Relationships

Data Development and Maintenance within the Municipal Public Works Arena

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Paper Abstract

The City of Kirkland, Washington is completing the first phase of its ambitious GIS implementation, begun in 1998. The City's Public Works Department has been a major participant in developing this program, and is currently a primary custodian and maintainer of much of the city-wide ArcGIS database. From the outset, department staff has helped address technical requirements such as GIS content and functionality. Business drivers include various kinds of high-priority municipal service delivery such as utilities, street use, transportation, development review, and public safety. The department has leveraged a number of citywide GIS program capabilities to reduce or avoid costs, improve productivity, and enhance regional data sharing. These benefits are the result of numerous staff within several public works disciplined actively participating in GIS tasks and decision making. This paper examines the workings of this participation at the technical task level as well as within the overall project management.

The stage

The City of Kirkland, Washington has a population of around 45,000 and is an 11 square mile community across Lake Washington east of Seattle. We share borders with the City of Bellevue to the south, the City of Redmond of Microsoft and Nintendo fame to the east, and unincorporated King County to the north. Lake Washington which hosts the hydroplane races of Seafair forms the western border of our City and all major drainages enter the Lake at some point.

Organization

The City is set up as a City Manager form of government with seven elected council members that appoint the Mayor from the Council. We have approximately 420 full-time employees in eight departments:

- City Attorney
- Finance and Administration
- Fire and Building
- Information Technology
- Parks and Community Services
- Police
- Planning and Community Services
- Public Works

Pre-GIS mapping

Prior to beginning GIS at the City in the mid 1990's, mapping was the primary responsibility of a mapping technician in our Public Works department. Mapping had advanced from ink and mylar to AutoCAD in the early 1990's. We printed field map books usually twice a year and that was a pretty significant undertaking which involved a lot of printer time. We had attribute data that we had developed from the individual project record drawings and other historical data. The City's basemap was developed in AutoCAD using the published assessors map, and we were pretty happy with a 5 – 10' accuracy scale. We also maintained AutoCAD maps for the water utility and the sewer utility, but had not yet done the storm maps in AutoCAD. Field crews used a combination of old storm maps to keep track of cleaning, pipe systems and the like. The Planning Department used consultant services to provide mapping in Arcview; layering it onto our AutoCAD basemap was always a challenge. Parks, Police, Fire, and others developed their own approach to providing what we could afford and only those critical items. Business systems had no relation to our mapping systems.

1998 Land Based Information System

In the mid 1990's the idea of GIS at the City became more of a reality when a new City Manager began to champion the benefits he had seen "from a former life". We interviewed other Cities that had implemented GIS and learned that there were as many models for GIS as there were agencies; most had successes and failures in their own implementation. The City Council funded a needs assessment for a new GIS system and in 1998 the City completed its first specific plan to implement GIS. The 1998 Land Based Information System (LBIS) plan presented recommendations for staffing, funding, priorities and laid out a six-year Implementation plan. This plan, a collaboration of many individuals and excellent consultant input, allowed the City to proceed with a roadmap and funding level which is, as we near the completion of the plan, only about 6-9 months behind schedule, and roughly 6% over our original (not adjusted for inflation) budget. Roughly 2/3 of the $1.5 million implementation plan came from our enterprise utilities including water/sewer and the new surface water utility; the remaining 1/3 balance was from the general fund.

The major elements of the plan in order of their implementation were: PLS survey for control, photogrammetric services, development of a transportation centerline network, the real property layers, and finally, and very specific to the Public Works arena were the utility layers (surface water, sanitary sewer, and water). Custodianship for the overall GIS was recommended and is now within our IT department; other critical layers are apportioned to designated departments with a major proportion of those within Public Works.

1998 Surface Water Utility

At about the same time that we were implementing GIS in the City, we had also begun a surface water utility which was supported by customer rates. Previously, many of the functions of the new surface water utility were being performed in our streets department. In the rainy northwest it would seem that a mechanism to fund surface water improvements would be a natural for every community, but we were the last kids on the block to do so. Most of the other Cities and Counties around us have had surface water utilities predating the early to mid 1980's, and as such many of the mapping issues had been worked out and resolved.

Project Objective

One of the major elements of the LBIS plan was for the production of high quality utility GIS layers. Due to the "non-existent" surface water maps, this was the hands down winner for the utility system that would be completed in GIS first. Additionally, in creating the new utility, the City Council had stressed the importance to field personnel, regulatory agencies, and the community to be able to demonstrate the importance of surface water systems and how they functioned it the community.

