City Maps Services With GIS

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By Anne Chen

For Erich Seamon, location is everything.

Last year, as most IT organizations were cutting budgets, Seamon, geographic information systems manager for the city and county of San Francisco, was moving forward with a project to integrate the City by the Bay's geographic information in a standard fashion online. The result: City employees and San Franciscans now have online access to up-to-date geographic information, and this has dramatically increased city departments' ability to do everything from collecting tax revenues to responding to crimes.

"We wanted to find a way to use this information to enable us to track the land we own as well as see in real time where crimes were happening," Seamon said. "We wanted to use this information in a way that would enable police, for example, to better protect our citizenry."

The falling costs of hardware and software, coupled with the ability for GIS data to be used to provide a multitude of services, has increased the adoption of GIS technology.

This is particularly the case within government organizations. While most IT budgets remain flat, one-third of federal, state, county and local organizations will see an increase in their GIS budgets this year, according to research company Gartner Inc., in Stamford, Conn.

The city and county of San Francisco is one municipality that has invested heavily in GIS technologies and is now reaping the benefits.

San Francisco, with approximately 188,000 leased ground lots, needed a way to plan and coordinate daily business processes, such as real property analysis and emergency services. An increasing number of departments that once relied on paper-driven planning processes to accomplish this work are now using electronic geospatial data to provide city services enhanced with location-based information.

San Francisco began its GIS work in 1993, when the Department of Public Works took 250 high-resolution photographs of the city. These photos—which included parcel information, street center lines, edge-of-pavement information and aerial views—were used to form San Francisco's core base map.

GIS data was distributed every six months to city and county departments for use in spatial analysis. Although this approach provided access to GIS information, it was difficult for the city to keep its data up-to-date. In addition, each department was running its own GIS program, forcing San Francisco's Department of Telecommunications and Information Services to support redundant systems.

Three years ago, Seamon and his team decided to create an integrated GIS solution by building a federated enterprise database system to provide spatial information to 61 municipal departments. Seamon chose to deploy ESRI's ArcSDE, which facilitates management of spatial data, and ArcIMS, to provide the foundation for distributing these spatial systems and mapping services to the Internet.

The city and county of San Francisco uses IBM's DB2 Spatial Extender Version 7.0 to manage the updating, structuring and insertion of data into IBM DB2 Universal Database Enterprise Edition for

Windows NT Version 7.0 and IBM DB2 Relational Connect. DB2 Relational Connect provides access to the city's databases, allowing the use of legacy GIS data. The entire installation runs on IBM Netfinity hardware running Microsoft Corp.'s Windows 2000 to create a repository of geospatial data, which is shared citywide.

"The deployment of online map services has allowed us to improve our ability to manage and facilitate city business processes," Seamon said. "We've integrated our data to provide better public safety coordination, like emergency services, disaster planning and homeland security."

To maintain a distributed approach to GIS data sharing, Seamon and his team allow ownership and control of core data to be managed and maintained by departments while being used in enterprise GIS services. The GIS implementation resides on one server behind the city's firewall for internal intranet applications and on one server outside the firewall for Internet applications.

Today, about 1,000 city employees across 61 municipal departments access geospatial data through the ArcIMS front end using any Web browser on the city's LAN. To prevent unauthorized use of department-specific data such as crime reports or aerial photographs of key city buildings (such as the Transamerica Tower), users are required to authenticate to ArcSDE, which facilitates the management of San Francisco's spatial data.

Internally, Seamon said, city departments are or will be using ArcIMS map services for everything from managing parking meter locations to crime mapping, a function that will be available in September. Using GIS systems, Seamon said, the police department will be able to determine which pockets of the city have the highest percentage of a certain crime and can then focus task groups on those areas. Police officers will also be able to access geographical data from their squad cars to respond to emergencies faster.

Enterprise GIS is also used by San Francisco's assessor and real estate staff to manage real property information. The location data enables the city to better manage the property it owns, Seamon said.

Externally, San Francisco provides limited access to its geospatial data. Still, citizens can go to San Francisco's Web site and enter their addresses to access information, for example, about when their streets will be cleaned or on their legislative representatives.

