

# Discovering the Growing Centric Business Process in the Public Sector

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**Abstract:** What can a City accomplish in two years? Within that time the City of Hamilton, Ohio underwent a migration to the ESRI platform along with implementing the Miner & Miner ArcFM editing tools, the Govern permitting/inspection application, and the Cityworks work management application. The implementation of multiple applications during this time provided the City with many learning experiences in terms of system architecture, application integration and refining their organization's business process.

**Purpose:** Leveraging enterprise technologies to consolidate databases, improve data access, streamline business processes, and better manage and support applications with minimal Information Technology Staff.

**Prelude:** The City of Hamilton has had a mature GIS since 1993. The primary consumers of the system were our Utility Engineering Staff (Electric, Gas, Water), Public Works department (Storm, Sanitary, and Transportation) and Planning. Recognizing that our GIS was limited and no longer supported by the software vendor as of 1998, we decided in 2003 to migrate our GIS into an Enterprise ESRI solution.

The Information Technology Department was also supporting a permitting and inspections application that was utilized only by the Construction Services division. Because many other work areas were involved in similar work flows and processes, we decided to implement the Govern application for permitting and inspections; a solution that defined work flows and could be utilized by many departments.

The Director of Information Technology was coordinating with City departments to consolidate databases and implement paperless solutions when the idea of automating Service Request's and Work Orders was resurrected. Various City departments attempted automating the Service Request and Work Order but did not have the proper support. Hamilton started researching other cities similar in size and the services they provided. Visits were made to Westerville, OH and Naperville, IL. We were specifically interested in viewing Miner & Miner's ArcFM product and ESRI's ArcGIS. While in Naperville, we observed two other technologies that really impressed us; Azteca Systems Cityworks and Citrix. We recognized that publishing applications over the web using Citrix would be a very efficient way of managing these technologies with minimal IT support staff.

In summary, what started as a GIS conversion became a GIS and Work Management project. We replaced our existing GIS and the custom user-end tools that had been developed with customized off the shelf applications. The permitting and inspection application utilized by our Construction Services division was replaced with Govern and expanded into other divisions that provided similar services. Multiple paper service request processes were automated with an enterprise wide service request system (Cityworks) that

includes wireless units in the field. This is what a city can accomplish in 2 years. This is Hamilton's success story.

**Technology Planning and Business Process discovery:** Several technologies were changing, and new technologies were being implemented where inefficient paper processes dominated the work force. Department Directors began restructuring departments to position them properly to support and utilize the technology and benefit from the efficiencies. What needed to be determined was; the identification of all paper forms and what process they served, what departments and who (personnel) are involved with the process, and what do they do with the information.

During the planning phases of our GIS migration, we were approached by many divisions interested in being involved with the GIS. We purchased ArcView from ESRI, knowing that we could create personal geodatabases for them. Base data needed to be transferred periodically to the ESRI environment from the legacy system. For a period of time the Information Technology Department maintained 2 systems. This strategy also made data conversion less intense.

#### *ESRI-ArcGIS / Miner & Miner-ArcFM*

We knew that ESRI was our GIS solution, now it was determining what business applications would utilize the GIS data in an efficient way (directly connecting to the geodatabase). We also had custom tools developed for the old GIS to streamline some of the functionality specific to editing functions for the utility departments; this needed to be replaced too. While doing the research to replace the custom GIS tools, one of the products reviewed was Miner & Miner's ArcFM application. This application met all of our business requirements, and our site visits of other Miner & Miner clients were very insightful.

The City chose to follow the concept "Design, Develop, and Deploy" an implementation concept explained in Jeff Meyer's (Miner & Miner) book "Building Your ArcFM". This book provided a clear and defined approach to implementing the technologies.

