

PREDICTING CRIME & KEEPING CITIES SAFE

WHY THE INTERNET OF THINGS MATTERS

IoT data, smart software and advanced analytics can give public safety officials powerful insights into possible threats ahead of time, and better tools to mount a response.

When New York, London and Madrid fell victim to terrorist attacks, we all learned the hard way what can happen when a terrorist group is well coordinated, but first responders are left scrambling. Rescue efforts are hindered, and investigations are confused and delayed, when even the most highly trained and competent police, firefighters, medical emergency teams and transit authorities all rush in at the same time with no way to organize a unified response. Smaller cities and rural areas can experience similar disorder as sheriffs, state and national police try to defuse an active shooter situation and keep the public safe from crimes and emergencies that strike when we least expect them.

Enhanced equipment, smarter software platforms and advanced analytics are helping to shift the advantage toward law enforcement. New software can help coordinate existing communication and control systems without having to rip out and replace installed equipment. Machine-to-machine communication can step in as an early warning system and give first responders detailed information about the scene of an emergency before they arrive—keeping officers, first responders and the public safer. Better surveillance equipment means officials can have more eyes and ears on the street to see what is unfolding in real time.

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All of these advances make a big difference in coordinating reactions to major events. But they also help with everyday public safety incidents, such as rerouting traffic during rush hour when an accident is blocking the highway—before the road gets backed up for hours. Surveillance cameras, for example, have been part of the landscape for decades—on city streets, in building lobbies, banks, shops and schools—but now video from many different sources can be fed into intelligent systems, shared across many platforms to be viewed in one place, analyzed for anomalies and controlled remotely. The newest generation of surveillance equipment will have analytics embedded in it, so there is no need to pull video footage back to a central location to process it, says Darrin Lipscomb, CTO and senior director, Public Safety and Visualization at Hitachi, and cofounder of Avrio and Pantascene, two companies that developed this crime-monitoring technology. Both were acquired by Hitachi Data

Systems in 2014 and are now part of its IoT business unit.

“The video camera is like an eye,” he says. “The platform we are working on is like putting a brain on the dumb camera that’s sitting out there. Video analytics have been around for years, but with advances in networking and processing power, we can do certain things via the cloud that we couldn’t do before,” he explains.

Consider the software platform that controls a video surveillance system. It is now possible to upload a picture of a missing child or a criminal and propagate that information to all of the cameras and other devices on the platform. Face-matching capabilities can send out an instant alert if there is a match. “The ability to have this sort of machine-to-machine communication will be a key enabler of video analytics,” explains Lipscomb. “I don’t need to bring all that video back to process it. I can process it at the edge.”

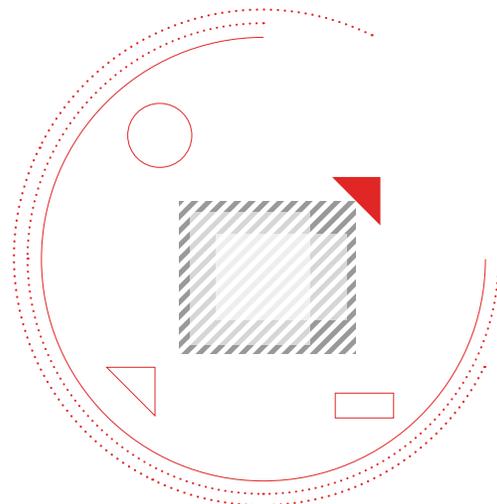


HOW IT WORKS

Hitachi Visualization Platform is the core technology of the solution. The platform starts with high-definition video cameras with analytics built in. Data comes into the system via intelligent gateways that can bring in video feeds from stores, schools, hotels or any location that is willing to share it. Other sensors, such as gunshot detectors or fire alarms, can be connected; even social media data can be fed into the system—anything that can be used to improve situational awareness and keep people safe.

The sensors and cameras are mounted around the city in shiny, white-domed pods that resemble the robot named EVE in the Pixar film *WALL-E*. Each pod can have a set of static cameras or one camera that can rotate automatically or at the command of someone remotely, giving law enforcement, traffic management and other public safety officials eyes and ears at the street level, even if they are miles away. The pods can also determine the location of gunfire using acoustic and optical sensors. They can be equipped with high-definition license-plate recognition readers, and even radioactive isotope detection.

Users can pull up the information on a single screen, as events are unfolding. Hitachi Visualization Suite (HVS) integrates data feeds and organizes everything on a single map, together with information from public safety systems, including event data, such as 911 calls and dispatch information. With more police departments requiring that law enforcement officers wear body cameras, the amount of video being fed into the central control will increase exponentially. No human could monitor so many moving parts at once. Software aggregates the data and organizes it intuitively. The software can even be set to tap public source information, such as social media and online news, to search and provide rapid correlations, anomalies and insights.



SAFER AND SMARTER

Watching events unfold in real time in a single view feels like stepping into the future. But police departments that deploy these public safety systems are usually motivated by another reason: the need to cut costs and use resources more efficiently—even in small cities.

The City of Moreno Valley, one of California's fastest-growing cities, was looking for an innovative way to enhance the effectiveness of the city's police force during a period of budget cuts, says

platform rivaling those of much larger cities. The platform is saving police time already, says Hargis. "The system allows us to know if a call about a man with a gun is a real threat or if it's a guy with a stick," he says. "We've also had unanticipated benefits, such as greater situational awareness and clarity for officers before they do go into the field or arrive at a scene. Also, they have been able to generate more leads in a case where we might not have any witnesses. They can go back to the camera footage

The platform is "a force multiplier with the police department. We are solving problems we didn't foresee being able to solve."

