



Enhancing Quality of Life

(QOL) with GIS



“A true GIS is not only about making maps, it is a tool than can be used to improve the quality of life of our Citizens.”



PAPER ABSTRACT:

College Station continuously strives to utilize technology to enhance the level of service it provides to its citizens and staff, with the determination to become a model of local government for others to follow. Our GIS exists to take advantage of the analytical capabilities of a true GIS, instead of a map-making system. Information is knowledge, and providing the latest information to the citizens and staff empowers them to make informed decisions. This paper discusses specific examples of “Quality of Life Moments of Truth” to show how the GIS has improved the quality of life of our Citizens.

EXECUTIVE SUMMARY

“Information is knowledge, and providing the latest information to Citizens and Staff empowers them to make better and more informed decisions.”

If you were to go back in time and ask a farmer what he would wish for, he would probably say he wanted a horse that would work twice as hard and ate half as many oats. He would not know to ask for a tractor. Technology changes things so fast that many people aren't sure what the best solutions to their problems might be. This is where Geographic Information Systems (GIS) comes into play. Our program exists to take advantage of GIS’s analytical capabilities instead of it’s proficiency at making maps.

We strive to utilize technology to enhance the level of service we provide citizens and staff with the determination to become a model of local government for others to follow. The GIS is specifically responsible for the implementation and management of the geographic data within the City. We currently have numerous data layers covering not only the city, but layers that encompass neighboring government entities. Great cooperation exists between these surrounding entities to make certain that all the data is accurate and as current as possible.

Internally, GIS supports the needs, processes the requests, and maintain the GIS's overall development standards. We coordinate system development, conduct and coordinate end user training classes, develop custom applications, provide data input and quality control, and act as the GIS "Help Desk". We have streamlined many of the daily tasks with the use of the GIS, and are always on the lookout for specialized GIS applications for individual departments. In a sense, we have become the efficiency experts for the

City. We have, for example, cut the time it takes to do a typical 200-foot notification of a zoning change on a particular property from 4 hours to 20 minutes. This frees up valuable staff time to dedicate to projects that always seemed to be on the “back burner” increasing the level and quality of service we provide our Citizens. Some of the Quality of Life (QOL) Moments of Truth are explained later that have made an improvement to the overall livability of our City.

Externally, our goal is to make information about City government easily accessible to the Citizens. Information is knowledge, and providing current information (appraisal data, zoning, infrastructure) to Citizens and staff empowers them to make better-informed decisions. Finding out if a certain park has a jogging trail, or what day the recycling is picked up in the neighborhood, or even where a certain individual is interred in the city cemetery are all questions that can now be quickly answered with the GIS. The possibilities are endless as to what can be asked from the system.

The ultimate goal is to have the city operate under a city-wide suite of integrated systems which serve the primary needs of the individual departments yet share information between systems. The City’s GIS plays an important role in accomplishing this task as it is the common link between every city department since they all deal with geographic issues in one way or another.

BACKGROUND

“Geographic Information Systems is our common language.”

GIS is the compilation of different types of data coming from different sources in a format that will consider all of the attributes to make better informed decisions. It is about finding patterns that answer questions of location such as where, why, and how. It can be used to solve problems and make decisions that will have long term effects. GIS analysis sees patterns and trends that spreadsheets alone can’t show.

The ability to click on a parcel of land on a digital map and be able to find out all the information that is available has always been one of the goals of the GIS. With the technological advances in recent years, the proliferation of the Internet, and the availability of relatively inexpensive desktop computers that 10 years ago would have been impossible to own, it was only natural to create a system to digitally convert

all of the City's maps into digital form. The creation of a Geographic Information Systems was the logical solution.

In the 10 years since the City converted the first paper map to digital files, an immense amount of time and money has been invested into the GIS project and the City is now reaping the benefits of this effort. The GIS has been extremely successful in the creation and collection of graphic data sets and currently has an assortment of elements that some cities only hope to one day see in their systems.

Until recently, the possible benefactors of such a system, Citizens and Staff, had largely been ignored. Those for whom the system was created were frustrated by the lack of attention that had been directed to the dissemination of the information to their desktops and homes. A consultant was hired to assist in how to best approach these customers to win back their confidence, as well as distributing the data into the hands of the community. GIS is the common language that links all aspects of municipal government.

