BIBLIOGRAPHICAL INFORMATION

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EMA, Inc.

Specific Responsibilities

Joined EMA, Inc. in 1997. Responsible for CMMS/GIS Implementations. Projects have included the design and implementation of custom software applications, technology project management, and the implementation of geographic information systems and computerized maintenance management systems.

Past Experience

Viridian Inc. - Systems Analyst: Database integrity, program debugging, Electronic Data Interface support and upgrade, software analysis, and program installations.
University of Alberta - Information Systems Manager: Database integrity, data entry administration, and database reporting; implemented and managed database for Alumni Affairs/Development offices.
Government of Alberta – Research Analyst: Precision farming project.
Alberta Power - Project Cost Analyst: Management of cost, scheduling, and document databases for construction projects.

Educational Information

B.SC. – Geography – University of Alberta

M.B.A. – Florida Metropolitan University

USE OF A SYSTEM – DOES IT MEAN SUCCESS?

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Abstract

Piecing together products from many suppliers (hardware and software) and tying these diverse components together is an endeavor within itself. But is this enough? Pinellas County Utilities (PCU) management created a vision. They wanted to give employees information about the physical locations (geographic information), attributes (characteristics), and work history on the water, reclaimed water, and sewer infrastructures stored within county-wide databases. Information had to be easily accessible and access needed to be user friendly.

Today, over 500 PCU employees have access to the GIS and use it for infrastructure management, map publishing, and business applications. The widespread use of this system has brought forward a new set of challenges. Primarily, how can the users do their work if we have a catastrophic event and there is a disruption in the service? This led to the development of a remote, stand alone solution. Users have the same look and feel in the office (connected to the network) or working in remote sites (with a stand alone lap-top). Using browser technology, they are able to point and click to select a layer and/or dynamically query information to create maps. If use of the GIS is the measure of it's success, Pinellas County's GIS has to be deemed A GREAT SUCCESS.

Introduction

Pinellas County, Florida is situated on a 39-mile-long peninsula, west of Tampa Bay on the Gulf of Mexico. It has 587.77 miles of coastline including 35 miles of sandy beaches. There are ~921,000 permanent residents, 50,000 seasonal residents, and 4,000,000 annual visitors and tourists making Pinellas County an extremely densely populated county (3,339 persons per square mile as of 2002).

Pinellas County Utilities (PCU) supplies water, sewer, reclaim water (for irrigation purposes), and solid waste services to the county. In 1995 PCU management developed a vision:

> Pinellas County wanted to give employees information about the physical locations (geographic information), attributes (characteristics), and work history on the water, reclaimed water, and sewer infrastructures stored within county-wide databases. Information had to be easily accessible and access needed to be user friendly.

Evolution of the System

To accomplish the vision, they needed a plan. With internal and external sources, an Information Systems Analysis (ISA) Master Plan was completed. The ISA Master Plan identified GIS as a strategic technology to the Utilities, as over 80% of the utility's information necessary to support its business was determined to be spatially related. PCU identified categories of business processes that were central to the Utilities' success:

- Capital Improvement Projects
- Customer Complaints
- Design of New Installations
- Industrial Pre-Treatment and Compliance Monitoring
- Meter Reading
- Sample Collection and Analysis
- Operations and Maintenance for
    - Wastewater Collection System
    - Water Distribution System
    - Reclaimed Water System

Within these categories, potential GIS applications were identified and were to be developed.

PCU set out to build a GIS for the functional applications that could be developed in conjunction with the Board of County Commissioners Information System (BCCIS). PCU planned to and are utilizing county-wide information; parcel, right-of-way, transportation, natural features (basins and subbasins), permit, and administrative boundary data. These data sets are maintained by various County departments and agencies, and are available to PCU through the countywide GIS. With multiple agencies creating the GIS for Pinellas County, redundant activities were eliminated among various groups. In order to utilize outside data sets efficiently and to reduce the coding to provide links, PCU defined standards for their internal files that were compatible with the external files.

The first step was identifying the data sets that currently existed. Over eighty different data sets were found (hard-copy and electronic maps, drawings, databases, and various paper records). Field and office personnel were using paper maps (from mylar originals) to locate infrastructure. Although there was a long-term vision – PCU did not want to lose any of their ability to do their daily work; therefore, short tem transitional stages were embraced. The next step was to use both an in-house and outsourcing approach to transfer graphic and attribute information to digital format. Graphic data was stored in the GIS along with specific attribute information relating to geographic specifics. Other attribute information was stored in temporary databases. In 1997, the first digital maps were made accessible to the end-users. Using X-Windows, work order dispatchers and customer service representatives were able to view changes after they were input by engineering staff, without having to wait for the printing of maps. Field personnel were still using paper maps.