During the Design phase we took into consideration one of the complaints echoed among GIS editors concerning the design of old system; they did not have any input on the design and structure of the GIS. We needed to provide them with ownership, choices, and making decisions. We made exhausted efforts which including 8 hour days of geodatabase design sessions which took weeks and were conducted with each division. It was critical to identify who needed to participate in these meetings. Some participants had never heard of GIS, or ever used a computer. We meticulously analyzed the current GIS data with each division and determined what data needed to be eliminated, consolidated or additional data the divisions wanted to capture for the new GIS. During this exercise, we discovered multiple databases, spreadsheets, or standalone systems maintaining data outside of GIS. We made sure that

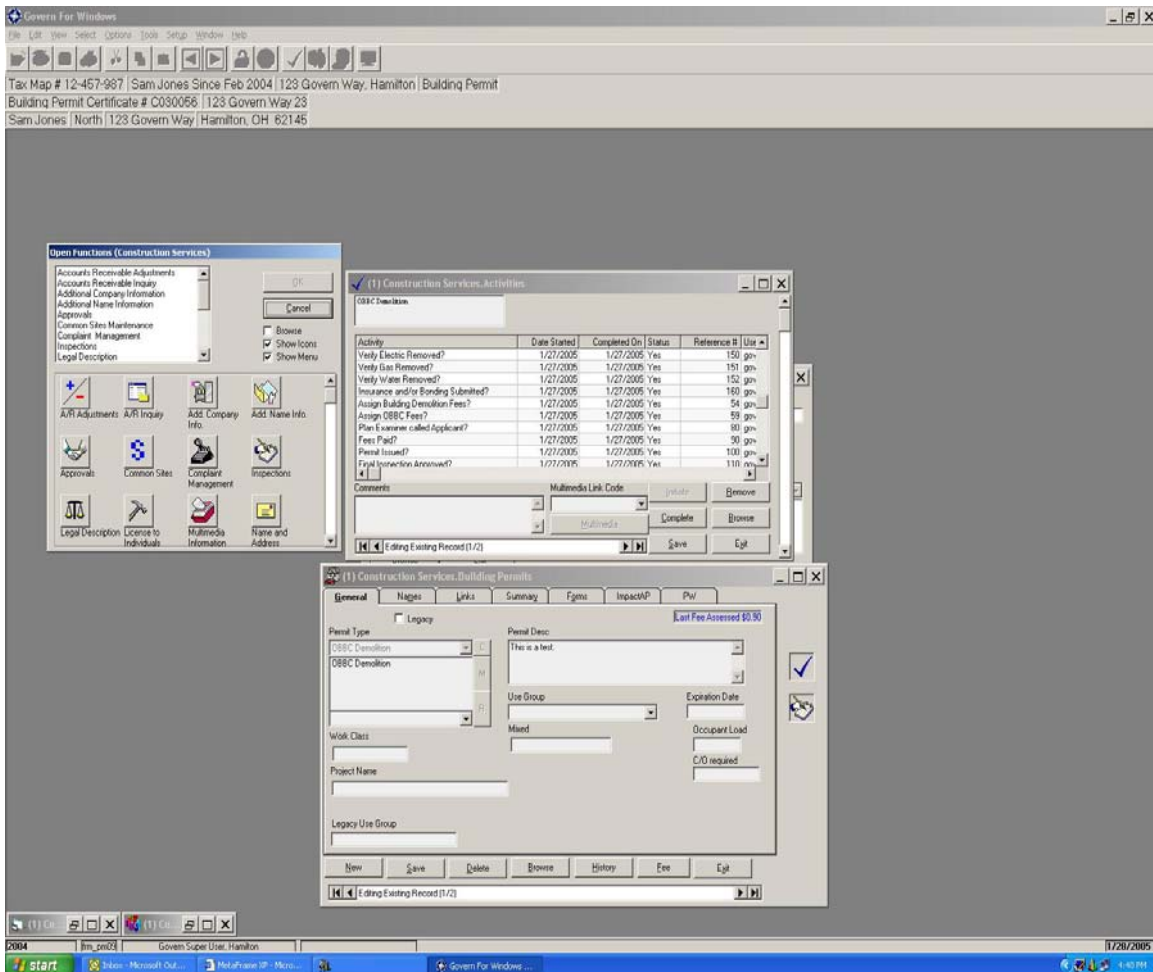
everyone had the opportunity to provide input on the design of the GIS. We also made sure that those employees were recognized as a valuable resource to the process. This extra effort provided us with the needed departmental buy-in to change our system. We made the users aware that this was their opportunity to change their data and our opportunity to change the System to today's standards. As we all know well, most users do not like change.

