Always aware
Advancing policing in the twenty-first century with smart data
Be passionate and bold.
Always keep learning. You stop doing useful things if you don’t learn.

Satya Nadella
CEO, Microsoft
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Law enforcement agencies today have thousands of information sources—such as body cameras, computer-aided dispatch (CAD), record management systems (RMS), and automated license plate recognition (ALPR)—with the potential to provide rich insights, yet their data is often unstructured and lacks the necessary context and connections.

The challenge is discerning what data is truly important and how to surface, connect, and apply it appropriately to enhance situational intelligence around an incident. For example, when responding to an emergency, having greater understanding of any prior calls from the residence may influence your response. From the enhanced computational power of the cloud to the sophisticated machine learning algorithms that underpin artificial intelligence, digital technology offers solutions that greatly advance law enforcement’s ability to make use of its data.

“There is a need for police to evolve if they are to succeed in connecting with communities and keeping people safe in the twenty-first century.”

James P. O’Neil
Commissioner, NYC Police Department
The weight of the uniform

Globally, the demands on law enforcement are increasing due to new threats from terrorism and increasingly sophisticated criminals. Stretched budgets mean law enforcement agencies are being asked to do more with less every day. Increasingly public discussions and scrutiny through channels such as social media add complexity to an already challenging assignment. With all these pressures, the deceptively simple mission of law enforcement—"to serve and protect"—has never been more daunting.

I’m not going to get more money. I’m not going to get more cops. I have to be better at using what I have, and that’s what predictive policing is about.

Charlie Beck
Police Chief, LAPD
"I’m proud about how we changed the entire culture of this institution. There’s been a change in how the citizens see us, how the judges feel, how the people who work in the office and serve the population feel. The negative feelings of the past have converted into positive."

Rosely Castilho
CIO, State Court of Justice of Sao Paulo, Brazil

Protecting privacy

However, technology isn’t isolated from the public controversies encircling law enforcement. Primary among these are valid privacy concerns over how, when, and where sensors should be employed to expand the reach of policing.

There is no “digital bill of rights” that would clearly allay privacy concerns or the risk of improper data use. In part, this is because the potential of data has only recently begun to be realized. Unfortunately, courts are slow to react to this rapidly evolving technology landscape, leaving citizens and law enforcement unsure about how data can be legally collected, analyzed, stored, and shared. As advanced data collection and use becomes more integrated into policing, many of these questions will have to be answered. Societies will choose to strike the balance between values such as privacy, transparency, and safety differently depending on environmental, historical, and cultural factors, among other concerns.

Tech joins the force

While there are no easy solutions to the issues law enforcement is facing, technology can significantly increase the efficiency and reach of overtaxed police forces. It does this by improving real-time situational intelligence and outcomes, increasing trust and collaboration with citizens, and enhancing pre- and post-incident analysis. In addition, it can also provide an unfiltered version of the truth.
Putting data on the beat

While most law enforcement agencies operate in a fog of big data, it doesn’t have to be this way. There are approaches to improving data integration and analytics that substantially enhance policing.

Broadly these initiatives fall into three categories:

1. Knowing before
2. Knowing in the moment
3. Knowing after
**Knowing in the moment**

Sensors coupled with real-time data ingestion and analysis (performed in a secure cloud environment) can enhance situational intelligence. Combining this data with geo-spatial information allows first responders to correlate and execute an appropriate response within the critical first minutes of an incident. The relevant technologies include:

**Connected devices.** Synchronized feeds from CAD; RMS; body cameras and in-vehicle camera systems; CCTV; (CBRN); (ALPR); acoustic listening devices; and open-source intelligence (OSINT) all help to capture a detailed picture of the event.

**Geo-spatial awareness.** Event information, as well as objects of potential interest nearby, is mapped, providing an enhanced view of the environment. For example, additional sensors are monitored and nearby schools and businesses identified, along with egress routes, traffic patterns, and hospitals.

**Other relevant information and histories.** By using address-specific identity and licensing data, past calls for service, and other active calls in the area, pertinent information about the residence (such as any weapons or chemicals on the premises) can be instantly surfaced. In the event of fire, chemical, or environmental disasters, weather information can be overlaid to help predict at-risk areas.

**Knowing before**

Hindsight, as they say, is 20/20. But a retrospective view only gets you so far in terms of applicable intelligence. This is why machine learning offers such promise—because it offers the possibility of actual foresight in real-time situations.

Using predictive, cloud-based analytics, it is possible to identify subtle patterns in data streams that lead to advanced awareness of crimes about to be committed or emergencies about to occur. In this way, the sort of intuition that a seasoned police officer has can be extended to provide an always-on view, thereby greatly multiplying and optimizing law enforcement resources. For example, activities that individually might qualify as normal but collectively trigger suspicion or flag an increased risk can be identified using machine learning algorithms—such as shifts in travel or purchase patterns, or social media activity.

In addition, some police forces are moving beyond traditional approaches of predicting crime based on historical activity to using underlying features of an environment as indicators for future criminal behavior. For example, features such as the proximity of night clubs, fast-food restaurants, bars, or liquor stores can all be added to a model that more accurately predicts crime in an area.
At 9:16 P.M., a 911 call reports an active shooter. The call is geo-located to a shopping center. At 9:17 P.M., another 911 call reports a shooter from a nearby location. The system correlates the two calls into one view and begins showing resources assigned while mapping nearby public areas of interest (schools, hospitals, train stations, malls, parks).

