

BIOGRAPHICAL INFORMATION

Christine Watson-Hudgens

Information Technology Director

City of Killeen, TX.

Specific Responsibilities

Ms. Watson-Hudgens is Director of the City of Killeen Information Technology Department, which supports all technical aspects of operations to include, planning, design and implementation. Areas of support include, hardware, software, telecommunications, radios and networks. Ms. Watson-Hudgens is responsible for the planning, budgeting and administration of the City's current and future technology. Her department consists of 13 people including, a network technician, a telco/radio technician, 2 computer technicians, a software trainer, a network administrator, a GIS data technician, a Operations Manager, a Network Manager, GIS Project Manager and a Helpdesk/secretary. Ms. Watson-Hudgens is responsible for the management over 700 computers, 750 telephones, 280 cell phones and over 300 radios. Ms. Watson-Hudgens and her staff are also responsible for the project management of an average 30 projects per year.

Past Experience

Prior to joining the City of Killeen Team, Ms. Watson-Hudgens was employed by the City of Temple as a systems administrator, charged with the management of 4 programmers, 2 clustered NUMA boxes and the integration between the DG/UX platform and Windows. Ms. Watson-Hudgens also administered and participated in the implementation and design of the State's first county wide 911 system. Which required conversion and integration between existing city historical files, current court files and the new computer aided dispatch system and records management system. Prior to this, Ms. Watson-Hudgens held a computer programming position with the United States Army, serving in Operation Desert Shield and Desert Storm. During her tenure with the Army, she participated in the design, programming and implementation of the first post wide integrated Company Information System (CIS).

Educational Information

A.A.S. – Computer Science, Business Programming, Central Texas College, Killeen, Texas

DG/UX Unix certification

Professional Memberships/Awards

Member TAGITM – Texas Association of Information Technology Managers

Serve as a board member of the Central Texas College Technical Advisory Board

BIOGRAPHICAL INFORMATION

Robert W. Finkle
President
IT Nexus, Inc.

Specific Responsibilities

Mr. Finkle is the co-founder and President of IT Nexus, Inc. – a company that specializes in IT and GIS systems integration and enterprise-wide GIS implementation. Mr. Finkle assists public sector agencies and utilities in preparing and winning funding approval for enterprise GIS/IT system implementation strategies. He leads consulting teams in the implementation of GIS/IT systems and the integration of GIS with external information systems including permit tracking, maintenance management, hydraulic modeling, public safety, emergency response and customer information systems.

Past Experience

Twenty-three years experience managing, designing and implementing GIS and engineering support information systems.

Vice President for PlanGraphics managing its public sector group and water/wastewater implementation practice.

Project Manager and GIS group leader for Montgomery Watson Consulting Engineering, Inc.

Seven years experience managing a countywide GIS in New Castle County, Delaware.

Educational Information

B.A. - Biology, Kent State University (1977)

M.P.A - University of Delaware College of Urban Affairs and Public Policy (1988)

Professional Memberships

Geospatial Information & Technology Association (GITA)

THE REAL MEANING OF INTEGRATION – ACHIEVING INTEGRATION SUCCESS USING GIS

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ABSTRACT

By definition, the success of enterprise GIS is measured by the extent to which the GIS serves the entire organization's geospatial information needs and the extent to which the GIS achieves a high degree of integration across the organization's many islands of information. This paper, and its companion presentation, focuses on the expectations and technical issues associated with integrating GIS with 3rd party Maintenance Management software. It lays out a technical hierarchy for defining and understanding integration, and reviews the experience of the City of Killeen in working with its MMS software vendor to achieve data sharing integration with the City's enterprise GIS.

