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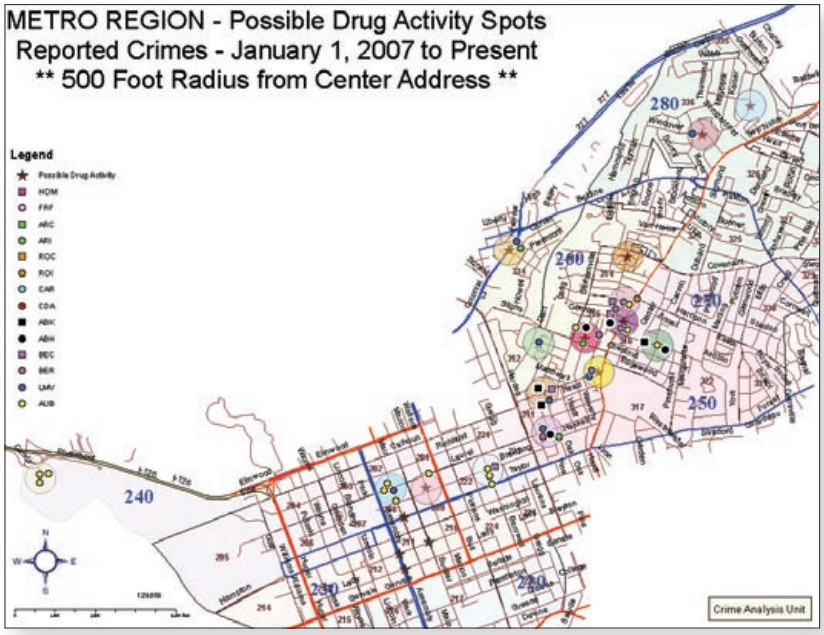
Columbia, South Carolina, Police Department Uses GIS For Improved Policing

Data-Driven Problem Identification and Response Helps Agency Catch Criminals and Lower Crime Rates

In modern policing, geographic information system (GIS) technology empowers law enforcement with better tools for fighting crime. With more powerful, easy-to-use software available at lower costs, law enforcement agencies of all sizes can work smarter, faster, and with greater efficiency using GIS. It's no longer just the largest cities taking advantage of spatial analysis and visualizations to fight crime. Smaller agencies are now putting GIS to work to help catch criminals and protect communities.



GIS technology shows the Columbia, S.C., Police Department what type of crimes are being committed in places where officers suspect illegal drug activity.

One such agency using GIS as a crime-fighting tool is the 400-member Columbia, South Carolina, Police Department (PD). In Columbia, GIS is helping commanders, crime analysts, patrol officers, and others analyze crime patterns to get the most from their resources and provide improved services for the city of 117,000 people.

The Police Department implemented ESRI-based Crime Analysis Tools™ (CAT), an ArcGIS extension that analyzes crime patterns and calls for service, from Bradshaw Consulting Services, Inc. (BCS), an ESRI business partner. CAT effectively assesses crime, helps forecast future incidents, creates a common operating picture for incident commanders, and provides enhanced decision support. Comparative analysis is conducted by looking at incidents on a weekly, monthly, and year-to-date basis. Data on homicides, sexual assaults, commercial robbery, armed robbery, carjackings, aggravated assaults, larceny, motor vehicle theft, and more, is analyzed and mapped. The resulting maps and information are shared agency-wide and assist the department in several ways including helping officers spot trends in crime and know where to concentrate their patrols.

"The crime rate for the city of Columbia has fallen dramatically with the implementation of GIS mapping," says Chief H. Dean Crisp Jr., police chief of Columbia. "It provides a basis for commanders and analysts to come together and to identify and solve problems using what we call COMPSTAT, or computer statistics. COMPSTAT, using GIS mapping, helps us concentrate efforts to maximize resources in the most effective manner possible. It has helped produce the lowest crime rate that Columbia has seen within the past 15 years."

Tapping Into the Geographic Advantage

After looking at different data analysis technologies, Columbia PD recognized the advantage GIS provides for looking at crime issues at the local level and at various scales. By selecting ESRI to provide its GIS foundation, the agency could leverage the city's GIS Department resources, which also use ESRI technology. The city's basemap data, aerial photography, and other datasets could be easily integrated within the crime analysis unit's GIS solution.

"The decision was already made by the City of Columbia, South Carolina, GIS Department to utilize the ArcGIS suite of mapping tools and functions," says Captain Rick J. Hines, Columbia PD. "CAT enables the police user to quickly analyze different datasets visually from various perspectives using map layers accessible through the city's GIS database. It's a powerful, easy method for performing what-if scenarios or viewing what is happening in our community at any given time."

Transforming Data into Actionable Information

The CAT tools are used to compile GIS crime analysis maps on a daily basis. The tools integrate data from various police department and city sources to determine crime trends and/or patterns. Data for time, location, demographics, traffic flow, and more, can be mapped and analyzed to determine where the problems are, how to respond to specific incidents, and how to deter and prevent crime.

