schedule.

How Things Probably Work

What is more common is that the city, federal agencies and utilities do not have technology in place to share information. Lacking the technology and good process design, this is how things probably happen.

The utility has a stand alone automated mapping/facility management (AM/FM) mapping system (not a real GIS), a standalone work management system and the same ERP as in the above example.

Jim contacts the utility with the request for the new connection work order on Tuesday of week 1.

Frank, the utility representative takes down the information about the new service location and the proposed demand of the ATM. He enters the data into the work management system. Jim requests that the utility complete the service in three weeks. Frank warns Jim that that seems likes awfully short notice. He tells Jim that there is no way that the utility can guarantee that the work will be complete. Frank dutifully enters the requested in service date in the system. But of course, Frank has no idea whether it's reasonable.

Jim gets worried. He's got three other jobs lined up after the ATM deal and he can't afford a delay.

On the next day, Wednesday of week 1, Dorrie, the customer service planner checks her work queue to discover that she has twenty new work orders just from yesterday. She begins work on the first one on the list. The ATM project is number 16 in her queue. On Monday of week 2, she gets to the ATM project. She checks the AM/FM system for the existing electrical system information and discovers that the shopping mall information doesn't appear on the system. The work order for the new Eastgate Mall is still in the open status, so she knows that no one has posted the as built electrical drawings and field notes to the AM/FM system. Phyllis was the planner on that job. So she has to find the Eastgate work order file from Phyllis. The problem is that Phyllis is on vacation and won't be back until next Wednesday. She decides that it is probably best to put this project aside and begin work on the next work order.

Jim calls promptly on Tuesday morning of week 2, exactly one week after he contacted the utility.

A different clerk informs Jim that the work has been assigned to a designer, but the status is "On hold – Waiting for more information." The new clerk suggests that Jim call back in a week and maybe they will have more information. Now Jim is downright distraught.

On Monday of week 3, Jim calls back again. Another clerk tells Jim that the work order status hasn't changed since he last called. But he assures Jim that he will put a rush on the work order. The general contactor now is pressuring Jim for electrical service so the bank can begin testing of the ATM software in a week.

On Thursday of week 3, Dorrie gets the work order folder for the Eastgate mall from Phyllis. Dorrie deciphers the old field notes that crew created for the original installation of supply transformer AC725. AC725 is the transformer nearest to the new ATM. She then calls the billing department and orders a billing history for the services connected to transformer AC725 so she can calculate the new demand. Billing is backed up and probably can't get to it for a week or so. She makes a note in the work management system: ATM project on hold – waiting for billing data.

On Friday of week 3, Dorrie notes that the ATM work order has a rush on it. She also notes that the proposed in-service date has already lapsed. She calls the billing department to put a rush the usage numbers for transformer AC725. On Tuesday of week 4, Dorrie gets a call from billing. They tell her the expected load on Transformer AC725. Dorrie now determines that Transformer AC725 is at its limit and that no further services can be safety added without an upgrade to the next larger transformer size. She then creates an upgrade order for transformer AC725.

Unfortunately, what Dorrie didn't know was that the when the Eastgate Mall was being proposed to the city, the federal highway department decided to reroute Highway 44 along the access road to the mall. She also has no idea the ATM is across a federal highway from the transformer that needs to feed it. And of course, she knows nothing about the highway department's repaving project. So what Dorrie failed to do is to order a street opening permit from the federal highway department. On Friday of week 5, the federal highway department completes the new paving job on the highway section across from the new, but not functioning ATM. By this time, Jim has given up calling and just has to wait for the utility to complete its work. On Monday of week 6, a utility crew replaces AC725 with a new transformer AC750. An alert distribution construction supervisor notes that he has an order to install a service pipe

across Highway 44, but has no permit in the work order file. He calls Dorrie. She complains that the mapping department should have updated the plans and how did she know that she needed a federal street opening permit? She puts a rush on to the highway department to get the permit. They grant permit the on Wednesday of Week 9.

On Wednesday of week 10, the utility crew cuts a trench into the newly paved highway. Several days later, the highway department informs them that they must repave the entire section of roadway at their cost.

On Friday of week 11, a utility crew energizes the ATM. The crew completes the field notes on a pad of paper, indicating in sketch form the change in location of the service line. They never got a chance to fix the broken handle. They send the work order paperwork back to Dorrie for reconciliation. The utility hires ACE paving to repave a section of the highway at a cost of 1400 euros.

On Monday of week 45, one of the utility company's drafting technicians adds the as built electrical construction details for the original Eastgate Mall to the AM/FM system, by comparing the design sketches with hand written field notes. She sends the work order details to the accounting department including paper plots that show where the crew added the new equipment. However, they show the original transformer AC725, not the upgraded transformer AC750. The accounting clerk manually adds the plant data to the ERP system. Eight weeks later (week 53), the drafting technician posts the upgrade work order for transformer AC750 to the mapping system. The accounting department gets the revised work order. The new service to the ATM appears on the books two months later. By week 60, BankWorks finally gets a bill for the electricity usage of the new ATM installed over a year ago. The accounting department completes the asset information by week 65. The work is finally closed on week 70.