THE NEED FOR SYSTEM INTEGRATION

The vast majority of organizations – whether public sector, utility sector or private sector – have come to recognize that their information systems are highly fragmented and that there is significant cost imposed by this fragmentation. The problems imposed by “islands of automation” are well documented and increasingly understood by managers and staff, and underlie a range of information management issues that directly challenge the efficiency and effectiveness of an organization:

- Redundant data entry/data capture;
- Limited coordination between departments;
- Difficulty analyzing information;
- Laborious and often conflicting responses to information requests;
- Reactive versus proactive management of facilities and events

It is widely recognized that to be more competitive, to provide better customer service and to constrain operating costs, organization's must improve their information management by integrating their data systems so information is capture once, easily accessed and flexibly analyzed.

The approach taken by some large organizations to integrate their information systems has been to implement Enterprise Resource Planning/Management (ERP/ERM) software, which essentially replaces the legacy software packages used by each of its departments with a single

software package. This “clean sweep” approach can ensure integration (of data and business processes) but it requires a top-down management mandate and is highly disruptive, if not traumatic, for the organization. For most organizations, and particularly public sector and utility sector entities, an ERP approach to system integration is neither practical nor achievable - the costs are too high, the requirement for complete organization alignment and cooperation too difficult and the pain of surrendering legacy software or complying with ERP-mandated work processes too great.

THE ROLE OF GIS IN ACHIEVING ENTERPRISE SYSTEM INTEGRATION

For public sector entities, utilities and other organizations that manage land and land-based facilities and processes, Geographic Information System technology provides an alternate and far less costly avenue to achieving organization-wide system integration. Because 80% or more of the information managed by these agencies can be referenced by a location on a map, GIS, when properly designed and implemented, can provide a powerful tool for providing integrated access to the disparate data sets and the many legacy information systems supporting the organization’s departments.

THE CITY OF KILLEEN’S GIS PROGRAM

GIS Program Overview

Killeen, Texas, home to Fort Hood, the largest military base in the country, is a dynamic and fast-growing city with a population of 101,000 and an expected growth of 23% over the next 10-15 years. During the late 1990’s, the City’s incoming IT Director, along with several other managers in the City recognized the need to upgrade the City’s existing CAD mapping program to an enterprise-wide, GIS program, serving as a key component of the City’s overall information technology architecture. A comprehensive GIS Needs Assessment and Implementation Master Plan was published by the City’s GIS consultant in May of 2001 with City Council giving approval to a five phase implementation budget in December of 2001.

Killeen’s System Integration Objectives

From the inception of its’ GIS program, the City of Killeen envisioned GIS as the “hub” of its system integration strategy. To this end, the City created an enterprise GIS database design that accommodates the spatial data needs of all City departments and that lays the foundation for integration of the City’s legacy systems and new, 3rd party application software using the GIS data model and GIS technology. A central theme of the City’s IT program is to use the GIS design and development process to overcome its “islands of automation”, improving the efficiency of its operations and the effectiveness of its services by:

- implementing standardized addressing across the GIS and its’ primary information systems
- implementing GIS integration with the City’s Utility Billing System
- the targeted procurement of “best of breed” software packages that integrate with GIS to address the specific business needs of key user departments

A primary technical objective of the City's enterprise GIS implementation, therefore, is to minimize or eliminate any data redundancies between the GIS and the external information systems that it integrates, and to provide end users GIS access to the information contained in these external information systems.

KILLEEN'S EXPERIENCE WITH GIS-MMS INTEGRATION

Phase 1 of the City's GIS implementation program brought an early test to the City's integration objectives and expectations. The first phase of the City's implementation called for:

- the development of a city-wide landbase (parcels, intelligent street centerlines and digital orthophotos)
- the purchase of core GIS software
- the implementation of Phase 1 data maintenance tools and processes
- the delivery of a few, high priority end user applications
- the purchase and implementation of the first component of a Maintenance Management system (pavement management was selected because of Phase 1's delivery of a GIS street centerline file)

The Vendor Selection Process

The City's enterprise GIS database design was completed by July of 2002, with funding for the first phase of GIS system development not becoming available until the start the new fiscal year (November of 2002). During the July - October time period, the City focused on the review and selection of a maintenance management software vendor.

