Geography of a Regional Government: A Decentralized Enterprise System

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Abstract

This paper will describe how the Regional Municipality of Durham has successfully implemented an enterprise GIS in an environment where varying and sometimes conflicting goals arise. The Regions GIS has progressed from a modest beginnings in 2000 with only two members to a fully integrated IT department servicing over 100 power users including 3 core GIS groups, numerous web clients and approximately 40 external stakeholders comprised of Local Municipalities, School Boards, Conservation Authorities, Bell 911, and Transit. Corporate GIS Services mission was, and remains, to foster and provide GIS solutions that enable the coordination of data, technology, standards and partnerships for departmental users, external agencies and the public. A road map outlining how the Region designed a system to support a decentralized enterprise while balancing stakeholder requirements and defining new business workflows will be presented. We will also share our lessons learned and how we are planning our future directions.

Who is the Region of Durham

The Regional Municipality of Durham is the eastern member of the Greater Toronto Area (GTA) in Ontario, Canada and was formed January 1, 1974. The Region of Durham has a population of 596, 660 with 187,414 parcels and 5224 km (3246mi) of road covering a unique mix of rural, densely populated residential and industrial areas spanning 2537 km sq.

The Regional system of government consists of a two-tier level of municipal government: the Regional Municipality of Durham is the first level; and the eight area municipalities, consisting of Pickering, Ajax, Whitby, Oshawa, Clarington, Uxbridge, Brock and Scugog, constitute the second level of the two-tier system of local government. The Region and the eight area municipalities work together to respond to the challenges posed by a diverse and expanding community.

The Region's services are distributed and supported by the following departments: Clerk's; Corporate Information Services; Human Resources; Legal; Durham Emergency Measures Office; Economic Development and Tourism; Finance; Health; Planning; Social Services; and Works.

GIS is Introduced to the Region

In 1999 it was recognized that the Region of Durham was lagging behind other comparable organizations; and some of the local municipalities were on the verge of moving ahead of the Region in their use of GIS. Seeing this as a window of opportunity, a strategic plan to implement GIS at a region-wide level was introduced. The Planning Department was its champion.

A study was undertaken examining the current situation of geospatial data and knowledge of the Region as well as identifying the potential use of GIS to improve data access and common decision-making across departments and external partners. Recommendations were made suggesting a GIS Services Group be placed in a Corporate IT environment to create a centralized data warehouse and provide the infrastructure needed for an enterprise system.

At the time both Planning and Works were engaged in developing spatial data, some basic analysis and providing mapping products. It was recognized that fitting a new GIS Services into either of these departments could initially work but there was a long-term risk in that the new GIS group would be identified with the priorities of the host department.

Ultimately, GIS was identified as a high priority in the Corporate Strategic Plan of 1999 as a service that would further enhance its objectives of:

- Increasing customer service focus and service excellence;
- Efficiency and effectiveness enhanced within Departments;
- Enhanced relationships and cooperation both inter-departmental and inter-municipal;
- Process improvement;
- Information sharing; and
- Enhanced decision making

In 2000, Corporate Information Services, the Regions IT department, added a new division, GIS Services to its ranks. Its mission was, and is, to foster and provide GIS solutions that enable the coordination of data, technology, standards and partnerships for departmental users, external agencies and the public.

Corporate GIS Services Group

In its first year the department consisted of a GIS Manager and SR GIS Specialist. Priorities at this time included an inventory of current data sources and types, the development of a corporate GIS infrastructure and the acquisition of regional base datasets including a SLRN, parcel data and orthophotography. The focus of the group was strictly to provide GIS Services to the clients within the Region, and not mapping services. At the outset, the basic thought was to provide the services which would allow customers to create their own mapping products. This direction was considered practical as GIS Services was relatively small in size and the creation of map products was so highly labour intensive there was no way for the group to sustain the practice.

Partnerships with internal departments as well as outside stakeholders such as Local Municipalities, School Boards and Conservation Authorities would be essential to the success of a corporate GIS Services.

It was a slow start as GIS was not initially recognized as an effective tool for conveying information and supporting decisions. The reasons for this were varied. Some among which were; departments created silos and felt that sharing their information would take away autonomy, there were feelings of proprietorship regarding the data of which they were stewards, some departments did not feel comfortable with the introduction of new technology and others did not understand what GIS was and how it could help them with their tasks.

Since GIS Services was built in the Corporate Information Services Department (CIS) it was initially envisioned that the enterprise GIS would grow as a fairly centralized model; where one division would be responsible for most GIS services at the Region. GIS Services would also then incorporate the services of other divisions under CIS – Infrastructure, Applications, and Desktop to help with hardware, software, and application development. Data would be created and maintained by GIS Services, or outsourced to contractors.