PCU undertook an enterprise wide implementation of a CMMS in 1998. Six departmental work management systems were incorporated into one database, as well as attribute information about the water, reclaim, and sewer infrastructure. Historical work order information was loaded if it related to regulatory requirements. ~120,000 customer locations and related meter information were extracted from the mainframe CIS; then cross-referenced with the meter reading cards maintained by the maintenance department. To allow spatial display of the customer point information, an electronic comparison to the tax appraiser's database was made, with a 50-60% match rate. Data cleanup (changing Lane to Ln, Str to St, etc.) allowed the match of another 20%. The remainder needed manually research. 325,000 pieces of equipment were input, of which 315,000 were field infrastructure. These were already geographically matched, as the GIS label assigned in the data extraction from mylar to digital maps was used as the id in the CMMS. The remaining 10,000 pieces of equipment were related to plant information and have not been geographically located and/or mapped. After implementation, all work orders across the enterprise were now able to be viewed through a common interface and using the same terminology.

The next phase was to get the information to the field personnel. In January 1999, PCU rolled out the first set of maps on CD. One CD was able to hold the spatial information that was printed on >800 paper maps (potable water, reclaim water, and sewer maps on ½ section grid). Additionally, there was a searchable database on the CD of locations and a subset of field infrastructure. This technology gave the user in the field the capability to locate the equipment and/or customer location via a laptop computer. Laptop computers were chosen for field personnel as the viewing area of the screen was large enough to allow readable graphic representation. Additional software did not have to be bought to enable users to do their job. Laptop computers could be used effectively both in remote areas and in the office.

There were still times where the employees in the field needed more information than could be stored and updated efficiently on the laptop computers. Personal Computer Memory Card International Association (PCMCIA) Cellular Digital Packet Data (CDPD) cards were installed into laptop computers. Field workers can query on work orders assigned to themselves or their group, and continue to the next job without having to phone or go into the office. They can also add information to the work order, infrastructure, or location, and this information is immediately accessible by anyone with access to the work management system. Information about a piece of infrastructure – both work order history and attribute information - is literally immediately available.

The next major achievement was the embracing of browser technology for end users. BCCIS and partners developed a number of municipal applications that are both easily accessible and user friendly. Using the browser front end and

open database accessibility, information can be displayed directly from the source database dynamically. Infrastructure can be found by using the GIS label, or by zooming in to a specific area of the county. Attribute information is displayed by double clicking on the selected infrastructure. Users can see all work orders in an area, or be selective as to date range and/or work order type. Report information from the CMMS brings back details relating to the selected work orders. Users can also query to quickly find out what exists at a particular location. To zoom to a specific location, users can search on a variety of information including customer or property owner names, street address, subdivision, and/or geographic coordinates. Customer information displays what equipment is at the customer location (meter, backflow, etc.), work orders, current and historical meter readings, PCU customer name, property owner name, etc. Layers are turned off and on with the click of a button using drop-down menus or checking/unchecking the boxes in the legend.

In 2003, the CD was replaced with the implementation of the GIS laptop solution. An application server was installed on each laptop computer. Maps, infrastructure information, customer information, and the past 365 days of work orders are downloaded to the laptop when connected to the intranet. The laptop information is as current as the latest download. This solution has a two-fold benefit. Information retrieval is the same for both the stand-alone solution and the network browser, so the field users always have the same look and feel. Additionally, all laptop computer users have a complete information set to allow them to do their job in case of a catastrophic event and network connectivity to the application server is interrupted.

PCU is using the GIS for three main categories:
Infrastructure Management – development, maintenance, and management of the potable water, reclaim water, and sewer utilities
Map and database publishing – thematic maps showing information such as average consumption or areas with uncertainty, with detailed information about each parcel available.
Business applications – the ability to make better business decisions through the rapid retrieval and portrayal of requested information

Use of the system today

The underlined questions below were sent to end users via email and the following are their responses relating to how they use GIS and how GIS helps them do their job.

BM – Operations – Water Quality

"<u>How do I use the GIS to do my daily/weekly/monthly work?</u>

I use it to determine the location in the distribution system of a customer complaint. I am able to get an overview of the number of work orders for that address and surrounding area. I also use the link to CMMS to get more detail than the GIS reports provide.

As a program manager, I use GIS to evaluate each complaint to determine if there is any reoccurring problems in the area where corrective action either short or long term are warranted. I print maps of the area where the complaint originated and attach it to the field report so that when gathering data to facilitate some type of corrective action a visual representation will be readily available.

My division uses GIS when collecting bacteriological samples following a water line repair. A map of the site where a repair has been accomplished is required by regulation to accompany the sample report. With GIS we are able to add comments to the map such as the site of the break, site of the sample, etc.

We now have GIS available on some laptops that are utilized in the field. Although the CD-ROM was terrific it had shortcomings not the least of which was it was not seamless. The new and improved GIS eliminated that. It has similar capabilities as the live version that is very helpful in the field.

How often do I use the GIS?

I use GIS daily.

How does the GIS help me to do my job?

I use GIS to give me an idea of the number and frequency of complaints at a residence or area. It helps me in determining the cause of a complaint. An example is the Galvanized Pipe Replacement Program; a layer on GIS is available that shows (black highlight) every street where water lines are scheduled to be replaced. This is an excellent tool used to determine potential causes for complaints.

If the GIS was taken away: Would that impact me?

ABSOLUTELY

How?