The city evaluated three competing software vendors. On-site software demonstrations were performed by each vendor and evaluated by the City's end-users and IT Department staff, focusing on the functionality of each vendor's modules for:

- Pavement facility management
- Signal and sign facility management
- Sewer facility management
- Storm facility management
- Work order management

The IT Department met with each vendor to explain the City's GIS integration objectives, expressing that full integration was an absolute requirement. Each vendor assured the City that their product met the City's GIS and system integration objectives and supported GIS integration.

After reviewing each vendor's demonstration and product literature, the City requested that each vendor provide client references. The City called the client references and collected information on the quality of their MMS installation and the vendor's customer support. The City then factored in vendor pricing and selected their MMS software vendor.

Discovering Issues with Vendor Integration Capabilities

With the approval of the Phase 1 GIS implementation budget, the City entered into a contract with the 3rd party MMS vendor it had selected. The first step in the MMS vendor's implementation process was to perform an on-site operational consultation that reviewed the MMS software module being purchased, specified any customization required by the client and reviewed database creation and GIS system integration requirements, publishing the results of the consultation in an Operational Report that would guide the MMS implementation.

It was with the publication of the Operational Report that it became apparent that the MMS vendor's approach to GIS system integration differed markedly from the City's stated system integration objectives. The Operational Report revealed that:

- The MMS product would not be able to use the existing GIS street centerline file
- A duplicate street centerline file or a duplicate street name file would need to be maintained in the MMS software product
- Ensuring data integrity and synchronization between the duplicate files would be the City's responsibility

The City's IT Director was extremely disappointed with this news and it was difficult for the IT Department's managers and staff to not feel betrayed by this startling information.

The IT Director informed the MMS vendor that their proposed approach was unacceptable and that it was in direct contravention of the City's previously stated system integration objectives.

Resolving Issues and Communicating with the Vendor

At this point, the City requested their GIS implementation consultant to assist the City in working with the MMS vendor to communicate technical requirements and to define an integration solution that did not duplicate data or impose any additional data maintenance or system administration burdens on the City.

The City and its GIS implementation consultant provided the MMS vendor with the City's GIS database design. Several technical sessions were conducted with the MMS vendor over the next 30 days, but an acceptable technical resolution was not forthcoming. It became apparent that the MMS vendor:

- was reticent to share information about the software product's architecture and database structure
- appeared to be resisting approaches that forced changes to their software product
- may not be very knowledgeable about the GIS software product used by the City

As a last resort, the City issued a stop work notice to the MMS vendor, explaining that the City was not satisfied with the vendor's cooperation and that the contract would be suspended until a technical resolution was defined by the MMS vendor. The City further communicated that:

- 1) the MMS vendor must define a technical resolution acceptable to the City and technically approved by its GIS implementation consultant.
- 2) the MMS vendor must then implement the solution and demonstrate it to the City and its GIS implementation consultant to confirm it worked properly.
- 3) if the solution did not meet the City's integration requirements, the City would cancel the MMS vendor's contract.

Achieving a Solution

The stop work notice has its desired effect – the MMS vendor's cooperation markedly improved and in late April of 2003 they began working in earnest with the City and its GIS implementation consultant to define a solution.

The increased technical cooperation between the MMS vendor and the City's GIS implementation consultant eventually led to positive results. It was learned that the MMS vendor really was suffering from limited knowledge of the GIS software product's capabilities. In time, it was resolved that:

- a duplicate data set would not be required and no additional data maintenance or system administration requirements would be required
- route events could be applied to the GIS street centerline that satisfied the MMS vendor's specific data needs
- the MMS vendor would make several changes to their data structure and code to allow their software to read the GIS street centerline data

The MMS vendor's solution was demonstrated to the City in late November and a final version of the revised product was installed during the second week of December. After a four week period of acceptance review, the City accepted the MMS vendor's revised product and authorized full payment of the vendor's original purchase contract.