MAYOR AND CITY GOVERNMENT'S ROLE

There has to be a complete commitment or "buy-in" to the GIS effort at all levels of City government – "not just a project, but a necessary tool".

GIS in the City began in 1990 in the Public Utilities department. At that time, all that was available was AutoCad maps, or what are known as flat files with lines with no data or information behind the graphics. In 1995, the City contracted to have a flyover imagery completed, from where most of the now existing data layers were extracted, and a true GIS was born. Several years later, a needs assessment and implementation strategy was developed to facilitate the creation of the applications, manage the GIS, and ensure the viability, reliability, and accuracy of the GIS database.

Out of the needs assessment came the creation of a GIS Steering Committee consisting of departmental directors. At the direction of the Steering Committee, requests were made of the City Council and the Mayor's Office to fund the training of staff, the creation of custom department specific applications, as well as data acquisition for the continued growth and expansion of the GIS. With the guidance and the monetary blessing of the City Council and the Mayor's Office, the GIS effort rapidly

progressed into what it is today, a model for other cities. The support of Council and the Mayor is the foundational element for a progressive GIS implementation. There has to be a complete commitment or “buy-in” to the GIS effort at all levels of City government – “not just a project, but a necessary tool”.

One of the problems encountered was that the GIS was “controlled” by the developing group and not “shared” freely with the users. Through direct one-on-one contact, we slowly began to “win” back the confidences of the fellow employees. These internal customers required a considerable amount of attention and patience as the GIS began down its new course. The GIS found a home in the Office of Technology and Information Services (OTIS). This location is ideal, since OTIS is considered an internal service department. This way, GIS is perceived as being in a “neutral” department where one of the dominant user departments is not controlling the project. This type of organizational structure is key because it does not remove any data functionality or responsibility from the individual departments. The departments remain the “keepers” of their data. The GIS exists to support the needs, process the requests, and maintain the overall development standards of the system.

PROJECT FINANCING

“The key to the success of a GIS project is satisfied users and the key to satisfied users is a quality installation of all the necessary elements.”

The implementation of a GIS system is an expensive endeavor, so the buy-in of upper management, elected officials, and staff is critical to the success of the project. Justification for the expenditure of funds for data acquisition, software, hardware, and training has to be made clear to all parties involved. Time and effort invested must show a promise of ample returns on investment, be it increased efficiency, increased functionality, or better customer service.

College Station operates an “*Enterprise-Wide*” GIS. Individual departments maintain, update, and create their own data as a part of their daily operations, with the GIS linking to these existing data sets. General data acquisition costs are not quantifiable since the individual departments would have to create and maintain their data with or without the existence of the GIS. Everyone saves time and effort by increasing the efficiency and usability of their data and everybody benefits from the end results.

The key to the success of a GIS project is satisfied users and the key to satisfied users is a quality installation of all the necessary elements. Shortcuts in data acquisition, application development, or staff training will only hinder the progress and functionality of the system.

IMPROVING QUALITY OF LIFE

“Better service at a lower cost equals satisfied customers, and satisfied customers are happy citizens.”

The largest benefit of GIS has been the increased availability of information to our Citizens, and the ease by which they can access this information. Parents sending their children to Texas A&M University can look up crime statistics about a specific area they are thinking of leasing or purchasing property. Developers and engineers can look up zoning type, building setbacks, minimum lot areas, and property ownership, through the Internet. Realtors can look up appraised value information on properties they are looking to list, or investors can get ownership information on properties they want to purchase. Citizens can see what precinct they need to vote in as well as their polling location, what amenities a certain park has, or find a dearly departed relative in the city cemetery. They can find out when their rubbish pickup or recycling day is or what year the historic home across the street was built.

The City’s GIS maintains accurate and up-to-date digital layers of public and private assets, be it streets, soil types, or waterlines. Below is a list of some of the projects and a few examples of how the GIS has increased the quality of life of our Citizens with what we call *Quality of Life (QOL) Moments of Truth*.

