

IBM Public Safety Solutions for a Safer Planet

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Executive overview

Public safety refers to the protection of the general population and critical infrastructure from the dangers affecting communities, such as crime, unexpected events including power outages and water main breaks, or natural disasters large and small.

IBM® public safety solutions bring a unified approach to public safety that fosters interagency collaboration and provides foundational data integration, visualization, and analysis tools that drive analytics and insights.

Public safety solutions from IBM provide the optimum knowledge tools for modeling, assessing, and managing responses to the incidents and the people who pose danger. Through proven software tools, IBM solutions assist public safety agencies in collecting, storing, searching, and analyzing video, weather, criminal, and police data, and related geospatial information. These tools support public safety agencies in intelligence analysis, lead generation, threat assessment, interagency collaboration, and emergency planning. They can help remove barriers to information access and sharing and help enable integration with many parts of an organization's pre-existing information structure.

A flexible, modular approach provides the freedom to deploy functions based on the most prevailing business needs first and to complement existing capabilities. Using core components, organizations can readily integrate functions that provide extended value for them.

Public safety solutions from IBM include advanced capabilities that provide unified support for the critical missions of the law enforcement and emergency and incident management communities, as shown in Figure 1.

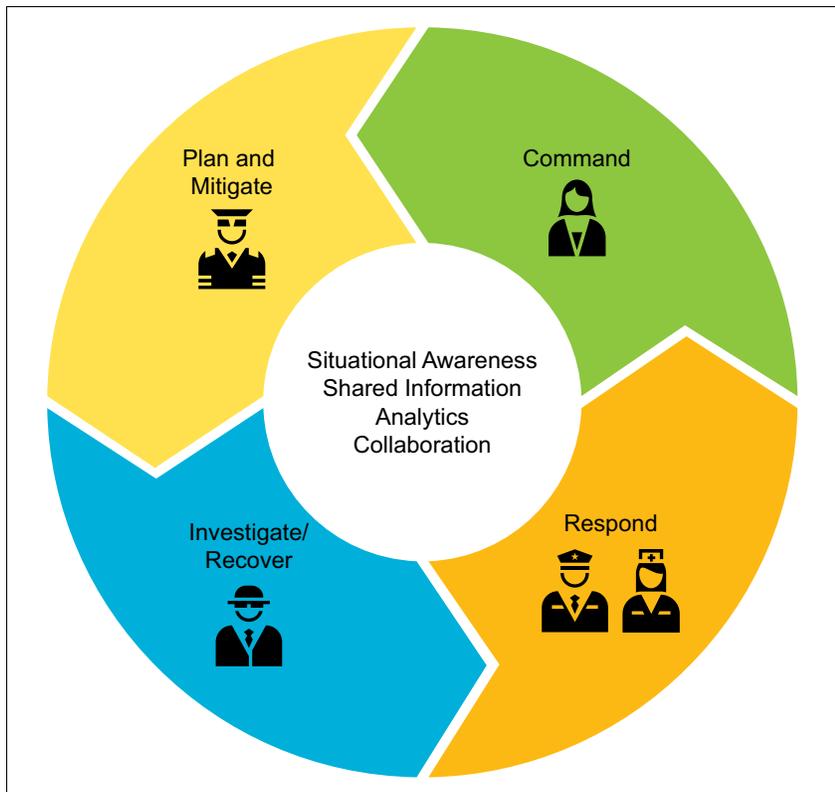


Figure 1 IBM unified public safety - providing support for each critical mission

IBM unified public safety supports each critical mission as follows:

- ▶ **Plan and mitigate**
Plan, prepare, and test local and inter-jurisdictional resources and procedures to improve time-to-action, mitigate impact, and reduce loss. Determine trends and causal effects, forecast resource levels, and establish priorities.
- ▶ **Command**
Control the operations of multifaceted public safety situations, including communication and coordination between agencies. Provide real-time support to synchronize resources and manage the safety of first responders. Use analytic insights to drive immediate actions and meet objectives.
- ▶ **Respond**
Access cross-jurisdictional data at the tactical edge. Use situational awareness for quick and accurate responses to protect people and property and increase first responder safety. Initiate the short-term recovery process.
- ▶ **Investigate and Recover**
Restore critical systems and infrastructure to re-establish the normal operations. Resolve identities, uncover hidden associations, and generate fresh leads for the timely resolution of on-going investigations.

Modern-day pressures for public safety are intensified by the surge in urbanization. Today, half the world's population (3.5 billion people) lives in cities, and every day the worldwide population of cities grows by almost 180,000 citizens. Public safety organizations that begin today to use the force multiplier of advance analytics and collaboration to help close the operational gap are going to be the ones that are best placed to fight crime, respond rapidly and more effectively to emergencies, and ensure public safety tomorrow. IBM public safety solutions can help you meet these challenges.

This IBM Redguide™ publication describes the business value of IBM public safety solutions and the capabilities that include a flexible design that enables organizations to deploy the solution in phases according to their most pressing needs. This guide is intended as an introduction for public safety, law enforcement, and emergency management executives and professionals evaluating advanced software solutions for their organizations.

Business value

IBM provides integrated solutions to address the myriad of challenges facing the spectrum of public safety responders, from line officers to incident commanders, managing executives, and government leaders. Some of the many benefits of these solutions include the following ones:

- ▶ Increased speed of discovery with reduced risk of missing connected information from multiple sources through a single view of data with identity resolution and no duplication.
- ▶ Increased officer or first responder safety by reducing or eliminating surprises when responding to a call or incident. Better tactical decisions are made when a common operating picture provides real-time information about a situation that officers or responders are entering.
- ▶ Better law enforcement decisions by using current, fact-based information to gain deeper insights by incorporating data from other agencies and jurisdictions.
- ▶ Better emergency response decisions through real-time understanding of complex environments that enable early identification of potentially adverse conditions.
- ▶ Improved emergency response and time-to-action with insights to assess and determine quickly the most appropriate actions, with an understanding of the cascading impacts of critical infrastructure, key resources, and other assets that are affected by planned or unplanned incidents, events, or emergencies.
- ▶ Decreased time to solve crimes by discovering a crime series, both historical and current, which can improve resource allocation, speed resolution, and create safer communities.
- ▶ Significantly decreased time to uncover robust case leads, enabling law enforcement to solve cases faster. With improved close rates, more cases can be handled by the department.
- ▶ Advanced oversight of complex crime and emergency situations provides clear information that enables senior officials to better understand progress and status. The solution provides intelligence analyses and reports that clearly outline timeline progressions, cause and effect, link charts, social network analysis, and more.
- ▶ Reduced complexity of cross-jurisdictional and cross-agency response to incidents and emergencies by working with existing systems to create a common operating picture as a foundation for decision making and resource coordination.
- ▶ Unparalleled command and control functionality through increased situational awareness that integrates many data sources in near real-time and enables rapid analysis capabilities.

- ▶ Improved response collaboration and decision effectiveness by using unified dashboards, real-time alerts, decision support analytics, and mobile accessibility.
- ▶ Reduced economic and human costs of both natural or human-created disasters by understanding the cascading impact that affected resources have through simulation and what-if analysis.

Law enforcement solutions for a safer planet

IBM i2® Integrated Law Enforcement is a preconfigured law enforcement solution that provides the optimum knowledge tools for intelligence analysis, lead generation, operational effectiveness, and agency collaboration. It can connect to various Geographic Information Systems (GIS) and has communication integration in the form of a suite of collaborative tools.

i2 Integrated Law Enforcement takes a holistic view of the information of policing and partner agencies, removing barriers to information access and sharing, enabling the entire law enforcement organization to focus solely on its mission of predicting, and preventing and defeating sophisticated criminal and terrorist threats. The solution design allows i2 Integrated Law Enforcement to integrate with many parts of an organization's preexisting information structure.