(Visio diagrams of the Geodatabases can be made available)

#### Govern Software – Govern

The City had an application utilized by our Construction Services division for Inspections and Permits which was supported by a small firm. We were looking for a land management application with the capability to read from the Geodatabase, allow users to access the application from the field, and offer more robust functionality so that the City could expand the application into other departments that are engaged in the land management process. Govern Software's Govern for Windows and Govern.Web – offered such capabilities. The City worked with Varion Systems, a division of GeoAnalytics to implement Govern. Govern for Windows is a work flow centric application that guides users through the work process based on user defined activities. Govern provides view only access to critical property control data published from the County's parcel data (tax map number, owner, etc.) as well as address data from the EAS. In addition, some parcel attributes such as subdivision and zoning are made available through staging area publication processes between the County parcel data and City managed spatial data layers. Govern is a read only consumer of these enterprise data layers yet utilizes them to manage the permitting, complaint and inspection processes. The City utilizes Govern to manage dozens of different permit types and complaints including tracking detailed plan review comments and routing of information. Internal and external reporting tools (Crystal Reports) are used to extract business process specific data (a permit poster) or overall activity data (inspection schedules and monthly activity reports).

Govern.Web allows the City to extend this technology to the public by giving them access to property details, building permits, codes, inspections, and construction plan review status. Govern.Web will be available through the City's web site and offer our constituents the ability to search via an address and view a business process and its subsequent detail. Examples of this may include documents that have been linked such as inspection photos, status of each work flow step, or plan review comments.



### Govern To Cityworks Integration

For some business processes, there is a direct correlation between the data that is managed within Govern and the data managed within Cityworks. A new house at some point will require the creation of a service request to visit the site to complete a tap to the water system and installation of a meter. We needed integration between Govern and Cityworks to facilitate this connection. Varion Systems developed an integration tool that allows critical data to be passed from Govern to Cityworks. When the work flow of a permit dictates that it's time for a service request to be issued to complete something in the field, a Govern user can pass the appropriate data to Cityworks automatically.

### Azteca Systems - Cityworks

As a municipality, we are a service to our residents. Improving customer service is a never ending task. In efforts to conserve paper and computerize the forms being used by the Customer Service division, the business process quickly evolved into a complete city-wide solution to the Service Request heavily utilized by our utility divisions (Gas, Water, Electric, and Storm). This solution eliminated one of the largest paper process's (next to the Work Order) in the city, and quickly became the largest success story of the project.

We diagramed each request type tracing them from beginning to end to determine who filled out the request and why, then where did it go. In most cases department personnel only knew their process, and once completed, it was apparent that various departments were completing the same tasks and the paperwork was redundant. Paperwork, traveling around the city through inner office paper mail could often take days until the work was assigned. Those forms, most in triplicate, were being filed in various departments and stored for years as paper documents, making file retrieval a lengthy process. This has been eliminated.

