Rancho Santa Fe Community Services District GIS Implementation

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Introduction

The question is often raised on the feasibility of implementing GIS in a situation where there will be only a small number of users or amount of data to be collected. This paper will discuss the ways in which the Rancho Santa Fe Community Services District, a wastewater district in San Diego County, California, has implemented GIS on a smaller scale to meet their needs and requirements. There will be a discussion of the reasons for using GIS, the desired data, choice of software, and plans for future uses. There will also be a discussion of the lessons learned throughout the implementation, and how they can be applied to other small scale implementations.

Background

The Rancho Santa Fe CSD is a community services district providing wastewater collection and treatment in southern California. The District serves approximately 1900 customers through a collection system of 50 miles of gravity sewer lines and 10 pump stations. A number of factors originally led to the decision to implement a GIS. At the time, the data available to District staff included an AutoCad based district map and an atlas book comprising parcel map pages from the county assessor. The atlas book had the sewer collection system manually drawn in, and included data such as permit-bearing parcels, easements, reimbursement agreements, and

assorted other data. The District also had a 1999 District Master Plan which used a GIS based hydraulic model which included mapping of the collection system, as well as basic attributes such as pipeline diameter and invert elevations. There was a need for this existing information to be made available to District management and operations staff, and to have new additions to the collection system mapped and the attribute data collected. Dudek & Associates, an engineering and environmental services firm located in San Diego County, was retained to prepare this GIS mapping effort. Dudek had a long history of working together with the District, having prepared the original skeletonized hydraulic model and master plan. To begin the effort to convert the mapping system to a GIS, Dudek staff first performed the digitizing and data collection effort for the entire district collection system. The firm also advised District staff on the GIS software package to use. The choice was made to have District staff use ESRI ArcExplorer, the free viewing/querying software provided by ESRI. This decision was made for two basic reasons: cost, and ease of use. District staff were interested in a simple solution that would allow them to view, query and identify features within the collection system, as well as investigate underlying base layers as needed. The next phase of the GIS implementation involved the conversion of the District's paper atlas book to a digital format. The staff at Dudek has done this for a number of clients, and suggested using the "Mapbook" developer sample extension from ESRI as a template. This extension is flexible enough to accommodate a number of special conditions associated with the atlas book. The first condition was that the District wanted the atlas book based on the County assessor's parcel book pages, not on a rectangular grid. Each page is potentially at a different scale, and/or rotation. A special index layer was created specifying the desired scale and rotation for each page. Geodatabase annotation was created to store labels for a number of features. These features included data such as pipeline diameter and material,

manhole depth, parcel numbers, assessor's parcel book and page numbers, and adjacent page numbers. Through the use of the "DS Mapbook" extension, and some additional Visual Basic programming, the annotation layers were turned on or off, based on the scale and rotation of the current page. This extension allowed for the easy viewing and printing of any page. It also allowed for the addition of pages as necessary due to growth within the District. At the time the atlas book was converted to a digital format, it was decided to change the software that the District staff used to access the GIS. The "ArcPublisher/ArcReader" system was deployed for District use. This enabled the District staff to access the geodatabase annotation, which was not an option supported in ArcExplorer. By using ArcReader, staff at Dudek are now able to actively maintain the data, including adding new facilities or updating the base data, and provide District staff with an update by simply exporting a new ArcPublisher document.

Challenges

Over the course of the GIS development at the District, there have been a number of challenges. The first of these came about regarding the process for converting existing CAD and hydraulic model data into GIS layers. Through discussions between District and Dudek staff, it was decided to use the hydraulic model data as the basis for the layers. Dudek staff then went through all as-built improvement plans to verify the pipeline and manhole locations, and pull off all additional attribute data. One hurdle encountered along the way is the fact that the District contains facilities that were originally constructed as early as the 1930's, and quality plans were no longer available for these pipelines. In these situations, the knowledge of the District staff and field crews proved to be an invaluable resource. Another challenge that occurred was the non-traditional page layout of the atlas books, and the desire of the District to remain with the format based on the assessor's parcel pages. A traditional, rectangular page layout generally has

all pages of the same scale, with no rotation of elements with them. This caused an increase in the number of labels and annotation layers required for the atlas book. It became necessary to have a layer for each combination of scale and rotation that was found in the book. As you switch between pages in the project file, these layers are turned on and off based on the rotation and scale of the current page. The improved controls for editing and working with annotation have been very useful for recent updates to the GIS. Dudek is in the process of converting some of the layers of annotation that are broken up by scale into single annotation layers that have a scale subtype. Maintaining open communication between District and Dudek staff was key in fulfilling the District's wishes.