This flexible approach provides the freedom to deploy functions based on the most prevailing business needs first to complement existing capabilities. Using the core components of i2 Integrated Law Enforcement, organizations can readily integrate functions that provide extended value for them. Case management, sophisticated analytical modeling, big data hardware and software solutions, and video analytics are several of the more common capabilities that can be added as extensions to i2 Integrated Law Enforcement.

i2 Integrated Law Enforcement is one solution supporting multiple user communities:

- ▶ Command, operational, and planning staff
 - Expressing clear, easily understood information for rapid situational awareness to ensure resource synchronization, officer safety, and attainment of performance targets.
- ▶ Analysts and investigators
 - Supporting long running and complex analytical tasks requiring specialist skills, with sharing and collaboration on the gathering, analysis, and dissemination of intelligence.
- ▶ Front line officers
 - Providing tactical lead generation through access to historical and near real-time records from a single source to help generate investigative leads, and develop links, associations, and crime analysis.

Flexible design: Integrated core solution components

i2 Integrated Law Enforcement is designed to address the most pressing needs of the organization first. Prioritization of the deployment sequence of the i2 Integrated Law Enforcement capabilities is the focus of initial architectural discussions.

i2 Integrated Law Enforcement integrates core components from the IBM portfolio of operations, intelligence analysis, and policing products into a collaborative solution with an enhanced user experience. The offering provides a unified system to support the work of predicting, preventing, and helping defeat the world's most sophisticated criminal and terrorist threats.

The concepts and functions that are described in the following sections explain the capabilities that are provided by integrating large amounts of data from disparate sources to discover insights that increase officer safety, help to deploy effectively resources to maximize results, and reduce crime.

Regardless of immediate needs and near-term requirements to augment current law enforcement processes, the goal of i2 Integrated Law Enforcement is to provide role-based access to current, valid data that is made available through collaboration with a common information hub.

Figure 2 shows that there are three major logical user interfaces (policing, analysis, and portal) to provide data that is appropriate for each primary law enforcement role. Each underlying data source contributes to the *Public Safety Information Hub*, which represents the logical grouping of all repositories and databases that are used within i2 Integrated Law Enforcement. This Public Safety Information Hub implements one of the most important value propositions of a holistic law enforcement solution, that is, data integration and sharing. It is from this one source that each function of law enforcement draws the same data according to authorized need.

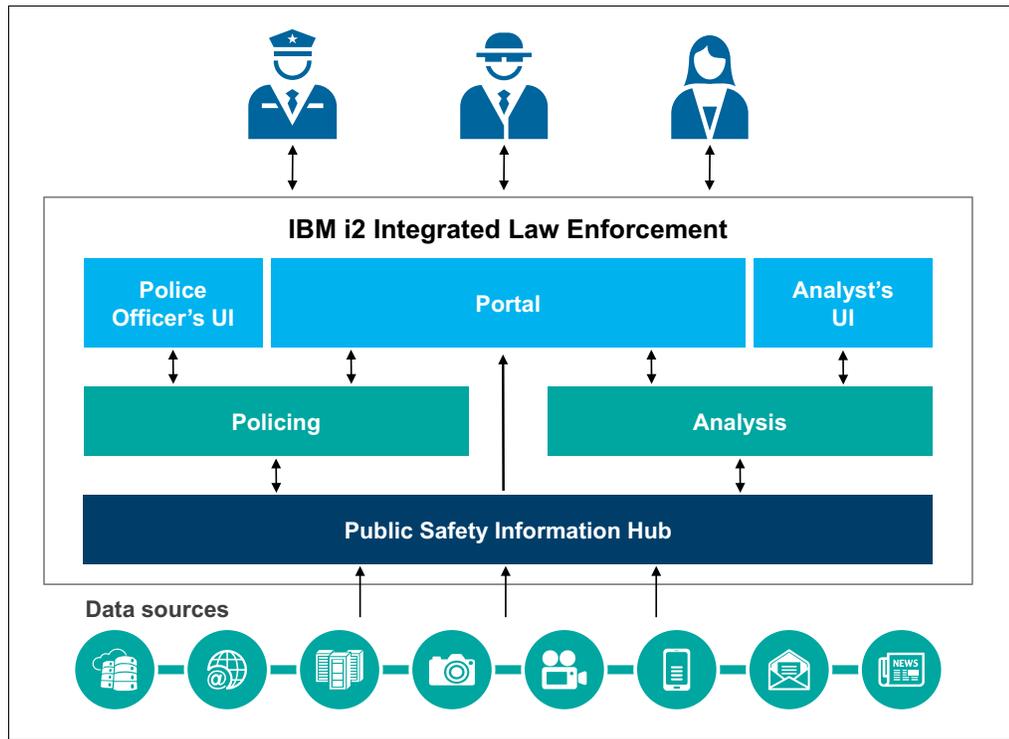


Figure 2 Logical architecture of IBM i2 Integrated Law Enforcement enabling data sharing

Integrated Operations: Serving the command, planning, and operational communities

Decision makers have little time and no need to understand the analytical process or tactical lead generation. They need clear, easily understood briefings for rapid situational awareness to ensure that resource synchronization, officer safety, and performance targets are being met.

A key component of i2 Integrated Law Enforcement is IBM Intelligent Operations Center, which can provide situational awareness and information for decision support. It also provides a status about key performance indicators (KPIs) and events in near real-time within a common operational picture that provides these functions:

- ▶ Assists the command staff with making better decisions based on a single source of trusted, consolidated information
- ▶ Helps ensure that crime-reduction operations meet their targets with repeatable, accurate, and timely information
- ▶ Provides crime trend analysis and allows the quick development of crime patterns by answering specific questions, such as *Where are most vehicle thefts occurring on Monday mornings?*
- ▶ Increases confidence for key tactical and strategic decisions
- ▶ Removes much of the manual effort of reporting, allowing reallocation of resources to perform other functions
- ▶ Supports command staff briefings of status against goals (measured as KPIs)
- ▶ Uses criminal behavior patterns to support quickly and confidently strategic and resource deployment decisions

IBM Intelligent Operations Center provides a system for storing the correct, current procedures and workflows that are based on activities that are associated with events. For example, after IBM Intelligent Operations Center recognizes an event, it can choose several actions to mediate or manage the event. Typically, the first action involves escalating the event to an incident. The operator might first consult and communicate with local teams through collaboration tools that are provided by IBM Intelligent Operations Center.

Standard operating procedures (SOPs) are the predefined instructions for dealing with events or situations for which a city can anticipate and plan. SOPs can be reduced programmatically to a series of steps and actions. Certain SOPs can be automated, and others require a person to make a decision.

For example, an incident can be flagged to require special attention and handling. After an event is escalated to an incident, a workflow or other predefined series of actions begin in accordance with an SOP. You can track the progress of workflows and monitor or update the status of activities that are assigned to you. Information about a range of available resources can be highlighted on a map. The information is easy to access when and where you need it.

IBM Intelligent Operations Center can help to tailor and define KPIs, which are automatically updated as the underlying data changes. Through this function, users of IBM Intelligent Operations Center can perform the following actions:

- ▶ Summarize the executive-level status for a single domain or across domains.
- ▶ Highlight issues and identify problems.
- ▶ Investigate further by drilling down into the KPI details.

KPIs are used to measure nearly anything of importance to city leaders, from the number of traffic accidents in this calendar quarter and where they occurred to the on-time performance of the public transportation system. IBM Integrated Operations Center receives raw or computed metrics and uses them to compute the actual KPI.

A good example of KPIs for public safety is the establishment of an overall crime rate as the highest level KPI, which can then be broken down by departments and geographies, type of crimes, date and time of occurrences, and other factors, such as weather or key social events. Visualizing trends for KPIs as they emerge is a significant advantage in efforts to be proactive.