Crime Analysis: The City’s Crime Analyst is responsible for tracking crime throughout the city. Crime trends, patterns, hot spots (areas of criminal activity that are very active) are noted and the information is routed to patrol officers for action. Citizens and soon to be Citizens are interested in crime statistics to assure themselves that the area in which they reside is a safe one. To Citizens, the ability to monitor

crime in their area can be a great asset to their quality of life. Using the GIS on the website allows citizens to check the area they are interested in and make their own determination as to whether an area of the city is safe. By utilizing the GIS, visual snapshots of crime in the City can be created. Officers would much rather be out on the streets than going through pages and pages of police reports. With mapping, a glimpse of the map representing their beat area of the City can give the officer a better plan of action.

***QOL Moment of Truth:** College Station was having a problem with vehicles being broken into and radios, backpacks, etc. stolen. The Crime Analyst used the GIS to break down the burglaries into location and the day of the week. The analysis showed that on Thursdays the burglars were hitting a certain area of town. They staked out that area on that day, and apprehended the perpetrators.*

Registered Sex Offenders: We imported, from the Sheriff's office a database of all the registered sex offenders in the area. We took the address information for each offender, and created a layer on our GIS so that if the unfortunate occurs and a child were to disappear, we can quickly create a buffer around where the child disappeared, and generate a list of the registered sex offenders in that area. Their image, their vehicles, and even their shoe size and blood type, can be quickly sent out to folks in the field.

***QOL Moment of Truth:** Our Crime Analyst did a presentation to the Grimes (nearby county) Sheriff's office on how she utilizes the GIS in her daily tasks, and used a GIS screen shot of one of the registered sex offenders to show how the system works. One of the detectives in the room recognized him as someone that had an outstanding criminal warrant. He was apprehended the next day.*

Mobile Data Terminals: The ability of emergency vehicles to respond to an emergency call in a timely manner is the foundation of an effective emergency response system. College Station Fire and Police personnel have always relied on paper map books to find the location of emergency calls. Because the City of College Station is rapidly growing, new streets are being added on a regular basis. By the time that the map books are generated, printed, and distributed to the emergency vehicles, they are out of date. The Fire and Police departments now have the ability to quickly find the physical address of an emergency call without having to manually search through paper map books. Utilizing data from the

City's GIS, they can digitally pinpoint the location of the incident, nearest fire hydrant, and the best way to get there, within seconds of receiving a call.

***QOL Moment of Truth:** The system has already been credited for saving the life of an individual outside the normal response area who was clinically dead when emergency personnel arrived. Thanks to being able to get to the location several minutes sooner, they were able to revive him. Every time it is put to use it has the potential to cut valuable seconds from the response time of an emergency call, especially for those incidents outside of the "normal" response areas.*

Lightning Predictor System: The Fire Department received funding to install numerous lightning predictor systems throughout many of the city parks, schools, and other facilities. Utilizing the GIS to display and analyze possible coverage areas in such a way as to get the largest coverage area possible for the equipment allocated to the City.

***QOL Moment of Truth:** We utilized the GIS to analyze the proposed location of the lightning predictors, and found out that there were "holes" where certain parks and schools were not being covered by the system. By moving the location of the units within the parks, more area parks and schools were under the protected areas.*

Smoke Detector Program: The Fire Department received a grant to purchase and distribute 2000 smoke detectors, primarily to low to moderate income areas of town. We generated small area maps, lists of property owners, lists of utility account customers, as well as lists of the apartment complexes in the target area, facilitating the distribution and installation of the smoke detectors by volunteers.

***QOL Moment of Truth:** The ability to generate lists of possible recipients of the free smoke detectors that met the criteria for the grant greatly sped up the distribution of the detectors, as well as having the ability, at a later date to show where the detectors were distributed and installed.*

Code Enforcement: We utilize the GIS to analyze densities of code enforcement areas to see which areas of town were receiving the most citations. We correlated the results with those of the tenant occupied analysis to discover that the majority of code enforcement cases were in student housing areas.

QOL Moment of Truth: A campaign (“*Bee a Good Neighbor*”) was launched to educate the university student population in our City in an effort to reduce the number of code violations near student occupied housing.

New Fire Station Location Analysis: College Station currently has 4 fire stations. With the rapid growth that our City is experiencing, the immediate need for a fifth station became evident. The GIS was utilized to calculate 2-minute emergency response time, as well as two mile driving distances and property values outside of the buffer areas of the existing stations. From this map, it was evident as to where the new fire station needed to be located.

