

A SMARTER APPROACH TO PUBLIC SAFETY



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Mike Reade

Public Safety Specialist, IBM Smarter Cities Team



INTRODUCTION

In partnership with IBM®, GovLoop is conducting a four-part guide series. Our reports will emphasize how big data has transformed government agencies and help you set a road map for adopting big data solutions. Here's what to expect in each chapter of our report.

Chapter 1: Leveraging Your Most Critical Asset: Data

In this section, we provided an overview of the current state of big data and the opportunity that big data analysis presents for government. Leveraging insights from the GovLoop community, we explored how agencies could capitalize on their most important asset: data.

Chapter 2: Big Data's Role in Countering Fraud

The second section of this report will explore how agencies can leverage data to improve fraud prevention methods. Growing use of the web for government transactions opens more areas to fraud. But with the proper tools and solutions, agencies can help combat fraud before it happens and be more efficient in service delivery.

IN THIS GUIDE:

Chapter 3: Improving the Safety of Our Communities

Agencies are looking at new ways to combat threats and keep communities safe. This means understanding how data can empower stronger insights and help prevent crime. With the use of analytics and robust data applications, agencies can improve the safety and economic vitality of their communities.

COMING SOON:

Chapter 4: How Data Analysis Powers Smarter Care

Governments are looking for ways to improve how they deliver services to citizens and take a more holistic view of an individual. This requires a thorough understanding of the role of data. This section will explore how agencies are taking innovative approaches to using data to improve service delivery and support communities of care.

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A SMARTER APPROACH TO PUBLIC SAFETY



In our first two chapters, we outlined the [benefits of big data](#) and discussed how analytics can help [counter waste, fraud and abuse](#). In this chapter, we look at how public safety organizations can benefit from a robust analytics strategy. Specifically we explore:

- Case studies from Miami-Dade County, New York City and Lancaster, California police departments.
- Expert insights from IBM public safety subject matter experts.
- Seven benefits of using analytics to fight crime.

With emerging analytic solutions and access to more information than ever before, public safety organizations are now able to use data as a means to transform the way they identify, respond and mitigate criminal activity.

“Agencies simply cannot afford to put more officers on the street. They need to make improved decisions and allocate resources more effectively. Leveraging crime analytics is part of the solution in a time of tight budgets and resources,” said Mike Reade, IBM Integrated Smarter Solutions Team in the IBM and GovLoop report, [Building Safer Communities in the Digital Age](#). Existing use cases for crime analytics include:

1. **Curbing recidivism trends** by understanding and focusing on serious and prolific offenders.
2. **Anticipating and preventing** crime before it happens.
3. **Improving situational awareness** for officers through social media analytics, or video analytics.
4. **Gaining real-time insights** through GIS technology and geo-tagged crime data to deliver knowledge on surrounding locations and identify potential escape routes.
5. **Optimizing resource deployment** and measure outcomes of decisions and crime-fighting initiatives.

By deploying new analytics solutions, agencies can transform the way they protect communities. Our report explores how.

TRANSFORMING PUBLIC SAFETY WITH ANALYTICS



The job of a public safety employee never ends. First responders don't have the luxury of clocking out at 5 p.m. Events can happen at any given hour, and officers must always be alert and ready.

And now, with new technology and changes in society's norms, security professionals are faced with diverse and emerging security obstacles. Anything from a "flash mob" – where a large group of people spontaneously break out in a public space – to a robbery at a local corner store, has the potential to endanger myriad individuals.

Fortunately, there's now data available to help public safety employees track events and potential dangers. Security cameras, social media and real-time video feeds provide a mammoth amount of data that provide police, fire and medical responders with valuable information that could help keep the public safe.

However, nearly 80 percent of that data is unstructured, making it difficult to analyze and put to proper use. Failing to use this data effectively misses an important opportunity for security professionals. Without analyzing unstructured data, officials risk missing important details and may fail to respond properly to threats.

That's why IBM argues that it's time to take a smarter approach to public safety.

In the IBM report, [The Value of Smarter Public Safety and Security](#), IBM offers a comprehensive, hierarchical approach to data analysis to arm public safety employees with the information they need to rapidly and properly respond to threats. This strategy includes five competencies that act as layers on a pyramid – each level is productive on its own, but is most beneficial when employed alongside the other pieces.