Executive dashboards, which are built on IBM Intelligent Operations Center, can show color-coded KPIs to reflect their status, quickly bringing focus to the area that requires attention. Alert conditions are immediately reflected in the dashboard, notifications are received, and the SOPs that are associated with the event are outlined in the activities list.

Figure 3 shows an example of monitoring intervention tactics with instant facts delivered across a range of dashboards.

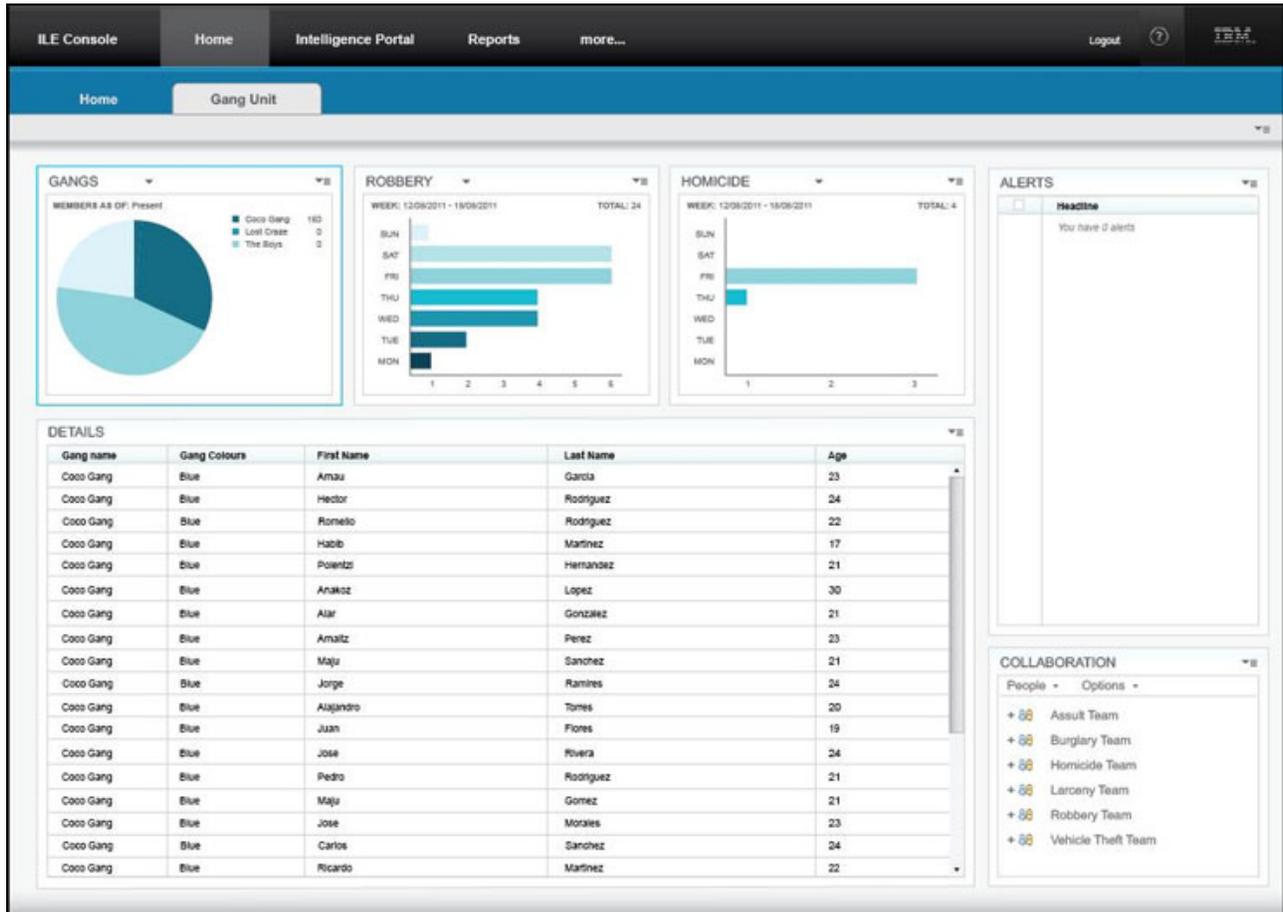


Figure 3 i2 Integrated Law Enforcement dashboard facts

An integrated collaboration and communication tool is also provided in IBM Intelligent Operations Center for messaging and communication among users where and when it is needed. If an instant messaging tool is already deployed within a jurisdiction, it can be readily integrated with IBM Intelligent Operations Center. IBM Intelligent Operations Center also has an integrated reporting facility to set up and run reports with the events and KPIs that are supplied by the solution.

Although numerous agencies might target the functions of IBM Intelligent Operation Center as the key objective for i2 Integrated Law Enforcement, many agencies can also begin deployment by addressing another area of primary need.

Intelligence Analysis: Serving the analyst and investigative community

Intelligence analysts often engage in lengthy and complex analytical tasks requiring specialized skills. With the i2 Analyst Notebook capabilities within i2 Integrated Law Enforcement, analysts can share and collaborate on the gathering, analysis, and dissemination of intelligence with each other, command staff, officers in the field, and other jurisdictions.

These capabilities identify key targets, associations, commodity flows, and complex networks, and can help you achieve the following goals:

- ▶ Build a single common intelligence picture.
- ▶ Develop a clear operational view of the threats that are being tracked.
- ▶ Identify emerging threats to enable decision makers to choose an appropriate response.
- ▶ Concisely present fact-based information to decision makers, courts, or other bodies.
- ▶ Develop intelligence packages that outline timeline progressions, cause and effect, and criminal network weaknesses and strengths.
- ▶ Collaborate with colleagues and maintain continuity over long running investigations.

i2 Integrated Law Enforcement also includes an extensible, scalable, and service-oriented analytical environment that is designed to provide organizations with access to intelligence when and where they need it for faster, more informed decisions.

This capability helps organizations to translate data efficiently and effectively to actionable intelligence by performing the following functions:

- ▶ Providing advanced data management tools to collect, collate, and consolidate data from various disparate sources, creating a richer, centralized, and aggregated view of analysis-ready information. Whether the analysis requires data on demand or as a bulk data load, the correct model or a combination of models can be implemented to complement operational needs.
- ▶ Delivering intuitive visual analysis tools that allow all key stakeholders to use greater insight from information and existing intelligence products. Situational awareness is improved across the operational community through the on demand visualization tools.
- ▶ Bridging operational knowledge gaps through a single, security-rich collaborative environment that addresses both need-to-know and need-to-share directives through both built-in tools and existing security services. Flexible features enable analysts and the greater operational team to work cooperatively across a centralized aggregated view of information with operational governance that includes the ability to track and retain the provenance of information that is gathered from various sources.

Visualizing associations among people, objects, and events builds a common intelligence picture that can include commodity flows and highlight criminal networks, yielding a clear operational view of current and emerging threats.

Figure 4 on page 9 illustrates this visualization technique to present the relationships and potential linkages among individuals, objects, and events. It provides the ability to zoom in, drill down, and save relationship maps. Visualization provokes insights in ways that are not possible with tabular or textual data.