QOL Moment of Truth: We also went one step further and utilized the population data, growth projection information, and existing property values to quantify the need for two additional stations in the next 10 years. This is an example of how GIS is used proactively instead of reactively.

Emergency Operation Center (EOC): GIS has become a major presence in our EOC. In the event of an emergency, we have a dedicated computer available to quickly calculate population estimates, property damage assessments, evacuation routes, evacuation lists, etc. for any part of the City. We can show contours to track the downhill flow of fumes, creek beds to show the possible flow of toxic spills, etc.

QOL Moment of Truth: We had a high-pressure gas line break near several of our subdivisions. We utilized the GIS to create an evacuation area based on the wind direction, and ground contours (gas is heavier than air, so it travels downhill, much like water). On the aerial image, we noticed that there was a home, located deep in a rural area that had been overlooked by emergency personnel. So, a unit was sent to make sure that the elderly resident was okay and evacuated her.

Utility Dispatch: Utility Dispatch has always relied on paper map books to find the location of water lines, sewer lines, transformers, etc. when they receive calls about service outages. By the time these map books were compiled, printed, and sent out in the vehicles, they were out of date. A GIS project was created to maintain the information current, so that the crews using laptops in their trucks (14 total to date) are able to see the latest infrastructure maps in digital form. Staff used to have to carry a map book for the water system, one for the sewer system and one for the electrical system. Now all three systems

are viewable on one screen. Layers can be turned on and off, changed, and queried. The layers are continuously updated and displayed in the utility dispatch area on two large 72-inch Smart Boards to facilitate vehicle dispatching.

***QOL Moment of Truth:** When a citizen calls utility dispatch to notify that his lights are off, or that his water is turning brown, as those calls come in they are displayed on the dispatch screen, and usually patterns emerge. GIS can show a certain transformer went out or a certain section of waterline has been damaged. A picture says a thousand words, especially when water and electrical outages are concerned.*

Capital Improvement Project (CIP): The City's CIP will soon be available on the Intranet for staff and Citizens to review, get contact information, or budget and completion timelines for major capital improvement projects in the City.

***QOL Moment of Truth:** Having information on infrastructure projects throughout the City available on the Intranet helps the Citizen's government "insiders" by giving them a direct link to the information. As a benefit, it has freed up precious staff time that can now be dedicated to other projects, since they don't have to personally explain the project to multiple parties.*

Lease Space Project: Potential businesses will now be able to find commercial lease space on the Internet based on selected criteria. They can say that they need 1,500 square feet in a certain area of town, and then be able to see what properties are available, see pictures of the building, get broker phone numbers, and even see what other similar type properties are in the same area that they are looking for.

***QOL Moment of Truth:** The use of the GIS to attract new businesses and promote the continued economic development and growth of the City shows a very tangible economic return on investment of the GIS effort. By making it easier for a business to locate in our City, it can potentially increase the tax base, create jobs, and make College Station a better place to live.*

Distressed Property Acquisition: The City's Community Development folks utilize the GIS to look for distressed, or low valued single-family homes for inclusion into the myriad of programs that are available. Based on the value per square foot of improved value, homes were selected for purchase and demolition, low or no interest home loans for the homeowner, or homes for purchase and rehabilitation.

***QOL Moment of Truth:** GIS analyzed census, income, and land use to generate a list of possible recipients of Community Development funds. Staff contacted this list of potential benefactors to make them aware of the available programs. Many of these folks would have never found out about the programs and their benefits. The GIS was used proactively instead of reactively contacting the potential benefactors and rehabilitating distressed areas of town.*

Neighborhood/Long Range Planning: Mailing lists for neighborhood planning seminars and conferences are quickly generated utilizing the GIS. Geographical grouping of homes into neighborhoods was simplified by the use of the GIS. Land use planning, and “what if” scenarios can be played out with the use of the GIS, as well as, land use inventories, zoning analysis, population estimates, and growth patterns.

***QOL Moment of Truth:** City planning involves the comparison of many types and styles of information that can not be easily analyzed with the use of simple spreadsheets. Bringing the GIS and the planning related data layers to each planner’s desk has given them the ability to utilize the GIS as a valuable analytical tool, instead of a simple way to make maps.*

Address Notifications: Letters notifying residents of nearby zoning changes are now quickly generated by the GIS with the simple creation of fixed distance buffers around the subject properties. Mailing lists can be quickly generated and sent out, saving valuable staff time.