Here is IBM's 5-tiered approach to public safety:

1. **Access to relevant data:** This is the first step to a comprehensive safety strategy. Identify existing data and make sure it is accessible and readable. Agencies should focus on collating and streamlining data between departments and transferring data into digital formats.
2. **Integrated, trusted information:** Next, don't be afraid to think outside the box with your data sources. "Integrate content from disparate sources and systems to create a trusted information base," IBM recommends. By bringing in all types of data from diverse sources, you can take your analysis to a new level and reveals unique insights.
3. **Responder operational insight:** Having the proper information is key, but it's not useful if it's not in the hands of those on the frontlines. When you integrate technology, you also promote more accurate responder decisions, based on data. IBM recommends automated reporting systems to enable personnel to spend more time in the community, and less time at the desk.
4. **Proactive planning and decision-making:** Opening your agency's data encourages community-wide and proactive decision-making. "Combined with tools and techniques that can project trends and predict outcomes," said IBM, "an agency can be more effective in strategic planning, allocating resources and responding to incidents."
5. **Unified threat assessment and response:** Finally, bring all of the data and resources into a centralized location; this will pool data across departments to develop a comprehensive preparedness strategy. IBM recommends establishing a command center to manage all of the data and create full situational awareness.

Employing these competencies can streamline and strengthen public safety agencies' operations. With an overwhelming amount of data informing response and preparedness efforts, it's important that public safety agencies employ a comprehensive strategy. IBM's approach streamlines the analysis process and arms public safety employees with the tools, tactics and intelligence they need to help keep citizens safe.



CRIME ANALYTICS IN ACTION: MIAMI-DADE COUNTY POLICE DEPARTMENT



Miami-Dade County is Florida's largest county, with 2.5 million citizens. The county is also the seventh largest in the United States. As is the case with many counties in Florida, tourism is one of the largest economic drivers. In order to promote tourism, officials have placed an emphasis on public safety to maintain the economic viability of their community.

"With tourists spending nearly US \$20 billion every year and generating nearly a third of Florida's sales taxes, it's hard to overstate the importance of tourism to the region's economy. So while few of the county's police officers would likely list economic development in their job description, nearly all grasp the vital link between safe streets and the region's tourist-driven prosperity," notes the IBM report from the Smarter Planet Leadership Series, [Miami-Dade Police Department: New patterns offer breakthroughs for cold cases](#).

To improve the safety of their community, public safety officials developed the [Blue PALMS](#) (Predictive Analytics Lead Modeling Software) program. Blue PALMS uses advanced analytics to generate a list of potential suspects based on match probability. This list is then delivered to investigators to narrow their focus from thousands of known offenders to those with the highest probability of having committed the crime. Blue PALMS provides stronger leads to investigators by leveraging historical crime patterns and offender modus operandi from huge volumes of data.

Using advanced analytics, Miami-Dade Police is combating robbery cases and reducing street crime. Blue PALMS allows officials to analyze cold robbery cases against historical data to help identify leads and discover previously unknown insights to help in investigations.

Below we briefly break down how Blue PALMS works:

- Details of the crime are captured by detectives.
- Captured information is placed into Blue PALMS model by staff crime analysts.
- Blue PALMS makes connections with existing historical data, drawing from a case file database.
- The historical data shows distinct crime patterns from criminals.
- Blue PALMS uses an algorithm to generate a list of potential suspects based on match probability and is delivered to investigators.

Blue PALMS is allowing officials to focus on reducing incidents of recidivism, improve leads in cases and leverage data in new, efficient ways to combat crimes within the county. Additionally, the police department has witnessed many benefits in time saved around investigations, employee efficiency and improved allocation of resources. The IBM report notes the department achieved a 73 percent "hit rate" in identifying suspects when the model was tested on 40 solved cases.

With the success of Blue PALMS, the agency has been able to reduce crime, and support the tourism industry in the county.

THE PUBLIC SAFETY JOURNEY INTO ANALYTICS: NYPD CASE STUDY



The New York Police Department is the largest municipal police force in the U.S., with a uniformed strength of approximately 34,500 officers. Responsible for ensuring the safety of over 8 million residents, the agency is constantly looking for ways to effectively utilize its resources, information and law enforcement processes.

Good police work depends on good information. An effective police force relies on solid and timely information to prevent, respond and prevent crime. The NYPD has been leading the charge in utilizing data-driven law enforcement tactics to produce dramatic reductions in crime incidence. In the last several years, the NYPD has been using advanced data storage technology, data analytics, GIS and visualization tools to innovate their law enforcement strategies and improve public safety.

The NYPD public safety journey into analytics begins with understanding the flow of crime data into the police system. The law enforcement system generates diverse streams of information on a crime from the point of detection, throughout the investigation up to and including the closure of the case. These streams of information are generated from the initial 911 call, the dispatch of police, ongoing reporting throughout investigation and various other perspectives of the incident.

But to see an entire crime story, detectives and investigators needed a way to pull together information streams, which were previously stored in departmentalized silos.