— **Steve Hargis**
Technology Services Division Manager
City of Moreno Valley, California

Steve Hargis, technology services division manager for the city of 200,000 residents. "But the technical complexity of capturing high-definition video from anywhere in a geographically diverse city and streaming it back to the police department viewing room so that it is stored and available to multiple users, including citizens, makes for a very sophisticated challenge," he explains.

Hargis has been working with Hitachi to set up cameras and the visualization tools to deploy a community-wide video

and take a look at what happened," says Hargis.

The platform is "a force multiplier with the police department," he says. "We are solving problems we didn't foresee being able to solve." Pods installed in public parks are equipped with speakers, for example, that allow officials to speak directly with perpetrators or victims if cameras detect a problem. The city reports that more families are visiting public parks since the pods were installed.

PREDICTING CRIME

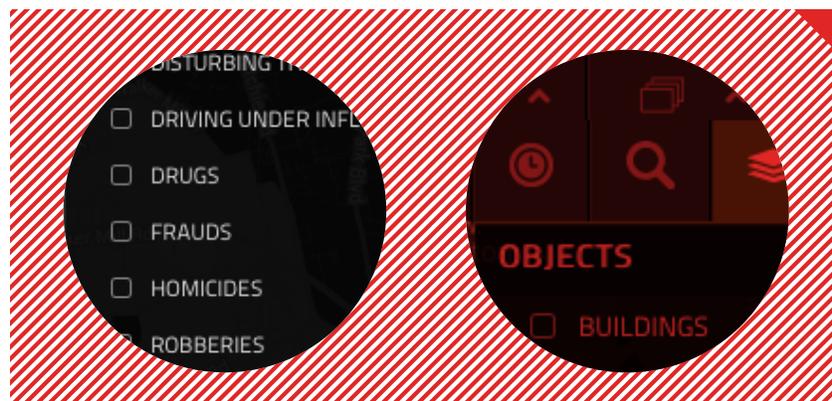
With advanced analytics, the potential to anticipate threats to public safety—whether through natural events or criminal activity—will become even more refined and reliable. For instance, the weather is a major force in public safety, but does it have any effect on crime? Can social media chatter give clues to future gang activity? Which factors are likely to cause—or forestall—a spike in certain crimes?

Hitachi is providing the tools to help find out with Hitachi Visualization Predictive Crime Analytics, which uses regression analysis to look at a broad range of variables that might correlate to help predict a future crime. Unlike other techniques, such as hot-spot mapping of past activity, the software analyzes past threats in context to identify underlying risk factors, and makes predictions about where, when and why

threats are likely to be elevated or diminished. The result: a better understanding of the risk factors associated with the threat of a specific type of crime, along with the likelihood that it will happen in a given area, within a given time range.

In theory, users of the software module will be able to identify potential locations and targets for police intervention to reduce the crime threat level and respond proactively to help prevent crime before it has a chance to occur. The technology is being tested now in a handful of U.S. cities.

Advanced analytics in public safety can help officials stay ahead of crime and be better prepared to launch a smart, appropriate and coordinated response when necessary—ultimately keeping streets safer for everyone.



NOT JUST FOR CRIME— CARS, BOATS AND PARKING METERS

In Moreno Valley, data feeds are integrated with two existing technology networks to create a city-wide resource. Live video footage from parks and intersections is streamed to the city's Transportation Management Center. "Hitachi Visualization allows us to monitor traffic in real time as we adjust the signal timing. Now we can see exactly what's happening and make any changes on the fly," details Eric Lewis, city traffic engineer for the City of Moreno Valley. This means operators can see a collision as it occurs, assess the situation, request emergency services response, and have a record of events if there is a question of fault.

Not every citizen wants a camera on every corner. The Austin Police Department is taking a strategic approach with street cameras, installing surveillance devices in a crime-dense area known as Rundberg and in two of Austin's downtown entertainment districts. The project started with 41 cameras, but the department has since gained viewing access to approximately 1,000 cameras across the city, including school districts, who have agreed to let the police department have access to the video feeds relevant to public security.

Advances in mobile networks and cloud computing are changing the management of one of the oldest forms of transportation: ferry service. Boats and terminals on New York City's waterways have had cameras for years, but there was no cohesive way to view video in real time, and cameras took a beating from temperature swings and water spray. What's more, finding and keeping IP or phone connectivity while aboard moving vessels has long been an issue.

The NY Waterway system incorporates various manufacturers' technologies into Hitachi's single interface. HVS enables camera video feeds to be transmitted through a wireless mesh network that uses antennas on moving vessels and on shore to help communicate data to the control system for real-time accessibility. The video feeds are integrated on a single map, along with data from sensors and public safety systems. The analytics of HVS can tap public information, such as social media and online news, to search and provide instant correlations or detect anomalies.



Hitachi demo heat map showing concentrations of thefts in Washington, D.C. area

The technology behind these systems can tie into other smart city initiatives as well, says Justin Bean, director of smart city solutions marketing at Hitachi Data Systems. “Imagine being able to pull up a map that shows where all the busses, trains and even garbage trucks are in a city—along with access to the on-board cameras so that emergencies can be responded to quickly and effectively,” says Bean. Data from the transit payment units or trash cans could be used to optimize routes based on ridership or how full trash cans are. “Or, imagine being

able to incorporate all smart parking, environmental and road sensors into a single solution, so city administrators could optimize everything from parking management to sustainability initiatives, or even predict and minimize traffic jams,” he adds. “The Internet of Things can provide us with a wealth of data about everything in a city, but what really matters is what we do with the data. Using IoT technology to improve safety, transportation and sustainability—this is what we call the Internet of Things *That Matter.*”

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