Predictive Policing in Los Angeles:
Planning and Development

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Introduction

The era of Predictive Policing has begun. Technology-based crime fighting tools are
being developed and used across the country. "Predictive analytics," "intelligence applications,"
and "predictive spatial analysis," are among the new buzz words used by researchers,
policymakers, and chief executives to describe their entrance into this new era. What are the
elements of predictive policing and how does 'it' work? How does predictive policing translate
into crime reduction, order maintenance, working within the community, and managing
personnel and resources? What is the research basis for predictive policing? What is the
technological backbone of predictive policing? This paper answers these and other questions.

Definition and Background: Predictive Policing

*We define predictive policing as a multi-disciplinary, law enforcement-based strategy
that brings together advanced technologies, criminological theory, predictive analysis, and
tactical operations that ultimately lead to results and outcomes -- crime reduction, management
efficiency, and safer communities. Predictive policing builds on concepts from community
policing and problem solving. It enhances and expands comprehensive computer statistics
(Compstat) for accountability purposes and crime reduction. It also makes use of established
and long-known "predictor variables" developed from criminological research.*

Predictive policing does not ignore the past, and in fact, builds on four trends that began
in the 20th century. First is the development and use of research in policing. Since the ground-
breaking work of the Kansas City Preventive Patrol Experiment to the use of hotspot analyses

and knowledge of what works and why (Sherman et al, 1998), research has become an acceptable practice in law enforcement. Evaluations and research studies have spurred law enforcement executives to ask: why are we doing things this way and not another, better way? Second is problem-oriented policing, Herman Goldstein's idea that stresses the importance of analysis and evaluation to deal with problems before they become crimes (Goldstein, 1990). Problem solving has stressed the use of data, proactive policing, and assessments. Third is the growth of technology, particularly in mapping crime and geographic information systems (Weisburd et al, 2009). The rapid growth of technology has allowed for instant communication, rapid analysis, and visuals of people, places, and crime maps. Fourth, is the development, use, and dissemination of Compstat as a management tool that changed the way in which police think about crime (Weisburd et al, 2003, McDonald et al, 2001, and Silverman, 1999). Compstat accountability meetings have enabled police practitioners to focus on crime hot spots and respond to crime problems faster and more thoroughly than was previously possible.

Predictive policing utilizes research and 'best practices'; it includes new technology and statistical analysis, and takes Compstat to a higher level. It promises to increase the depth and breadth of information about crime and the nature of the relationship between and among the people, places and things associated with crime (Bratton, Morgan, and Malinowski, 2009).

Predictive Policing: Recent Developments

Recently, law enforcement agencies have turned to business intelligence (BI) capabilities and new data analysis programs for assistance in predicting criminal behavior. The Richmond (VA) Police Department (RPD) has received the most publicity and accolades for developing a new system that provides predictive crime analysis, data mining, geographic information system (GIS) capabilities, and reporting to RPD officers. Data from the RPD records management

system are integrated and analyzed continuously. The Memphis (TN) Police Department, Macon (GA) Police Department and international forces in Manchester (UK) and the Netherlands have begun using forms of predictive analyses in crime fighting (SPSS, 2009).

In Richmond, Dr. Colleen McCue identified data that could be used to create predictive crime reports and created a model that automatically improves itself and avoids the manual refreshing of variables. Time, day, holidays, weather, moon phases, city events, paydays, and crime records were among the data that were analyzed. RPD developed a custom solution using several different technologies. Information Builders' WebFocus software which included business intelligence capabilities is the primary user interface that displays criminal activity every four hours. Officers receive the information at police stations and in squad cars and real-time alerts are sent by email and text messages. GIS mapping from ESRI and aerial photography from Pictometry provide maps and pictures of the reported incident locations and the surrounding neighborhoods. RPD uses SPSS's Clementine and Predictive Enterprise Services products for data mining capabilities that examine how current crime reports relate to data on past, present and projected actions (Harris, 2008).

