BIOGRAPHICAL INFORMATION

Michael Muilenburg
Manager of GIS
Great Plains Locating Service

Specific Responsibilities

Joined Great Plains Locating Service in 2000
Responsible for all data maintenance and translations of incoming utility records
Manage creation and distribution of update process to 400+ mobile field users.
Research and manage development of applications to enhance field productivity using GIS tools.

Professional Memberships

GITA

BIOGRAPHICAL INFORMATION

Charles Marlin
Senior Consultant
Graphic Technologies, Inc.

Specific Responsibilities

Assist prospective customers in defining their requirements.
Manage projects.
Write and implement applications.

Past Experience

Worked at Intergraph from March 1982 to October 2001, except for a hiatus in 1988-90. Held positions of Customer Engineer, Regional Technical Director, Executive Director of the International Graphic Users Group (IGUG), and Executive Manager for Utilities Customer Services.

Taught mathematics at Chattanooga State Technical Community College.

Educational Information

Bachelor's degree in Mathematics, Harvard College

Professional Memberships

GITA
St. Elmo Maze Builders

FINDING FACILITIES IN THE GREAT PLAINS

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ABSTRACT

Lewis and Clark would be amazed. From Minnesota to Missouri, from Illinois to Wyoming, over 400 Great Plains Locating Service technicians use mobile laptops to locate underground facilities.

Up to the year 2000, Great Plains Locating Service supported this activity with paper records. We tried to update locators weekly, but that proved impossible; and the attempt was expensive. Typically, when we received records from a utility, we would make tens of thousands of copies; organize the sheets into areas; and send packets to individual locators. For the locator, matching a one-call ticket to a place on the map sheets took as much time as actually driving to the facility and marking it.

We bought our first laptop computers in 1999 for a trial area. The improvement in productivity was compelling, so in May 2001, we started providing a laptop for each locator. Success bred its own problems: we quickly realized that we would need 4 or 5 viewing products for the variety of data sources. So we have begun consolidating viewers, primarily to avoid the expense and confusion of training locators on multiple products. Meanwhile, across the expanse of the Great Plains, the vision of instant information has become a daily reality.

BEFORE THE BEGINNING

Lewis and Clark would be amazed. Almost exactly 200 years ago, they traveled from St. Louis to the Pacific Ocean by way of the Great Plains, the Rocky Mountains, and the Columbia Valley. They pulled a boat, rode horses, and walked. They had unreliable maps, inaccurate ideas about what lay before them, and survey equipment that would be quite primitive by today's standards. But they made the journey and returned.

What would amaze them most if they could see the employees of Great Plains Locating Services at work today? The trucks? Their phenomenal speed? The highways themselves? What about the towers and cables transmitting electricity? Or telephones? Or computers with intelligent maps?

Let's draw closer in time than 200 years. Let's take a look backward for only 10 years. Great Plains Locating Service, Inc. (GPLS) was a brand new company, founded in anticipation of the needs that would arise when Nebraska created its One Call Law in 1993. Almost immediately, utilities in Nebraska began to outsource their facility locating operations to GPLS. In 1995, GPLS expanded into Iowa. And by 1999, GPLS had clients in five states across the Great Plains. Today GPLS serves clients across the Great Plains as shown on the map below.

THE STARTING POINT

Let's pick up the story in 1999, and describe how GPLS encountered some challenges because of its growth, and how it used geospatial information technology to overcome those challenges and fuel the next stage of growth.

GPLS was then, as now, in the business of providing locating services for utility and communications companies. GPLS accepted tickets from state One Call centers at its regional offices. GPLS's ticket distribution system then assigned these tickets to individual locators via remote printers. Regulations vary, but in general, the location work is required to be completed within two days of the contractor calling the One Call center. The locator would drive to the address or location listed on the ticket. Then he tried to find the print that corresponded to his actual location. This operation could chew up a considerable amount of time, flipping though page after page, trying to find a particular road name and address. Some maps had road names without addresses, especially in less densely settled areas. Some maps did not even include road names. These map sets were on paper, naturally. The locator used copies made by GPLS from paper maps generated by the utility or communications company. Once the locator had the appropriate facility map, he could mark any facilities that would be in conflict with construction digging.

A GROWING PROBLEM

GPLS enjoyed success and gained more contracts: over 2,000,000 locates annually for 75 clients. And received more maps. And made more copies. Receiving new updates daily, GPLS found itself needing to make and organize tens of thousands of copies on a weekly basis to maintain current facility records.

Clearly, this process would collapse of its own weight if it grew much further. GPLS began to consider mobile GIS. If the locator could carry a laptop computer and use it to find facilities instead of printed maps, the task of providing up to date maps would be changed. Instead of physically printing tens of thousands of sheets of paper, the data could be received and distributed digitally. The paper-based process had several disadvantages:

- It had grown to a point where it was a physical challenge to manage the number of pages required.
- It was expensive, and the expense of paper and printing was likely to rise over time rather than decrease.

- It was time consuming. It introduced a delay between the arrival of new maps from a utility or communications company and the distribution of these maps to the locators.
- It offered the locators an inefficient method for finding facilities. It takes time to flip though page after page of a printed map book looking for an address. Not only does it consume time, it is prone to error. If a locator missed an address, he might continue looking on other pages. Measurements revealed that this activity, just finding the right place on the map, filled a major fraction of the total time spent by a locator.