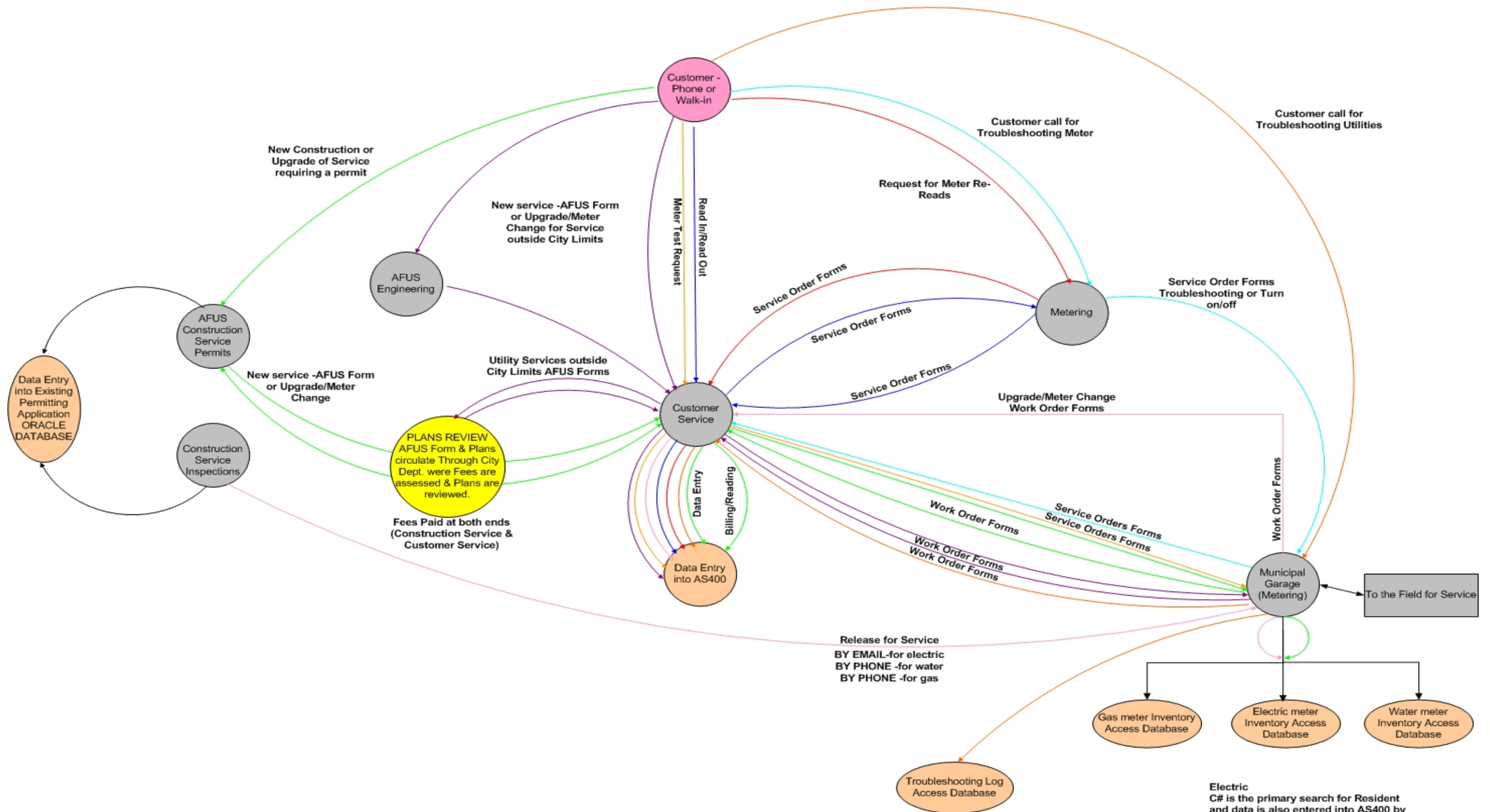
For each service request type or problem code, we looked at customer calls, walk-ins, and those that were started internally and then followed them through their respective life cycle to determine how each department handled the work task. Each process was diagramed and analyzed for improved efficiencies. Our main question was “Why”? Most of our answers had a similar response “That’s the way we have always done it”. We knew that we were going to automate the process, but we did not want to automate a convoluted process. Extensive business process redesign helped the City streamline how it did business and realize savings.

#### Cityworks Integration with Other Systems

As with other business systems, there was data maintained in other systems that was of interest to the Cityworks user. Because of that, the City investigated the integration of Cityworks with other business systems. Some added functionality we included into the system was the nightly refresh of customer and meter data from our Customer Utility Billing System added to the Cityworks system. This information or Service Requests based on the customer data can then be geocoded against our Enterprise Addressing System. The City worked with Varion Systems, a division of GeoAnalytics to implement Cityworks.

