White Paper

Getting the Most Out of Your Predictive Policing Strategy

Implementing the best analytical tools and methodologies for your agency

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Government

Most law enforcement agencies realize that data analysis is an essential aspect of modern policing. While data analytics can be used for a wide range of activities, one of the key uses is often referred to as predictive policing. To varying degrees, virtually all law enforcement agencies are now engaged in some level of predictive policing—but the reality is that most agencies are greatly underestimating and underutilizing the full potential and power of a truly comprehensive predictive policing program. "Predictive policing" has become an industry buzzword that is largely misunderstood. Many agencies believe they are running successful predictive policing programs, unaware they are only leveraging a fraction of the predictive capacity that's possible through a complete and properly implemented program.

The importance of understanding

While some solution providers claim to have developed easy, turnkey predictive policing solutions, it's impossible to evaluate the quality of a particular solution without understanding the four key issues listed at right.

All successful predictive policing programs include essential elements that are used in specific ways. Let us explore predictive policing and the requirements for implementing and operating a highly effective predictive policing program.

1. What predictive policing really means

2. What a complete predictive policing methodology consists of

3. How to unleash the full potential of data and analytics

4. Whether or not the program is achieving its full potential

1. Predictive policing defined

All traditional predictive policing models attempt to address questions related to where and when future criminal activities may occur. However, the latest generation of predictive technology also looks at "who" is likely to be involved in future crimes. The phrase predictive policing actually encompasses two main categories—predictions and forecasts. Understanding the difference is important because a quality predictive policing solution must have the capabilities to perform both.

Predictions vs. Forecasts

Predictions	Forecasts
- Used to predict a specific "next event" including time and location	- Addresses broader crime patterns rather than specific crimes
- Associated with a discrete series of criminal activities linked to a specific suspect (or specific set of suspects)	- Includes extrapolations from past events to anticipate and "predict" the development, movement or growth of crime patterns
- Typically more straightforward to operationalize by putting officers in the right time and place	- More complex, typically requiring collaboration between operational units to allocate resources to right areas during right time frames
Example: The same suspect has robbed 3 gas stations in a 3-mile radius in the last 3 weeks all between 11:00 PM - midnight. Based on crime series specifics, deploy resources late in the evenings to a few locations where the suspect will likely commit the next robbery.	Example: An analysis of increased violent crimes in the downtown area identified that the issue primarily involved juvenile gang members. Based on isolating this specific activity, deploy the department's gang unit to specific areas at specific times downtown to disrupt this violent gang activity.

2. The two key components of predictive policing

All predictions and forecasts have (at least) two components: temporal and spatial.

Temporal vs. Spatial

Temporal	Spatial
Temporal analytics aim to predict the time a crime or pattern of crimes will likely occur (season, date, day of week, time of day, etc.)	Spatial analytics aim to predict the location or area that a crime or pattern of crimes is likely to occur (home, store, neighborhood, radius, etc.)

There are plenty of easily accessible resources that describe, in detail, the various temporal and spatial analysis methods used in predictive modeling. The key takeaway is that a comprehensive program will provide access to all of these methods and enable users to combine and customize the various methods based on the types of crimes they are trying to predict and the type of intelligence they are trying to extract. Currently, many agencies and analysts are using just one or two of these individual methods and mistakenly thinking that they are doing a thorough job of predictive policing.

Predictive Policing Methodologies

- Weighted method
- Value interval regression
- Mean interval analysis
- LAG analysis
- Centroid analysis
- Mean sequential distance
- Mean nearest neighbor
- Historic kernel density

3. Revealing a complete picture with data analytics

Quantitative data—that is, data that is commonly used to predict the time and location of criminal activities—represents only the first layer of predictive intelligence. With the right analysis and tools, quantitative data can be used to generate temporal topologies and maps—but temporal topologies and hot spot maps are inadequate for conceptualizing and executing effective crime-stopping strategies. Early adopter agencies already realize that the future of predictive policing will inevitably include the addition of qualitative data, which usually consists of identity or identity-related information. Currently, the majority

Identity Public Record Data examples:

- Active gangs/gang members

- Human intelligence—"word on the street"

- Individuals on parole/probation

- Information from officers and detectives that doesn't "make the report"

- Social media activity

of agencies neglect the qualitative information, such as identity data, that truly activates predictions and makes them more meaningful. The lack of qualitative data in today's predictive models is primarily due to one or more of the following reasons:

- The agency is unaware there are tools that aggregate, link and provide easy access to identity data

- Agency systems are not set up to access the data

- The agency is unaware of the value of adding identity data

- Department systems may not be structured for efficient sharing of data

- The agency lacks the tools and/or formal processes to facilitate the analysis of quantitative and qualitative data, such as identity information, in combination
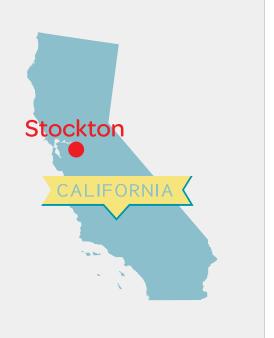
4. Testing, evaluating and adjusting

There is no single, magic formula that will predict all crime types in any circumstance for every police department out there. Each agency needs to know what adjustments to make in order to make the predictive policing program successful for them. The first step in creating these adjustments is to test and evaluate them regularly for their effectiveness. A quality third-party solutions provider will offer resources and services to help measure predictive policing effectiveness and recommend adjustments for improving on underperforming program areas.

The data collected from historic events are highly influential for both predictions and forecasts of future events. In the same light, the effectiveness of historic predictions and forecasts determine the success of current predictive policing outputs.

Stockton, California Police Department—
Predictive Policing Done Right

- Regular formal meetings between analysts, command staff and line-level officers to discuss and incorporate qualitative data into forecasts

- Third-party identity and public records data

- Formal processes in place to analyze both quantitative and qualitative identity data

- Trained analysts with access to sophisticated tools that show forecast areas and temporal topologies

- Structure to operationalize forecasts—calls for service issued based on predictive intel

Stockton

CALIFORNIA

3 key drivers of prediction efficacy

To ensure the ongoing efficacy of predictive policies strategies, agencies should be constantly asking important questions about these three critical program success factors:

1. Methodology

    a. Was the statistical method appropriate?
    b. Was the data accurate and complete?

2. Communication

    a. Were the results distributed to the appropriate operational personnel?
    b. Were the predictions explained clearly and concisely?
    c. Was the intelligence shared in time for effective response?

3. Response

    a. Was the prediction taken seriously?
    b. Was it operationalized? If not, why?
    c. Does the lack of response to a prediction reveal gaps or issues related to agency structure?

Conclusion

The accuracy, precision and effectiveness of a comprehensive and properly managed predictive policing program are already reaching new heights and evolving rapidly. Agencies committed to operating a gold standard program must identify and implement the right data tools, support the initiative with integrated internal systems and collaborative processes, and continuously monitor, test and adjust the program to ensure its efficacy.

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