The diversity and disassociation of data, mapping, and even definitions used in surface water would quickly become critical and let the project team know that this may have been the most challenging utility to start with – so much for starting with the easy tasks and getting experience.

Challenges

I'm not going to go into all of the technical challenges of the project in this paper, I don't want to diminish them, and they were absolutely there. There are plenty of other technical sessions available at the conference if you would like to get those answers. I want to talk more about the organizational and relational challenges that we experienced along the way, and more importantly, how we worked through them, and what we learned along the way.

Mission impossible

Although one would argue we are "the City" and as such have a single mission of improving the lifestyle for our citizenship. That is true, but we have a variety of perspectives of how that should be done. The Planning and Community Development's mission is: "To assist the Kirkland Community in planning for the future and to help guide growth consistent with the Community vision". Their perspective on land use and master planning are extremely public process oriented; be it a zoning amendment, a sensitive areas ordinance, or decisions on a wetland buffer limit, their work plans include significant process to bring out the needs and desires of the community and its sense of what Kirkland should be.

Although not in a written form, Public Works would tend to focus on efficient and timely maintenance, repair, and replacement of infrastructure. Public process is also an everyday interaction, but a conflict often arises, even in a harmonious organization, in the accomplishment of our missions. The undertaking of the surface water GIS highlighted how that often plays out.

Public Works

Engineers and field crews

I know, just like lawyers, you probably all have a good engineering joke, or a perception. I will first of all go into my own glass house. Over the years, be it working for a general contractor or in my last 15 years in the public sector, there are differences of opinion between us engineers and the people who actually go out there to build operate and maintain these fine systems that we build. Sometimes there are perceptions that the Engineers don't care about what "the crews" inherit. We sit in our cushy offices and turn out plans and projects that despite all of our engineering degrees and credentials, still cause them extra work. Rarely is a concept turned to the user without some fine tuning. That difference can lead to barriers. In my experience, the

engineer is missing out on a key element of their training if they aren't involving their maintenance personnel in their design and listening to the feedback from the final users.

On the mapping side of the engineering equation, quite often those "as-builts" or "record drawings" aren't really. It is really a challenge for an engineering draftsman/technician to verify plans once they come in to the office, and thus the field mapping being used at 1:00 in the morning that doesn't have a critical valve or is missing an entire new watermain, leads to a lack of confidence in the maps. This builds the barrier.

Computers and shovels don't mix

It is a rare individual that will trust that which they don't know. Technology is the same thing. Fortunately many of our citizens are exposed to technology not only at work, but at home too. Sure it may be asking your wife to figure out the remote or your kid how to retrieve a text message on your cell phone, but technology pervades our life. There is a sanctuary however for the crews, work. Now take that same individual, excellent at performing their field work, proficient on a backhoe, can lay pipe with the best of them, and tell them we are going to give them GIS...I don't know it, I'm not sure I trust it.

Out of sight out of mind

Unfortunately, due to the size of our City Hall campus and the nature of the surrounding residential area, our maintenance personnel are located at a facility that is about a mile east of City Hall. Daily operations rarely bring O&M personnel and other staff into direct contact. Meetings and projects of course allow interaction, but physical proximity inhibits normal interaction.

Extremely production oriented

Production, production, production. We measure our success by the number of widgets that we can build in a day. We have refined our production down to the hour. Work plans for a typical operations and maintenance crew are built around production, and continually trying to make it more productive. Street sweepers can cover so many miles per day, the pipe crew installed 400 feet today, a good day; we have our manhours "dialed in". Now what do you want me to do? Mapping? Where is the benefit there? How do you measure it?

Planning and Community Development

Wetlands vs. ditches

One of the key elements of the Planning Departments charge is the establishment and monitoring of the City's sensitive areas: steep grades, poor building soils, floodplains, and water courses and wetlands. In Washington State, the advancement of the Endangered Species Act toward protection of the Pacific Salmon, has further elevated the importance of areas in and around potential impact to Salmon. This has lead to dramatic changes in the regulation of projects and development, and in everyday maintenance activities that are performed by the City Crews. Roadside weed control with spraying or the removal of vegetation from of roadside ditches to allow drainage is now encumbered by the potential effects on salmon. Conflicting missions of protection of the environment and efficient use of limited manpower and equipment builds barriers.

