Integrating ArcIMS with Oblique Imaging Systems

To Promote Economic Development

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Abstract

Merrimack Valley Planning Commission (MVPC), a Massachusetts Regional Agency, has developed a unique, interactive economic development Web Site, wherein any building/lot in the metropolitan area can be queried, viewed close-up and analyzed from multiple oblique perspectives. The application uses ESRI's ArcIMS backbone and integrates an ActiveX control developed by ESRI business partner, Pictometry International.

Background

The Merrimack Valley Planning Commission (MVPC) is a regional planning agency providing professional planning services to fifteen communities in Northeastern Massachusetts. MVPC is one of thirteen regional planning agencies operating in the Commonwealth of Massachusetts. MVPC is a public, nonprofit organization committed to assisting the Valley's communities in Transportation, Environmental, Economic Development Planning and Geographic Information Systems (GIS). As such, MVPC is committed to upholding a friendly business climate in our region.

The Merrimack Valley region is an area comprised of fifteen cities and towns in the northeast corner of Massachusetts. It is a diverse area that is populated by urban cities and rural communities. The Merrimack Valley, in the late 1800's and early 1900's, was home to some of America's most thriving industrial communities. As much of the manufacturing and textile industries relocated, the region has been faced with the challenge of rebuilding and restructuring its economy.

To assist the communities of the Valley, the local Chambers of Commerce developed a project with the goal of promoting business in Valley communities. Ultimately, the expansion of the commercial/industrial tax base was viewed as the mechanism through which the economy of local communities could be expanded and made more sustainable. Working collaboratively with the Chambers and the participating municipalities, MVPC's goal was to attract new businesses to the region as well as to retain existing businesses.

Proposed Solution

In agreeing to fulfill the technical role in the economic development project, MVPC conducted a review of the current technology being utilized to promote business development, evaluated all in-house technology and formulated a proposal that would help facilitate economic growth

The trend in technology is to not only provide specific information about doing business in a community or region, but also to enable the user to search for available sites through an interactive search application, deployed via the internet. Consistent with this trend, it was the collective goal of MVPC and the Chambers to produce a website that would provide listings of prospective sites as well as information concerning zoning, permitting, utilities and demographics of the region.

Because the project goal was to promote the Merrimack Valley as a prospective area for relocation as well as to facilitate the retention and expansion of existing businesses, MVPC proposed to compile a comprehensive inventory of all sites. This inventory would include available buildings and land, as well as all existing commercial and industrial businesses.

Using the internet, it was proposed that users be able to identify sites through the interactive application and then perform geographically based demographic analysis for each site, including consumer expenditures, business and workforce reports.

To make the site totally unique, MVPC further proposed the integration of detailed, oblique angle aerial photographs known as Pictometry for every site in the project region.

Data Development

To develop the interactive web utility and to plan for the data that would be required to support the application, it was necessary to determine which specific search criteria would be available to the user. Working with the Chambers, the community economic development directors and individuals from private real estate firms, MVPC developed a set of criteria that would be available to users enabling a comprehensive search of the database.

Search criteria included the type of property (existing business, available space or vacant land), the name of the business, specific address, size of the building, community(s) where the site is located, actively marketed properties, industry of the existing business (based on generalized NAICS values), proximity to public transportation, and whether the particular site is within various economic incentive zones.

Once the search criteria were finalized, a data attribute structure was developed. The attributing structure was formulated to reflect data that, once created, would support the search options selected by each individual user.

Lastly, a data collection and production methodology was established representing a step-by-step process encompassing each aspect of data development. Starting with the setup of the portable data collection devices, the methodology describes background data requirements, then references specific actions to be taken during field collection, and concludes with step-by-step procedures for manipulating the data once all fieldwork has been completed.

Data Collection

The project area is a five-community region with a population of approximately 238,000. The entire area would be covered during the inventory, with all businesses and available properties encountered being recorded. During a previous project, MVPC GIS staff developed a point-based, master address file known as GeoPAL for the project area. GeoPAL features, which are points that are located on the geographic center of each building or structure, served as the basis for data collection.

For field data collection, Personal Data Assistants (PDA) were set up. Two HP iPAQ 2750 PDA were equipped with an Ambicom Compact Flash II Global Positioning System (GPS). The HP iPAQ's were chosen based on their storage capability and processor speed. The PDAs would serve as the field data collection devices. The GPS would provide additional verification of position during data collection.

Utilizing ArcPad version 6 as the field GIS solution, local street data, GeoPAL files, parcel data and orthophotographs were loaded onto the PDA. To simplify the data entry process, input forms were setup within ArcPad using a script downloaded from the user scripts section of the ESRI website.

Using base maps prepared in the office depicting each community with a grid overlay, two field crews reviewed each street in the project area. At the conclusion of each day of field collection, data was uploaded from the PDA, attributed according to the methodology, and reloaded onto the PDA.

Once data collection in the field had been completed, the dataset of businesses and available sites was further enhanced and attributed. Using several commercially purchased business databases and assessor records from each of the project communities, each record was attributed with additional information, including: type of property (existing business, available property or vacant land), the name of the business, specific address, ownership, size of the building, community(s) where the site is located, land use code, actively marketed by realtors, industry of the existing business (based on generalized NAICS values), proximity to public transportation, and whether the particular site was within various economic incentive zones.

