ESRI Presentation Paper

City of Vaughan Enterprise GIS Enabled Land Development Tracking Project

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Introduction

The City of Vaughan is located in the province of Ontario, immediately north of the City of Toronto. It is part of the Greater Toronto Area, which is considered to be Canada's economic engine. Vaughan is one of the fastest-growing municipalities in the country. Since the early 1980s, the City's population has increased from 20,000 to more than 250,000. In six of the last eight years, new construction in the municipality has exceeded one billion dollars.

As a result of this unprecedented growth, the City needed to greatly expand its services to its residents and local businesses. In just a few years, the City emerged as a major urban centre requiring a sophisticated and progressive local government. This meant providing City staff with the necessary tools to perform their jobs in the most effective and productive way possible.

The City's strategic plan identified the need to employ new technologies to improve its standard of service delivery. In terms of automated business processes, for example, this would include the automation of the land development approval process.

In the larger context, the City has made a commitment to building a Smart City centered around a community web portal to link every resident and business. As many City services as possible would be delivered or accessed through the use of new technologies. A need was identified for location-based services and information that could be delivered automatically and in real time. This lead to the City's decision to implement an Enterprise Geographic Information System (EGIS).

In 2001, the City of Vaughan established a partnership with Munirom Technologies Inc. (MTI) to prepare a comprehensive EGIS strategy for Council's approval. The software developed by Environmental Systems Research Institute, Inc. (ESRI) was selected to support this initiative.

The Business Solution for Growth

The first business application to be built under Vaughan EGIS strategy was a solution that provided the ability to collect data, share information and conduct cross-departmental analyses. This would enable City staff to effectively manage and deal with rapid growth issues and provide the means to effectively plan for service, resource and infrastructure requirements.

Given the unprecedented growth of the City and the need to manage growth in a systematic fashion, the municipality recognized the need for specialized software to track the land development approval process. The manual process for tracking and circulating applications and final plans could not keep the City ahead of the growth curve and ensure

the application of sound growth management principles. Legislative changes further complicated the development approval process and left municipal staff to deal with additional requirements imposed by provincial regulatory changes and reporting responsibilities.

Senior management realized that automating the land development approval review process and tightly integrating it with GIS technology would ensure that municipal planners, engineers and other staff would have the required tools to keep up-to-date statistics on growth, be able to determine where the City is on growth curve at any given time, and be able to readily access information support the decision-making process.

The City of Vaughan's Development Tracking Application (DTA) was commissioned to be built by its partner MTI. The implementation of the DTA became a priority for the City's planning department. As the lead department, they provided the necessary direction to ensure the new system met the business-driven requirements of the end user, and allowed the communication and sharing of data and information to other departments, external agencies, the land development industry and residents.

The GIS Foundation for Business Solutions

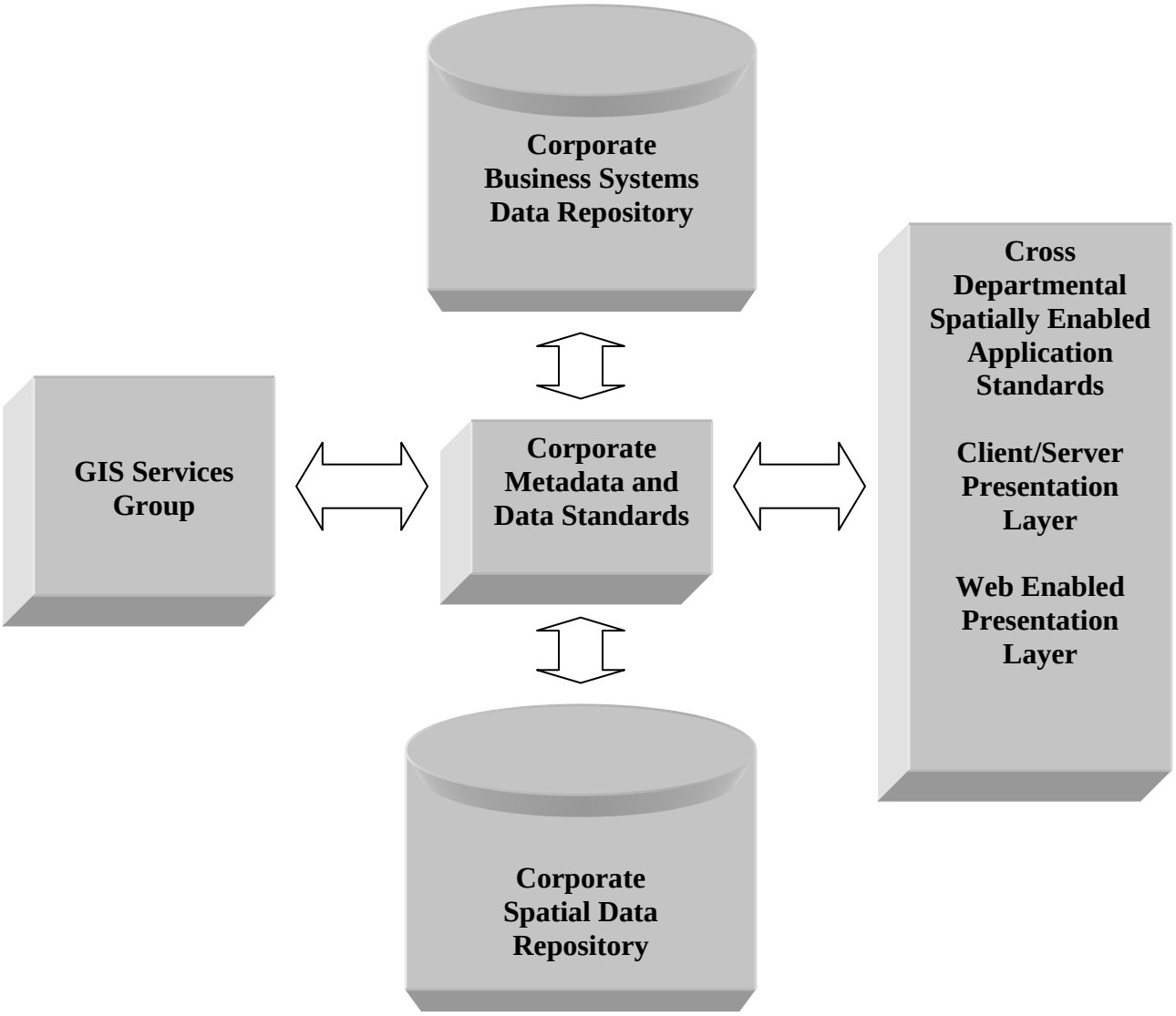
The objective in the mission statement of the DTA project charter was to build a spatially enabled enterprise level business application which provided the following:

