Law enforcement

Transit-based technology solutions

The San Francisco Bay Area Rapid Transit District (BART) is a combination aerial/subway transit system that spans four counties and 22 cities in California. BART transports 50 percent of the Bay Area commuter traffic across the San Francisco Bay and carries one-third of commuters into Oakland, connecting over 250,000 riders to their destinations daily. The District has a number of specialized departments to ensure smooth operations of the system; one such department is BART Police.

The Police Department's responsibilities include protection of BART patrons, of its own more than 2,000 employees, and of property throughout the district. BART Police is staffed with 280 employees, consisting of 215 sworn and 65 civilian employees. The department receives, on average, over 50,000 service calls a year, to which officers are required to respond. The tracking of this information and associated processes was dependent entirely upon manual processes and one 1960s mainframe computer, until the department's recent technological journey. Although far from complete, some of the projects initiated in the last year include the procurement of a new Computer Aided Dispatch (CAD) and Records Management System (RMS), the addition of a department-wide document imaging system, creation of an intranet, and implementation of a Geographic Information System (GIS). Of these technologies, GIS is the most comprehensive, as it involves not only the hardware, but also a number of mapping software packages, data customization and significant changes in workflow processes.

The implementation of the GIS was a five-month process, during which the department embarked on an extensive needs analysis. A number of divisions within the Police Department participated in the assessment by assigning their employees as members of the project team. These members identified a number of department needs, including staffing, technology and process changes. The project team was also responsible for researching GIS companies and grants available for public safety. BART Police chose to purchase their GIS from MapInfo Corporation, which coincidentally was offering a software grant for public safety. Once awarded the grant, BART Police began project

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implementation, with the help of local Map-Info resellers. The GIS was released for use in the department in November 2003. Since that time, the department has used the GIS to address effectively a number of critical areas of weakness identified during the needs assessment: (1) minimal functionality of the department's mainframe; (2) the inability to effectively share data internally or cross-jurisdictionally; (3) the inability to perform effective homeland security analyses; and (4) shrinking departmental resources.

(1) IMPROVING DATA MANAGEMENT

BART Police used the data management strengths of the GIS to counteract the weaknesses of the mainframe CAD/RMS. Information such as date, time and location of calls for service was extracted from the mainframe and imported into the GIS in a text format. This information was combined, in the GIS, with a number of imported Access databases that gathered information about victims, arrests, property, suspects, and suspect methods of operation. Once this information was concentrated into a single location, it was organized a number of ways and analyzed for patterns and consistencies. Furthermore, the data was then available for

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presentation in both visual or data form to a number of departments within BART. For example, the supervisor of the Information Technology Division may want a numeric report showing how many computers exist at each station, whereas the Chief of Police may want a visual report of the technology resources. Using the same data sets, this information could be distributed to both in several minutes. Furthermore, this data management capability has also helped BART Police address the challenge they face in sharing information across the department and with other law enforcement agencies within the four counties through which the BART system crosses.

(2) INFORMATION SHARING AND CROSS-JURISDICTIONAL COOPERATION

BART Police was enabled to better share information internally through the GIS in two ways. Primarily, the grant, which included a software package that allowed the publication of maps in a Web-enabled environment, in combination with the Police Department's new intranet, became the main platform for sharing analyses from the GIS. Secondly, because technicians were able to post both visual and data format reports, a larger number of people were able to understand the findings from the analyses. Although BART Police has not yet been given permission to post these reports on BART's public Web site, the team has been able to distribute reports to surrounding jurisdictions via mail and meetings, which was never previously accomplished.

(3) GIS FOR HOMELAND SECURITY ANALYSIS

To perform homeland security analyses, BART Police used the GIS to identify geographical liabilities and assets and to analyze how the location of those facilities will impact BART during an emergency. The identified liabilities include the Transbay Tube (a section of the system that crosses underneath the San Francisco Bay), tunnels, subway and aerial structures, and structures straddled by freeways. Assets identified through analysis in the GIS include hospitals, parks, schools and freeways within a few miles of the system. Analysis of the assets and liabilities in relation to BART is complex and is still under way, as the role of each can change in a given disaster scenario.

