



# PredPol

Predict Crime in **Real Time™**

# PredPol & Open Data: 2013 Chicago Gun Violence Abstract

*PredPol accurately predicts where and when crimes are most likely to occur. It is the only predictive analytic system that has repeatedly demonstrated the ability to predict more than double the amount of crime in head-to-head field deployments comparing dedicated crime analysts using hotspot tools alone.*

*PredPol delivers the same predictive accuracy for gun violence using unique mathematical methods.*

# Using Chicago's Open Data

- A study of Chicago data shows that PredPol successfully predicts 50% of gun homicides by flagging in real-time only 10.3% of city locations.
- Knowing where and when gun homicides are most likely to occur empowers law enforcement to use their knowledge, skills and experience to disrupt gun crime before it happens.

# The Challenge of Gun Violence



*In 2012 there were 507 homicides and 12,137 crimes involving handguns in Chicago, Illinois.*

In light of recent gun violence across the country, including school shootings, and as police departments across the nation face tighter budgets and scarcer resources, reducing violence and gun related crime from the current high levels observed in cities like Chicago is a significant challenge.

# Prediction Map in 2011

PredPol predictions provide clear recommendations about where and when to deploy precious police resources to suppress gun violence.

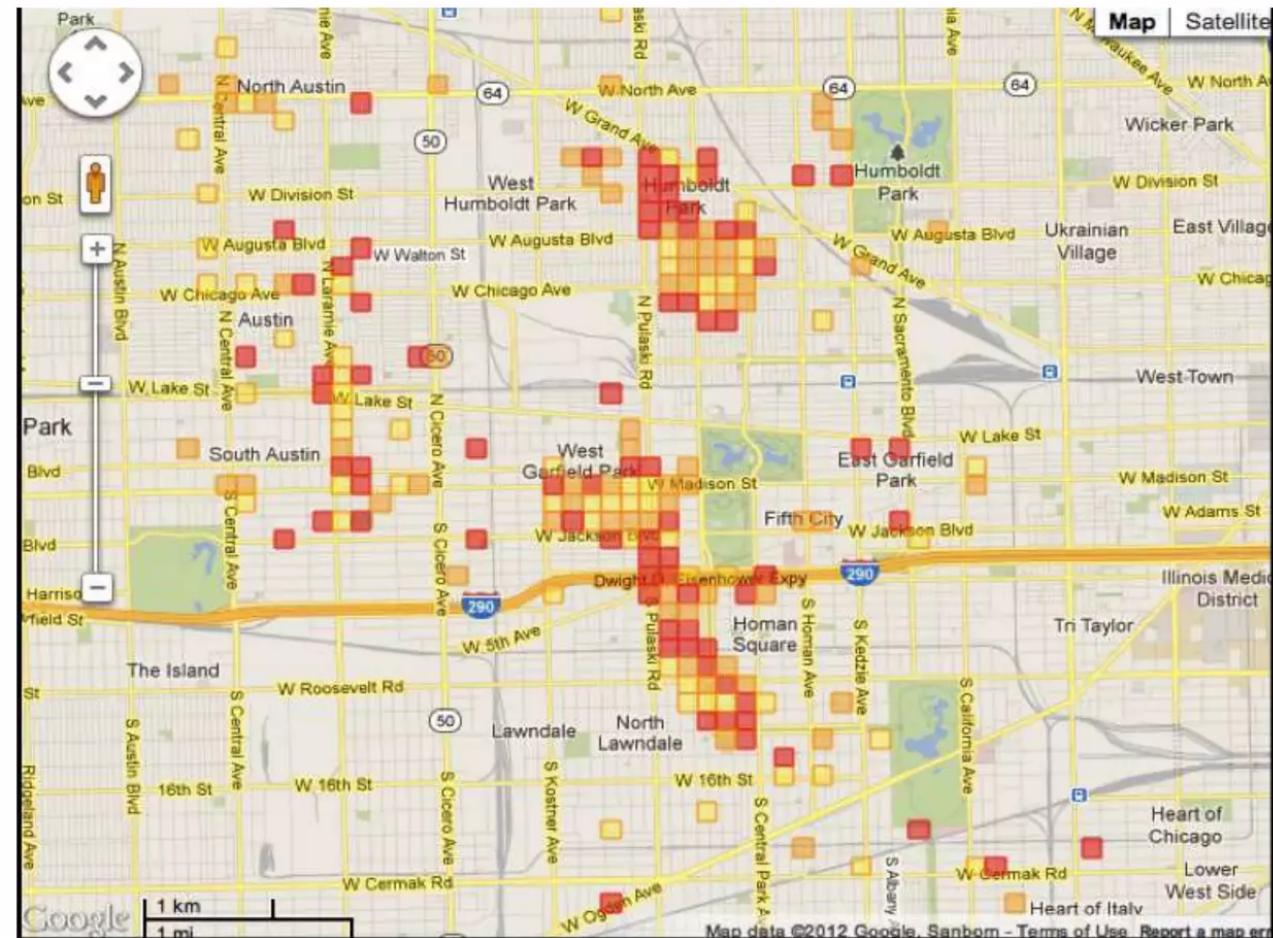
Zones of Chicago flagged, corresponding to the percentage of homicides predicted.