Information Technology

Pretty maps and data bases

I know that in this arena, if I attempt to classify GIS as pretty maps, many of you will chuckle – obviously there is always really, really good data behind those maps. But going back to an early barrier, what we don't know we either don't trust it or we fail to fully understand what it can do for us. Compounding this is thinking that IT is just gadgets and new technology. Communication and vernacular are completely different among many of the end users that they support.

Logistical

There were also those challenges that had to be addressed including cartographic representation of various elements, boundaries of drainage basins, the definitions of a creek, of a watercourse, etc. and how accurate did each user need to be? Since many of the uses by Planning Department were codified in comprehensive plans and land uses, buffers of a meandering stream had a much higher degree of accuracy than our maintenance personnel needed in order to show where things were that could be field verified. Changes of the existing mapping system for public works was a "no-brainer", however for the Planning Department, the ripple effect of moving a water course based on a new way of doing things could have dramatic effects on a property owners rights on their land.

Corporate philosophy

The success of this project had many components, but probably the biggest element is relationships. These relationships are continually being formed based on an approach that emphasizes a "service team" approach. This approach is certainly not uniquely Kirkland, as it is employed in many other situations throughout the world. What is critical to its success in Kirkland are the individuals that are on those service teams. Kirkland has cultivated an organization that is comfortable with cross-departmental service teams , and they are used in everything from formulating processes to completing small projects. It is done by involving and listening to the various interests. Clearly the previous cultural and logistical challenges are present in Kirkland and are at the table during the process, but having a forum that allows those differences to come out is key. We sincerely feel that when you bring interest groups together the projects will be better.

Steps to success

- Consultant on board forced to develop a scope of work and timeline
- Interest group meetings
- Common needs identified
- Differences identified and allowed to remain (at least for now)
- Implementation plan – develop a good "roadmap"
- Comprehensive database design (other business systems, future needs)
- Field work by the crews (**this was the critical piece of the puzzle**)
- Training for the crews
- Willingness to shed boundaries and roles
- Strong front end QC and feedback

- Refinements
- Get the heck out of the way!
- Chart progress and measure production
- Brag along the way
- Bring up the differences again allow them to remain (but they are getting critical)
- Timeline begins to force resolution of differences
- Roll out and celebration

Winning elements

- Support at the Council and leadership level
- Strong reliable Funding
- Service Team approach and identify common goals
- Select a good consultant on board
- Trust
- Compromise and synergy

Things we learned

Users get the best data

Despite preconceived ideas of technology and mapping, the single best investment in this project was to train our key field personnel with ArcPAD and send them into the field to collect all of the data. They were in on the design of the dropdown menus at the start, and they were there when the last catch basin was keyed into the system. The support of upper management to commit "production" personnel, for gathering field data allowed a shift of normal duties to accomplish what would ultimately become "their maps". Even with excellent consulting resources available to public agencies, funding and budget restraints often require compromises which lead to a lack of trust – the crews trust these maps more than any they have had in the past. Yes, it slowed our normal operation, but again, to quote our City Manager, "you sometimes have to go slow to go fast".

Individuals do make a difference

An organization can have all of the right structures and processes in place, but it is the individuals that are in those spots that make the difference between getting the product completed and getting an excellent product. Individuals need to be able to learn to trust each other, listen to each other, and above all, not be content with just getting the job done. Yes timeliness is important to the deliverables, but more importantly it is *what* you deliver. Absent a committed staff willing to see it through, a GIS will fail at its infancy.

"Toot your horn"

Celebrate those milestones. Too often we move on to the next task at hand and just start using the product, because that is business. Our IT staff always lets us know when GIS day is coming and when the surface water GIS product was completed provided beautiful plaques for all of those involved. A small tribute, but it emphasizes for all, the power of team work, and the accountability for all members to see its success.

Success breeds additional support/envy

At first it appeared that taking on the surface water GIS to start with might have been a mistake due to the complexity of the interrelatedness of the system, however, it required departments and individuals to cooperate in ways not previously done. It was a challenging start, but has allowed us to more completely define the approach to other GIS layers, and the successes of the approach are contagious, in a sense of competition, the other following layers (water and sewer) which are now fully underway have vowed to raise the bar

Relationships spread

After the project was completed it was clear that not only did we have a new GIS component that addressed the needs and business applications of a myriad of users, but we also had new understandings of each others job. We developed empathy and a better understanding of what others had to do and how they were using the information. The GIS has been a relationship builder which has lead to better cooperation and in turn has improved productivity in areas that go beyond GIS.

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