

# GIS for Law Enforcement



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# GIS for Law Enforcement

## An Esri White Paper

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# GIS for Law Enforcement

## Executive Summary

In today's world of fiscal uncertainty and ever-increasing budget constraints, law enforcement agencies are forced to find ways to meet higher service demands with fewer resources. To meet these challenges, police agencies need to maximize their return on investment (ROI). This means using every available asset to optimal effect.

Increasingly, one of the most effective tools for attaining continuing mission success is information technology (IT). Today, many systems are in place to help, including mobile technologies, computer-aided dispatch (CAD), records management systems (RMS), and automated vehicle location (AVL) systems. The combined data, software, and analysis tools from these systems serve many functions, including the delivery of fast, effective call response times; managing crime reports; and improving the effectiveness of CompStat, intelligence-led, and place-based policing methodologies. The result is that more agencies are benefiting from using technology as a weapon against crime.

Yet these systems fall short of providing a complete set of collection, communication, coordination, and intelligence tools to every department and officer. Moreover, not every agency uses technology as a fundamental asset to achieve mission success. Many agencies own technology but aren't using it because it is difficult to use or incompatible with existing architecture.

Challenging questions for law enforcement include

- How can technology be made actionable for officers and staff throughout the organization?
- What can be done to provide useful solutions that require little or no training?
- If not using technology, what's available that delivers true value?
- What approaches are available to quickly begin improving decision making?

A geographic information system (GIS) can meet these and other challenges. GIS provides the ability to rapidly process and disseminate actionable intelligence organization-wide. It serves as the foundation to integrate the various systems, databases, and data types that every agency possesses. Moreover, law enforcement can leverage robust analytic tools for a myriad of purposes. GIS dramatically improves every workflow. In addition, GIS is compatible with many of the world's leading law enforcement solutions and can be adapted to meet specific needs. This means that as technology evolves, agencies can take advantage of cutting-edge tools and industry innovations.

The purpose of this paper is to discuss how Esri® GIS delivers value to support the law enforcement mission.

**GIS Is a Complete System**

GIS is a complete system for law enforcement and is scalable to meet any organization's specific operational needs. When implemented, GIS functions on many levels, becoming a technology, platform, and tool that supports all of a law enforcement organization's missions.

***GIS as a Technology***

GIS integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. GIS technology is scalable and fits into any existing IT infrastructure. Today local, state, and federal government agencies across the country and around the world use GIS. What this means for law enforcement is that an extensive network of data, applications, and expertise is immediately available for use. Agencies can share and take advantage of satellite images; building floor plans; and street network, census, infrastructure, and utility data. They can also benefit from live data feeds such as weather and video cameras. The power of geospatial technology comes from its ability to bring together data from disparate sources and relate this information spatially.

Everything law enforcement manages has a location. GIS can be used to reference and convert this information into a digital format, overlay it on a map consisting of base layers, and then perform analysis. GIS allows anyone—crime analysts, investigators, commanders, and patrol officers—to view, understand, question, interpret, and visualize data. These different personnel can then use the technology to reveal relationships, patterns, and trends in the form of maps, reports, and charts.

***GIS as a Platform***

Esri GIS provides a complete platform that connects the entire organization. It allows departments to share and distribute intelligence and knowledge through workflows for more effective communication, collaboration, and coordination. Specialized units, such as crime analysis, investigations, gangs, and narcotics, can be linked together using a single GIS framework. Each can access, update, share, and analyze the same datasets that had previously been maintained independently. GIS also links law enforcement organizations and the community. GIS web services allow agencies to open up crime data as part of their service delivery. GIS software works in desktop, server, cloud, web, and mobile environments. It's an integrated and adaptable set of tools, components, and software that can be shared through any of these environments.

***GIS as a Tool***

GIS allows you to deploy mission-specific applications that require minimal training. These applications become part of the law enforcement toolbox. They provide specific functionality based on the role or duty of the officer. This means that agencies can supply exactly what staff members need with little training. GIS can be customized to fit each agency's needs and can quickly help an organization realize the power of a geospatially enabled operational model.

**GIS Powers Operational Capabilities**

GIS supplies capabilities that support all facets of the increasingly diverse law enforcement mission. These capabilities meet operational needs, from the command center to tactical planning to field operations.

***Operational Awareness***

Under ever-increasing budgetary cuts and with fewer personnel and limited equipment and assets, understanding operational readiness, capability, and daily activities is challenging. More and more, agencies are struggling to get the most out of finite resources.

GIS provides a gateway to understanding all phases of operations. It supplies a comprehensive, informed, and relevant view into the activities of the entire organization. It can be used to gather data from varying sources including community basemaps; critical infrastructure; and calls for service, crime reports, and other types of activity into one cohesive, easy-to-understand format. Staff can then easily retrieve, process, and share information from each of these separate sources and make timely, informed decisions.

