May 2014

Predictive Policing in Action in Atlanta, Georgia

George Turner, Police Chief, Atlanta, Georgia, Police Department; Dr. Jeff Brantingham, Professor, University of California, Los Angeles; and Dr. George Mohler, Assistant Professor, Santa Clara University, California

We pride ourselves on being a department that is not satisfied with the status quo. We are forward-looking, with a strategic view grounded in innovation. We know the PredPol technology has helped us get smarter on our fight against crime.

—Atlanta Police Chief George Turner

Policing crime patterns is hard business. Atlanta, Georgia, is no different than any other jurisdiction in this regard. Every day sees new crimes added to the database; and every day, the Atlanta police seek to use these data to not only respond to victims, but also to try to get out ahead of emerging hotspots and prevent crime in the first place. Until recently, the Atlanta Police Department (APD) followed a system for daily mission planning that combined hotspot mapping with the selective use of street-level intelligence. Beginning in July of 2013 for 90 days, the APD added predictive policing to the mix in two policing zones, targeting burglary, car theft, and robbery. Aggregate crime declined by 8 percent and 9 percent in the two zones compared to the prior 90-day period, with burglary and car thefts falling 10 to 28 percent. Aggregate crimes in the zones that did not deploy predictive policing increased from 1 to 8 percent.

On the basis of these results, the APD decided to deploy predictive policing, as developed by the Los Angeles Police Department (LAPD) and provided by PredPol, across the city.[1] The decision, though, was based on more than observed declines in crime; it was based also on a review of the science behind predictive policing and, equally important, the seamless way in which predictive policing fits within the department's day-to-day operations.

The Science behind Predictive Policing

If one can accurately predict where and when crime will occur today, then law enforcement personnel can disrupt those crimes before they happen. But predicting where and when crime will occur is no simple task.

While crime may concentrate in some of the same neighborhoods year after year, the daily variation in where and when crimes occur is often large. A neighborhood may experience multiple burglaries over the course of a year, but only one or two houses in that neighborhood may be at risk today, while tomorrow it might be two different houses on the other side of the same neighborhood.

It is very difficult to predict where crime will occur in the next 10–12 hours simply based on where it occurred recently. Extensive research has shown that short-term crime patterns are driven by interactions among (1) crime generators that are built-in features of the environment; (2) repeat and

near-repeat victimization that leads previous victims and their neighbors to be at greater risk of follow-on crimes; (3) the routine activity patterns of offenders and victims that keeps risk local; and (4) substantial random noise. Each of these processes is well-known empirically, but when put together, their relationship to the emergence, spread, and disappearance of crime hotspots over time is incredibly complex.

Using real-time data piped in from Atlanta's records management system, PredPol's methodology uses high-powered mathematics to calculate probabilities of where and when crime will occur today. The mathematics are closely related to those used to study earthquakes. Any one crime can be linked to crime generators in the environment or recent nearby crime events in the same way that an earthquake can be classified as a main shock tied to a fault in the earth or an aftershock occurring closely on the heels of a previous quake. What matters most is that the mathematics allow police to not only characterize past crime, but also use past crime to forecast with great accuracy the locations where crime will occur in the immediate future.

The mathematics also allows Atlanta police to forecast crime at a very fine scale while constantly adapting to crime patterns as they change from day to day. PredPol predictions identify 500 x 500 foot boxes that are at the greatest risk of crime in the coming shift. This is about the same area as four American football fields arranged side by side. The value of identifying such a small area is that police can zero in on a location with the greatest risk of crime today and distinguish it from nearby areas that are at significantly lower risk. Further, a location that is at low risk of crime today may be at high risk tomorrow, so patrol units see different boxes on different days depending on each area's risk level for that specific day.

Predictive Accuracy in Atlanta

How accurate is predictive policing? To answer this question, one first needs to count how many crimes actually occurred in active prediction boxes. The second step is to take into account the percentage of the total policing area represented by active predictions. The value of predictive policing is maximized by predicting as much crime as possible in as small of an area as possible.

Atlanta deployed predictive policing in July 2013 in two urban policing zones. Zone 4 is located to the southwest of downtown Atlanta and is characterized by mostly residential and some business areas. Zone 6 is located to the east of downtown and has retail, residential, and many

Figure 1: PredPol Predictions of Hotspots

restaurant areas. Both zones record some of the highest volume of Part 1 crimes in the city. The focus in Zone 4 was on burglary and robbery during the day shift, vehicle crime and robbery during the evening shift, and vehicle crime during the morning shift. The focus in Zone 6 was on burglary and vehicle crime during the day and evening shift, and all Part 1 crimes in the morning (reduced to only robbery after 45 days). The total land area of Zone 4 is 31 square miles and Zone 6 is 15 square miles. In total, 21 and 18 hotspots were predicted for each shift in Zone 4 and 6 respectively.