Although they still serve a purpose, we will have to go back to map books. They are heavy, bulky, and take up valuable space

We as an organization will lose a valuable tool that has moved us forward in the ability to obtain information in a single place that will greatly enhance response to our customers needs.

Thanks for helping develop this invaluable tool.“

MC – General Maintenance Department

“When helping in dispatch, there are occasions when a unit needs specific directions to a location. If they are not in possession of a laptop or street finder, using GIS, I can pin point their location and guide them via radio.

When investigating restoration complaints, a view of PCU work orders, and other features such as project identification, helps me
#1. Identify if we have specifically worked at the location in question or was it one of our contractors.
#2. Assign responsibility of action needed.
#3. Process work orders created that need no action by us.

I use GIS at least 10 times a day.

My ability to investigate complaints and assist crew members would be subjugated and I would regress to perusing work orders and street finders.”

SA – General Maintenance Department

“I use GIS/CMMS as an integral part of my core job functions. Since most of my work involves emergency maintenance this program gives me almost instant access to the information needed to send response crews to a work site. I use the system in several ways. These include directing emergency personal to an address, accessing equipment in the vicinity [hydrants, valves, water and sewer mains] of a reported utility concern, checking work order history for previous maintenance actions and checking on ongoing projects that may impact the system. This program is used almost on a constant basis by GMD dispatchers to determine the type of job, appropriate personal to send and when not to send PCU employees.

Many times I can determine through work order history that we have been to an address repeatedly for a similar complaint. Such as a customer that has an internal plumbing/ sewer problem but calls the county for assistance when they really need to get a private plumber. By having this information so readily available I have saved the county countless return trips to an address. In the same respect there have been instances where I knew to immediately send a crew to an address due to the information I could access.

I guess the bottom line here is that this program greatly enhances the ability to provide superior customer service. Not having this informational tool would be like trying to thread a needle in the dark.”

BE – General Maintenance Division – Line Locates

“As a supervisor of three employees who do all of the utility locates for north Pinellas County, I can truly say that the GIS mapping system is indispensable in going about our daily duties; with the implementation of GIS on our laptops, the determination of the location of actual physical pieces of infrastructure is so much more efficient than referring to paper maps etc. As an added benefit, the auto update feature also ensure that we are current with our information.

Working in tandem with the work management system we constantly query on the status of ongoing jobs, infrastructure changes and actually any interaction between the physical system itself, ourselves as maintainers of the system, and our customers, the general public.

As we begin to utilize to a greater degree the features of GIS in conjunction with the work management system, it is apparent to me that these systems are becoming an indispensable part of our daily work that we truly cannot do without.”

CLS - Director

“Implementing our GIS system in conjunction with the intranet browser was a key step in bringing Utilities' information management resources to the front line teams. It has provided a useful tool for the teams that deal directly with the customers to solve their problems and improve service.

In conjunction with our work management system and GIS, our next step is implementing a customer service system that will integrate seamlessly with the other systems and free us from the last of our legacy systems.

GIS integrates multiple databases from around the county including the property appraiser, tax assessor, public works, law enforcement and others to pull together information that allows the user to analyze, evaluate and solve problems improving service to our customers.

In the not so distant future we intend to use information in GIS and other databases to further aid our efforts in managing our assets on a life cycle basis to improve our long range planning, repair and replacement strategies.”

Applications related to PCU identified categories of business processes that were central to the Utilities’ success include:

- Capital Improvement Projects – Galvanized Pipe Replacement Program
- Customer Complaints – Ability to spatially show customer complaints in an area. This was not historically easy to do, as customers in close proximity to one another were not easily identifiable. Reduced the number of duplicate work orders for one piece of infrastructure (numerous calls may be received for a broken/leaking hydrant – but only one crew would need to be dispatched).

- Design of New Installations – Overlays of current water, reclaim, and sewer infrastructure are available simultaneously.
- Industrial Pre-Treatment and Compliance Monitoring – Show location of customers and non-compliance visually identified.
- Meter Reading – High historic averages may indicate areas that are candidates for reclaim water services.
- Sample Collection and Analysis – Show location of sample collection point and out-of-limit results visually identified
- Operations and Maintenance – Line Locates relating to Sunshine One-Call. Set up of planned maintenance for infrastructure that were identified as problem areas (dead-end lines, low volume neighborhoods, etc.) to improve customer service.

End-users have been empowered with the ability to create and publish their own maps based on their needs. After selection of map layers and point information, the map can be printed at their network or local printer. This allows users to have the information they need immediately based on their criteria.

Plans for the future

Implementing a new Customer Information System, with electronic links to the GIS.
Integrating the SCADA and Laboratory Information to the GIS.

Conclusion/Summary

Over 500 PCU employees have access to the GIS and use it for infrastructure management, map publishing, and business applications. The GIS is used through out the entire utility from Operations to General Maintenance to Customer Service to Engineering. End users include field personnel, office personnel, managers, customer service representative, inspectors, dispatchers, engineers, and directors. If use of the GIS is the measure of it's success, Pinellas County's GIS has to be deemed **A GREAT SUCCESS**.

GITA 2004 presentation will be a demonstration of the laptop field GIS.