The combination of technology and process implementation formed an effective solution for the NYPD to obtain a timely and full picture of crime incidents. Below is a technology breakdown of how IBM aided the NYPD in utilizing analytics in public safety.

DATA STORAGE

The NYPD Crime Information Warehouse (CIW) is the foundation of the organization's analytic capabilities. The CIW pulls data from various standalone systems, transforms it into a consistent format and consolidates the data into one place. Prior to CIW, the NYPD struggled to share data because its individual police departments maintained their own systems of data collection and storage. The CIW provides a single-point access for officers to see integrated crime information in real-time, enabling officers to easily pinpoint the key information needed to resolve cases faster.

ANALYTICS

Having a single data repository for crime data empowers the NYPD to do far more with its information inventory. The CIW coupled with business intelligence software allows officers to spot emerging trends and make informed enforcement decisions for crime prevention. Analytic capabilities allow the NYPD to examine crime across a broad size spectrum—from individual cases to bigger picture, citywide crime trends.

GIS MAPPING AND VISUALIZATION

The police force utilizes geographic information systems (GIS) mapping and visualization tools to further capitalize on the CIW and analytic capabilities. These tools enable the force to visually examine aggregated crime data across the city or in a certain neighborhood. Officers can then plan their enforcement activities proactively to prevent crime where it's most likely to recur.

The NYPD exemplifies how the combination of the right technology and process design can have transformative effects on business as usual. Now, analytics officers are able to solidify gut feelings and hunches based on robust integrated information, patterns and statistics.



MEASURING THE ROI OF CRIME ANALYTICS: CASE STUDY FROM LANCASTER, CALIFORNIA



Cities rely on sound leadership and passionate public servants to improve the quality of life for citizens. In order to create a vibrant and healthy citizenry, organizations need to be smart as they deal with shrinking budgets to build sustainable economic growth for communities. This means cities need to adopt tools to proactively analyze data to improve decision-making.

As cities continue to implement transformative technology, agencies must accurately measure the return on investment (ROI) of technology adoption. The City of Lancaster is a great example of the benefits of leveraging analytics in the digital age. IBM recently conducted a study measuring the ROI of the City of Lancaster's predictive analytics program.

The City of Lancaster, California, was incorporated in 1977 and is part of Los Angeles County. The city currently has a population of over 150,000. Through a contractual arrangement, the Los Angeles County Police Department provides a fixed number of personnel to cover Lancaster as well as 40 other cities.

In 2008, Lancaster was in the midst of intense budgetary pressures and realized they needed a new way to protect the community and efficiently allocate resources. The City of Lancaster had an annual police budget of \$24 million, and the prospects of additional funding were highly unlikely.

The city ultimately hired James Kobolt as the first Senior Criminal Justice Analyst in January of 2008. Kobolt purchased IBM SPSS and ArcGIS licenses to explore how to fight crime in a new way. Lancaster public safety officers estimated that roughly 35 percent of their time was spent on reducing Part I crimes, which are defined as murder and nonnegligent homicide, forcible rape, robbery, aggravated assault, burglary, vehicle theft, larceny and arson. The IBM SPSS and ArcGIS solution would be targeted to specifically fight crime using data.

By 2010, Kobolt had created predictive data models that accurately showed crime patterns. Esri maps showed heat maps and color codes to show crime throughout the city. These maps have provided the City of Lancaster with new insights and improved decisions as to how resources are allocated.

The results were staggering, as the city witnessed a 37% decrease in crime from their benchmark set in 2007. IBM also worked with Nucleus Research to understand the ROI for Lancaster County, benefits from the study included:

- Lancaster saw a 35 percent reduction in Part I crimes in 2010 and a 42 percent reduction in 2011 compared to the 2007 benchmark rate

- Over \$800,000 savings in the partial year of 2010 when predictive analytics were implemented
- By using predictive and geographic analytics, Lancaster was able to gain over a million dollars in productivity on a year-over-year basis.

The IBM case study also highlighted some initial costs Lancaster incurred to adopt a predictive analytics solution. The project costs included:

- **Software:** The case study identified that the majority of the startup cost consisted of the original SPSS and ArcGIS licenses.
- **Hardware:** Minor hardware costs were incurred due to purchasing SPSS and ArcGIS. The costs were minimal as they were able to host this solution on existing services.
- **Training:** Costs related to having users learn SPSS and ArcGIS software, and how to input information correctly.
- **On Going Support:** The city hired a data scientist as a consultant to clean data and structure data correctly for SPSS and ArcGIS feeds. Ongoing support costs have been minimal and primarily consist of software assurance and maintenance costs.