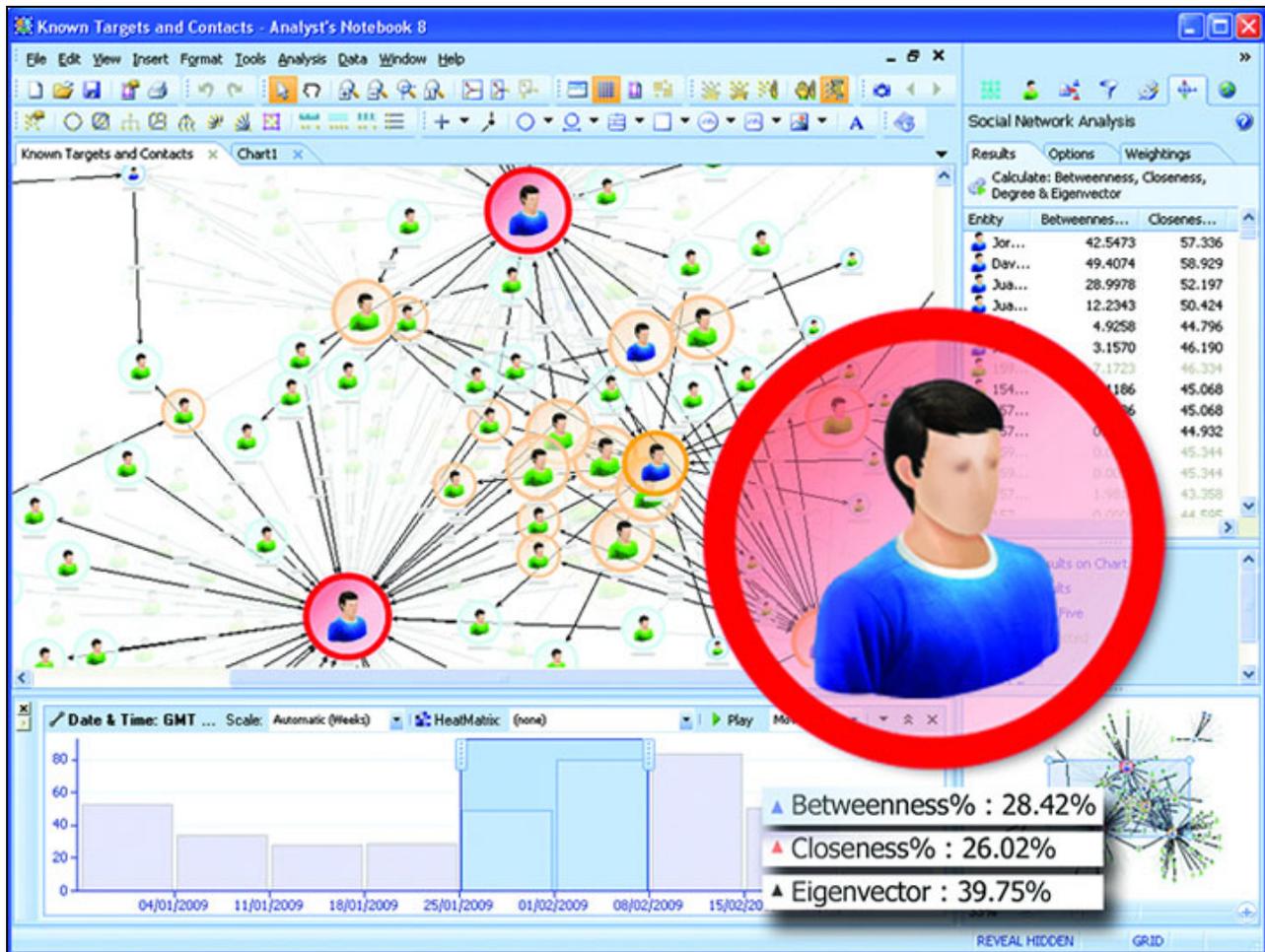


Figure 4 Visualizing relationships

Integrated Policing: Serving the front line officer community

i2 Integrated Law Enforcement provides access to historical and real-time records from a single source to help generate investigative leads and develop links, associations, and crime analysis. These modules push information to the tactical edge to provide situational awareness and information for investigative lead generation.

The key engine that drives this capability is IBM i2 COPLINK®. i2 COPLINK is a tactical, line-level solution to the problem of inaccessible or irretrievable information as a result of disparate law enforcement information systems that lack a common language or platform. These capabilities were designed with continuous feedback from the users (such as line-level officers and detectives), and are continually evaluated for new functions. i2 COPLINK provides an easy-to-use, intuitive, and web-based interface that can be mastered by even inexperienced computer users in less than a day. The information is presented in a clearly labeled format that includes hypertext links to the underlying data and originating documents. Additional custom links can be accommodated for direct document retrieval from underlying databases. The browser-based format allows the user to navigate through the program as though they were navigating the Internet.

From its beginnings as an information sharing and tactical lead generation tool, i2 COPLINK has evolved into a solution that covers the continuum of law enforcement activities from pre-dispatch to post conviction. Modules with specific functions, such as facial recognition, can help criminal justice agencies accelerate the entire criminal justice process, providing information that was difficult, if not impossible, to secure in a timely fashion. In today's criminal justice environment, the need to improve efficiency and effectiveness has never been greater. Police and criminal justice agencies need help dealing with the ever-increasing demands for service. i2 COPLINK can help provide that assistance.

The solution suite offers the following broad features:

- ▶ Data integration from disparate information systems without redundant manual entry of data. Integrated data is refreshed (updated) on a schedule that is determined by the contributing agencies. Individual agencies control the data that is integrated. Integrated data allows advanced analysis by using artificial intelligence-based searches.
- ▶ Monitoring, collaboration, and notification to assist on-going investigations.
- ▶ Mobile device access is available.
- ▶ Security through role-based system access of authorized users.
- ▶ Regional node concept that permits queries between agencies across jurisdictions.
- ▶ Modern user interface to assemble key data on a single screen and increase productivity.
- ▶ Connection to external data sources for extended queries.
- ▶ Visualization tools for developing networks, statistical patterns, and GIS mapping displays.
- ▶ Real-time notification of events based on user-defined tasks and thresholds.
- ▶ Three deployment models: on-premises, on the cloud, or a hybrid.

The new IBM COPLINK on Cloud deployment model eases the need of the law enforcement agencies for hardware and software budgets and extensive IT support. IBM COPLINK on Cloud automatically provides frequent and transparent updates and fix packs to ensure that the most up-to-date software version is available. A cloud deployment also accelerates an agency's return on investment (ROI) and alleviates many of the data sharing issues facing small agencies that do not have the personnel, budget, or expertise to run their own i2 COPLINK node.

The policing capabilities that are available for front-line officers and detectives address many of the problem areas that are commonly found in existing law enforcement systems:

- ▶ Difficulty in sharing information across jurisdictional boundaries (or in some cases within a single jurisdiction)
- ▶ Lack of sophisticated analytical tools to solve crimes quickly
- ▶ Lack of collaboration notices to bring together different investigations
- ▶ Lack of notification tools that alert users to new information

To address these problems, a comprehensive consolidation database for policing that receives, sorts, consolidates, indexes, and stores data from disparate data sources is provided.

After the initial data migration is complete, an automated refresh schedule can be implemented as necessary for the data source and jurisdictional needs. Modern records management systems that support XML can refresh the tool virtually in real time. After the initial required data is loaded, officers can realize the following benefits:

- ▶ More quickly discover investigative leads.
- ▶ Generate leads with little or even partial information.
- ▶ Save critical time to enable cases to be solved faster.
- ▶ Reduce the backlog of unsolved cases, without further hiring.
- ▶ Improve the quality of life for citizens.

Various specialty modules further refine an agency's ability to meet specific needs and address priorities. i2 COPLINK Face Match for facial recognition, i2 COPLINK Adaptive Analytical Architecture (A3) for temporary data consolidation, and an adapter to integrate Esri ArcGIS Server 9.3 are a few of the specialty modules.

Figure 5 highlights the many types of information and various display formats that are readily available through the i2 Integrated Law Enforcement policing modules.