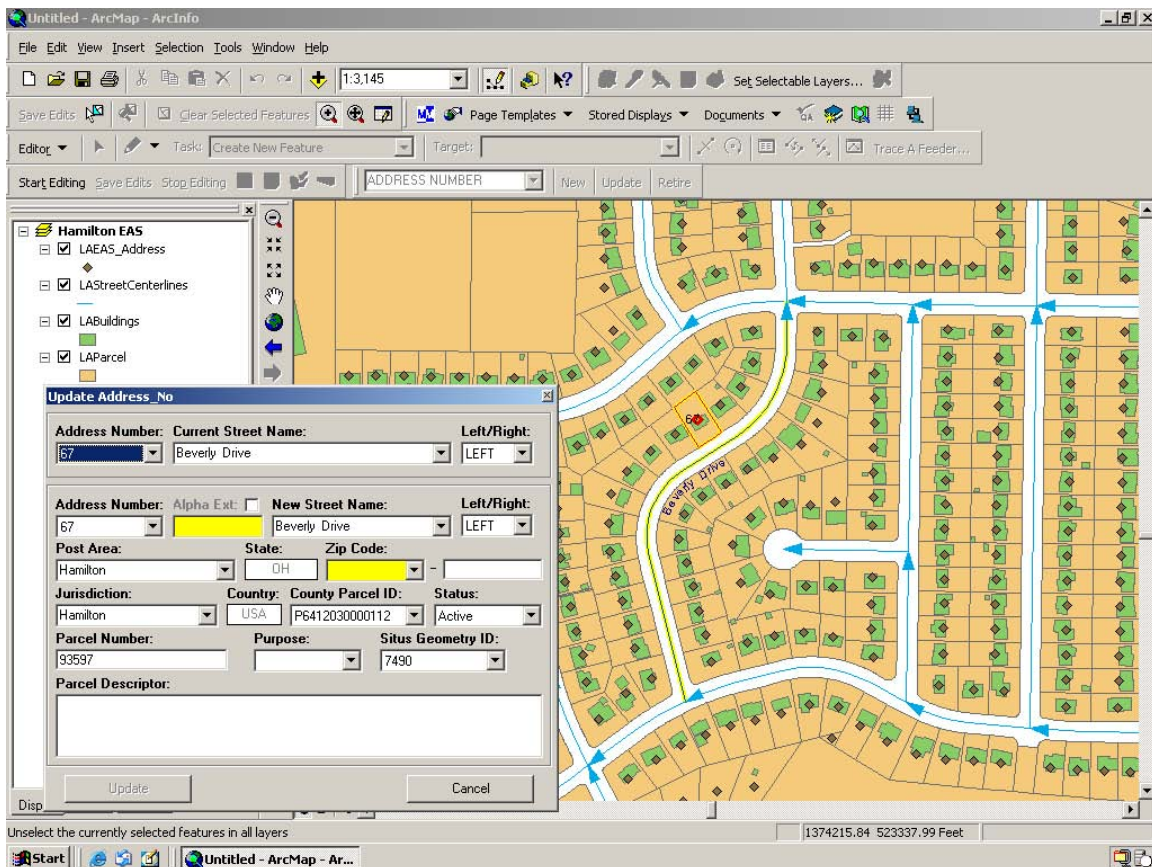






Electric  
 C# is the primary search for Resident  
 and data is also entered into AS400 by  
 Customer Service  
 CD# is commercial and entered into  
 AS400 by Customer Service  
 Gas & Water use serial number of the meter & all  
 forms are sent to Customer Service to be entered into  
 AS400

## Enterprise Addressing System (EAS)



One of the biggest issues for any city is addressing. Throughout the City there were numerous sources of addresses, many of which were created to meet specific data needs of a given business unit in the City. This caused unneeded work to replicate this data, inconsistencies in the currency and accuracy of data, and extra work in creating business specific addresses that were not captured by the other address sources. An example of this was the tracking of unit and suite data within the permitting system in order for permit activity to tie to specific units in a commercial development. This level of detail was not available in other address data sources. Based on issues such as this, the City clearly identified a need for a central repository for the master version of addresses as well as implementing business applications that leverage the official version of address data. To meet these needs, GeoAnalytics designed and developed an enterprise address system (EAS) for Hamilton.