While this may be an exaggerated example, the costs of not having an integrated GIS with customer care increases costs and negatively impacts customer service. Note the comparison of work flows in Table 1

Metrics	How It's Supposed to Work	How it often works
Elapsed time	3 weeks	70 weeks
In service date	3 weeks on time	11 weeks, 8 weeks late
Time to work order close out and documentation completed	3 weeks	70 weeks
Call center costs – work order group	10 minutes – 5 euros	40 minutes – 20 euros
Engineering	Review – ½ hour – 20 euros	12 hours – 480 euros
Billing department		2 hours of research – 40 euros
Mapping department	10 minutes – 5 euros	2 hours – 40 euros
Plant accounting processing		2 hours – 40 euros
Billing call center to resolve summary billing issue		20 minutes – 10 euros
Lost revenue from ATM		5 euros per week for 8 weeks or 40 euros
Extra cost of paving		1400 euros
Total Costs	30 euros	2070 euros
Customer service impact	Smooth	Painful

Table 1 – How Good Process and GIS Saves Money

GIS AND CUSTOMER CARE

Customer care is a major business process within electric and gas utility companies. As noted in the above example, the key to outstanding customer care is integrated information. Since so much of what matters to customers relates to location, integrated spatial information is critical. The following sections describe GIS's role in other customer care business processes.

Metering and Billing

When the utility cannot read some meters or when utilities serve customers in places with no meters, they have to estimate bills. Whenever bill estimation occurs, billing disputes likely follow. While most utilities handle the vast majority of bills without a problem, the small minority of billing issues can create an enormous workload for call center and billing employees.

GIS can help in a couple of ways. The first way is to better manage the meter reading process itself. Estimated reads are due to the inability of meter readers to access the meter or the inability of the meter reader to get to the meter during the scheduled route. Special meter reads occur when customers move or when utilities replace a meter or if they found the meter to be faulty. It's these special circumstances that create the most work and create the vast majority of billing inquires and problems. Utilities use GIS to manage meter reading routes. It can used to dynamically readjust the routes for new situations. It can be used to analyze where billing issues most commonly occur. If access is an issue, GIS can determine where to surgically insert automated systems in certain problem areas. GIS can help determine patterns for meter readers.

Many utilities are moving toward total automation of meter reading. GIS can play a strong role in the planning and rollout of the systems.

Managing Customer Orders

Customers' orders often trigger other processes. Examples include, ordering a new service, like in our example above, ordering a private property street light, requesting a meter test, seeking a lighting rebate or ordering an energy survey. Since these activities involve a customer, making accurate appointments, optimizing travel between appointments and scheduling tasks can be daunting. GIS provides help in visualizing the work, seeing patterns in the work, helping to route technicians, sales people and inspectors and in helping the field crews understand the current status of equipment in the field.

Call Center

Some utilities have installed GIS to help the call center better communicate with customers. They populate the GIS with information about the locations of trouble and crew and emergency locations. They show where technician are working and fixing broken meters. Projecting this information on large screens throughout the call center provides each customer service representative ready access to what's going on within the territory. When a customer calls about smelling gas, the call center representative can quickly view the known locations of gas leaks, the locations of gas company field crews working the area and communicate this quickly and accurately to the customer.

Credit and Collections

Nearly every utility sets aside a certain amount of money each year in their operating budget for bad debt. Bad debt is money that the utility has decided it will not or can not collect from its customers for electric or gas usage. There are a number of reasons why people don't pay their utility bill. They usually fall into one of four categories: people who forget to pay, people who can not afford to pay, people who are chronic delinquents and people who deliberately attempt to defraud the utility.

GIS is a wonderful tool for evaluating demographics. By using simple demographics, utilities can decide the most effective way of collecting from these four kinds of people.

The only real weapon a utility has to force a customer to pay is to shut off their service. However, a shut off involves dispatching a technician to the premise. If at any given time the utility has thousands of people who are so far in arrears that the utility is contemplating writing off their debt, the cost associated with shutting all these customers off would be enormous. So if the utility plans to do shut offs, GIS can help to determine which customer to shut off

Revenue Protection

Some customers steal energy. Like collections, this problem can be extreme in some parts of the world, where widespread theft of energy is common. GIS can help visualize significant mismatches between known usage and actual consumption using GIS's advanced network modeling. Utilities can use GIS to visualize areas with widespread theft of energy.

Marketing

Marketers increasingly rely on GIS to create business maps to organize, analyze and visualize customer behavior. In the case of a gas utility that behavior often is about what kind of fuel they use. They also analyze customer demographics to understand the future uses. Marketers use GIS to target neighborhoods for particular products and services. Gas companies perform market analysis, trending and target marketing. Electric companies will often target market segments of the community to participate in efficiency related programs.

Demand Side Management

One way to offset new distribution system expansion is by the use of demand side management (DSM). DSM services reduce the demand on the system by improving energy utilization. These services offer discounts to customers who allow the utility to shut off a portion of their load during energy shortages. Utilities can use GIS to visualize those areas where supply or distribution capacity may be tight. They then can target those areas for conservation programs.

GIS IN CUSTOMER CARE

Utilities are using GIS as a to help them care for their customers. Integration with Customer Billing and Relationship Management systems are becoming common. That's because customer location is so key to managing customer connections, collections, meter reading, meter repair, private property street-lighting, trouble location and many other customer interactions. More and more utilities want to understand customer behavior. They are looking for tools to draw connections between the service they provide and the impact that that service has on its customers. In responding to customer needs, utilities need to organize their work in the most efficient way to meet increasing customer demands. GIS helps utility employees better communicate with their customers. They need to make and meet customer appointments. Utilities also need to understand how best to leverage their assets in relationship to their growing customer supply demands.

GIS is not just about making maps. It's about empowering the utility to fully care for its customers in the most cost effective and intelligent way using GIS integrated with the critical customer care IT systems.