TESTING THE WATERS

GPLS bought its first laptops in 1999. The advantages were immediate and significant:

- Vastly improved productivity. In most cases, the locator could perform a software search for a facility rather than flipping through pages of paper. This drastically reduced the amount of time for each locate.
- Elimination of copying and printing costs.
- Elimination of paper organizing costs, both in time and shipping.
- Information was available to locators more promptly.

So GPLS enjoyed the double benefits of higher productivity and reduced costs.

But once again, success led to growth, which led to problems, which led to innovation. Naturally, GPLS wanted to expand the use of mobile GIS, in order to obtain additional double benefits of increased productivity and lower costs. However, the realization grew that to make full use of mobile GIS, GPLS would need four or five viewing software products to read the data from the variety of customer GIS systems. This would mean training locators on the use of four or five software products. Plus buying them, of course. Because of the significant productivity improvement, the cost of the viewer licenses was not a limiting issue. But the prospect of training locators on four or five products, each with its own peculiarities, presented a major challenge. Even if each product were fairly straightforward to use, five different ones would confuse locators. If a locator used only one or two of the viewers for a few weeks of work, he would forget how the others worked and would need retraining once he started using them again. This would slow down the locator's work and add the expense of training, both in labor hours for the locator, for the trainer, and travel cost. There was also the problem of user acceptance. If the software required frequent retraining, the locators would become discouraged and call for a return to the paper they trusted and understood. Even if the paper process was slower

compared to software that the locator could use, it was faster compared to software that the locator could not use.

In the face of this challenge, GPLS wondered whether a single viewer could be used for multiple data sources. If so, it would reduce training costs and lead to broader acceptance by users. It would reduce the cost of licenses. It would streamline back office operations, since data sets would be produced for only one product instead of several. And finally, it would lead to a more consistent treatment of all incoming data.

JUMPING IN

Great Plains spent much of the year 2002 testing a software product from Graphic Technologies, Inc., called GTViewer, with various data sources. The evaluation was successful. Those four words summarize a good bit of work. Data from several types of MicroStation-based GIS systems was examined. Some had attribute information in Oracle, some in Access. Some had attribute information stored in tags. All were brought into GTViewer format. Some of the data was in ESRI shape files. Some of it was in AutoCAD. As GPLS received data from customers and prospects through 2002, all these data types were brought into GTViewer format.

In the year 2003 GPLS moved to deploy over 250 laptops. We phased in its use with one data set after another. Each type of source data has its own conversion peculiarities, so we invited the vendor for a week of training on the conversion utilities. So far, we have been able to tackle each new data source independently or with support over the telephone and by email.

SWIMMING

For the year 2003, we estimate that we have saved approximately $1,000,000 by using GTViewer rather than relying on paper. Beyond savings, use of the viewer has allowed us to bid on additional contracts that otherwise would have been impractical. So adoption of mobile viewing technology has allowed our business to expand. The deployment has increased to 400 laptops.

For the year 2004, we will have depreciated a portion of the hardware investment, and we will be in full production for the entire year. So when we add in productivity increases we estimate that our savings will grow to $1,800,000. The return on investment is compelling when you consider that our capital investment was about $350,000.

User acceptance is a traditional barrier to the success of technical innovations. No matter how attractive the potential gains may be from automation, if the end user does not make active use of the tool, its promise is not fulfilled.

Local managers and supervisors were trained on using GTViewer. This took 20 to 30 minutes on average. These individuals in turn trained the locators in their areas. Field locators took to the viewer immediately and few follow up support calls have occurred. The previous training period was two days to train the locators on a minimum of three different viewers and sometimes as many as five. The locators found this to be overwhelming and there were many follow up questions from the field.

We started with a single utility in Iowa and introduced GTViewer into a ten-county area that involved a single supervisor and approximately ten locators. The previous viewer was kept in place to allow the locators to make facility comparisons. We received feedback from the locators, and with a favorable field review we proceeded with the second phase of the rollout, which included all of Iowa and Illinois. The necessary viewer training was completed and the new viewing format was officially in place.

With GTViewer successfully in production throughout a multi-state region, we proceeded to switch other utility records to the GT format. In areas where the viewer was not already in use, we adopted the same procedure as in the initial rollout: allow the locators to have the previous viewer during the introduction period and obtain field feedback regarding the new viewer performance. In areas where GTViewer was already in place, the records were simply added as the conversion process was completed on existing facility records or records from new clients.

The entire rollout has progressed better than I could have ever anticipated. One piece of advice that I had heard from others involved in mass rollouts (and I followed it) is to always have the same version of viewer software on every machine. This is critical for proper troubleshooting and support.

LOOKING TO THE HORIZON

Can a solution ever be called complete? As we look to the future, we have some improvements in mind. Our project for 2004 is to tie all the GTViewer records to a common query so that multiple utilities can be accessed from a single address input. This has the potential of saving $750,000 annually for each minute that is saved by the technicians during the query process. This is a huge number – almost twice our original investment. It shows how even a small increase in

productivity for a single operation can have a major impact if that operation is used frequently by many people.

As we have grown with mobile viewing technology, we can now see the possibility of a higher level of integration with the ticket distribution system. GPLS is currently working to link a One Call ticket distribution system to the mobile field laptops. This will extend automation to the entire workflow chain, from the One Call center to the locator in the field. This step will further reduce paper costs and allow for an automated address query from the information provided by the One Call ticket. When the required utility prints are automatically displayed even more savings will realized.