To deploy the City's EAS, GeoAnalytics worked with the City to craft an enterprise database design to house the master version of address data. The design was influenced by the needs of various business units at the City. With a database design in hand, GeoAnalytics worked with the City to load selected address data into the database and to clean up inconsistencies and conflicts in the data. Finally, GeoAnalytics designed and built an address maintenance tool

using ArcGIS and ArcObjects. The maintenance tool leverages the database design previously defined and offers the City the ability to manage street centerlines, assign street names, reserve ranges, create and maintain specific situs addresses, manage buildings, and edit data over time.

To assist other applications in leveraging the City's EAS, GeoAnalytics assisted the City in developing a staging area. The staging area was created to separate transactional data from an official, published dataset. Addresses in the staging area support geocoding services within ArcGIS and Cityworks as well as address lookup from within Govern. The staging area is populated on an as needed basis using SQL code.

#### EAS and Parcel Management

Data in the staging area extends beyond enterprise addresses to include parcels from the Butler County Auditors Office. The City refreshes the parcels (bi-weekly) from the office via a direct-connect to the County's SDE server via a dedicated fiber line to our SDE server. This frequency of access to parcel data and their subsequent splits and merges is a huge step forward in the coordination between the City and Butler County and a critical success factor in the utility of what was being developed. However, the staging area publication process was complicated by the lack of genealogy in the parcel data. The project team needed to evaluate the new parcel data set with the existing data set to determine what parcels had been retired and what new parcels had been created. The City incorporated Govern's unique key for parcels (P\_ID) into the EAS. This allows all systems to relate business activity (e.g., new addresses, new permits, etc.) to one or many parcels without the presence of County assigned information. Since addresses sometimes need to be created in the EAS or permits assigned prior to a new cut of parcels, some P\_ID to address associations need to be held as "temporary" and the corresponding parcels are updated at the next bi-weekly load. Miner & Miner developed a Parcel Loading Utility using ArcObjects that backs up current parcels and compares an incoming parcel dataset to the current parcels to determine where splits and merges have occurred as well as unassigned P\_IDs. The procedure loads new parcels, assigns P\_IDs as appropriate, and outputs 4 interface tables to the staging area for Govern and the EAS to consume.

In addition, the City wanted to leverage City managed parcel centric attributes such as zoning and subdivision classification. Because of that, additional spatial processes needed to occur on the parcels to ensure that the data published to the staging area was usable by the business requirements of end users and their applications. Miner & Miner's parcel loading utility also overlays the latest cut of parcels with a variety of City owned data sets to assign other attributes to the parcels.

**People, Technology, and change:** Moving away from a CAD oriented GIS. CAD has its purpose; designs, schematics, utility profiles, etc... The final destination is the GIS. Our engineering group was ingrained into the CAD functionality of the legacy system and not utilizing the analysis capabilities of the GIS for decision making nor was all the attribution properly being entered. This was a learned process that we still are discovering and teaching today.

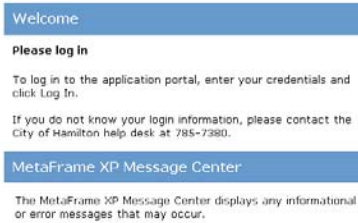
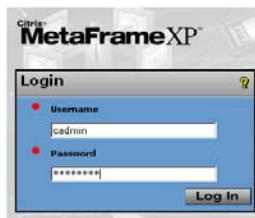
We concentrated on the people factor; Regular meetings with City personnel, bringing departments together to discuss processes and how to improve these processes with technology. City staff from various departments participated in multiple software demonstrations and site visits. We helped them recognize the value of knowing and caring about the business process, not just what they have to do today. Some groups had never interacted before and in most cases did not know what other departments were involved. The departments have now taken ownership of the technology and have a sense of improving the efficiencies by understanding the entire process.