10%

13%

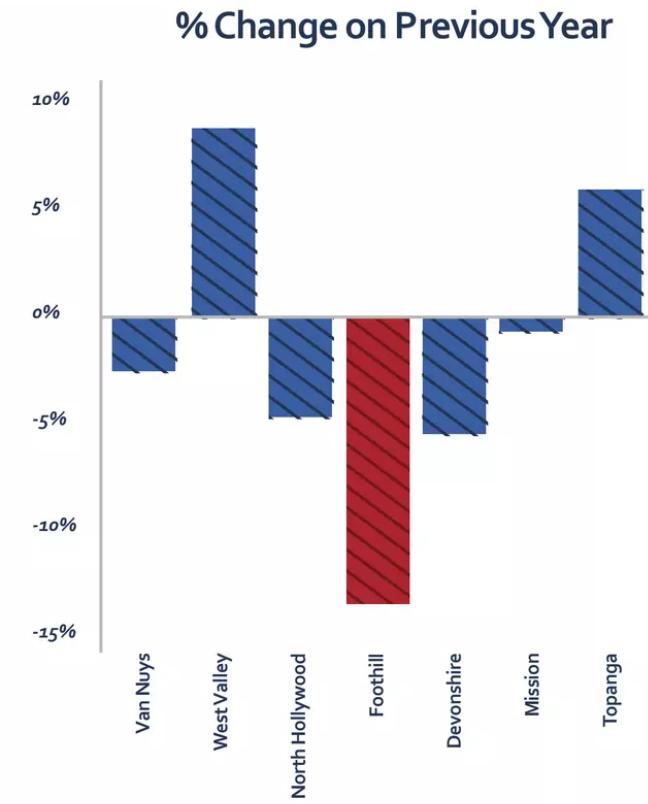
20%



# PredPol Success in the Field

PredPol has been extensively evaluated using historical crime data and controlled field trials with multiple law enforcement agencies.

Analyses demonstrate that PredPol outperforms existing methods for forecasting crime such as kernel density estimation, which underlies most crime hotspot mapping programs.

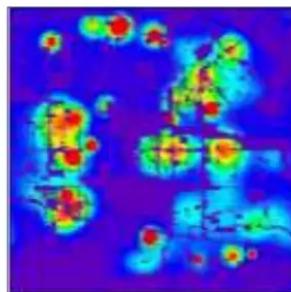


Serious  
property  
crime

▼ 12%

# Tactical Clarity on Predictions

*The PredPol technology offers microscale, real-time geospatial intelligence, displayed in a way that is tactically clear to supervisors and patrol officers.*



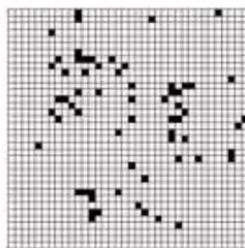
*Current models such as hotspot maps are often underused because they are ambiguous and confusing.*



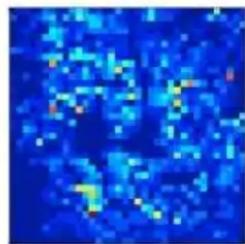
*Without predictive analytics, officers end up chasing yesterday's crime.*

# Prediction Methodology

*PredPol is based upon a marked point process methodology that allows for several years of crime data, and multiple crime types, to be utilized by hotspot maps, incorporating both fixed risk heterogeneity across the city and temporally dynamic risk.*



*Chronic hotspots are long term in duration and necessitate problem-oriented policing strategies to address the root causes of crime.*



*Temporary hotspots, on the other hand, last on the time scale of days to weeks.*

# Gun Violence & Homicide

In many instances there may be little difference in the situation and intent separating gun violence and a homicide. The occurrence of serious violent crimes may provide as much, or more, information on where and when homicides are most likely to occur as actual homicides themselves.