A new application called SFViewer enables users to specify an address, city property or block number to view parcel information, aerial photographs and even print maps.

Businesses can also access an online application called SF Prospector, which allows users to view, create and print maps using GIS information as well as demographic and economic data. A law office looking for new office space, for example, could use the application to map a potential building and then determine how many other law offices are in the vicinity.

"We use GIS extensively in our day-to-day operations, and it's really become a key part of our mission to use the technology to better serve our community," Seamon said.

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GIS Grows More Accessible

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By Henry Baltazar

Based on eWEEK Labs' testing and evaluation of GIS in action, there is good reason to believe that investments in geographic information systems technology today could help drive new business and open new markets, as well as cut costs down the line by helping management get more out of organizational data and personnel.

In addition to tight budgets, the major hurdles for wider implementation of GIS have been the complexity of the technology and a general lack of familiarity with it outside the geography community.

So what's lowering those hurdles now?

For one thing, GIS software doesn't require the raw processing power it once did. In fact, with their significantly improved processing power, mobile devices have become viable platforms for running GIS software. Couple this with advances in Web services and the mobile Internet access market, and it is clear that mobile devices will be the gateways to location-based services.

A good example of business-class GIS software that caters to the needs of mobile computing is ESRI's ArcPad 6.0.2.

ArcPad 6.0.2 implements a lightweight GIS technology that allows users to access and modify information using mobile computing devices. ArcPad was easy to use during eWEEK Labs' tests, and ArcPad Application Builder, which allows developers to create scripts and tool bars to simplify tasks, has interesting potential. ArcPad 6.0.2 began shipping in April; a single ArcPad 6.0.2 license costs $495.

Higher on the GIS chain is ESRI's ArcView 8.3, a professional-class GIS suite geared toward people who use maps and mapping technology on a daily basis. ArcView is much more complex and full-featured than ArcPad, but it is still relatively easy to use. This is a trend we're seeing among even high-end GIS products.

ArcView 8.3 began shipping in February; a single-user license costs $1,500.

In the mobile GIS space, it will be interesting to see how location-based services develop. These services will allow users to gain access to specific applications based on their geographical location.

Microsoft Corp.'s MapPoint Web Service is an XML/ Simple Object Access Protocol programmable system that allows developers to add location-based services to enterprise-class applications. Hosted by Microsoft, MapPoint Web Service could be used to enhance applications such as CRM (customer relationship management). For example, leveraging geographic data, a CRM tool could help determine the sales representative closest to a client. (CRM vendor E.piphany Inc. last year announced the integration of MapPoint Web Service into its E.piphany E.6 software.)

There are two pricing models for MapPoint Web Service: The service can be used per transaction (a transaction is defined as an activity that renders a map or takes data from the service) for 0.008 cents per transaction; the per-user model costs $3 with unlimited transactions. ´

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Open GIS Consortium Focuses on Interoperability

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By Anne Chen

With so much—and such disparate—geo-spatial and location information available, standards are key to the interoperability and wider use of geographic information systems technology.

The Open GIS Consortium, an international standards body comprising 258 companies, government agencies and universities, aims to address these connectivity issues.

Founded in 1994, the Open GIS Consortium has a membership that includes organizations such as Mitre Corp., the United Nations and Harvard University. The city and county of San Francisco, which became a member last year, was one of the first to join as a local government associate member.

Historically built as stand-alone applications, GIS services weren't made to easily communicate with other applications and systems. The standards developed by the Open GIS Consortium, called OpenGIS Specifications, support interoperability with open interfaces and protocols.

As with many standards bodies, the Open GIS Consortium has been working with Web services and XML. In February, the organization released an approved GML (Geography Markup Language) Version 3.0 implementation specification. GML—an XML grammar written in XML Schema for the modeling, transport and storage of geographic information—provides a variety of object types for describing geography. In April, the Open GIS Consortium issued a public call for comment on the proposed

OpenLS (OpenGIS Location Services) implementation specification, which defines XML for location services.

