Government Technology

Mapping the Future
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By David Raths

As local and state governments in the Gulf Coast struggled in summer 2005 to provide up-to-date information in Hurricane Katrina's wake, two programmers in Austin, Texas, took matters into their own hands. Jonathan Mendez, a software engineer from New Orleans, and Greg Stoll created Scipionus.com. The Web site is a "visual wiki" -- a Google map of affected areas overlaid with dozens of site-specific comments -- in the same way that Wikipedia is a publicly produced and edited document. Individuals who were in New Orleans went to the Web site and posted statements such as, "Hynes Elementary School. 8/30. Ten feet of water inside."

Scipionus, which drew tens of thousands of visitors, is just one example of a revolution under way involving digital mapping and Web applications.

As hobbyists and Web developers gain access to mapping tools and geospatial data, they are rediscovering the excitement and entrepreneurial spirit the Internet originally spawned.

It's part of the emerging geospatial Web, which could take the form of anything from city maps overlaid with health data to maps of city subway systems developed for digital music player downloads.

New Windows
Government officials should take note, because this surge in mapping creativity could open new windows to important civic information for the public.

However, local governments' role in information dissemination isn't clear yet, said Mike Liebhold, a senior researcher at the Institute for the Future in Palo Alto, Calif. "There's enormous value in detailed map information, and Web mapping using Google maps is only about a year old," Liebhold said. "Cities and states use digital mapping for planning, facilities management, police and fire services, houses and zoning."

Still, state and local governments so far haven't done much to open that infrastructure to the public, he said.

"Soon the public will have the ability to add notes and comments to those public maps," Liebhold said.
Web developers worldwide are busy creating "mash-ups" -- seamlessly combining data from other sources with Google maps. For instance, one site -- incidentlog.com -- maps police, fire and 911 alerts in more than 85 cities across the country.

Another term being bandied about in digital mapping circles is the "geospatial Web," which Liebhold said could include a combination of digital map information and location-based hypermedia.

"For instance, [if] you're walking down the street with a wireless device that knows where it is," he explained, "you can pull up information about that particular location that is of interest to you, perhaps safety data posted by a municipality or by another citizen, such as "Watch out for traffic coming around a blind curve here."

One ambitious geospatial Web project involves creating real-time maps of cell phone use in urban areas. In a demonstration project in 2005, researchers from the SENSEable City Laboratory at the Massachusetts Institute of Technology in Cambridge, Mass., used anonymous cell phone data from A1/Mobilkom to create electronic maps of cell phone use in the metropolitan area of Graz, Austria -- the country's second largest city.

MIT's researchers created computer-generated images of the cell-phone data overlaid with street maps of the city. The digital maps changed as people traveled around the city, offering a view of the urban area as a shifting entity rather than a fixed, physical environment.

When unveiling the maps, Director of SENSEable City Laboratory Carlo Ratti said, "[Visualizing a city in real time] opens up new possibilities for urban studies and planning."

It also could play a role for public safety officials in case of emergencies.

Mapping Civic Data

The spirit of civic Web mapping is strong in Chicago. In 2005 Windy City resident Adrian Holovaty drew praise and media attention for combining the Police Department's crime statistics with Google maps to create an easy-to-use portal so residents could see, among other things, where robbery and homicide are highest.

The Chicago-based nonprofit Center for Neighborhood Technology's Civic Footprint project uses mapping software to help voters understand who their local, state and federal representatives are.

On the Web site civicfootprint.org, voters can plug in their address and a map displays their house with overlapping district boundaries for state representatives and senators, members of Congress, county boards and other offices.

"Some of this information is already available, either online or in paper form, but it's scattered and poorly utilized," said Ben Helphand, director of the project. "We decided to use our mapping capabilities to bring it all together."

Illinois has more units of government than any other state, Helphand added, and when you register to vote in Chicago, you get a voter information card with eight units of government, but it's just a list of a number of districts.

"With the map, you can see the different districts, how they overlap and if they're gerrymandered," he said.

Although the project is still in its first year, Helphand said the effort has received praise from government agencies and board of election officials. He noted that a few years ago, after his organization put legislative bill-tracking information online, the state eventually unveiled its own bill-tracking service, so government agencies may mimic the Civic Footprint as well.

The next phase of the project, he said, will add data sets such as politicians' voting information and campaign finance data personalized for the user. Another possibility is to capture expertise on civic engagement by creating a guide using wiki technology.

"Users can offer advice on topics such as how best to interact with your alderman or how to make community policing work for you," Helphand said.

Transportation Solutions

In the San Francisco Bay Area, entrepreneurs often use mapping, GPS and the Internet to work on traffic congestion, parking and public transportation in conjunction with local transportation agencies.

A company called NextBus Inc. offers transit users updated schedules and real-time online maps. NextBus uses satellite technology to track vehicles on their routes. Each vehicle is fitted with a satellite tracking system, and modeling software takes into account the actual position of the buses, their intended stops and the typical traffic patterns. NextBus' constantly updated estimates are overlaid on route maps, and the predictions are posted on the Web and to wireless devices and PDAs.

Combining database and mapping technology, Acme Innovation Inc.'s SmartParking technology allows wireless and Internet users to view a map of real-time availability of parking spaces on private lots in San Francisco from their cars, homes or offices. They can then reserve parking spaces through its ParkingCarma phone reservation system or via the Internet.
Although local governments are important partners in providing data, it makes sense that they are not taking the lead in developing advanced mapping applications.

Professor Dennis Culhane, co-director of the Cartographic Modeling Laboratory at the University of Pennsylvania in Philadelphia, said that in many communities, the local GIS division in government is consumed with data standards and keeping the parcel map layers up to date.

"That is a huge job, and they are struggling to catch up with demand," Culhane said. "They often don't have the time or resources for the fun, creative stuff."

Culhane's lab has created a Neighborhood Information System (NIS), a Web-based property and social indicator information system that uses mapping software to support city agencies and community-based organizations throughout Philadelphia.

The Neighborhood Gardens Association uses the NIS to assess gardens it is considering purchasing for its land trust. The garden group can collect information on a property's ownership, size, tax status and council jurisdiction.

"There was a window over the last several years where nonprofits jumped in to offer community information systems, and the cities are just now starting to catch up," he said. "Philadelphia has been a big supporter in sharing data because they're one of our biggest users."

Culhane said cities and counties also face liability issues about publishing erroneous information or wiki-style guides that may be inaccurate.

Philadelphia spent five years updating its parcel layers, he noted, but city officials didn't build an application to show them because they knew there were errors in the data. Nonprofits like the NIS have more leeway, he said, to advise users that data may not be 100 percent accurate.

Some local government GIS departments are innovating with geospatial data for their own use.

In March 2006, the Technology Services Department of Johnston County, N.C., began field-testing a program that gives the county's planning and inspection teams GPS units attached to wireless data transmitters. That gave the inspection manager a real-time map of exactly where each building inspector is at all times, said Lori Key, GIS applications analyst for Johnston County.

"If a call for an inspection comes in, she can see which one is closest, call them and say, 'Go to 305 Henry Street,'" Key said.

With the GPS devices, inspectors also can record the exact location of a pothole or other problem the county needs to address, Key said.

The county is considering adding GPS devices to emergency response vehicles so it could instantly generate helpful maps for the public in case of emergencies such as hurricanes. Key, who has been working in GIS since 1997, said the field has recently exploded. A few years ago, people in county government, including some of the commissioners, didn't even know what GIS and GPS were.

"But now that they've seen what it can do, they're asking about its potential for use in other areas of county government," Key said. "It's an exciting time."

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