When information is produced, digital maps in PDF format are sent to officers via e-mail. The information can then be printed out in hard-copy format.

Crime analysts produce continuously updated crime maps that are distributed via e-mail throughout Columbia PD including to law enforcement commanders, investigators, and police officers working on patrol.

With just a few mouse clicks and within minutes, crime intelligence sergeants send out information about suspects in the form of prepared Be-On-the-Lookout (BOLO) reports, which are crime notifications that go to police staff after an incident, or series of related incidents, occurs. GIS helps quickly and accurately spot a crime trend in a certain location, collect related descriptive incident data, and e-mail or transmit that location-specific data to officers working in the streets.

Previously, doing this might have taken days for data preparation and dissemination as it was a multilayered process that involved gleaning information from data in spreadsheet format. This process has now gone from days to minutes.

Police officials also can use mapped intelligence to help forecast where future crimes may occur. For example, a comparative analysis may reveal a jump in residential burglaries from one week to another or from one year to another; mapping those crimes reveals what beats and/or jurisdictions are impacted and how regional police staff can work together and allocate resources and make more arrests. Clicking on an incident point on a map can provide commanders with descriptive information, such as how a suspect broke into a house to commit a burglary, what items were stolen, and the date and time the incident took place. Previously, these reports were maintained in separate spreadsheets or paper documents; now the digital maps and data are fully integrated using one interface for performing analysis.

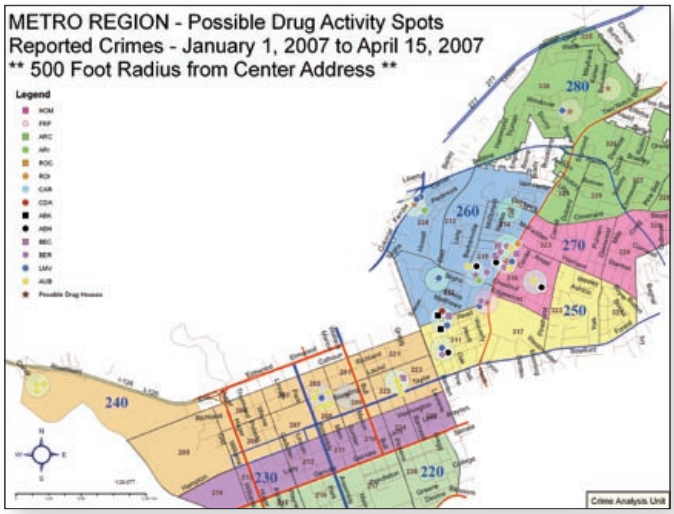
Using statistical analysis that looked at incident location, time of day, day of the week, and other historical variables, the agency was able to model where potential crime might take place

Getting Results

By using GIS, crime-fighting efforts had an immediate impact in the city, with officers more effectively using information for both long-term strategic planning and immediate tactical deployments.

The 10-officer crime suppression team (CST), drawn from all areas of the department, began using GIS to tackle automobile break-ins as a first priority. Using incident data compiled within Microsoft® Access™ database files and then uploaded to the GIS, digital crime density and incident location maps revealed when and where criminals were operating within a newly renovated area of downtown Columbia.

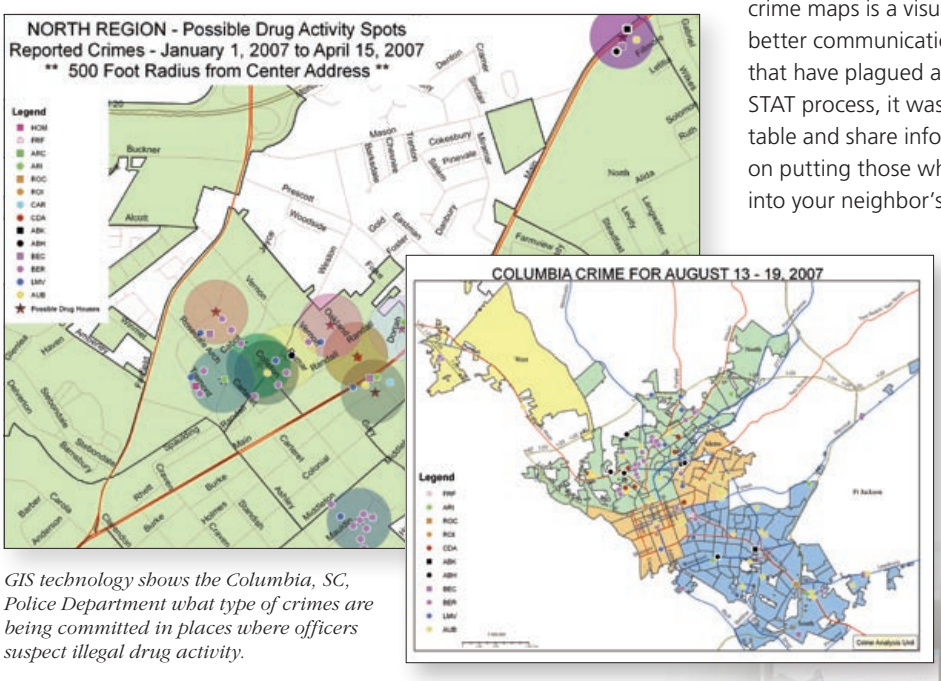
With a map of the incidents combined with aerial photography, road networks, building plans, and other spatial data layers, a comprehensive, integrated view was developed. It was used for planning when and where to deploy officers to deter crimes from occurring and for quickly apprehending suspects when a crime did occur.