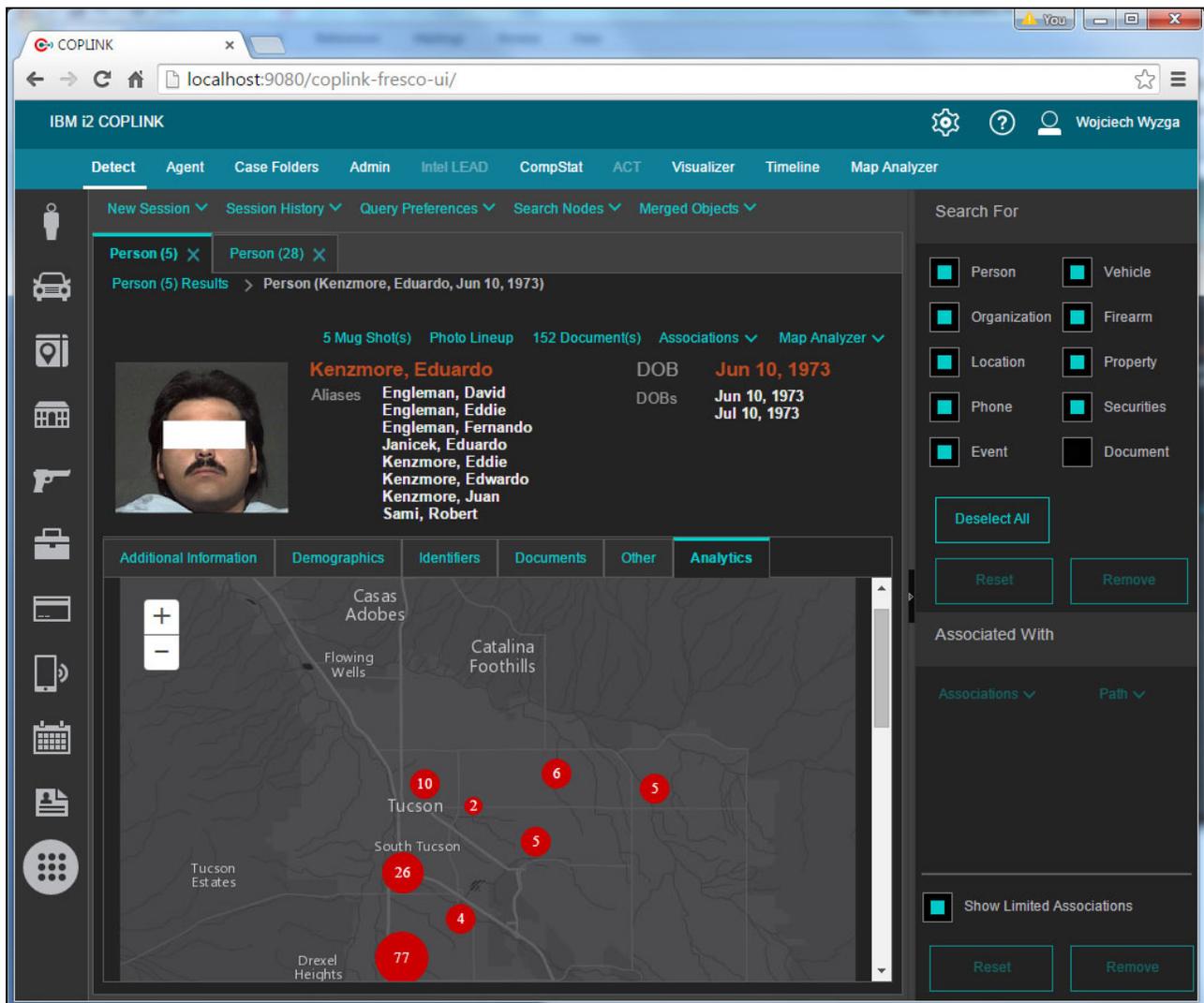


Figure 5 The many specialty data displays that are available for police officers and detectives

Integrating video analytics with law enforcement solutions

IBM Intelligent Video Analytics assists the law enforcement community in the following ways:

- ▶ Using information to make better decisions
- ▶ Anticipating problems to resolve them proactively
- ▶ Coordinating resources and process to operate effectively

A video camera is a powerful, non-intrusive sensor that can capture information (such as motion, size, shape, color, speed, and direction) for analysis and alerting. In many cases, single events might not be significant, but the pattern of events can be significant. Video monitoring or reviewing does not need the human eye as the first filter. Combining data and human insight with what the camera captures can provide additional assistance to law enforcement. Video analytics can be programmed to include triggers that provide alerts to situations that might defy simple human observation. With the addition of new data feeds, a new level of insight can be gained.

Incident and emergency management for a safer planet

IBM Intelligent Operations Center for Emergency Management is an incident and emergency management solution that helps authorities with coordinated preparedness, response, recovery, and mitigation efforts for daily operations and for emergency or crisis situations. It integrates and correlates many systems and information sources to create a dynamic, geospatial, and common operating picture with analytic-based insights that can help incident commanders and emergency managers understand and adapt to rapidly changing situations. By fusing knowledge of current operational status with powerful consequence analysis functions and presenting information in a real-time geospatial framework, IBM Intelligent Operations Center for Emergency Management provides rich command, control, and collaboration functions to first responders, incident commanders, and government leaders.

This software provides an integration, collaboration, and analytic technology platform with rich, readily available application functions that combine risk assessment, viewer, first responder, physical security information systems (PSIM), and situational awareness capabilities. Users can quickly aggregate information from disparate data sources to create near real-time situational awareness that helps identify potential man-made or natural threats.

The advanced analytic capability fuses knowledge of current operational statuses with *what-if* consequence analysis and recovery decision support functions, allowing decision makers and emergency leaders to plan ahead and adjust response plans *in the moment* to minimize losses and disruptions to citizens. The improved speed and accuracy of collaboration and decision making reduces time-to-action and helps mitigate the impact to affected areas.

IBM Intelligent Operations Center for Emergency Management enables officials to prioritize and make informed decisions. It provides insights to assess and determine quickly the most appropriate actions, with an understanding of the cascading effects of assets being taken offline by emergencies or other incidents and online during the recovery activities. For example, if a power substation goes offline during a major storm, what is the cascading effect that is associated with the power interruption from that particular substation? What are the hospitals that are affected and therefore cannot manage medical emergencies? The solution also enables command staff to move between real-time reactive recovery and response mode and proactive planning and simulation. For example, during a recovery activity, officials can simulate the cascading impact of bringing back online critical assets, such as water, power, and opening roads, so that they can better prioritize the response.

Intelligent Operations Center for Emergency Management is designed to manage major disasters, such as floods, earthquakes, typhoons, and human-caused attacks. But, very importantly, the solution provides capabilities to manage the impact and recovery of ordinary day-to-day events and incidents, such as accidents, road closures, fires, or power outages. The underlying premise is that one of the best preparation techniques is to use the same analytic, social, and mobile technology to manage day-to-day community incidents as you plan to use in responding to crisis situations. Familiarity helps ensure that first responders and command staff can engage immediately and naturally in response, recovery, and mitigation regardless of the complexity or scope of the crises.

IBM Intelligent Operations Center for Emergency Management

IBM Intelligent Operations Center for Emergency Management aggregates and correlates data from many disparate information sources to create a common operating picture. As shown in Figure 6, the logical architecture of IBM Intelligent Operations Center for Emergency Management creates a common operating picture that is accessed through a role-based user interface. The common operating picture provides situational awareness, analytic driven insight, and collaboration capabilities through different role-based user interfaces, ensuring that users access the correct information and insight for the tasks on which they are focused.