Data mining tools and predictive analytics are the key elements in the Richmond effort. Data mining basically "churns" through data and discovers "hidden patterns and relationships" (McCue and Parker, 2003). The strength of the data mining tool is:

"…it is not necessary to know exactly what you are looking for before you start. Data mining uses powerful analytic tools to quickly and thoroughly explore mountains of data and pull out the valuable, usable information. The primary use of data mining is to find something new in the data -- to discover a new piece of information that no one knew previously. This is sometimes referred to as the *bottom-up or data driven approach* because start with the data and then build theories based on discovered patterns or trends… on the other hand, (you can) *begin with a top-down or theory-driven data* analysis because you start with a hypothesis and then check the data to determine whether it is consistent with the hypothesis." (McCue and Parker, 2003).

McCue and Parker raise important points in discussing the bottom-up approach and the top-down or theory-driven method.

Bottom-Up or Data Driven Approach

The bottom-up approach is not without theoretical development and should not be taken as simply "data dredging." According to McCue, hypotheses are created, models are developed, and 'what if' questions are posed. The data mining tools allow police to conduct a multitude of activities focusing on crime fighting and efficient use of manpower. The developers of these tools assert that they are useful in adding value to 1) deployment, 2) tactical crime analysis, 3) behavioral analysis of violent crime, and 4) officer safety (SPSS, 2009; and Sentinel Software Group, 2009).

In using the bottom-up approach, the SPSS product, Clementine, allows the Richmond police to deploy officers at different hours of the day, during different seasons, and for varying types of offenses. The tools provide them with unanticipated factors that they would not ordinarily find without data mining.

Data mining and predictive analytics are used to enhance traditional methods of crime analysis and investigations. In a traditional analysis of a series of crimes, one would examine a limited number of linkages such as the time of occurrence, location, modus operandi, and other variables. With data mining, not only would a large amount of data and variables be examined, but predictive analytics adds selective weighting factors that would assist in predicting future events. For violent crimes, data mining is used to develop models for rapes and sexual assaults, robberies, and drug-related violence.

Enhancement of officer safety is provided through an increased understanding of the offender, crime patterns, and trends. By understanding the interrelationships between different

factors and unsafe environments the officer on the street is more wary of what could affect his or her safety.

Top-Down or Theory Driven Approach

The subtext for predictive policing lies within a number of macro-level, quantitative criminological research studies, including those that use social disorganization, collective efficacy, strain, economic deprivation, routine activity, deterrence or rational choice, social support, and subcultural theories (Pratt and Cullen, 2005). These theories use 'predictor variables' to forecast and predict crime locations and victims.

Theories of social disorganization and collective efficacy are the most relevant in identifying and predicting where crime may flourish or not. Sociological literature over the last 30 years establishes the relationship between community characteristics and problem behavior. Areas characterized by high levels of economic disadvantage have long been associated with crime and other forms of disorder. Bursik and Grasmick (1993) argued that concentrated disadvantage and other neighborhood-level indicators of *social disorganization* create conditions that hamper the development of meaningful pro-social institutions to flourish. Institutions such as schools, churches, formal/informal community groups play an important role in regulating behavior among its residents. Sampson and Groves (1989) found that disorganized neighborhoods were also characterized by low organizational participation, sparse friendship networks, and large numbers of unsupervised youth. Neighborhoods with the most extreme forms of social disorganization also tended to experience greatly reduced levels of *collective efficacy*. With poor community organization, the capacity of the communities to develop formal

and informal mechanisms of legal social control was diminished (Sampson et al.1997; Warner, 2007).[1]

Other theories are also applicable. Environmental criminology, which includes routine activity, rational choice, and situational crime prevention, is the broad, general approach that is most germane. Routine activity theory explains the components of a criminal incident, by breaking it down to three basic elements: (1) a likely offender, (2) a suitable target, and (3) the absence of a capable guardian. It is only when these three elements converge in time and space that a crime occurs (Cohen and Felson, 1979). This perspective established the spatial and temporal context of criminal events as an important focus of study.