### ***Citizen Engagement***

GIS also improves organizational performance measures by monitoring outcomes. It provides the flexibility to give multiple data viewpoints based on the responsibilities of users such as commanders, supervisors, officers, and analysts. These user-defined views can include customized dashboards that give individual users exactly what they need to make informed decisions quickly and easily. GIS-based citizen engagement portals allow agencies to empower the public to voluntarily share information about any location. They can also take certain operational datasets and release them to the public. Ultimately, police departments improve visibility and transparency throughout the organization.

### ***Information Integration and Management***

As law enforcement moves to more intelligence-led and knowledge-based workflows, the difficulty becomes how to make sense of the vast amounts of data that agencies collect. Calls for service, field interview cards, situational awareness reports, and investigative reports, coupled with open source data, result in a constant flow of raw data. Making sense of these data assets is difficult. Analysts and others charged with maintaining this data can deploy geospatial tools to capture, collect, integrate, analyze, and disseminate information in a fast, efficient manner. Data storage and management are enhanced using GIS technology and servers in conjunction with web applications and cloud capabilities. This helps analysts manage data, avoid data overload, and effectively capture and distribute information such as citizen alerts or special crime bulletins. Law enforcement can create value from massive data stores, and intelligence is delivered in a timely, logical, intuitive, and contextual manner.

### ***Planning and Analysis***

Effective police work involves intimate knowledge of criminal behavior and illegal activities. It also involves looking at previous crime patterns to predict trends and continuously reevaluating tactics and strategies. Yet understanding exactly these issues in a holistic manner is difficult. The comprehensive analysis tools available in GIS give frontline supervisors the opportunity to proactively fight crime and perform community policing. They can ask questions such as

- Where are crimes occurring?
- What types of crimes are being committed?
- When are incidents occurring?
- Where are patrols during these peaks in criminal activity?

Spatial and temporal analysis help define the best field deployments. They paint an accurate picture for communicating the need for existing resources as well as new funds, personnel, or equipment. The ability to view and analyze crime and event data also helps officers make arrests and holds them to the highest accountability standards. The organization decides which planning and analysis tools are available to units and officers as needed. Agencies have the ability to quickly identify and target emerging issues, optimize personnel scheduling and allocation, and increase mission readiness.

***Field Mobility***

Officers need the ability to access critical data in the field as well as provide updates remotely in an emergency situation or during tactical operations. While nearly every agency has mobile data terminals in vehicles, geospatial solutions extend mobile capabilities from the car to the street, using tools as simple as a smartphone. Mobile GIS gives law enforcement the ability to view and share critical information about their location, suspicious persons or unlawful activity, and more, using a mobile phone, tablet, or laptop. GIS software and a digital map interface supply an intuitive method for interacting with data and applications, resulting in wider data dissemination among personnel, other agencies, and the community.

**GIS Supports  
Mission Workflows**

The power of Esri software and services lies in their ability to impact every workflow. This means agencies get the most out of their investment. The GIS software and solutions available through the Esri Partner Network provide customized, user-defined functionality. Here are just a few of the important ways GIS improves law enforcement.

***CompStat/  
Intelligence-Led  
Policing***

CompStat, intelligence-led policing, and other modern law enforcement techniques use statistics to reduce crime, improve quality of life, and better manage personnel and resources. These are typically driven by weekly strategic meetings where police commanders discuss the previous week's statistics and identify developing trends. These meetings also offer command staff a forum for sharing significant intelligence or community issues with one another.

What makes CompStat successful is its ability to hold command staff members accountable for what happens in their beat or command area. GIS improves this process with its ability to create crime maps and charts for use during the meetings. These visual aids help communicate new findings and provide context to presentations. Information such as crime and arrest data, quality of life details, community events, and emergency situations can all be displayed using GIS. To do this, the GIS software accesses the CAD systems and RMS to mine the data that can then be used to create maps, charts, and graphs. During the meetings, a map showing hot spots or other spatial locations and a chart with crime numbers will usually be displayed side by side and discussed.

GIS automates and simplifies the CompStat workflow. Geospatial models allow fast, efficient data collection and automated analysis. GIS then makes this data visually appealing and easy to understand through the digital map interface. Trends and problem areas become readily apparent. The discoveries can lead to collaboration between various units, agencies, and the community as information becomes intelligence.

***Operations***

The primary function of most police agencies is to patrol. Police organizations have long focused on random patrols of their assigned beat areas and responded to calls for service as assigned. GIS provides an information-based map interface to expedite and improve this process. It can tell commanders where their personnel should be deployed for optimal effectiveness, including factors by time of day and day of week. GIS can also be used to predict crime spikes and spot trends as they develop. Dispatchers can use GIS to quickly see the location of a call. They can then use AVL to see where officers are on a map and deploy the closest officer based on this information.

Real-time crime centers (RTCCs) are becoming more prevalent in law enforcement. As calls come in, the RTCC can map and analyze the information as well as bring up previous calls to that location and compare similar activity from other locations around

the reported incident. This additional intelligence allows officers to better understand the situation they are entering. Mobile devices can be used by officers to receive information from RTCCs or dispatch centers and help them identify suspicious activity, access suspect information, and perform on-the-fly crime analysis in the field.