Among the goals of the newly minted department was to build interest in GIS among internal departments and various external stakeholders. By establishing awareness and, ultimately, some trust in both GIS Services and what GIS was capable of doing; doors opened. Desktop

applications were welcomed but departments still did not want to "give up" their data. The growth of GIS was limited to departmental silos only.

More often than not, the lack of communication in what departments were doing led to duplication in the acquisition and maintenance of data, insufficient leveraging of existent data, as well as data which was incorrect or incomplete. These issues were further exacerbated by a lack of support in any coordination among groups – the organization simply didn't support this. (Region of Durham GIS Strategy Report May 2000). These are where the seeds of decentralization were germinated.

In the meantime, GIS Services was able to assemble the data required to build its warehouse. With strong support from the CIO, GIS Services was able to grow and over the span of the next two years, three GIS Specialists were added to the group and the SLRN – 911 compliance project started. This was the beginning.

Promoting GIS to Regional Departments

By 2004, the Region of Durham became the first organization to have a digitally compliant 911 Single Line Road Network in use by Emergency Services. It was an accomplishment and people began to have an inkling of just what GIS capable of doing.

This was a crucial turning point for GIS Services and it was understood that in order to truly implement a GIS enterprise discussion with other regional departments was necessary.

Getting to know the details of how a department would use geographic information also aided in promoting the use of GIS. What are the work processes and flows? What maps and tabular data do they rely on? How can GIS better their daily work tasks? What do they need? Do they have the skills in-house to do what they wanted to achieve? It was observed that GIS training would be required and it was the opportunity GIS Services was hoping would achieve enterprise wide support. Corporate Information Services worked with Human Resources and outside vendors to provide two on-site introductory training courses to the use of GIS to all departments.

GIS Services had achieved the development of a data warehouse and facilitated the education of GIS training courses but now needed to address the matter of departmental buy-in; it has only been within the last three years that GIS has started to find its place within the corporate business process.

GIS Services and Everyone Else

GIS Services came to realize that a centralized model would not work at The Region. Departments wanted autonomy, there were pockets of GIS growing within the different departments and so we became flexible. GIS needed to start growing and if this was how we were going to grow, then we needed to find a fit for our environment.

Migrating from a centralized to a de-centralized model actually opened more doors to GIS within the departments. GIS staff started to pop up in many different locations and though most users logged into a central warehouse there were still many datasets sitting exclusively in departments and projects on the go with no input from GIS Services. This is where the stumbling blocks started to adversely affect a successful enterprise system. Vendors came in, datasets were created with no adherence to the corporate warehouse data standards, projects started with no real understanding of how to incorporate GIS and many failed. There was still a reluctance in Departments to work with GIS Services which resulted in a lack of direction, and understanding

of how a corporate GIS works for all the stakeholders, as well as the who, what and how to get everything in place to successfully complete a GIS based project. GIS Services needed to build trusting and cooperative relationships with the Department stakeholders in order for them to realize that corporately the GIS Services department was there to help them develop and become stronger in their business.

During this time Works and Planning were steadily developing a strong Core GIS staff. With time, communication on a shared corporate GIS directions, as well as a proven track record to reliably maintain consistent, accurate and current key corporate data sets at all times so as to not to impact their business workflows, these departments began to see the benefits of engaging Corporate GIS Services. This relationship has become stronger with the fact that in our de-centralized environment the stewards of the data are responsible for updating their information and providing it out – Corporate GIS simply provides the tools to do this in a practical manner.

Successfully managing a decentralized enterprise prompted Corporate GIS Services to draft a Governance and Best Practices Document, which was sent to all departments and external stakeholders for general comment. Further they were asked to outline the workflows directly affecting their departments within this document. Inclusion in the process of growing GIS at the Region has opened a positive future, one where GIS is being recognized as a critical tool.

Regional departments are now looking to use corporate data sets not only for their GIS projects but also to feed or support other software applications. This is the point where it becomes critical for departmental discussion and consultation. With a sudden influx of needs, particularly in a de-centralized model where there is an obvious reliance between stakeholders, the timing of project and programs becomes key. Project leads and stakeholders must negotiate in an attempt to satisfy all participants' needs and requirements. Sometimes this is not always possible due to resources of the lead group and the inability of departments to find a common ground can sometimes lead to conflict of project or program ownership.

GIS at the Region of Durham Today and Tomorrow

In 2008, GIS Services has seen a sharp increased interest from a number of additional departments and stakeholders. The benefits are starting to outweigh the initial fears of the stakeholders; a central repository allows departmental data to be served up via a website and controlled through logins; the overlay of multi-departmental data via the GIS or other applications allows for cooperation and inter-departmental goals to be addressed and this is a service which can further be leveraged by Local Municipalities and promote inter-governmental needs to be met.