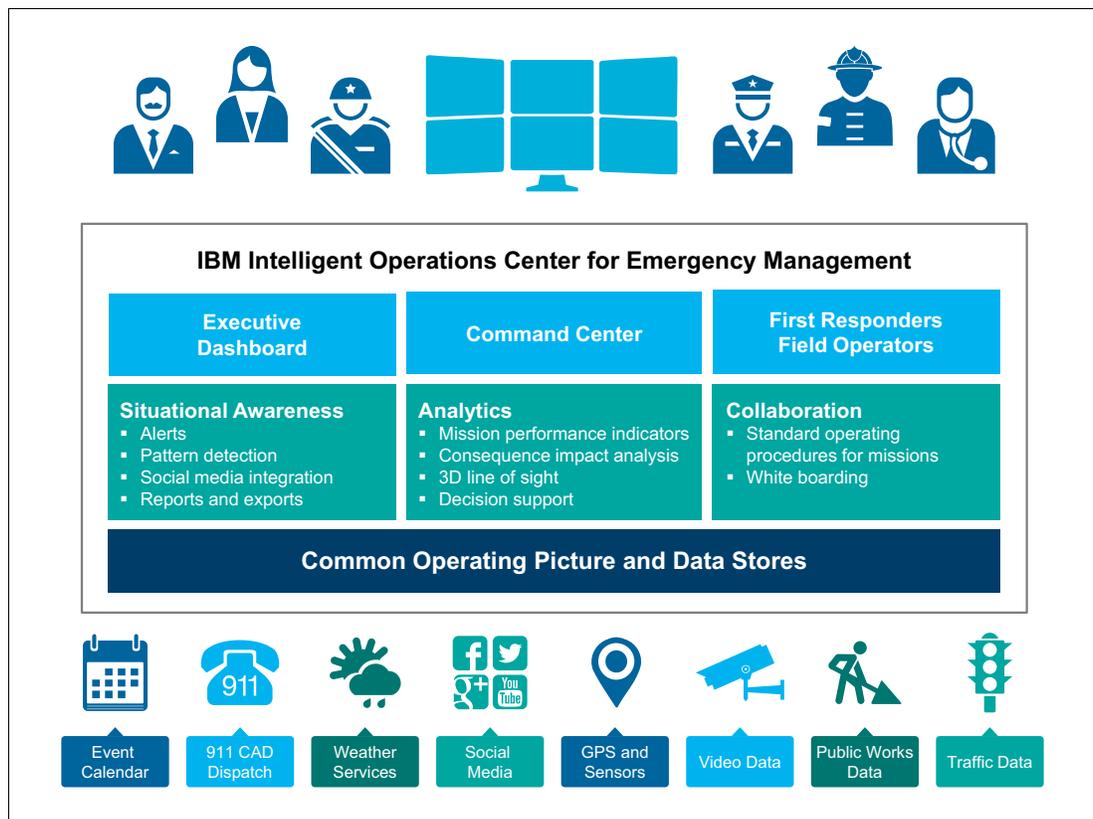


Figure 6 Logical architecture of IBM Intelligent Operations Center for Emergency Management

Role-based capabilities help different stakeholders focus on objectives

The role-based functions and capabilities of the solution help different stakeholders focus on their objectives throughout the cycle of preparing for, responding to, and recovering from incidents and emergencies of all sizes and complexity. The key roles that are addressed by the solution are the following ones:

► Strategic planning and preparedness

Being prepared has a significant impact on the consequences of a disaster, saving lives and providing financial benefits. Professionals in this role must understand how assets and resources are related to each other, and what is the potential cascading impact of taking those assets offline during a disaster. They must prepare by locating emergency response and recovery assets in core areas and simulate situations to create the most effective plan that helps to mitigate the consequences of a disaster.

The solution helps to plan by providing the following capabilities:

- Discover incident trends
- Model *what-if* scenarios for assessment
- Effectively deploy resources
- Determine strategies
- Monitor missions with KPIs
- Develop standard operations
- Maximize ROI and minimize costs

► Incident command and control

Operational decision makers have little time and no need to understand the analytical process. They need clear, easy to understand information to ensure proper resource synchronization, safety of first responders, and that performance targets are being met.

The solution supports this user role by providing the following capabilities:

- Share common operational data
- Exercise multi-agency control with role-based security
- Decrease incident response time
- Effectively coordinate resources
- Deploy standard operating procedures
- Send and receive alerts
- Monitor missions with KPIs
- Determine results

► First responders

Responders need access to reliable and consolidated near real-time data to assist those in need during an emergency and preserve their own safety.

The solution supports this community by providing the following capabilities:

- Manage urgent incidents end-to-end: preparation, mitigation, response, and recovery
- Access information at the tactical edge
- Share information across jurisdictions
- Mobile access from the field to the same operations data that is used by the command center

Stakeholders share a common operating picture

Situational awareness is the key element in managing operations, whether it is normal day-to-day monitoring of situations, special events, or during emergency situations that might be man-made security threats or caused by natural disasters. Figure 7 on page 15 shows the common operating picture that provides situational awareness to the different stakeholders.

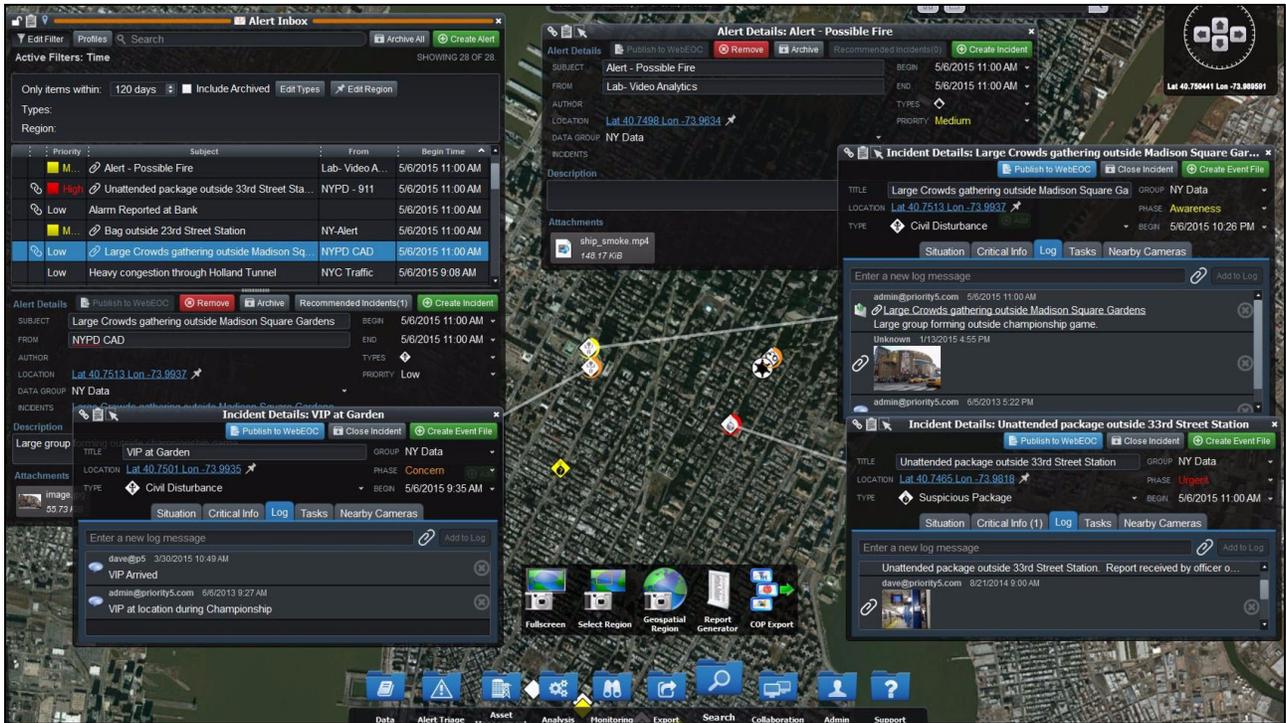


Figure 7 Common operating picture providing situational awareness for a command center

IBM Intelligent Operations Center for Emergency Management connects and integrates to existing data sources whenever they are needed to provide near real-time situational awareness. This data can then be shared among all users based on their roles and access rights.