Officers responding have live access to an up-to-the-second information view of the evolving incident. As 911 calls continue coming in, additional information (victims, suspect description, and so forth) can be added to the view. CCTV cameras and ALPRs are incorporated to help identify suspicious vehicles and persons. Overlaid traffic and area maps help define perimeters as the incident evolves.

At 9:21 P.M., additional reports indicate that a pipe bomb is found outside a building. The dispatch operator overlays a bomb zone that includes a lethal and potential danger zone based on the type of bomb. Responding officers leverage this information to increase on-scene safety. At 9:22 P.M., a suspect is reported fleeing in a car two minutes earlier with a partial license plate of “KBH.” The dispatch operator overlays a map showing a 2-minute drive-time analysis, and ALPRs in the area report a potential match. Using directional and geo-location coordinates, the system calculates the future position and alerts nearby officers of the fastest route to intercept the suspect.
Knowing after

Reconstructing events afterwards can be a time-consuming process, with the potential to overlook key evidence.

Highly integrated data systems can significantly reduce the effort and help investigators discover additional evidence buried across disparate data pools. In the most advanced cases, machine learning can draw correlations and develop promising leads that investigators might have missed otherwise. In addition, easily extrapolated data can simplify tasks such as annual reporting, grant applications, and trainings.

Whether in the context of a bank robbery, a suspicious bag in an airport, or an incident at a train station, being able to quickly ingest and analyze data for meaningful insights and potential patterns using machine learning can accelerate the capture of known individuals and contribute to a reduction in crime. By iterating advanced algorithms and connected sensor systems over historical experiences, law enforcement can strengthen its ability to prevent, prepare, respond, and recover when similar incidents occur in the future.
By working together with the private sector, law enforcement can continue to keep communities safe. And when communities are safe, they thrive.

Behind every badge

Although technology can further the mission of law enforcement, it will never replace the human intuition, experience, and action that officers bring to their work each day.

Law enforcement agents and society complement technology with their human wisdom, values, and experience around what can be collected, when it can be used, and how it can be shared. Police forces of the twenty-first century will necessarily struggle to find the appropriate balance as they navigate new and uncharted areas.

Moreover, each community, culture, and geography will require differing human-centered calculations to be integrated into the technology. Ultimately, however, technology will serve as a force-multiplier, furthering the mission and augmenting the abilities of law enforcement.

Walter McNeil
President, International Association of Chiefs of Police
Building tomorrow’s street smarts

It’s 8:37 P.M. on a wet, cloudy evening and a police officer on his beat falls in behind two men walking down a street. His experience tells him that the man on the right is anxious because of the perspiration on his neck and the way he rubs his fingers together rapidly. The other man’s gait is off, and the slight bulge in the back of his pants along with his oddly draped shirt are giveaways to the gun hidden in his waistband. The officer knows that nearby payday lenders and pawn shops hold large amounts of cash, making them potential targets. He tails the men for several blocks until the men separate, clearly abandoning whatever plan they had due to his presence.

Now imagine, instead, that the police officer is three blocks away when these men walk through an intersection where a CCTV camera is capturing video.

Today, the camera wouldn’t have the police officer’s intuition about the (potential) situation that is about to unfold. In all but a handful of precincts it wouldn’t be connected to a wider network of sensors—such that a meaningful picture could be developed if an incident occurred. The data would only be of limited use afterwards, as officers try to piece together evidence.

Now let’s fast-forward to tomorrow.

The same two men walk by data-capturing sensors, and facial recognition identifies one of them as a known person, which then results in the sending of an alert to officers in the area. Data from other nearby sensors (such as additional CCTVs, acoustic listening devices, and ALPRs), combined with nearby incident and address information, is recorded and run through an algorithm that pieces together a heightened threat score, similar in effect to the police officer’s intuition. The police officer three blocks over gets an alert on his smartphone that includes all the currently known information as well as live feeds from the surrounding sensors and the best route to follow to intercept the men. He responds to the potential threat and tails the men for several blocks until the men separate, clearly abandoning whatever plan they have due to his presence.
Big data and open data
Manage data wisely to drive productivity, increase mobility, and innovate new digital services across and between multiple departments and agencies to a broader set of taxpayers and stakeholders.

Security
Achieve a balance of security and citizen empowerment, with effective security controls across identity, device, data, apps, and infrastructure. Protect data against unauthorized access, detect attacks and breaches, and respond and adapt to prevent them from happening again.

Analytics, machine learning, artificial intelligence
Bring greater wisdom to analysis and service delivery with on-demand cloud-based compute power. Enable a digitized redesign of existing processes to deliver new, more flexible services.

Internet of Things
Connect infrastructures to make emergency systems more efficient, and reduce police and emergency response times across devices, cloud, analytics, and back-end systems.

The promise of technology
With flexible, integrated, and trustworthy solutions, Microsoft enables digital transformation for public safety organizations, helping them make more informed decisions and take more meaningful actions to increase the safety of citizens and the security of the communities they serve.

Thoughtfully applied technology can provide law enforcement officers and commanders with instant access to relevant information and the ability to collaborate—within their own agencies and partner organizations—securely and effectively.
What’s next?

No matter where you are on your digital transformation roadmap, Microsoft Enterprise Services can help.

Empower your service personnel
Create an agile, mobile, always connected work environment that improves operational productivity and collaboration.

Optimize decisions for greater impact
Connect people to the information they need in real time.

Engage the citizens you protect
Deliver a connected and personalized customer service experience.

Transform public safety and justice services
Innovate quickly to compete in changing markets by providing insightful analytics and more efficient ways to connect every aspect of your organization and the customer experience.

Credits

Many subject-matter experts from various groups at Microsoft contributed to the conceptualization and articulation of the story contained in this document.

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