(4) SHRINKING RESOURCES AND IMPROVED GOVERNMENT EFFICIENCY

The final weakness identified in the needs assessment that has been addressed through use of the GIS is the management of shrinking resources without the degradation of performance or service. One scenario that demonstrates the power of the GIS for BART Police can be found in an analysis of annual calls for service, staffing and technology resources. The number of calls in these three categories at each station within the BART system was recorded at the time the GIS was implemented. Analysis of the information demonstrated that the department had resource inconsistencies in two particular areas. A simple redistribution of staff and computers could increase the department's efficacy without cost.

In addition to the four primary needs identified by the project team, the GIS also gave BART Police the ability to perform functions of crime mapping and routing. Crime mapping is the primary use of GIS at law enforcement agencies. Typically, agencies map the number and location of incidents within their jurisdiction, often with focus on specific crimes by type.

The routing tool, not commonly used at other law enforcement agencies, is a valuable application of BART Police technology. Routing is used to dispatch officers to and from calls for service locations. Since major freeways in the Bay Area straddle many BART stations, officers use the freeways to quickly move from one call location to the next. In instances where an accident has occurred on one such freeway, however, officers experience an increase in response time

to the call. In order to avoid this problem, BART Police uses its GIS routing software in combination with the California Highway Patrol, which provides real-time access to traffic conditions, to advise officers of the quickest route to their call location. This specialized use of routing coupled with real-time traffic information is rarely used by other law enforcement agencies nationwide.

The function of routing also gives rise to the possibility of more highly technical uses of the GIS such as the inclusion of mobile devices for beat officers. BART Police has foot beats and vehicle patrol beats; officers on some of these beats have laptops or hand-held computing devices. Inclusion of the GIS on these devices would empower officers to retrieve routing information without the assistance of dispatch. Furthermore, the next logical step from routing and GIS on mobile devices is the creation of a Global Positioning System (GPS). Since officers will already have access to routing capabilities at their fingertips, the process of getting routes from the GIS will become much more efficient when the system inherently knows where the officer is. In this instance the officer will be able to bypass telling the GIS where he is at the moment and can focus on destination information.

There are, however, a number of concerns on behalf of officers nationwide that GPS is going to be used merely as a form of absentee supervision. BART Police is currently researching the ability to provide officers in the field with a GPS tool while ensuring that the information will be used solely for functions related to routing and to identifying officer locations during emergencies, or when the location has not been communicated to dispatch.

Other uses for GIS not typical at law enforcement agencies, but planned for BART, are the use of aerial imagery, closed circuit television cameras, crime forecasting, and victim profiling. Aerial imagery can be used in the GIS to perform tactical analyses where the positioning of resources can be planned for specialized operations. For example, BART Police performs a number of under-cover operations to stop identified crime trends at specific stations. The GIS can display the precise locations of the incidents of the trends, and locations where staff, surveillance equipment, and vacant police vehicles can be positioned to minimize the incidents or apprehend the offenders. Furthermore, BART Police is tasked with performing crowd control functions for a number of sporting events and concerts. The GIS can be used to show the most effective placement of barriers and staff to help protect patrons and employees alike and to ensure that people are able to board trains before stations become overcrowded.

BART Police has a number of existing Closed Circuit Television cameras (CCTV) spread throughout the system. These are used to discourage criminal acts on the system, to act as witnesses to crimes and to aid officers in identifying suspects. GIS can be used to help plan an appropriate environmental design for the most efficient use of the cameras.

Other advanced analyses that can be performed through the GIS at law enforcement agencies include crime forecasting and victim profiling. Forecasting is a function of crime analysis in which the analyst uses a number of mathematical equations relating to date, time and location to identify the most likely time and place a repeat offender will commit the next crime. Profiling, on the other hand, deals primarily with broad category details, such as race and method of operation.

A number of additional uses for GIS in law enforcement may not yet have been identified. Others may not yet be documented. Because BART Police realized the potential for GIS at their agency a year ago, an in-depth research of both academic and practical sources of information on the topic was completed prior to implementation. The project team found that GIS is currently limited primarily to crime mapping and analysis functions. Although this fact may not accurately reflect the potential for uses of GIS in public safety, it may reflect a lack of documentation about this powerful technological tool. As the use of GIS at BART expands, findings will be shared in verbal and written form. Even though we only have begun to reap the benefits of implementing such a powerful tool, expectations for additional uses of GIS remain high at BART. «