Using a common operational picture (Figure 7), emergency personnel in the command center or in the field, managers, and decision makers can all share data and critical information and collaborate in real time regardless of where they are.

Situational awareness capabilities help identify potential man-made or natural threats

The following capabilities of IBM Intelligent Operations Center for Emergency Management help create situational awareness for the users:

- ▶ Alerts and incident management

Real-time event information is sent into IBM Intelligent Operations Center for Emergency Management as *alerts*. Examples of real-time event information are information from police dispatch that is generated from sources, including Computer Aided Dispatch (CAD) systems, GPS and sensors from critical infrastructure and other key resources, and surveillance or traffic cameras. These alerts can be categorized and prioritized automatically or triaged by users. The alerts are then displayed on the *Alert Inbox* of the user interface. Any significant alerts can be grouped and escalated to incidents in which additional information is acquired and any actions that are taken are tracked.

- ▶ Automatic alert pattern detection

Based on geospatial relationships, alerts can be tracked to detect automatically patterns of events (alerts) that happen over a period. When patterns are detected, an operator can be notified to investigate in more detail. This tool can be used to identify precursor activities that might indicate more serious and imminent threats that might not be obvious.

- ▶ Social media integration

Where access to social media data streams is available, social media feeds can be used to supplement systems data, and add context to situational awareness. Live data feeds can be displayed on the map canvas and social media records can also be searched by keywords that might be relevant to an incident. Subsequently, any relevant findings can be dragged from the map canvas into an incident log.

- ▶ Situational report and Common Operational Picture (COP) export

Situational reports can be generated on demand by using a user-defined document template. Data is pre-populated into the report and users can also populate the report with additional information (for example, a screen capture of the map canvas). Snapshots of the COP can also be exported as a static picture or be exported with associated data (for example, alerts, incidents, and assets) to standard formats that can be viewed by other tools, for example, Google Earth.

Analytic capabilities help stakeholders to manage situations and deploy resources in all phases of emergency management

The advanced analytic and reporting capabilities of IBM Intelligent Operations Center for Emergency Management enable stakeholders to better manage situations and deploy resources in all phases of emergency management. These capabilities include the following ones:

- ▶ Critical Infrastructure/Key Resources

Critical Infrastructure and Key Resources (CI/KR), such as hospitals, power stations, water filtration plants, fire stations, police stations, bridges and tunnels, and vehicles and vessels, are assets that are essential to the security of a city or region, public health and safety, economic vitality, and way of life. After these assets are identified, they can be tracked. Each asset has a set of properties that describes their operational states, their interdependencies on other assets (asset network), vulnerability and operational parameters, and other information. The asset data might also come from an existing Enterprise Asset Management (EAM) system, sensors, SCADA systems, or GPS systems.

- ▶ Key Performance Indicator (KPI)

A mission construct is used to track critical tasks and their readiness. Users can create and maintain the rules to govern the states of missions according to the statuses of CI/KR (assets). Each of the defined missions has a corresponding KPI and business monitor model. Mission status changes trigger an update to the corresponding KPI.

KPIs can help accomplish the following tasks:

- Summarize executive-level status for a single domain or across domains for emergency services readiness and for other city statuses, for example, citizen sentiments and city financials.
- Highlight potential issues and identify problems.
- Investigate further by drilling down into the KPI details.

Figure 8 on page 17 provides an example of the KPI dashboard showing trends.

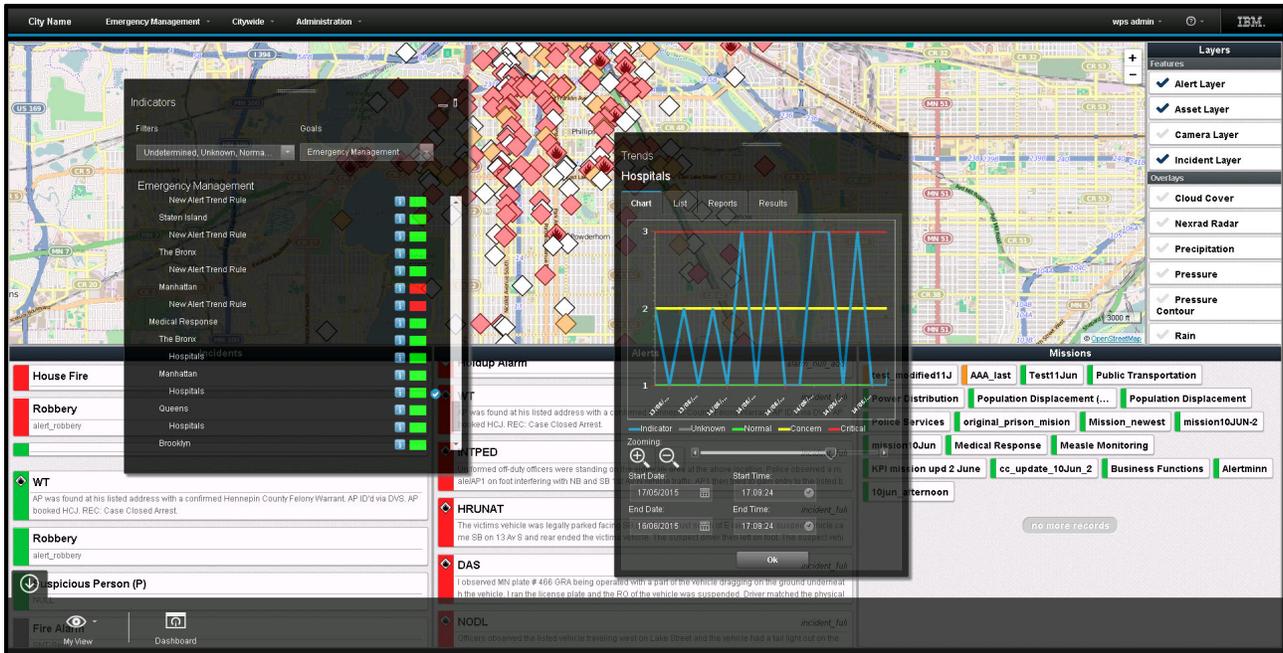


Figure 8 Example of KPI dashboard showing trends

- Consequence analysis

IBM Intelligent Operations Center for Emergency Management is an all-hazards solution. The consequence analysis capability enables a *what-if* mode to simulate the impact of various emergency or disaster events, such as bomb explosion, storm surge, and high wind. By running the consequence analysis tool, an emergency manager can evaluate the impact of such events by using the built-in simulation engine. The results of the consequence analysis can then be used to evaluate what type of response or SOPs should be initiated.

- Decision support tool

The decision support tool (DST) can be used to help emergency managers to better understand and optimize the recovery process. Recovery simulations can be run based on resource availability and positioning and recovery priorities. The resulting reports can then be used to evaluate whether the recovery plan meets the critical objectives and whether any additional resources are needed. This tool can be used during the planning stage to optimize the use and staging of resources based on the recovery priority of a community or an organization. This tool can also be used to generate an initial recovery plan after an emergency or disaster event happens.

- 3D Line of Sight Analysis

Using the 3D mapping capability, the Line of Sight Analysis tool allows an emergency manager to determine locations that are within a specific distance and are in a direct line of sight from any given point. This function can be used to determine how resources might be positioned and in the planning of transportation or evacuation routes for important events.