- Effective Management of the Land Development Approval Process
- Effective means to share data and communicate between internal departments, external agencies, the business community and residents about growth-related activity.

In order to achieve the objectives of the project charter, a corporate level Information Technology environment needed to be established to support the DTA. This environment had to be a GIS-based architecture due to the highly spatial nature of land development data.

The following diagram illustrates the elements of the environment which were required to support the DTA.

Meta Architecture



The various elements of this architecture are:

Corporate Metadata and Standards:

The most important element of an enterprise business application is the establishment of an accepted standard for data. Standards ensure the reliability of the data and that data used by the application meets the requirements of the Corporation. Better data means better decisions can be made, ultimately resulting in more effective planning and use of resources.

Corporate Business Data Repository:

The corporate business data repository provides a centrally managed corporate database to house the authority datasets (i.e. Master Contact Lists, Master Address Information Attributes, Master Property Information Attributes) for the Corporation and provide a master database repository which all business applications reside on or integrate with. The benefits of this database are:

- Provides single source for data input and retrieval in a well-managed database architecture and schema
- Provides the mechanism to share data across applications and departments
- Eliminates data redundancy and improved quality of data accuracy across the entire organization.

Corporate Spatial Data Repository:

Spatial data was being used on a departmental basis and often bought, collected and maintained in various file formats stored on local workstations. The purpose of the corporate spatial repository was to establish a centrally managed spatial database available to be accessed cross departmentally which contained all the spatial data used by the organization. The benefits of this database are:

- It provided a single source for all spatial data in a well managed database architecture and schema
- It provided the mechanism to share data across departments and spatially enabled applications.

GIS Services Group:

Centralizing the management and maintenance of the corporation spatial data required the organization to establish a GIS Services Grouped in the Information Management and Technology Department. Because, the business of creating and maintaining spatial data is a high specialized function the City has to hire professional GIS people to fill the

functions of this group. In the case of Vaughan we looked for personal high trained and specialized in the ESRI ArcGIS suite of products and tools. The benefits of establishing this services group are as follows:

- They ensure the quality and accuracy of spatial data. Because spatial data is visual it is important that the data be well maintained and as accurate to a real world presentation. Decision based on this data is most likely to be made from visual analysis.
- They ensure that data is maintained in a format and accessible to support spatially enabled applications such as the DTA.
- They provide guidance and expertise in specifying functional requirements of spatial enabled applications. As the city was moving towards spatially enabling most of its business applications were feasible and possible, having an in house expertise ensured consistency in spatial navigation and query functionality of each application.
- They provide in house expertise in managing specialized spatial data management tools such as ArcSDE and provide expertise in spatial data modeling i.e. ESRI GeoDatabase.