Rich data, ease of integration, outside influences such as Google and the ability to visually synthesize the data have all become the motivation behind this move to a GIS enhanced business model. In some cases, this is further necessitated by legislation which requires information to be spatially synthesized.

In the next few years, stakeholders are looking to incorporate GIS into Asset Management, Land Development, Call Centres, Mobile Data Collection via Road Crews, Health Indicators, Traffic Watch and the Transit System. This type of growth really can only demand a de-centralized model.

With departments increasing their GIS staffing to satisfy their business requirements, the need for a strong GIS core group is even more pronounced. Though GIS Services may not provide the on-hand GIS skills required, they will be there to provide the consultation on the projects,

requirements, resources both in GIS and Infrastructure and become the catalyst in the coordination and cooperation of departments.

Corporate GIS itself will be looking to add an additional staff member to deal exclusively with the Web Mapping Applications as this technology will grow to include a new generation of users. Future advancements in this area will allow clients to edit via the web, update related documents and amend attributes related to spatial entities. The anticipation is that the beginner and intermediate users will take this approach as initial functionality will allow for simple changes. Users requiring more intricate editing options and complex analysis tools will continue using the desktop applications. This expansion, in addition, to the growing use of GIS will stipulate GIS Services also add another GIS Specialist to meet the demands associated with increased data maintenance.

The evolution of technology and more complex systems will also require a more highly skilled Infrastructure group, knowledgeable in GIS, for the implementation of robust system architectures so as to support applications, mobile data transfer and an even more de-centralized GIS enterprise system.

To further ensure the growth of GIS and that its associated projects are successful, it will be integral that Project Management fundamentals such as ITIL are followed. Part of this process ensures that pre - planning, documenting requirements, ensuring stakeholder consensus and allocating the appropriate resources all be taken into consideration. Making sure these items are addressed before a GIS project is started can mean the difference between its success or failure.

Overview of Regional Partners and Services Provided by Corporate GIS Services, 2008

Why/Why Not a De-Centralized Enterprise GIS System Works for the Region of Durham

Time has shown that in our particular organization certain factors have contributed to a successful de-centralized model. They are:

- The recognition that business units have a greater understanding of their workflow processes, data requirements and analysis, therefore they are the subject matter experts on how GIS can increase the efficiencies within their departments,
- Supporting other departments in advancing their GIS programs instead of trying to control or manage them,
- Introductory GIS training provided to all staff within the organization so that there is a foundation of knowledge across departments,
- Providing a data warehouse with current and reliable data,
- Supporting the development of GIS within business units. Engagement typically started with requests for mapping products and dialogue on what GIS could so and how THEY could be empowered to undertake the work. GIS Services has moved to providing cartographic products, with the understanding that should departments wish, the skills can be transferred,
- Providing infrastructure to allow clients to store, manage and distribute their data,
- Creation of a mutually agreed upon Governance document which outlines best practices so that the stewards of the data have the ability to control access, set out common standards and share data across boundaries, and
- The subsidization of acquiring data for the Region as a whole.

By the same token, there have also been some drawbacks to growing in this manner:

- Duplication of effort as communication is not clear either between departments or pertaining to the particular goal of a project,
- Clients are not always clear on which GIS group to go for services,
- Conflicting priorities and resource availability – i.e. One GIS group may need a specific project completed before another group can commit resources thereby having to undertake a project for which they should not be responsible,
- Multiple software licensing purchases in which the separate groups are not able to take advantage of corporate purchasing discounts,
- Multiple purchases also work against the pooling and sharing of software resources across departments,
- Competition in resources where staff has migrated from one department to another, and
- The acquisition of funding. In a government environment business units are more likely to receive budget funds than the corporate GIS support group; business cases can show direct linkages to the department workflow.

Lessons Learned

By far, one of the most important steps that a Corporate GIS group can take is an open policy to working with other departments or external stakeholders. Communication and discussion of shared requirements up front can save a lot of time when developing a GIS. Sounds simple but the amount of work required to accomplish this goal is the one which will dictate the success or failure of the enterprise GIS system.

Working with business units to support their efforts and successes is of great importance, so as not to be seen as competition. By aiding in the development of GIS within these other areas

trust slowly begins to develop. Quite often developing GIS in other business workflows requires extending software and data conversion services – the department can chose to become a temporary client until they have their GIS staff in place or a client who uses GIS Services as needed. Initially clients do not understand the cost of providing software, consulting, mapping and data conversion services so a balance must be found of satisfying expectations, providing services and allowing business units to become self reliant.

In a government organization, or any organization by that matter, the sharing of information across boundaries is what makes the business sound. This is the information and data which will govern and direct the decisions made on behalf of the citizens by the Region. The creation of inter-departmental GIS groups, both at the management level and the technical staff level can become the foundation by which to share ideas, resources and future plans in a collaborative and non-threatening environment.