CST was sent into the area during the days and times identified as vulnerable to automobile break-ins. Using visible and covert tactics, officers made several arrests during a three-week operation. As a result, automobile break-ins decreased substantially. "Today the visible police presence still maintains a lasting deterrent effect in the area [and shows] that the city will not tolerate criminal activity," adds Crisp.

Two months later, a rash of armed robberies plagued another area known as a popular social hot spot for professionals and college students. The people who committed the crimes brandished weapons at citizens during the robberies. In two cases, the robbers discharged weapons in the air. With the dramatic increase in these types of crimes, the agency needed to be able to apprehend the suspects as quickly as possible to avoid the potential for serious injury or death. The police worried that more robberies might occur before they could apprehend the suspects.

Columbia PD uses ArcInfo to manage incident data and the BCS CAT application with ArcView Desktop to perform spatial analysis and data visualization. Using GIS, 56 robberies were identified and mapped in the problem area during a two-month period. Using statistical analysis that looked at incident location, time of day, day of the week, and other historical variables, the agency was able to model where potential crime might take place during specific times and at designated locations. Maps of the robberies were used by CST along with information provided by investigations personnel. Officers were sent out when and where they were needed. Within 36 hours, the suspects were taken into custody.



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"The photomap [created with GIS] visually depicted pathways between buildings, back alleys, and other potential locations for criminal opportunists to prey on social gatherers heading back to their cars late at night," says Hines. "Using the visual crime maps and detailed aerial photography, personnel and resources were better placed at the right times to provide a deterrent to potential crime. In the event of a crime, the staff was able to respond to an incident more quickly."

The Continuing Fight against Crime

To date, violent crimes and property crimes have decreased from the previous year by 6.06 percent and 14.22 percent, respectively. All categories within property crimes are showing a decrease from the previous year. Five of eight categories of violent crimes are also showing decreases, namely homicide, armed and strong-arm commercial robberies, carjacking, and assaults.

And the agency continues to build on its successes. Columbia PD plans to add arrest data and repeat calls for service data into the routine weekly maps produced for COMPSTAT. "Information sharing via digital crime maps is a visual and easy-to-understand method for providing better communication and decision support that tears down barriers that have plagued agencies for decades," says Crisp. "Via the COMPSTAT process, it was a necessity to bring surrounding agencies to the table and share information. Time is better spent concentrating efforts on putting those who commit crimes in jail rather than pushing them into your neighbor's backyard."

Hines adds, "ESRI and BCS software have given a new easy-to-use dimension to fighting crime within the city of Columbia. Pulling maps and data together to answer what-if questions based on observed conditions, then translating the various datasets into a medium that everyone can understand, puts us leaps and bounds ahead of the criminals."

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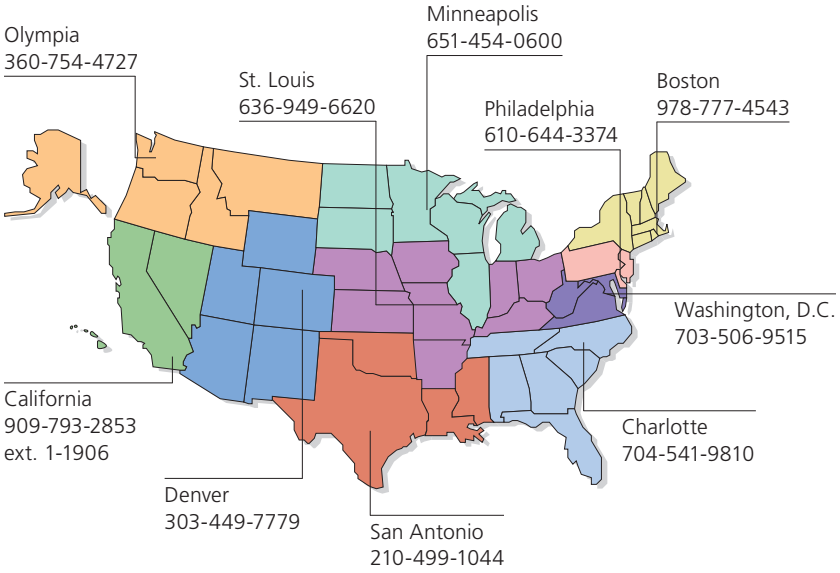

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