Cross Departmental Spatially Enabled Business Applications Standards:

As the city moved towards a centralization of data architecture it became necessary for the corporation to establish Application Standards. These standards are used to evaluate off the shelf product purchases or are used as the basis to formulate design/build specifications. The specifications determine how the application is going to utilize or integrate into the corporate business systems data repository and spatial data repository. The benefits are as follows:

- Ensures the business application directly integrate into a corporate data environment. It significantly reduces the risk of creating “island applications”
- Ensures standards around spatially enable functionality.

The City of Vaughan's Development Tracking Application

The total cost to date for the development and implementation of the Development Tracking Application (DTA) is approximately 1.5 million dollars. For that investment the DTA is both wide and deep in functionality. Its use initially germinated within the City's planning department, but today it is being used by many of the City's departments.

The DTA was designed with both a traditional client/server and web based presentation layer interface. The client/server deployment uses ESRI MapObjects as the GIS engine ESRI's ArcIMS is used for the web based interface.

The backend spatial database which supports the application is built using ArcSDE with Oracle.

The following list represents a comprehensive features list of the applications business functionality:

Area	Feature
GIS Integration:	
	Access to property information
	Spatial enabling
	Attach Historical designation info to Application
	Parkland tracking
	Spatial access to database
Fee Processing:	
	Application fees
	Application receipts
	Track payments against legal description
Circulations:	
	Commenting and circulation internal
	Commenting and circulation external
	Track design briefs - commenting
	Standard letters
Notifications:	
	Letters/mailing labels
	Spatial generate labels

Reporting:

- Flexible reporting
- Special report- activity by planner or ward

Statistics:

- Statistical and reporting functions
- Application statistics

Analysis:

- Attach growth management issues to applications
- Search info by owner, appno, planner, PIN

Event Tracking and Scheduling:

- Track conditions of draft approval
- Event tracking of applications

Document Management:

- MS OA compatibility
- Internet access to data
- Central documents attached to applications
- Integrate to existing Excel
- Standard letters

Contact Management:

- Prior to draft conditions - applicant checklist
- Applicant info

Agreement Management:

- Track financial requirements for agreements
- Insurance in agreements

Workflow:

- Departmental handoffs
- Workload by planner
- Track numbering sequences
- Business Processes

Development Charges Management

- Development charges - integrate to PeopleSoft
- DC collect and receipts - issue refunds

Letters of Credit Management

LOC tracking

Corporate IT Integration

Interface to Amanda

Retrieve building permit info

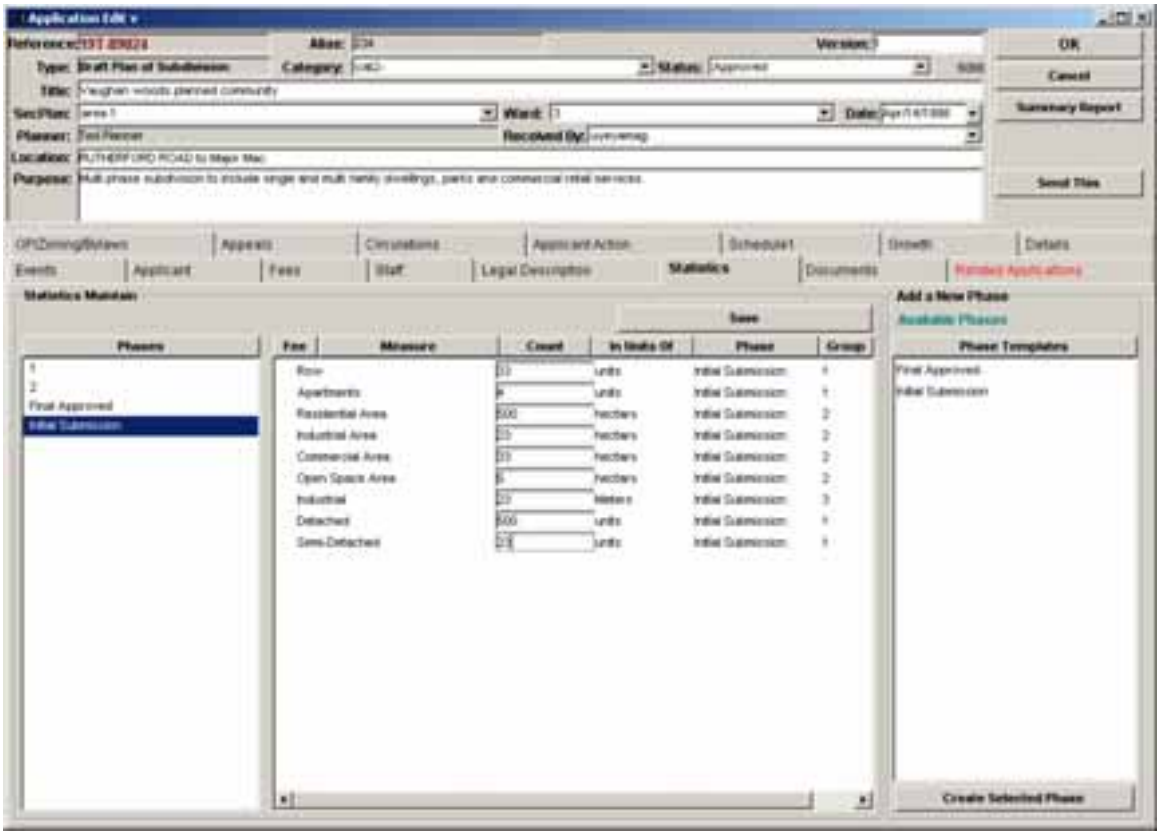
Benefits of the DTA:

The DTA has provided benefits to the city as it has improved the ability to service staff and other stakeholder better by enhancing operational efficiencies.

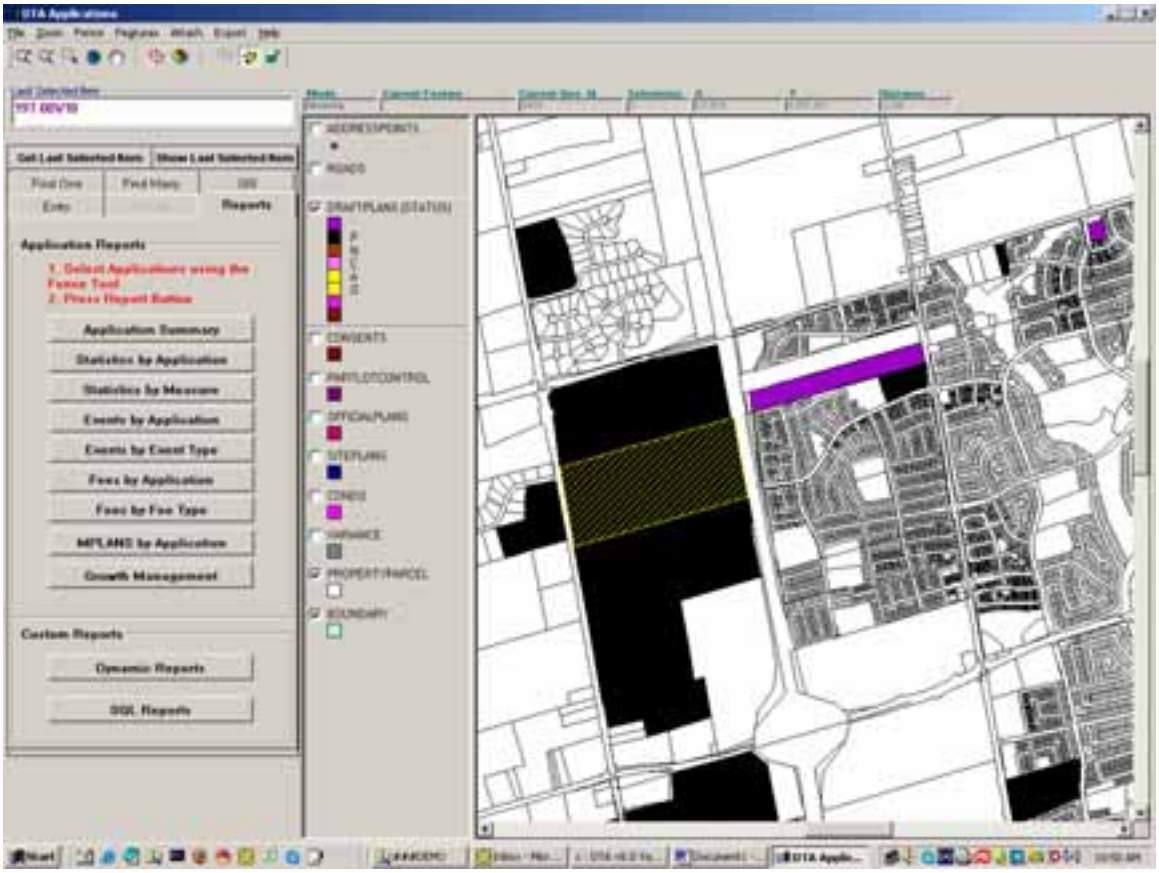
At the surface the benefits of having the DTA is simply having information available at finger tips of staff and citizens. Under the manual process each application was organized in a paper file usually residing on the desk of the planner responsible for the application making information about the file locked with planner. Anytime someone wanted information abut the file, they had to literally walk over physically pick through and retrieve the information they required. This was cumbersome and provided no way to enhance customer service to outside stakeholders and citizens.