CONCLUSIONS & LESSONS LEARNED

Reflecting back on our experience, it was definitely frustrating and arduous – for the City, for the City's GIS implementation consultant and for the MMS Vendor. The good news is that, working together, a good technical solution was implemented that fully achieved the City's enterprise GIS and system integration objectives. The not-so-good news is that it took over nine months from the discovery of the problem, and a lot of effort on everyone's behalf, to resolve the problem.

With the benefit of hind-sight (which the City will use as it moves forward with new 3rd party software procurements) we offer the following suggestions to other organizations for how to achieve GIS system integration success:

1. Understand the Different Meanings of "Integration" when Communicating Technical Requirements

The City felt it had clearly and unequivocally communicated its system integration expectations to the MMS vendors it evaluated. As a result, when the vendors responded they could integrate

with the City's GIS, the City evaluators took them at their word and when it was revealed the vendor's technical approach differed from their expectations, it felt like a betrayal of trust.

While it can be argued that the selected vendor could have done a better job of understanding the City's technical expectations, they did not lie about their ability to integrate with the City's GIS, they just failed to fully explain their technical requirements and approach to integration.

Asking a 3rd party software vendor if their product can integrate with GIS is not enough, they must be asked to explain how they will integrate. The following hierarchy of questions is offered to assist in clarifying a 3rd party vendor's GIS integration approach:

- 1) Is the software product database ANSI SQL or ODBC compliant? If it is not, integration will require the batch export and import of data in a neutral file format (like ASCII) to move data between the 3rd party product and the GIS.
- 2) Does the 3rd party software use the target GIS software for viewing map data or does it provide its' own map viewing module (if the later, the vendor's product may require a specific data structure that must be replicated in the GIS, minimizing or eliminating the GIS dataset's value to other department users).
- 3) Was the 3rd party software written to work directly with the target GIS software? If it was, what version of the GIS software is supported? Is the GIS vendor's native GIS data format used or is a neutral or open systems data format used (if the later, the vendor's product may make a copy of GIS data for use within the vendor product)?
- 4) If the 3rd party software requires attribute data stored in the GIS, will the vendor configure their product to directly read the data from the GIS's data table or tables?
- 5) If the 3rd party software will create attribute data that needs to be accessed from the GIS, will the 3rd party vendor provide you with the table and field definitions of their data model and allow you to write code that accesses their database?

2. Include Your GIS Consultant in Your Vendor Selection Process

If you are using a GIS consultant for the design and/or implementation of your GIS, it can be highly beneficial to include them in your 3rd party vendor selection process or ask them to structure and lead your evaluation process. If the full involvement of your implementation consultant in your evaluation process is cost prohibitive, freeing up a little funding for your consultant to assist you with preparing evaluation criteria and in reviewing your evaluation process can be well worth the expense.

3. Evaluate Your Vendor's GIS Knowledge and Capabilities

If your favored 3rd party vendor claims they can integrate with your GIS, they should be able to provide you with one or more client references where they have performed the level of integration you are requesting. Calling and learning first hand from these reference accounts about how the integration was performed and the client's satisfaction with the results is an excellent way to confirm your vendor's knowledge and abilities.

If your 3rd party vendor cannot produce client references, but you remain interested in their product, request that the vendor provide you with the resumes of one or more of their development staff to confirm they have hands-on experience programming in the current version of your GIS software.

4. Escalate Problems to Regain Control

If you have contracted with your 3rd party vendor but are not happy with the vendor's integration solution or the vendor is not able to show adequate progress in delivering the solution, do not hesitate to communicate your disappointment and take clear and firm action. While we regretted the need to issue a stop work order and threaten to cancel our MMS vendor's contract, we firmly believe it prevented a bad situation from getting worse. It was instrumental in communicating our sincerity to the vendor and was integral mobilizing the attention and resources we needed to resolve the situation.