In Atlanta, crime over the initial 90-day deployment was 24 times more likely to occur inside an active PredPol prediction box than elsewhere in the environment. This was measured by tabulating the number of crimes that occurred within each box and creating a Predictive Accuracy Index (PAI) score. The PAI is the percentage of crimes accurately predicted, normalized by the percent of the geographic area covered by the predictions. A PAI value of 1 corresponds to random chance, so a useful prediction must at least have a higher value than 1. Over the deployment period, the PAI value for Zone 4 was 23.7, and the Zone 6 PAI was 24.0.
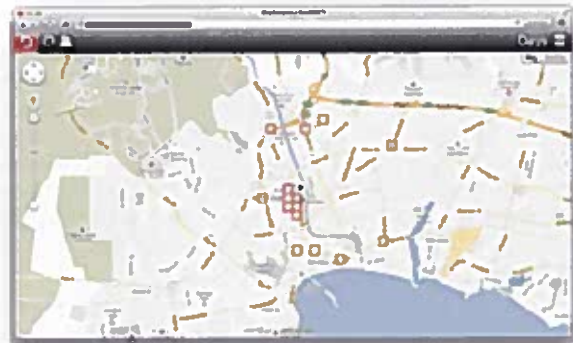
Before and After Predictive Policing in Atlanta

Crime rates across all six Atlanta policing zones for the 90-day period prior to deployment in the summer of 2013 were compared with the 90-day period following deployment. As already noted, for Part 1 crimes in total, Zones 4 and 6 (the zones with predictive policing) experienced crime rate reductions of 9 percent and 8 percent, respectively. In all four of the zones where PredPol was not deployed, crime rates increased from 1 percent to 8 percent. In Zones 4 and 6, burglary rates dropped by 21 percent and 10 percent and auto theft rates dropped by 15 percent and 28 percent. Higher variance was observed in robbery rate changes due to the lower volume of robbery compared to property crime and the corresponding lower weight assigned to robbery in PredPol predictions. Robbery dropped by 34 percent in Zone 6, but increased by 31 percent in Zone 4.

Using Predictive Policing in the Field

There are no constraints on how a police department can use predictions to deter and prevent crime. They can be distributed to specialized units such as auto theft or robbery details, or they can be used by patrol officers as part of their daily routines. In Atlanta, missions were distributed at the start of each watch to patrol officers who were given the directive to police prediction boxes during their available time.

Figure 2: Street View of At-Risk Area

Importantly, predictive policing does not replace the knowledge, skills, or experience of an analyst or patrol officer. Predictive policing provides information on where and when crime is most likely to occur, but it does not say how or why crimes are committed or who is potentially responsible. Patrol officers operate in ways they already know, while analysts spend less valuable time on mapmaking and more time working on the challenging problems that require their expert skills. Predictions also provide timely information about the distribution of risk that works seamlessly with analyst-developed criminal intelligence and department-driven community policing.

The compelling results from the initial deployment in Zones 4 and 6 in Atlanta led to a city-wide rollout of predictive policing in November 2013. By and large, this move to make predictive policing a part of every officer's daily routine has been favorably received by the front line.

Figure 3: Prediction by Crime Type

Leadership Matters

Not surprisingly, any change in policing comes with challenges. Predictive policing is easy to use, is accurate, and impacts crime, but it requires a commitment on the part of command staff, supervisors, and patrol officers to put it to good use. Atlanta prides itself on being a department that is not satisfied with the status quo. It is forward-looking, with a strategic view grounded in innovation. Atlanta police officers know the PredPol technology has helped them get smarter in their fight against crime.

The launch of predictive policing in Atlanta resulted from the partnership between the Atlanta Police Foundation (APF) and the APD. The Atlanta Police Foundation is a non profit, public/private partnership focused on advancing public safety in Atlanta. In partnership with the City of Atlanta, the APD, and the business community, the APF provides research on policing best practices, strategic direction, and resources to help the APD incubate innovation, keep pace with technology, and meet strategic time-

sensitive needs that help drive down crime and make Atlanta a safer city. The APF funded the initial three years of the project and are currently evaluating the results in the Technology Innovation Center where interns and professors from local universities are using quantitative methods to ensure the success and best deployment of the system.