We had our share of obstacles including users in the field that had never touched a computer, unions demanding that this was data entry and misinformation because of the thought of job loss. Because of the commitment or “buy-in” of our Technology Steering committee, which was chaired by the IT Director and the Utility Directors, supervisors and department managers were provided with a clear understanding and intent of this technology. Granted, there was restructuring and consolidation of departments, but the purpose was improved customer service, better communication between the office and field and the common goal of a more efficient work force. This “buy-in” at the top proved to be a valuable asset to the success of the project.

**Conclusion:** Understand your processes, and do not automate bad processes “because we have always done it that way”. Most importantly, understand your people and share the responsibility in the technology investment and the common goal of an efficient work force. People make technology successful.

## From the Technical Corner: What is supporting this system? (Diagram and technical description of supporting Servers, wireless devices, and Citrix).

### Enterprise Application Deployment



#### ● Accessing Citrix Metaframe

- Users log in by connecting to the Citrix Metaframe server web page.
- After login, users select the application group and application they wish.
- Citrix load-balancing initiates application sessions on one of the two application servers.
- ArcGIS/ArcFM/Cityworks/Govern software is only installed on the application servers.

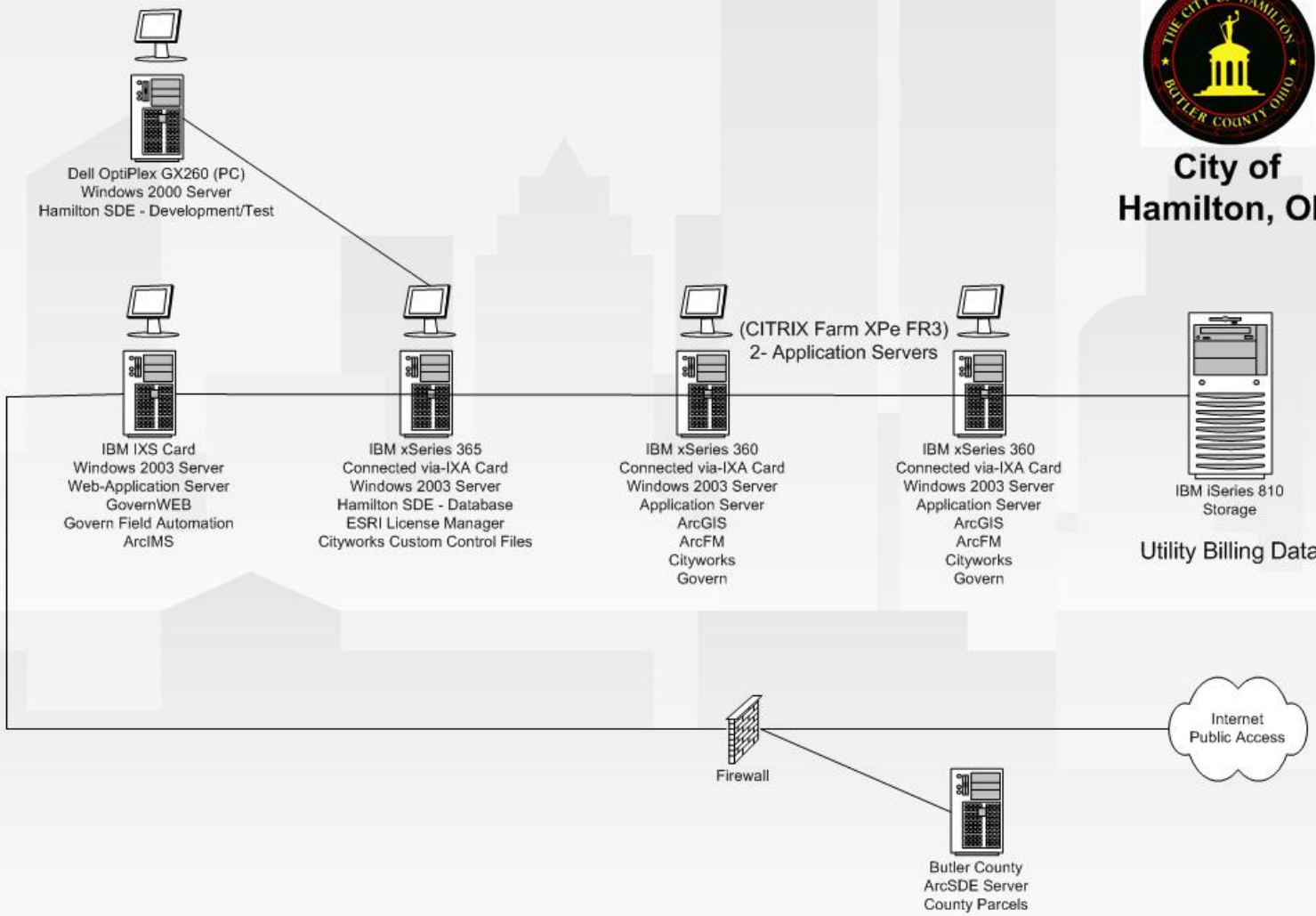


The City of Hamilton, OH, has implemented ESRI GIS software using Oracle and Citrix on an IBM iSeries 810 and three integrated xSeries attached Windows 2003 servers. Server consolidation, performance, and backup considerations were benefits realized in this architecture. Consolidating servers was a factor in this approach. Since the city was using the iSeries, it was cost beneficial to use it to centrally manage the servers instead of adding more stand-alone servers. Performance benefits were realized using