Through the mid 1990's the amount of growth in Vaughan became staggering. The manual paper based filling systems was not keeping pace and was breaking down. Application processing wait times were becoming unacceptable, information about growth issues were not being adequately processed to keep council and citizens up to date in a timely manner.

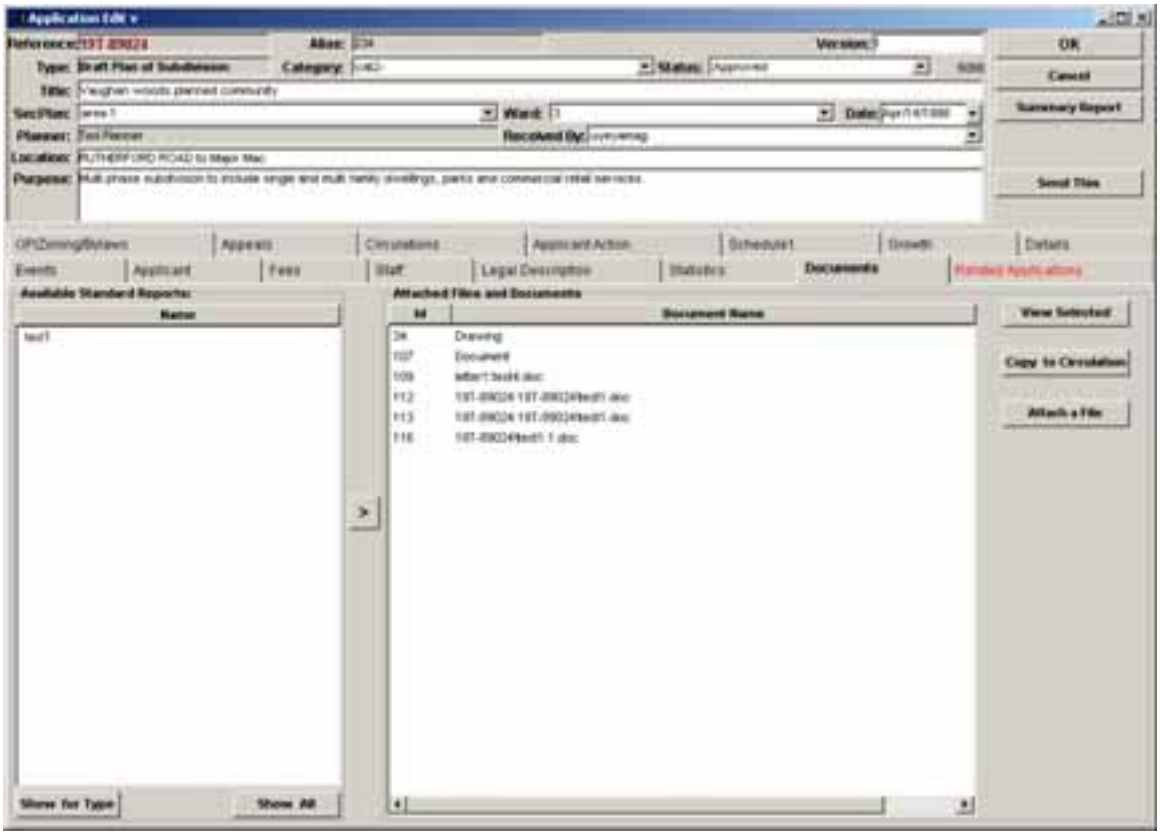
The DTA solved this problem. In a nutshell the DTA keeps a detailed virtual file of all the information about each development application and stores it in a central GIS enabled database. The GIS interface makes presentation and querying of the data a lot more intuitive and streamlined. Staff external stakeholder and the ordinary citizen now simply points and clicks on a map or types in a file number and instantly all the information and data about the application is instantaneously made available.



Information stored in the DTA is captured as part of the planners and support staff day to day work flow during the life cycle of the application. This was probably the single most important consideration in developing and implementing the system. The DTA had to flexible enough to ensure easy integration and an enhancement to the day to day work flow of each staff members performs in the processing of a land development application. The DTA does not rely on a single person to key in data; data is keyed in as staff process the application.