Collaboration tools facilitate cross-agency collaboration

The collaboration tools that are part of IBM Intelligent Operations Center for Emergency Management facilitate cross-agency collaboration in preparation or response to events and incidents. Collaboration tools include the following ones:

- ▶ Standard Operations Procedure (SOP)
IBM Intelligent Operations Center for Emergency Management supports the use of SOPs to enable emergency responders to coordinate successfully incident responses across disciplines and jurisdictions. SOPs can be augmented to align with predefined preparedness plans, regardless of how complex they are.
- ▶ White-boarding (the Tactical Data Layer (TDL))
The Tactical Data Layer (TDL) provides a real-time collaboration tool that allows users to create layers of markups, such as drawings, annotations, or comments by using the *map* as the canvas. Users can then share these markups with other users in the command center or field operators by using the mobile interface.

Integrating video analytics with emergency management solutions

With the increasing use of surveillance cameras by local governments, it becomes a challenge for city or public safety personnel to monitor effectively activities that are happening around a community. Observing even a single screen for long periods pushes human concentration to the limit. An operator can miss as much as 90% of the activity in a scene after 20 minutes.

Video analytic technology offers a more effective and proactive approach. IBM Intelligent Video Analytics can deliver automated video analysis and generate security alerts based on information that is collected from surveillance or traffic cameras. Real-time processing identifies user-defined alert conditions, giving public safety and emergency response teams the information they need to react swiftly and take appropriate action. By enhancing traditional video management solutions, video analytics decreases the time and risk that are associated with human review by providing timely alerts and reports of relevant activities and making the review of recorded video fast and accurate.

When preparing a public safety plan for community events, such as parades, concerts, or sporting events, video cameras are often used as part of the environment or facility monitoring tools. To ensure that the event is kept safe and secure, video analytic capabilities help security personnel to identify and respond to an issue as soon as possible in the following ways:

- ▶ Critical areas can be monitored, including VIP locations, perimeters, entrances, and exits.
- ▶ Alerts can be automatically generated for perimeter breaches, abandoned objects, and so on.
- ▶ Pre-planned procedures can start based on alerts to ensure a quick security response.

When a public safety crisis has occurred, video analytics can be used as an investigative and forensic tool in the following ways:

- ▶ Video footage from many different sources can be analyzed for specific parameters or patterns, such as vehicles (color, speed, and location) and people (clothing color and facial attributes).
- ▶ Key findings can be shared quickly to first responders through mobile technology.

IBM Solutions: Extending the value of integration

The broader IBM portfolio is rich with capabilities that enhance the ability of law enforcement and emergency managers to respond more readily to threats, quickly solve crimes, and respond effectively to urgent incidents. These additional functions include, but are not limited to, the following specialty functions that can be added as extensions to core public safety solutions:

- ▶ Weather data, through the IBM partnership with The Weather Company, can be combined with data from other sources to create more valuable actionable insights.
- ▶ Analytical modeling to identify crime patterns and discover hidden relationships that enable proactive policing.
- ▶ Identification of persons of interest through video analysis and facial recognition techniques.
- ▶ Management of enormous quantities of data (known as big data) through both hardware and software solutions.
- ▶ Case management and enhanced identity information for driving investigative efficiencies.

Each of these in-depth and focused solutions can be integrated with and implemented through the IBM public safety solutions. The wide range of additional functions enhances the value of foundation software solutions and strengthens the power of collaboration that is vital to public safety. Individual agency decisions regarding maximum value, minimal risk, and speedy implementation time determine the solution's unique extended configuration.

Summary

IBM public safety solutions provide unified support for the critical missions of the law enforcement and emergency and incident management communities by providing support for the following critical missions:

- ▶ **Plan and mitigate:** Plan, prepare, and test local and inter-jurisdictional resources and procedures to improve time-to-action, mitigate impact, and reduce loss. Determine trends and causal effects, forecast resource levels, and establish priorities.
- ▶ **Command:** Control the operations of multifaceted public safety situations, including communication and coordination between agencies. Provide real-time support to synchronize resources and manage the safety of first responders. Use analytic insights to drive immediate actions and meet objectives.
- ▶ **Respond:** Access cross-jurisdictional data at the tactical edge. Use situational awareness for quick and accurate responses to protect people and property and increase first responder safety. Initiate the short-term recovery process.
- ▶ **Investigate and Recover:** Restore critical systems and infrastructure to re-establish normal operations. Resolve identities, uncover hidden associations, and generate fresh leads for the timely resolution of on-going investigations.

i2 Integrated Law Enforcement offers a modular design and flexible deployment options. Law enforcement agencies can choose to deploy the entire pre-configured law enforcement solution or they can gradually deploy modules, prioritizing their most pressing business needs. This approach allows organizations to establish their ROI at the early stages of a project. Its modular design allows i2 Integrated Law Enforcement to integrate with any part of an organization's information structure.

i2 Integrated Law Enforcement is a proven solution that provides real value to law enforcement agencies around the world. IBM has a leadership position in public safety law enforcement solutions with a combined history of close to 40 years of forming trends in law enforcement information usage. IBM i2 public safety offerings include leading-edge technologies and deep-domain expertise and experience working with law enforcement agencies around the world. IBM i2 has been supporting law enforcement transformations for over 20 years.

IBM Intelligent Operations Center for Emergency Management is an incident and emergency management solution that can be used for daily operations and for emergency or crisis situations. It integrates and correlates many information sources to create a dynamic, geospatial, and common operating picture, and analytic-based insights that can help incident commanders and emergency managers understand and adapt to rapidly changing situations. By fusing knowledge of current operational status with powerful consequence analysis functions and presenting information in a near real-time geospatial framework, IBM Intelligent Operations Center for Emergency Management helps provide command and control functions to first responders, incident commanders, security leaders, various key stakeholders, and managing executives or government leaders.

Valuable to law enforcement and emergency management situational analysis, IBM Intelligent Video Analytics helps make it possible for an operator to manage concurrently dozens of cameras and use state-of-the-art analytics that can provide real-time alerts. These alerts can notify an operator of a potential incident. Extensive rapid forensic searches can be used to help locate persons or vehicles of interest and to gain insights into historical trends to help optimize resource utilization.

Other resources for more information

This section includes related information that is organized by specific domains.

Public safety

Public Safety for Law Enforcement and Emergency Management web page:

<http://ibm.com/publicsafety>

Law enforcement

- ▶ i2 Integrated Law Enforcement product website:
<http://www-03.ibm.com/software/products/en/integrated-law-enforcement>
- ▶ Proactive Policing through IBM Integrated Law Enforcement:
<https://www.youtube.com/watch?v=nDw01-FXRkM>
- ▶ Predictive Analytics: Using Real-Time Data to help transform Public Safety:
<https://www.youtube.com/watch?v=SwKETc0mEC8>
- ▶ IBM Big Data & Analytics Technology Helps Durham Police Reduce Crime:
http://youtu.be/sj_ItgsvEUo
- ▶ Mesa, Arizona PD - Smarter Policing with IBM i2 COPLINK leads to a safer Mesa:
http://www.youtube.com/watch?v=RFm1Sr_PX-Y

Emergency Management

- ▶ The Department of Science & Technology and IBM Collaborate to Build an Intelligent Operations Center:
<https://www.youtube.com/watch?v=TSsoJ1u1UBw&feature=youtu.be>
- ▶ 21st Century Emergency Management:
https://www14.software.ibm.com/webapp/iwm/web/signup.do?source=swg-smartercom_medium&S_PKG=ov22763&S_TACT=103HX06W&dynform=7901&lang=en_US
- ▶ IBM Intelligent Operations Center for Emergency Management:
<http://www-03.ibm.com/software/products/en/ioc-emergency-management>

Video Analytics

- ▶ IBM Intelligent Video Analytics web page:
<http://www-03.ibm.com/software/products/en/intelligent-video-analytics>
- ▶ *Enhancing a City's Ability to Plan, Protect and Manage with Intelligent Video Analytics*, found at:
https://www14.software.ibm.com/webapp/iwm/web/signup.do?source=swg-smartercom_medium&S_PKG=ov19395&S_TACT=101K83XW&dynform=4886&lang=en_US

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