The Open GIS Consortium has six guidelines for how geospatial information should be made available across any network, application or platform:

- Geospatial information should be easy to find, without regard to its physical location.
- Once found, geospatial information should be easy to access or acquire.
- Geospatial information from different sources should be easy to integrate, combine or use in spatial analyses, even when sources contain dissimilar types of data or data with disparate feature name schemas.
- Geospatial information from different sources should be easy to register, superimpose and render for display.
- Special displays and visualizations, for specific audiences and purposes, should be easy to generate, even when many sources and types of data are involved.
- It should be easy, without expensive integration efforts, to incorporate into enterprise information systems geoprocessing resources from many software and content providers.

More information on the Open GIS Consortium can be found at www.opengis.org.

MetaCarta's GTS Tool Links Information, Geography

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By Henry Baltazar

MetaCarta Inc.'s geographic text search appliance is an interesting product that attempts to link knowledge management with geographic information systems.

Funded by In-Q-Tel, the venture-funding arm of the CIA, MetaCarta's solutions are being used to aid in homeland security, but this technology could also be extremely useful in the private sector.

Putting it simply, the GTS appliance is a text-search tool that allows users to link information to geography. The target market for GTS is primarily research analysts looking to find common geographic themes within documents.

GTS is not a simple plug-and-play tool—exploiting it will require a fair amount of imagination and ingenuity.

A product demonstration showed that GTS has great potential, but, like many knowledge management products, it will take work to integrate it into IT infrastructures.

GTS scans documents and extracts geographical references, either structured or in natural language, with the most common references being addresses or names of cities and countries. The appliance can communicate with data sources using a variety of protocols, including Simple Object Access Protocol, HTTP, Network File System and Network News Transport Protocol.

Using these protocols, GTS can easily access data from multiple data sources, including file servers, databases and the Web. E-mail servers, for now, are not potential data sources, but MetaCarta officials said they will be adding this support as the product evolves.

In addition, as with knowledge management solutions, GTS' power is directly related to the data that is fed into it. As users find new ways to leverage the appliance and as more data is input, MetaCarta's technology could find its way into many markets outside the government.

The GTS appliance can scale up to 15 million documents; prices start at about $30,000.

GIS isn't Just for the Feds Anymore

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By Henry Baltazar

GIS has been an interesting technology for several years now. However, to get a better feel for how GIS will grow in prominence in the coming years, you need to look at its most prominent user, the U.S. government.

There are several reasons for the burgeoning governmental popularity of GIS, including the current focus on Homeland Security. GIS technology like MetaCarta's GTS (Geographic Text Search) appliance, for example, allow investigators to quickly analyze documents for geographical references and plot these points on a map.

Likewise, the GTS appliance can narrow a text-based search to a geographic region and can search for relevant documents—a good way to sift through mountains of data.

Information, Please

Homeland Security is one area where GIS and Government intersect, but GIS can also tap information of all stripes to help agencies function more smoothly. Governments—be they city, county, state or federal—have large amounts of data at their disposal. Whether this information is orthographic projections of cities, citizens' tax records or listings of business licenses, it can be harnessed in a variety of constructive ways.

In a recent visit I made to the City of San Francisco, I was impressed with how Erich Seamon, Chief of Geographic Information Systems, and his staff leveraged city data to not only save money, but also to actually find money by locating unclaimed revenue.

Using GIS technologies from ESRI, Seamon and his team helped the city locate businesses operating without the proper licenses; gave commercial real estate a shot in the arm with the www.sfprospector.com site, which helps businesses find commercial properties in San Francisco; and are now helping the city's police analyze crime data.

Will GIS become more important to enterprises outside the government? I believe it will, but information sharing—the emergence of Web services and other technology that facilitates information exchanges—will be the key that will unlock GIS for everyone.

Microsoft's MapPoint Web service allows developers to tap into geographical data, such as addresses and business listings, from Microsoft to create location-based services. MapPoint could be a step in the right direction, but information exchange between companies will be the long-term answer.

Information sharing from mobile devices to vendors is another key aspect that needs to be worked out. Location-based services (which make themselves available when a user is in a certain geographical position) show promise for commercial use, but will require solid information sharing between vendors and mobile devices in order to work.

In fact, location-based services could become the killer app for GIS, but extremely important privacy questions still need to be answered. Chief among these questions is: "Who should be allowed to know where I am?"

Thus, GIS technologies' ascent outside the halls of government could be a tough climb.

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