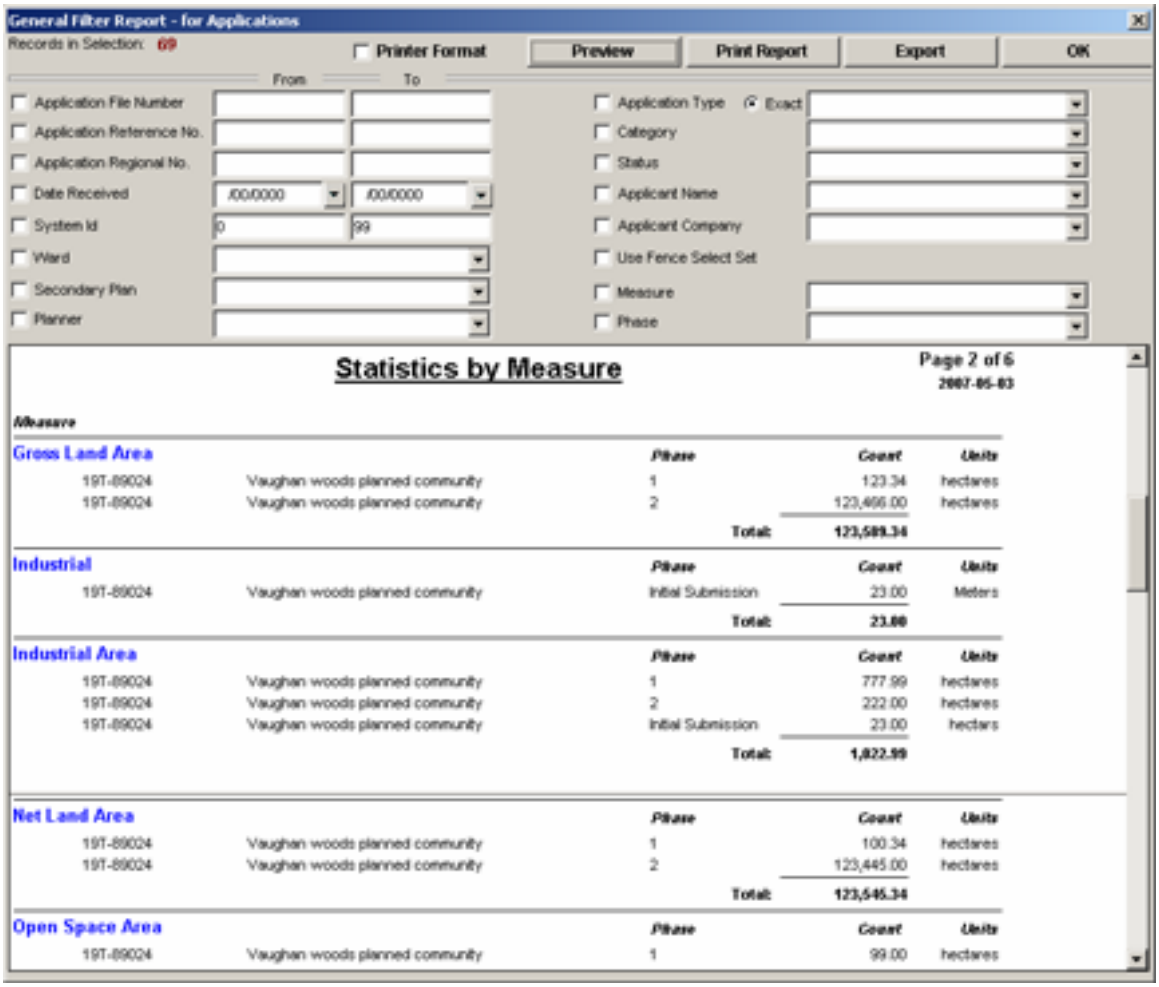


The DTA through office automation produces the required memos and notification letters based on the information stored in the database it automatically sets key date flags.