### ***Crime Analysis***

Crime analysts collect, interpret, and present data to support the police mission. Both civilian and sworn personnel work as analysts to identify emerging crime trends and patterns to support operations. Crime analysts create reports for tactical, strategic, and administrative uses. These support all levels of law enforcement, from executive staff to operations, investigation, and other units as needed.

GIS has many tools that enable crime analysts to carry out their job functions. They can better support data collection and aggregation from multiple agencies. Information from disparate sources can be joined to analyze cause-effect relationships. Crime analysts can also use or make available tools to interpret data and make discoveries.

Spatial analysis can identify and link seemingly unrelated crime patterns and trends. In addition to spatial analysis, GIS allows users to perform temporal analysis. Data can be used to link what crimes are occurring by specific time of day, week, month, or even season.

In addition, analysts can capture processes and workflows to identify best practices and necessary improvements. GIS ensures that analysts are spending their time doing analysis and high-priority work, not tasks that GIS can automate.

### ***Community Policing/ Information Sharing***

Police agencies partner with the community and neighboring agencies to reduce crime and foster goodwill. Information is shared through public information officers (PIOs), community meetings, and documents that are shared with other agencies. Volunteers, neighborhood watch groups, and citizen advisory boards are supported and asked to participate in decision making.

GIS can integrate community information from various sources such as demographics, housing, and business. Maps can be produced that help a community understand the issues it has, including how resources are coordinated. Online mapping and public-facing websites can be produced to inform citizens how crime and other quality-of-life issues may affect them. GIS can be integrated with social media to alert residents of affected areas about public-safety risks.

This type of public/private collaboration and communication—promoted through comprehensible information maps—fosters community partnerships. Citizens can look at what areas need greater grassroots action such as neighborhood watch and knock-and-lock campaigns. They can create volunteered geographic information by quickly taking a photo of a problem such as graffiti or vandalism and uploading the photo, providing law enforcement staff with a better understanding of crime and its location using proactive, community-based policing. This fast and easy means of information sharing builds safer, stronger communities.



***Corrections,  
Probation, and  
Parole***

The law enforcement mission doesn't end with an arrest. This is just one piece of the criminal justice system. Law enforcement agencies are responsible for offender management, from arrest and sentencing to incarceration and parole. Local sheriff departments and jails are responsible for pretrial detention and management of probationers. State and federal agencies manage offenders sentenced to prison and parole. Geospatial software helps these various agencies effectively manage and maintain the corrections, probation, and parole process.

For instance, in correctional facilities, personnel can quickly identify areas that are prone to inmate violence. Computer maps combined with live data feeds enhance inmate monitoring. Data can be linked to specific facility sites to capture and build intelligence about inmate criminal activity. In addition, inmate interactions with the outside world can be mapped and analyzed, including gang activity and risks. By using GIS to visualize inmate social networks and associations, officers can make intuitive connections that may otherwise be missed.

Sex offenders, parolees, and probationers can be fitted with GPS units and then be monitored with GIS. Probation and parole officers can look at digital maps showing where high-risk offenders are living; schools, parks, and other community sites; and the presence of any other known associates or offenders in the area. In compliance with existing laws, agencies can give the public map information on the web about where offenders live.

These types of comprehensive, data-rich mapping applications give officers and analysts valuable intelligence to make life-saving decisions. They increase officer safety and ease the workloads of probation and parole officers through smarter management.

**Conclusion**

Esri ArcGIS® software is a complete system for law enforcement. It's affordable and scalable and fits into existing IT or operates as a stand-alone solution. It transforms data into actionable intelligence for every department and workflow. ArcGIS enhances all modern policing techniques, including CompStat and intelligence-led policing. This enables any agency employing these proven methodologies to meet mission demands through better decisions at every level. Esri software benefits every department within an organization, improving connections and fostering greater collaboration. And because of Esri's extensive partner and user communities at local, state, and federal levels, users can leverage Esri as a complete system to work more effectively with homeland security, public safety, and other types of organizations, as well as the public. Esri global partners provide value-added solutions that meet specific needs. Esri's law enforcement users exchange knowledge, share best practices, and provide extensive outreach for resources and support. This combination of staff, software, services, partners, and user support gives agencies what they need to quickly get up and running with a GIS platform. It also means users have a long-term partner in Esri that will work to help them succeed.



Esri inspires and enables people to positively impact their future through a deeper, geographic understanding of the changing world around them.

Governments, industry leaders, academics, and nongovernmental organizations trust us to connect them with the analytic knowledge they need to make the critical decisions that shape the planet. For more than 40 years, Esri has cultivated collaborative relationships with partners who share our commitment to solving earth's most pressing challenges with geographic expertise and rational resolve. Today, we believe that geography is at the heart of a more resilient and sustainable future. Creating responsible products and solutions drives our passion for improving quality of life everywhere.



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