Uses

The District now uses the GIS mapping and database system as a one-stop-shop for a variety of mapping and data retrieval tasks which formerly required several steps to access. Data linked to the parcel base layer allows the District to retrieve customer information such as name, lot size, and connection status. Providing information in response to customer queries is another major benefit associated with the new GIS. For instance, the District is now able to access information based on customer name, APN, or site address. And because the printing capabilities in ArcReader are far more refined than they were in ArcExplorer, District staff can zoom in on individual parcel areas to provide detailed maps showing the proximity of a parcel to existing sewer lines. These maps can now also be sent electronically by pasting the map into an email. using the ArcReader software, the District staff is able to easily access the GIS layers knowing that they will always be viewing the most up to date version. Dudek staff handles more detailed queries and graphic creation requests, thus allowing the District staff to focus on day to day operations.

Future uses of the GIS will include expanding links to other data sources as they become available. For example, the District has a large number of sewer line reimbursement agreements with developers who have fronted the cost to extend sewer lines into new areas of the District. By entering in the reimbursement agreement data, District staff will be able to query a parcel and determine the total connection fee due. The actual reimbursement agreement could also be linked to the parcel. Data for currently permitted parcels such as permit number and amount paid is now being added to the GIS. District collections records can be linked to the GIS to more closely track paid or delinquent accounts.

The GIS mapping system and data will also be used to help coordinate and streamline field operations and maintenance activities, using the historical data compiled and adding new pipeline facilities which have been constructed. Having access to the database and maps showing pipeline location, sizes, and materials will speed cleaning and repair services. A yearly cleaning schedule can also be developed with emphasis on recurring problem areas to provide data on future capital replacement projects. Links to the actual improvement plans are also in the works. Another future addition is the location of easements and their related information to allow for better encroachment tracking.

Conclusions

There are a number of important and applicable ideas that can be taken from the GIS implementation at the Rancho Santa Fe CSD. The key to making GIS a successful tool is to remember that it is indeed a tool, and should be designed and utilized to make your job easier. Once this fact was taken to heart, it made the process of adding data and choosing software much easier. The process shifted from how to justify the top of the line GIS software installation, to focusing on identifying and meeting the clients needs on a smaller, more justifiable scale. This

was accomplished by first investigating what kind of data and mapping the District currently had. The next step was to determine what the District wanted from the new system. The District wanted a one-stop-shop to view the sewer system and access the underlying database of information from the parcel map layer. They also wanted to have all facilities available for querying in the GIS. They wanted a simple, easily accessible interface. They wanted to create a digital copy of their existing, much worn, APN based atlas book. Finally, they wanted the ability to expand the system and database as necessary in the future without starting back from square one. Following this, it was necessary to determine the order in which this would happen. The first task was the conversion and verification of the existing hydraulic model data to a GIS layer. Next was the addition of all facilities added since the master plan was created. At this time, new base map information was purchased from SanGIS (San Diego Geographic Information Source). It was decided that the base map information would only need to be updated ever 2-3 years, based on the state of development within the District. District staff was initially provided with access to the GIS using ESRI's ArcExplorer software. The last step in the process; the conversion of the atlas map book to a digital form, was begun in a number of stages. The index layer was created containing the page outlines for the book. A geodatabase was set up to hold the annotation layers, and ultimately, the pipeline and manhole layers. Rules for layer visibility were set up based on scale and rotation of the current atlas page. Annotation was generated based on attributes for a number of the layers in the atlas book. Finally, a number of tasks have been placed on the table for implementation in the future. These include the scanning and linking of record drawings to the GIS; more dynamic linking of customer and permit information to the GIS; and integration of more maintenance data onto the pipeline facilities layer.