Implementation

A server was purchased to support the application, which was then co-located at MVPC's Internet provider. The server is a Dell Poweredge 1750 running dual Xeon processors (3ghz) with 1gb RAM.

The operating system is Windows 2003 Server running Microsoft Internet Information Service and Microsoft.net/Application Server technologies.

ESRI's ArcIMS version 4 was setup on the server in addition to Pictometry's Network Image Warehouse (NIW). NIW facilitates ArcIMS accessing the oblique aerial photography for any selected site.

To support display and analysis of Pictometry images within the Internet browser framework, Pictometry's Active X control was then set up on the server. Upon the first access to Pictometry from a user's computer, the Active X control is downloaded and deployed to the user's PC.

The 'site finder' application (the interactive interface for the website) is provided by a private consultant, GIS Planning, and relies on Active Server Page programming for operation. All associated files of this component were then enabled on the server.

MVPC GIS staff worked with the technical staff at GIS Planning to adjust the application programming to facilitate communication between the interactive interface and Pictometry's NIW.

The final step in the implementation process was to test the application using Internet Explorer. The site functionality is as follows: User accesses the interactive application and selects database search criteria; using an outside database connection (ODBC), the application performs a search on the business database and retrieves eligible candidates; user then selects one of the results and the application retrieves the remaining attributes, displaying them in the framework of the internet browser. If the user subsequently chooses to access a Pictometry image for the location, the X and Y coordinate of the selected site are retrieved and passed to Pictometry's NIW application. Pictometry's Active X control is then launched in a new browser window and the Pictometry images corresponding with the X and Y coordinate are displayed in the browser. The user then has the option to perform distance, height and/or area measurements using the mouse and keyboard.

To make the site accessible to all Internet users, MVPC purchased the domain www.MerrimackValleyMeansBusiness.com. MVPC staff spent time developing the introductory web pages at this domain, introducing the Merrimack Valley Means Business Information Portal. These introductory web pages include a Welcome/Project Overview page, an Area Profile page, a "How To" page that gives step-by-step instructions on how to use the various features of the interactive application, a "Troubleshooting" page, a Property Information Submittal Form, offering both hardcopy and on-line avenues for property and business owners to submit new/updated property information to MVPC staff; and a general Contact page.

Marketing and Outreach

As field data collection was taking place, MVPC and the Chambers of Commerce conducted informational meetings with commercial real estate groups, Valley business leaders and state officials. Promoting the website as a means of obtaining valuable information about the region was the focus of these meetings.

Once the site was established and tested, MVPC and the Chambers of Commerce began a concerted effort to raise awareness of the application. As a first step in this effort, each business inventoried was mailed an informational postcard informing them of their listing on the website.

Additionally, Merrimack Valley Means Business was listed with several web search engines. The content of the introductory pages was also constructed in a manner by which search engines would readily identify the site and prominently display the listing in search results.

A series of advertisements to major business publications have been secured along with general advertising in the form of highway billboards, direct mailings and radio placements.

Summary

The Merrimack Valley Planning Commission (MVPC) is highly committed to upholding a friendly business climate in our region. Working collaboratively with local Chambers of Commerce and communities in the region, MVPC developed and implemented Merrimack Valley Means Business (MVMB). MVMB is an interactive, internet-based application that is used to assist in the establishment of new businesses as well as the retention of existing businesses. Creation of new businesses and retention of existing businesses will serve the valley by providing economic activity that is essential to sustain a successful, thriving economy. Using Internet mapping technology, MVPC has created a spatial database that can be accessed through a web browser from any internet-accessible computer.

Working collaboratively with the cities and towns of Andover, Haverhill, Lawrence, Methuen and North Andover, MVPC staff inventoried and compiled a database of all existing business sites. This database was then updated with current information about ownership, acreage, type of business, number of employees, zoning, land use, and proximity to nearest roadways. Sites available for sale or lease were also compiled and incorporated into the database during the field inventory phase.

MVPC, working with its consultant, GIS Planning, developed an interactive, web-based application that allows visitors to retrieve information by specifying user-defined variables. By visiting the website www.MerrimackValleyMeansBusiness.com and clicking on the Business, Demographic and Property Search link, users can run queries based on specific search criteria such as geography, size, assessor parcel numbers, available space, properties for sale or lease, or those within special designations (e.g. Economic Target Areas). Furthermore, all site locations are linked with U.S. Census data for detailed demographic analysis. As an additional tool, users are able to access high resolution, oblique imagery for any prospective site in the region using MVPCs Pictometry Image Warehouse (images current as of 2005).

MVPC and the Chambers of Commerce will continue to work with the cities and towns to keep the system up-to-date by integrating information on building permits, occupancy permits and other similar types of information. MVPC has also been working with local real estate brokers to include sites that are being actively marketed in the five-community region.

A total of approximately 7,600 businesses and 250 locations for sale or lease are accessible through the website. The site is easy to use and offers a wealth of information for prospective new businesses potentially relocating to the Valley as well as those businesses looking to market or expand within the region. Additionally the site demonstrates that the Merrimack Valley is a progressive, technology rich environment, supportive of what consumers have grown to expect from the information superhighway.

Acknowledgements

With special thanks to the Haverhill and Merrimack Valley Chambers of Commerce

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