One important note from the case study is: "Since ongoing reports are automated, the current support for this software takes up less than an hour per month, which allows the City of Lancaster to spend less time finding the correct information and more time to translate these maps and trends into effective strategies to fight crime."

The ROI was calculated to be 1301%, but to me, the more impressive number was the payback period was only 1 year. In other words, by investing in technology – the agency very quickly saw gains that led to cost savings.

[The case study](#) goes into more detail on how the ROI was calculated and is a great example for public sector professionals to explore the benefits of data analytics applied in law enforcement.

7 BENEFITS OF USING ANALYTICS TO FIGHT CRIME

In a recent [report by IBM, High Performance Law Enforcement](#), industry expert Dr. Mary Keeling, Manager, Economic Analysis, Global Smarter Cities Program at IBM, discussed the benefits of deploying an analytics program to combat crime.

The report notes the significant changes law enforcement has gone through in the past three decades. The authors observe that there have been two major changes in the way that enforcement agencies combat crime. The first shift was a movement to integrate policy resources by taking a “community-oriented” strategy. The hope was that by fostering relationships with the community, officers could work towards understanding the conditions that led to criminal behavior, and then prevent crimes from occurring.

The second shift was that agencies began to make significant investments in technology. Public safety officers recognized the benefits of data collection and improved use of information to combat crime, and knew that technology advancements would play a huge role to improve the security of their communities.

The authors argue that technology innovations complement strategies to improve community relationship for four reasons:

1. Extending the reach of police in the field through the use of video surveillance, shot spotters and license plate detection technologies.
2. More effectively deploying resources based on data analytics.
3. Increasing the speed and accuracy of core reporting functions, such as report preparation and evidence handling.
4. Improving the effectiveness of investigations by giving officers access to a broader array of integrated, actionable intelligence needed to solve crimes.

With these advancements, police officers can work more directly in their communities, and be empowered by data. They can have more situational awareness, understand a crisis as it unfolds, and take preventive steps to counter crime, even before it happens.

Although technology presents tremendous opportunities for government, the challenge still remains to build infrastructures and systems to find

meaningful data in the haystack. The problem is that the data “haystacks” agencies collect, store and manage are growing exponentially bigger.

Take, for instance, some statistics shared by the IBM report, which notes that 90 percent of all data in the world has been created in the last two years, and that by 2015, 80 percent of the world’s data will be collected in unstructured formats (like video or text). This puts enormous pressure on agencies to reform their data strategy, and think about how to modernize their legacy systems.

The report succinctly lays out seven benefits of using analytics to fight crime – and below we’ve highlighted them. You can read full descriptions in the [IBM report, High-performance law enforcement](#).

1. **Detection technologies can improve incident detection and engage public safety resources sooner.**
2. **Swifter incident reception and dispatch can improve response times.**
3. **Technology can improve accuracy and efficiency of incident response and reporting and allocation of investigative resources.**
4. **Technology can enhance the efficiency of incident investigations and help increase clearance rates.**
5. **Analytics can identify trends to improve operational effectiveness and efficiency.**
6. **Advanced analytics can drive planning to improve the use of resources.**
7. **Proactive policing can help stop crime before it happens.**

With new advances and strategies, police officers are able to get the right information, at the right time, to help keep communities secure and reduce crime.



Figure 1: Integrating operations and the supporting technologies across core law enforcement processes is key to optimizing performance.



ABOUT GOVLOOP

GovLoop's mission is to "connect government to improve government." We aim to inspire public-sector professionals by serving as the knowledge network for government. GovLoop connects more than 140,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C., with a team of dedicated professionals who share a commitment to connect and improve government.

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MORE READING

- Archived GovLoop Webinar: ["The Next Natural Resource? Data."](#)
- IBM White Paper: [Addressing government challenges with big data analytics](#)
- Video: [Predictive Analytics: Using Real-Time Data to Help Transform Public Safety](#)
- Case Study: [Memphis Police Department: Keeping Ahead of Criminals by Finding "Hot Spots"](#)
- Executive Report: [Accelerating Economic Vitality and Growth Through Smarter Public Safety Management](#)
- [Analytics to Outcomes](#) Group on GovLoop
- [Insights on Business Analytics](#) blog
- Whitepaper: [High-performance law enforcement report by IBM](#)
- Whitepaper: [Safety, Efficiency, Prosperity](#)





Coming Next: Smarter Care: Breaking the One-Size-Fits- All Model





In our upcoming final chapter on big data and analytics, we will explore IBM's Smarter Care Approach. We'll share how agencies are combating complexity and fragmentation within the health and social care systems— using data to gain a holistic view of a citizen to ultimately improve service delivery and reduce costs.



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