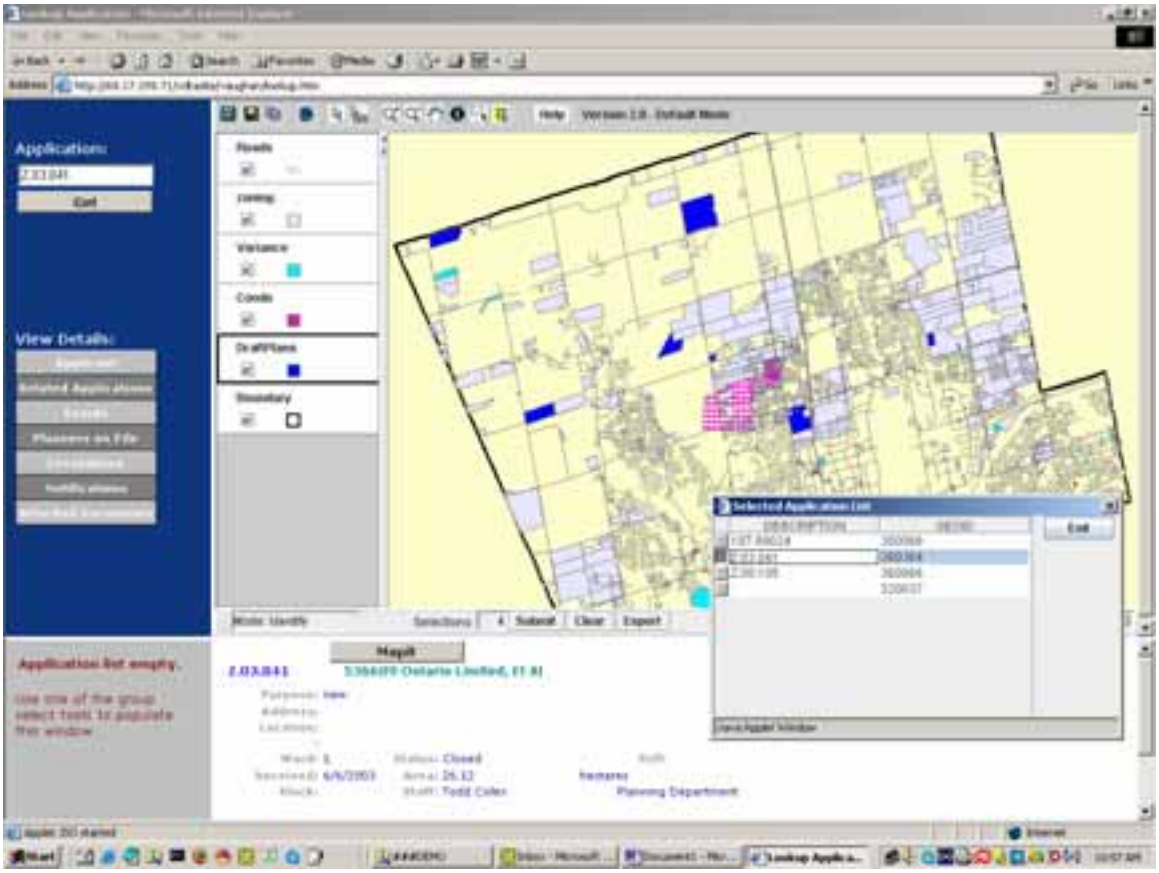


Once the document is created it remains attached to the file.

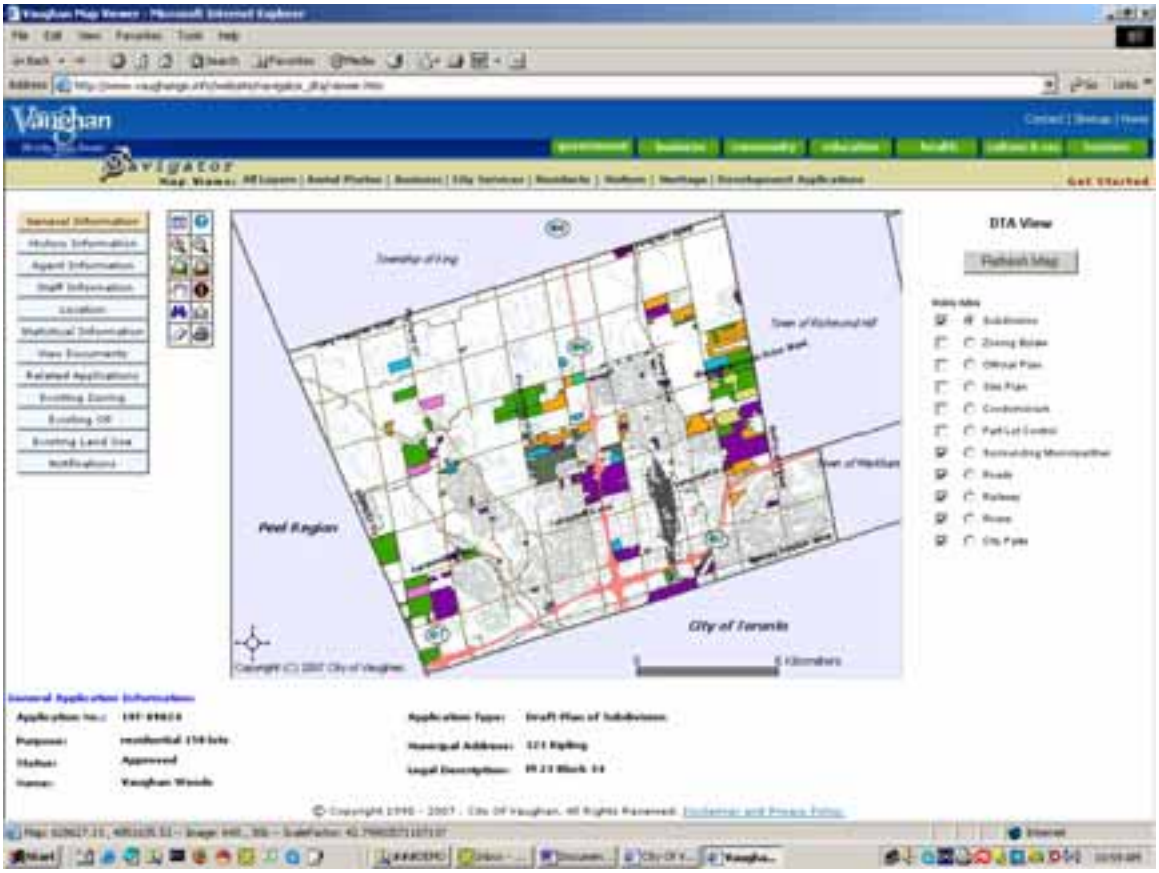
The spatial interface provides planners and other staff the ability to retrieve detailed statistics on growth (i.e. Unit count by type, amount of land area approved for commercial, residential and amenity development etc.) by planning block, ward or user defined geographic context.