"Predictive policing and the Technology Innovation Center have become banner programs for the Atlanta Police Foundation and have aided in significant crime reduction and prevention in Atlanta over the past year," said Dave Wilkinson, president and CEO of the APF. "We are helping to position the Atlanta Police Department as a national leader in cutting edge, technology-based policing solutions. We recently published our annual crime report, which showed that crime in Atlanta between 2002 and 2012 decreased at nearly double the national rate—a true testament to the success of the partnership between the APF, the APD, and Atlanta's business community."[2]?

Notes:
[1]"Predictive Policing' Making LA Safer," *CBS Evening News*, March 2012, http://www.cbsnews.com/video/watch/?id=7404996n (accessed April 15, 2014).
[2]Dave Wilkinson (president and CEO, Atlanta Police Foundation), correspondence with author, April 2014.

Please cite as:
        George Turner, Jeff Brantingham, and George Mohler, "Predictive Policing in Action in Atlanta, Georgia ," Technology Talk, *The Police Chief* 81 (May 2014): 72–74.

In deployments across the US and on three continents, law enforcement agencies deploying PredPol's predictive policing solution have seen reductions in targeted crime as high as 30%. Developed by a team of LAPD and UCLA researchers, PredPol's predictive solution represents six years of cooperative development, by law enforcement for law enforcement, culminating in the industry standard for crime prediction.

Year over year, **Los Angeles Police Department Foothill Division's** crime was down:

29%

Norcross, GA saw:

15-30%

reduction in burglaries and robberies, just four months after deployment.

Kent, England, saw violent crime drop:

6%

Richmond Police Department saw the following declines:

21%   50%   34%
violent crime   residential burglaries   vehicle theft

Atlanta, GA's aggregate crime decreased:

7% & 9%

10 months after deployment, **Alhambra, CA** saw the following drops:

20%   32%
vehicle theft

Santa Cruz Police Department saw the following reductions in its first year of deployment:

11%   27%   25%   29%
burglaries   car theft   overall crime,   overall crime,
                               June 2011   2013

PREDPOL®

"It's not how many people you catch, it's how many crimes you prevent."

Los Angeles, CA Police Department Chief Charlie Beck

"Residential theft has decreased by 11 percent, car burglaries by 20 percent and grand theft auto by 10 percent since the program started. "The only difference between this year and last year is utilizing PredPol in our policing strategies."

Alhambra, CA Chief Mark Yokoyama, L.A.

"Vehicle theft and burglaries are down ... but an officer's ability to listen to people, talk to people, and connect with people remains irreplaceable."

Richmond, CA Capt. Mark Gagan

"The theory is that you prevent them from committing the crime to begin with."

Modesto Police Chief Galen Carroll

"When you look at the crime reduction, in a year you're probably saving in costs to society about two million dollars — just in my division alone."

Los Angeles, CA Police Captain Sean Malinowski

"Since its inception, crime has dropped on my beat. It's like the perfect ally. We have the perfect sidekick that's already looking ahead and telling you what's going to happen next."

Atlanta, GA Police Department Officer Omari Price

"If I wasn't confident that this will help the city I would not invest in it. It will help us use our limited resources more efficiently."
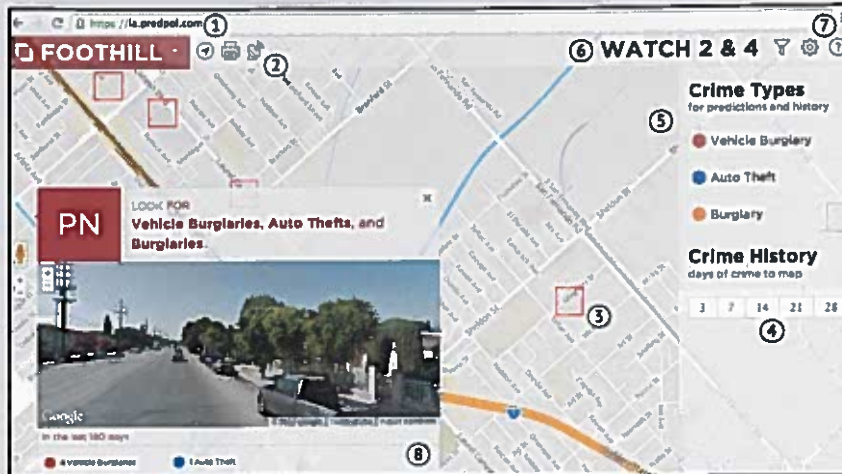
Haverhill, MA Police Chief Alan DeNaro