***QOL Moment of Truth:**The time needed to complete a typical notification dropped from 4 hours to less than 20 minutes, freeing staff for other planning projects that always seemed to be on the “back burner”.*

Parks Planning: By utilizing the GIS not only to locate existing parks, but also to plan the location of future parks with the use of the greenbelt/floodplain layers, facilitates the process of land acquisition and parks dedication by city staff and developers. Our community's Parks and Recreation department hired a consultant to develop a comprehensive Urban Forest Management Plan for the City. Through an interview process, they determined the influences, developed a list of needs, and made recommendations

to address tree and resource planning issues within the City. The consultants utilized GIS data layers (vegetation, parks, floodplains, greenways) to do their analysis.

***QOL Moment of Truth** Citizens now have the capability to go to the City website and see if a park has picnic tables, jogging trails, barbecue pits, nature trails, pools, or any other amenity. They can also see where future parks are planned.*

City Cemetery: Our community is one of the few municipalities in the United States to have a map of their cemetery digitally available on the Internet. Citizens can go to the web site and find the location of a dearly departed, a certain cemetery plot, or the availability of plots in certain areas of the cemetery.

***QOL Moment of Truth:** In the past, if a Citizen wanted to find where someone was buried in the cemetery, the City Secretary's office would have to spend days looking through card catalogs to find that name. Now it takes staff less than one minute to do the same thing. And, for those folks that are doing genealogy studies, can search our database on last name, first name, or a myriad of other ways.*

Voter Precincts: Finding where a citizen votes is now available on the Internet. Around election time, our City Secretary would get countless calls from voters asking where they were supposed to vote, and staff would have to look up the address in a map book to see where that person's polling place was. Quite often the street or subdivision would be so new that it would not be available. We created an up-to-date Internet project, by which a person can find their address and see where they need to vote, freeing up staff time to accomplish other tasks, as well as facilitating the flow of information between the Citizens and the City.

***QOL Moment of Truth:** Not only has our City Secretary come to rely on the voter precincts map on the Internet, but the county registrar's office uses it to assign voting districts to newly registered voters.*

MAJOR LESSONS LEARNED

"GIS needs to be an easily accessible, desk top analytical tool available to and useable by everyone".

GIS is not only a set of maps but an analytical tool that can be easily accessed and utilized by everyone. City departments make use of data sets from other departments that were once impossible or

impractical to access. It has brought together many of the systems throughout the City into a homogenous database. Departments realized that the whole is greater (and more efficient) than the individual parts. They are able to provide better customer service with other departments' data sets when used in conjunction with theirs. We also learned that the best way to accomplish this was to have a central depository for the data, with each department maintaining their particular datasets with one main controlling department "policing" the entire GIS. The GIS Division is not responsible for all the data. It is important that the user departments have a shared responsibility for the system. No one knows a data set better than the group that creates it.

The users are the key to a successful GIS. This includes communication with management, elected officials, and most importantly, the end users. A county-wide user group was created to inform area entities about the status of the GIS and to receive feedback and assistance from them. Also, an internal GIS users group was formed to make staff feel like GIS "insiders". This group meets on a quarterly basis where they are informed of what new data is available, when new users are scheduled to be brought on-line, and to receive input from the users on new applications, issues, and on-going functionality of the system.

The "owning" departments need to take responsibility for the maintenance of their specialized data. The quality and timeliness of the updates into the GIS are essential for the system to remain reliable for the end users. The GIS coordinates the overall GIS project (contracts, data standards, etc.), provides the necessary tools (programming, etc.), and insures the quality of the overall system. The focus should be the development of the tools to empower the end-user community. Some of the organizational consequences of using GIS has been an increase in the communication between departments, city-wide coordination of work flows, the creation of a GIS "Team" within the City, and the increased frequency of data sharing within the City and with outside entities.

"The reason why rain dances work is because the Indians wouldn't stop dancing till it rained!!" A GIS will be successful as long as you keep "dancing"...patience is a commodity that every GIS

department needs. Small successes are critical to the long term success of any GIS implementation. Look for ways to pat yourself on the back, because ultimately, you are the biggest ‘champion’ of your program.

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