We take the following marked point process approach to modeling the intensity of homicides. Given marks,  $M$ , representing crime types believed to be precursory to homicide, the intensity of homicide is modeled as:

$$\lambda(x, y, t) = \mu(x, y) + \sum_{t>t_i} g(x - x_i, y - y_i, t - t_i, M_i)$$

The background rate  $\mu(x, y)$  represents fixed risk across the city, whereas the kernel  $g(x, y, t)$  determines the time and spatial scales over which near-repeat crime patterns occur.

# Emerging Trends for Emerging Crime

Crimes involving guns continue to have an impact on future gun homicides for 30-100 days and risk spreads over as much as  $\frac{1}{2}$  mile in area. With knowledge of the increase in crime risk following precursory gun-related crimes, officers are in a better position to deter more serious gun crimes through directed patrol.



Morning Patrol



Evening Patrol

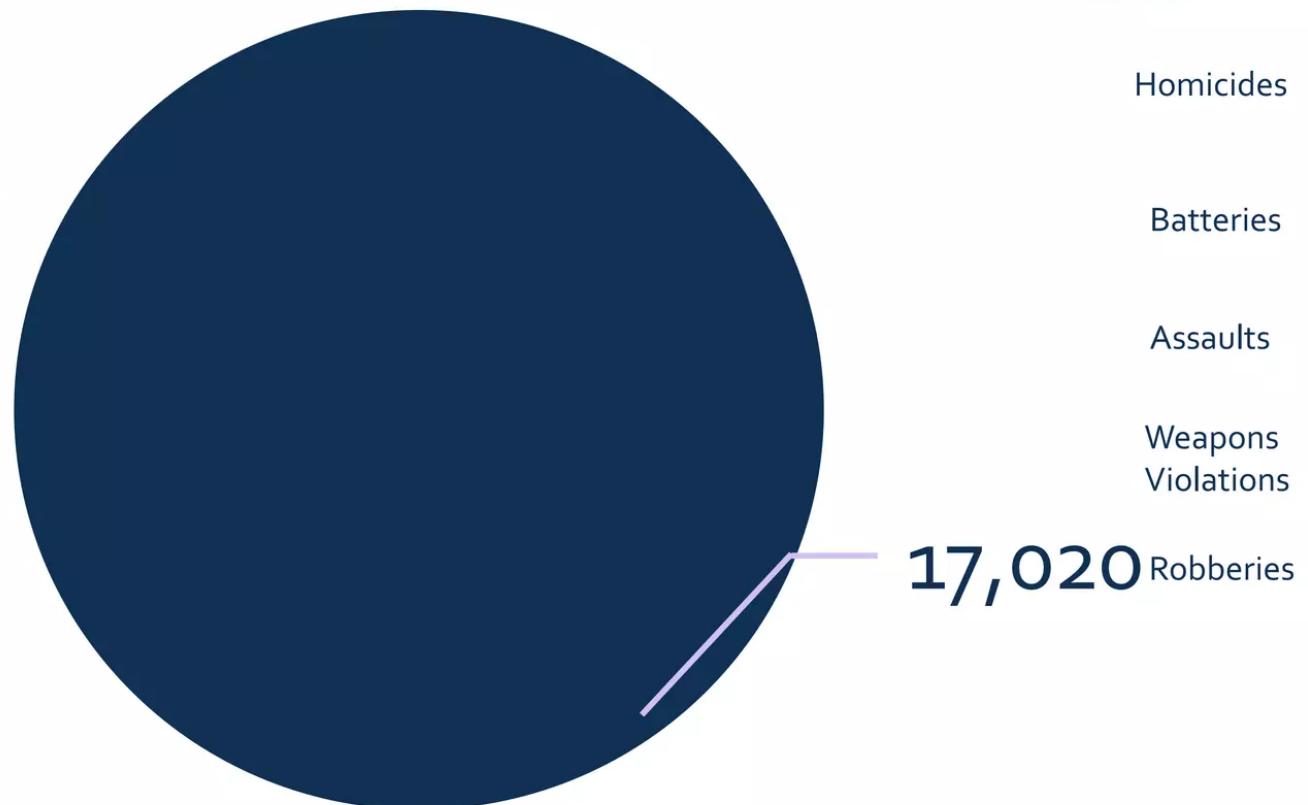


Swing Patrol

Police can therefore position their resources to make the best use of officer knowledge, skills and experience to disrupt gun violence.

# Chicago Gun Crime

We apply PredPol to an open source data set consisting of **38,740 violent crimes** occurring in Chicago, Illinois from 2009 through 2011. In total there are 1,331 homicides and the following gun related crimes with ``handgun'' in the description field.