Situational crime prevention involves crime prevention strategies that are aimed at reducing the criminal opportunities which arise from the routines of everyday life. Situational crime prevention assumes that crime is a rational choice by offenders and that crime can be prevented by hardening targets to increase the risks and reduce the rewards. British scholars, led by Ronald Clarke explored the practical application of this theory in the United Kingdom. They saw that "opportunity" was at the core of crime, and rather than trying to reform offenders they sought to reduce the criminal opportunities available to the criminal. Thus, they sought to change the environment through target hardening, improving surveillance of areas that might attract crime and deflecting potential offenders from settings in which crimes might occur.

Summary

Cutting-edge technologies, such as data mining and spatial analysis tools, should enable modeling and testing of various criminological and criminal justice theories. By modeling these

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[1] *Collective efficacy*, a concept that relates to the capacity of residents and other respectable groups to exert levels of social control, has important implications for how neighborhoods are informally managed by residents. Research shows that neighborhoods with higher levels of collective efficacy generally experience lower levels of violence (Sampson et al., 1997).

theories, we should be able to predict how crime will impact neighborhoods as factors such as neighborhood characteristics, target hardening strategies, and/or community involvement evolve. Further, over time we will be able to test how these changes impacted crime levels, including how crime may have been displaced across neighborhoods. From a tactical point of view, the sophisticated tools should allow for more efficiency, effectiveness, and timeliness in identifying suspects, targeting high-risk situations, and solving crimes and we should be able to measure and document these operational changes.

LAPD and Predictive Policing

The Los Angeles Police Department is one of seven jurisdictions awarded a predictive policing planning grant by the National Institute of Justice. The LAPD is ready to plan and implement a Predictive Policing Model that will be based in its Real-time Analysis and Critical Response Division (RACR).

RACR was formed in 2005 to extend the principles of Compstat and to move the LAPD forward. Chief Bill Bratton established the division to excavate targeted data for "real time" analysis and response. RACR provides a 24-hour response and notification apparatus as well as a means to quickly activate the Department Operations Center (DOC) for emergencies during off hours. (Crime and intelligence analysts, predictive policing analytics, and research support from Justice & Security Strategies will be based in RACR.)

To illustrate the operations of RACR we provide the following vignette:

"…an observant RACR Officer monitoring all channel communications noted the moniker 'Cory M' of a possible rape suspect. Further investigation revealed that the victim thought he was a Crip gang member. The RACR Officer immediately briefed a RACR Detective who opened a case and started manually searching three separate databases from parole, gangs, and criminal histories. The RACR Detective eventually identified four possible suspects including one nicknamed Cory M. The RACR Detective immediately notified the field officers and forwarded additional work-ups, all done by hand, to the field detective including DMV photos and criminal

histories on all four suspects. The victim identified Cory M as the rapist and an arrest warrant was issued for his arrest. Additional coordination led to another database search for a second suspect which turned out to be a cousin of Cory M."

The vignette illustrates the cooperative and collaborative efforts of officers and detectives in RACR and the field. Currently, however, RACR lacks the hardware and software to fully and effectively provide real time investigative analysis services. This vignette shows one area where technology can significantly enhance and speed up analysis and investigations. Without the observant officer in this example, no one might have even thought to search the three databases in the first place. This illustrates the need for additional technology to proactively search existing databases.

Maximizing police resource effectiveness is a primary objective of all policing agencies. Nowhere is this more important than in departments like the LAPD, which have limited resources, but have an extensive geographic area to cover and diverse communities to police. Cost-effective IT solutions are an essential management tool. Increasing the ability of the LAPD to effectively collect new data from the community and disseminate relevant location based information back to the community will provide broader crime reduction opportunities via new Compstat data and data analysis capabilities. This in turn will lead to new deployment strategies, new crime reduction strategies as well as additional public safety services that might include emergency preparedness and disaster event management, to name a few. In all, the proposed increase in data mining and the use of GIS will lead to better communication, new data, and enhanced Compstat crime analysis resulting in the implementation of new deployment and crime reduction strategies that can be replicated throughout the LAPD and the nation.

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