NYC0000847
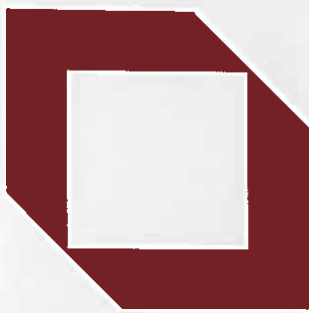
PREDPOL®

Key PredPol Features

1. uses https secure technology
2. delivers reports on paper, on any internet connected device, or MDT
3. 500' x 500' prediction boxes
4. crime mapped instantaneously
5. specific to crime type
6. specific to shifts and jurisdictions
7. crime history overlay
8. 'in the box' intelligence – box labels and street view

Proven Track Record, Multiple Field Tests, Easy Deployment, Intuitive

- An established track record of successful deployments in cities large and small, in the U.S. and internationally.

- Predictions for many types of crime, including property crime, gang activity, drug incidents, traffic accidents, and gun violence.

- Predictions for each shift (not for a week or month), with automatic recalibration whenever a department updates its RMS.

- Direct delivery to patrol officers via paper or email and to any internet-enabled device.

- A simple, intuitive, easy to use tool resulting in implementation time of days (not months), less training time, lower error rate, and better adoption rate by patrol officers.

- Cost savings from crime reduction that allow for reallocation of resources to more officers, more analysts, and more equipment.

"It makes us smarter. It puts us on the cutting edge in what's going on in this country in crime fighting."
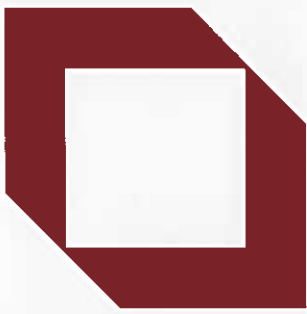
Atlanta, GA Police Chief George Turner

Since implementing PredPol serious property crimes have fallen by 29% in the Los Angeles Police Department's Foothill Division.

PREDPOL®

Easy-to-use crime prediction software

How PredPol Works

- Only three data points from an agency's RMS/CAD database: 1) Crime type 2) Crime location 3) Crime time

- Predictions are translated onto a map as distinctive red boxes representing an area of 500 feet by 500 feet. Maps can be broken down into divisions, districts or beats

- Predictions are recalibrated daily for each patrol shift

- Reports are delivered to any internet-connected device, viewed on an MDT (Mobile Data Terminal), or printed on paper

How PredPol Benefits Law Enforcement

- Crime analysts using PredPol are twice as effective as analysts using best practices alone

- Clear and simple visuals are easy to understand and immediately usable

- Complements officer judgment to problem solve while "in/around-the-box", and to help new officers get up-to-speed more quickly on crime risks in their environment

- Enables law enforcement to enhance and better direct the patrol resources they have

- It does not replace, but requires, the insights of veteran officers and crime analysts

- A force multiplier to disrupt and deter crime

PredPol software uses a pattern-recognition algorithm and existing crime data to make real-time crime predictions for safer communities.

Background

PredPol's patent-pending technology was created by police for police in collaboration with internationally recognized PhD's in mathematics, anthropology, and criminology.

PredPol Requirements

- 3-5 years of crime data from RMS/CAD database and continuous data updates

- Crime type, crime address, and crime times from RMS/CAD database

- No new hardware or software required

- No incremental training or maintenance fees
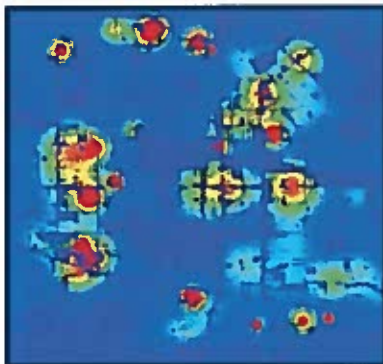
tactical ambiguity
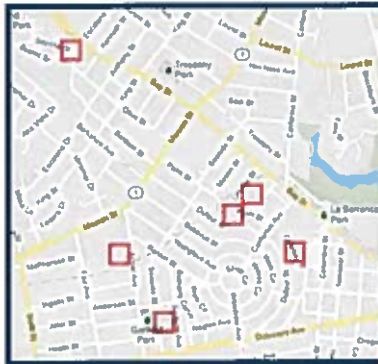
tactical clarity

"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."

Los Angeles Police Chief Charlie Beck