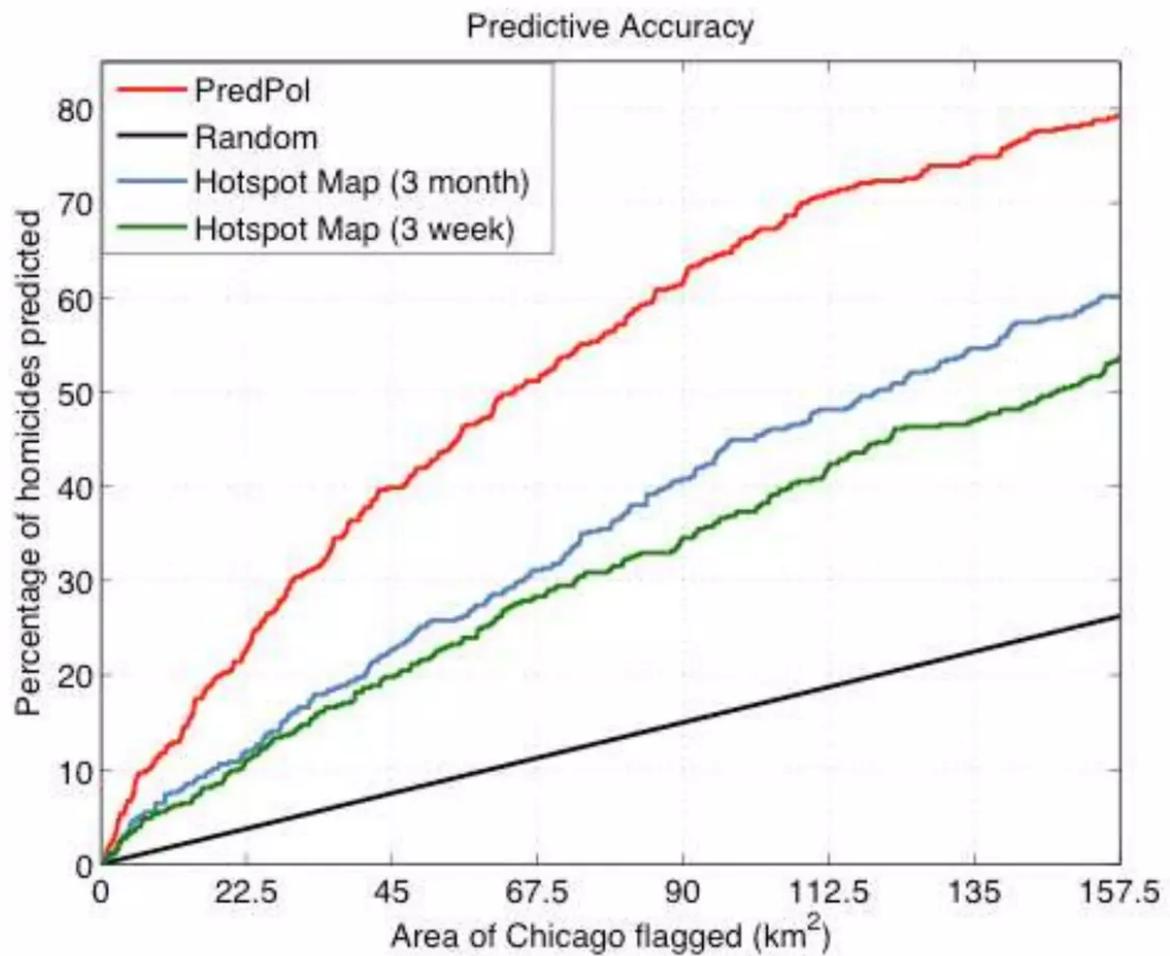
Source: <https://data.cityofchicago.org/Public-Safety/Crimes-2001-to-present/ijzp-q8t2>

# Prediction Results

PredPol predicts a greater number of gun homicides using its unique prediction methodology compared with alternative approaches.

---

Percentage of crime occurring within flagged areas vs. total area of Chicago flagged with predictions using 2011 historical data.



# PredPol Guides Police Practice

*PredPol fits seamlessly into existing police practice and creates strategic and tactical opportunities that would not exist otherwise. PredPol accurately predicts where and when gun homicides are most likely to occur.*

*The PredPol methodology creates clear tactical guidelines to focus on weapons violations, assault and battery as the major drivers of gun homicides. Targeting these precursor crimes can have a significant impact on gun homicide and ultimately on crime reduction.*

Contact Us to request the full PDF Whitepaper



[predpol.com](http://predpol.com) | [info@predpol.com](mailto:info@predpol.com) | 831.331.4551