



The Citizen as a Sensor

Using GIS to add geographic context gives meaning to increasing volumes of citizen-generated information.

Local government leaders are incorporating citizen-gathered data into their geographic information systems (GIS) to determine what is happening in their cities and counties—and exactly where it is occurring. By knowing the locations of incidents, local officials are placing situations in context and can make better decisions to quickly address current problems and prevent future ones.

But that's just the beginning of the story. New waves of data are pouring into local governments from citizens using mobile devices and Web sites to mobilize volunteer efforts, express opinions, or report incidents or problems. It's a phenomenon that is expected to grow, fueled in part by



Corpus Christi created a new smartphone app, CC Mobile, to better manage the information coming in from its new citizen sensors using their computers and, increasingly, their PDAs.

the continuing proliferation of smartphones and social networks and enhanced through GIS.

Welcome to Gov 2.0

However, because Gov 2.0 lacks a single definition, and many local officials are just now developing an understanding of what to do with the flood of new information, local governments are grappling with how best to leverage the various aspects of the Gov 2.0 movement.

What is clear is that the opportunity to strengthen community engagement by recognizing the citizen as a sensor can improve government services. Securing this citizen-generated information along with location offers a foundation where geography acts as a common denominator to keep the dialog moving.

Increased data flowing into local governments from citizens is valuable once the locations of events are known—then it can be

analyzed through a GIS. Without a geographic context, the citizen report would simply be going into yet another data silo.

“The ability to use GIS technology to plot the data generated by citizens offers multiple benefits,” said

“Securing citizen-generated information with location offers a foundation where geography is the common denominator to keep the dialogue moving.”

Christopher Thomas, director of government markets for Redlands, California-based Esri, which produces the ArcGIS geographic information system currently used by many municipal, county, and state governments. For starters, GIS helps agencies pinpoint exactly where an incident occurred, which traditionally was an inexact science, he says.

With its new smartphone app, CC Mobile, developed by Los Angeles-based CitySourced, the City of

Corpus Christi, Texas, is beginning to understand how to manage the information coming from its new “citizen sensors.” Now, citizens can report a wide variety of issues and events—such as potholes, graffiti, traffic accidents, open manhole

covers, abandoned or illegally parked cars, and trash problems—as they witness them.

Knowing Location Helps Solve Familiar Problems

“Today’s younger generations connect to the world differently than their parents’ generation,” said Michael Armstrong, CIO for Corpus Christi. “They’re using the technologies that are available to them on their computers and, increasingly, on their phones.”



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Knowing the specifics about the incident—especially location—enables an agency to quickly decide how to respond, according to Kurt Daradics, director of business development for CitySourced. “It also generates a lot of valuable data that enables agencies to automate their response to a service request,” he said. “They no longer have to send a truck out to verify the complaint.”

Twitter Feeds Processed through ArcGIS Platform

Governments can only respond to an event when they know where it is, Thomas said. “When someone calls in and says, ‘There are potholes on this street,’ that doesn’t help much because the street is 15 miles long. You have to break it down. GIS provides the context of where the problems, issues, and attitudes exist.”

Such context is a two-way street, according to Thomas.

“GIS allows citizens to see how the government is responding to them; it offers accountability,” Thomas said. “They can get and exchange information on a 24/7 basis on how an issue is being addressed and how it is impacting them—in their neighborhoods. With GIS-based online maps, they can see how it is going to affect where they live, where their children go to school, where they go to church, and where they go to work.”

As an example, Thomas pointed to the integration of social media feeds into GIS during the Gulf oil spill and the recent earthquake in Haiti. Social media, such as Twitter, was used to communicate everything from calls of distress to requests for supplies and to organize volunteers. These Twitter feeds were tagged by location and fed back in ArcGIS, where hot spot analysis could be performed.

The combination of the social media and GIS provided a unique

real-time operational picture. “The map provided clarity and allowed citizens and governments alike to mobilize rapidly,” Thomas said.

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Seeing Trends and Patterns

Once a citizen reports a concern via a Web-based device, the inquiry can be rapidly overlaid onto the GIS so government staff can quickly begin looking at the issue. For example, if a citizen reports water coming from beneath the street, public works personnel can look at the GIS data and determine whether the source is a sewer or water line.

While there are obvious advantages to citizens pinpointing the locations of various problems, GIS capabilities also enable government agencies to analyze trends and patterns that otherwise would escape them.

Such analyses save agencies time and money and result in more effective responses. For example, using a geospatial analysis of citizen

complaints about graffiti, Denver, Colorado, determined that a majority of graffiti complaints came from one area. Once the problem area was determined, the city was able to concentrate its efforts.

Los Angeles also used geospatial analysis of all the graffiti reports around the city and found that 80 percent of the graffiti reports were within a mile of a freeway. As a result, the city beefed up police patrols to look for vandals around freeways.

“Each day, we are witnessing the power of government innovation as citizens and government embrace Gov 2.0,” Thomas said. “Public participation activities that once took place within the walls of city hall are now taking place on the streets of the community.”

Today, citizens are engaging in community-oriented policing by reporting suspicious activity where and when it takes place. Opinions on where parks are needed, rating hiking and bike trails, and reporting whether or not a street is walkable are captured in real time.

“The vision of geoenabled Gov 2.0 is unfolding before our eyes,” Thomas said.

Much like the transparency Web sites that use GIS to show where stimulus dollars are being spent, governments can create GIS-based apps that incorporate citizen feedback and allow them to see how

their thoughts compare to others. More importantly, the information is communicated in the context of where they live, work, and play, according to Thomas.

Citizens can see the same variables and inputs their neighbors have provided and get a clearer picture of why decisions are being made. The geographic context makes information meaningful to the individual.

Addressing Problems Geographically

When the public may be in danger, local officials can use GIS-tagged data to warn people near a dangerous incident, while those outside the area can receive another message.

“One of our refineries was doing something called flaring, which involves a lot of open flames,” Armstrong said. “We sent out a message that said that there was no accident and no danger. The idea is that an informed citizenry is a safer and calmer citizenry. Additionally, it helps to keep the call volumes down.

GIS is also being used to pinpoint problem areas after a disaster and even engage citizens’ help. “We didn’t really think about this piece until we started playing with the application,” Armstrong said. “But we can use this to very quickly assess where the damage exists and where hazards still exist. We can

get pictures of those, and we can map those. That will help us use our scarce resources much better.

“The citizenry actually becomes an extension of our response team in those situations,” he continued. “That will help us react more rapidly and hopefully get things back to normal quicker than we would have otherwise.”

GIS Unifies the Information

The explosion of information that was the promise of the Internet now has become a two-way street with governments on the receiving end of much of it. But data is only data until GIS places it into a context that transcends a single piece of information.

“GIS is like a prism that captures the information from a highly engaged citizenry and separates it into meaningful information that helps local governments make decisions,” Thomas said.

“With mobile devices and government Web sites, citizens can actively participate with their government when they want to participate. However, the key is getting the citizen data back into local governments’ existing systems so the officials can respond to or execute from them,” he said. “The GIS—and more specifically the location—is the common element used to bring this information into the government’s back office.”



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