The DTA interface to city's web site provides real time information to external stake holders.



Now if a consultant land owner or resident wants to know what is happening with a particular application, they just have to visit the city's ArcIMS based mapping website and click on the application of interest or enter in a file number and immediately they have access to pertinent information about the application. Interested people can view attached drawing and documents about the application. Citizens are provided with up to date contact information indicating which planner is handling the file. Web publication the DTA has greatly reduces the volume of phone inquiries and has markedly improved customer service.



The DTA has been in production at the city for the past four years. Initially like many large system implementations the up take is slow and laborious. However the DTA has now become an integral part the day to day business work flow. The users have continually been canvassed for their continued feedback on how to better the use the application. The latest canvass amongst the city planning staff shows that they rely on DTA heavily and in their words can't imagine how they could do without it.

Conclusion

What makes the DTA solution unique and puts it ahead of other development tracking solution being used by other municipalities is its tight integration with spatial data and use of GIS interface. It was the fist spatially enabled application the City of Vaughan rolled out. Its uptake success and immediate effectiveness was substantial compared to implementation of other tabular based systems managing similar business processes at the city i.e. the city's building permit tracking system.

The DTA application has set a new standard for the City of Vaughan. The city is now striving to make other business systems spatially enabled, such as complaints tracking, and integrating them with the EGIS database model.

The build and deployment of the DTA provided an important lesson for the City's senior management and council. It was the first design/build implementation of application which clearly articulated the need to ensure that end user departments drive the process and define the functionality required. The City of Vaughan has now become a leader among its peers. Other municipalities are approaching Vaughan and seeking to implement the Vaughan DTA solution to help them deal with growth management more effectively.

About the Author

Frank Miele

Frank Miele is the Commissioner of Economic/Technology Development and Communications for the City of Vaughan. He brings to his position over 25 years of experience in the field of economic and technology development.

Mr. Miele holds a Masters of Applied Environmental Studies in Economic Development; a Baccalaureate Honours Degree in Environmental Studies; a Diploma in Economic Development and a Certificate in Economic Development all from the University of Waterloo. He also holds a Certified Municipal Manager III designation from the Ontario Municipal Management Institute.

Through his professional and educational development, Mr. Miele has received many prestigious awards including the American Economic Development Council (AEDC) **Richard Preston Award**; the Economic Developers Council of Ontario (EDCO) **President's Award** and the **Economic Development Achievement Award**.

Mr. Miele has also instructed at Ryerson Polytechnic University School of Urban & Regional Planning and currently atYork University's Political Science Department.

He has also published works in a number of Professional Journals such as, Municipal World; The Economic Development Journal of Canada; Trade and Commerce Magazine; The Entrepreneurial Development Review; Area Development Site; Cordillera Institute, The Ontario Planning Journal, World Teleport Association, Partners Magazine, and many more.

Mr. Miele is an active professional member of several International, National and Local Professional Organizations including the Vaughan Chamber of Commerce, World Teleport Organization; IEDC; EDCO; EDAC; and the Italian Chamber of Commerce. He is the Past President of the Ontario Municipal Management Institute, and the past Chair of the Parent Council for Our Lady of Fatima Catholic School.

Mr. Miele is married and has four children.

Munirom Technologies Inc.

Munirom Technologies Inc. (MTI) was established in 2001 to provide products and services to municipal organizations. The objectives of these services and products are to assist in the management of municipal services and to improve their abilities to communicate with interested stakeholders in the land development application process.

A unique aspect of MTI's corporate profile is its partnership arrangement with the City of Vaughan. The City of Vaughan awarded a contract to MTI to design / build the City's Development Tracking Application (DTA) and Enterprise GIS solution. As part of that award, MTI was granted a world-wide exclusive marketing license to sell DTA licenses and other City of Vaughan enterprise GIS application solutions.

MTI's core team is composed of experienced IT professionals who have a solid understanding of municipal government business processes, such as land use planning, building permits review, engineering review, and public works asset maintenance. The core team oversees project management activity, product development / customization, product support and maintenance. MTI also has an established network of IT professionals and business consultants who are brought in as needed to meet specific requirements.