the 1GBps Virtual Ethernet connection between the servers. Additionally, this provided a more reliable connection since there were fewer points of failure like switches, cables, and patch panels, and communication between the servers was more secure. Backup considerations were another key component for this implementation. Using the iSeries enabled the city to use its existing tape drive and backup software to provide file level backups for all the servers.





# City of Hamilton, OH





- *Motion M-Series Tablet PCs purchased through Dell.*
  - *51 M1400 TAA Centrino Base 1.1GH Pentium M, 512MB 2X256, 40GB, View Anywhere Display, Intel Pro/Wireless 802.11b/g (A0382399)*
- *Dell Laptops*
  - *15 Latitude D800, Pentium M 735 ( 1.70GHz) 15.4 WUXGA, English (221-5414)*

*All devices have a Sprint wireless card and are capable of accessing GIS applications, Azteca Cityworks for Service Requests, and Govern for permitting and field inspections via Citrix. Also available to the field is the GovernWEB and ArcIMS via an HTTP service.*

## **What's on the Horizon for the City of Hamilton?**

- ESRI 9.1 upgrade
- ESRI Network Analyst
- ESRI's ArcIMS
- Health District Information System (HDIS) and ESRI integration
- Azteca's Cityworks Work Orders
- Miner & Miner's Designer with Cityworks Work Order integration
- Shape file based interfaces to Haestead Methods WaterGEMS and Bradley Bean GasWorks System
- Shape file based interfaces to SWIMWare for Sanitary and Storm Modeling
- Network Adapter interfaces to Synergee Electric
- Implement M&M Valve Isolation and Incident Management software for Gas and Water.
- Possible implementation of M&M Fiber Manager Software
- Large AMR Project began in March 2005 – (ITRON)
  - Integration of AMR with New World Utility Billing
  - Possible Integration of Load Data into GIS for historical storage to feed Synergee Electric
- Omega Group's CrimeView for crime analysis
- Automated Vehicle Location (AVL) for all city vehicles
- Vehicle Routing
- Expanding the Enterprise Addressing System to support other business processes



## **Acknowledgments**

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