NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

DECODING JUSTICE: THE INFLUENCE OF PREDICTIVE POLICING ON REASONABLE SUSPICION AND PROBABLE CAUSE

by

George Tavares

December 2023

Co-Advisors: Carolyn C. Halladay
Lynda A. Peters (contractor)

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE	*Form Approved OMB No. 0704-0188*

1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** December 2023	**3. REPORT TYPE AND DATES COVERED** Master's thesis

4. TITLE AND SUBTITLE DECODING JUSTICE: THE INFLUENCE OF PREDICTIVE POLICING ON REASONABLE SUSPICION AND PROBABLE CAUSE	**5. FUNDING NUMBERS**
6. AUTHOR(S) George Tavares	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000	**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	**10. SPONSORING / MONITORING AGENCY REPORT NUMBER**

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.	**12b. DISTRIBUTION CODE** A

13. ABSTRACT (maximum 200 words)

This thesis examines the impact of predictive policing programs on the legal requisite to establish reasonable suspicion or probable cause in criminal investigations. In recent years, programs like the New York City Police Department's Domain Awareness System have helped the police address crime trends or patterns and have served as an investigative tool for the police to serve their communities better. This thesis examines these programs and their supporting technology, the history of their evolution, Supreme Court precedent regarding the Fourth Amendment rights of individuals, and the arguments presented by those who oppose these programs. Overall, this thesis recommends that police departments with predictive policing programs bolster the program's legitimacy, foster open transparency, assume accountability, educate stakeholders, respond to stakeholders' questions and concerns, and accentuate the programs' effectiveness in addressing crime. Furthermore, law enforcement agencies should establish independent oversight over the programs and train their officers to use the program properly. By implementing these recommendations, members of the community, as well as Fourth Amendment and civil rights advocates, may be more accepting of the use of these programs by police.

14. SUBJECT TERMS predictive policing, algorithms, Domain Awareness System, PredPol, Fourth Amendment, probable cause, reasonable suspicion, civil rights	**15. NUMBER OF PAGES** 85
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UU

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release. Distribution is unlimited.

DECODING JUSTICE: THE INFLUENCE OF PREDICTIVE POLICING ON REASONABLE SUSPICION AND PROBABLE CAUSE

George Tavares
Sergeant Supervisor Detective, New York City Police Department
BA, John Jay College of Criminal Justice, 2021

Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL
December 2023**

Approved by: Carolyn C. Halladay
Co-Advisor

Lynda A. Peters
Co-Advisor

Erik J. Dahl
Associate Professor, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

This thesis examines the impact of predictive policing programs on the legal requisite to establish reasonable suspicion or probable cause in criminal investigations. In recent years, programs like the New York City Police Department's Domain Awareness System have helped the police address crime trends or patterns and have served as an investigative tool for the police to serve their communities better. This thesis examines these programs and their supporting technology, the history of their evolution, Supreme Court precedent regarding the Fourth Amendment rights of individuals, and the arguments presented by those who oppose these programs. Overall, this thesis recommends that police departments with predictive policing programs bolster the program's legitimacy, foster open transparency, assume accountability, educate stakeholders, respond to stakeholders' questions and concerns, and accentuate the programs' effectiveness in addressing crime. Furthermore, law enforcement agencies should establish independent oversight over the programs and train their officers to use the program properly. By implementing these recommendations, members of the community, as well as Fourth Amendment and civil rights advocates, may be more accepting of the use of these programs by police.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

DAS	Domain Awareness System
DMV	Department of Motor Vehicles
GPS	global positioning system(s)
LAPD	Los Angeles Police Department
LPR	license plate reader
NYPD	New York City Police Department
NYSID	New York State identification number
POST	Public Oversight of Surveillance Technology (Act)

THIS PAGE INTENTIONALLY LEFT BLANK

EXECUTIVE SUMMARY

Predictive policing programs, now used by several police departments across the United States, have been a growing and important technological approach to addressing crime trends or patterns, thus assisting in criminal investigations. These programs, which use data-driven analysis and computer algorithms based on data obtained and gathered by the police, give law enforcement the ability to place resources where they are needed most to address crime trends or patterns. These programs also assist investigators in conducting their investigations by corroborating other gathered evidence or information to obtain reasonable suspicion or probable cause to arrest an individual.

The thesis examines these programs and their supporting technology and highlights the history and evolution of police departments using computer analytics to address crime, from the use of CompStat to the creation and use of PredPol and the Domain Awareness System. Various Supreme Court precedents regarding the Fourth Amendment rights of individuals, with an emphasis on the requirements needed by police to establish reasonable suspicion or probable cause during an investigation, are discussed. The present study examines the impact of computer-assisted predictive policing programs on reasonable suspicion and probable cause in criminal investigations by exploring the ways in which such programs and technology can be used to supplement traditional investigative techniques and the potential benefits and drawbacks of doing so.

The thesis begins with an overview of the history of predictive policing programs used by some U.S. police departments. The role of algorithms and the types of data that are analyzed by the programs are discussed. The thesis also examines the legal framework regarding Fourth Amendment rights as established by the U.S. Supreme Court. It also examines how predictive policing programs and other types of technology can be used to supplement traditional investigative techniques while ensuring that an individual's Fourth Amendment rights are not violated. It provides several examples of real-life scenarios in which predictive policing programs have been used successfully.

The thesis argues that such programs can be beneficial in identifying crime trends or patterns and identifying potential suspects. This information is key in corroborating other information or evidence that may help investigators obtain the necessary elements to establish reasonable suspicion or probable cause, which the courts require to arrest an individual. Next, the thesis dives into the arguments and concerns that have been raised by Fourth Amendment and civil rights advocates, who argue that predictive policing programs are biased toward low-income and minority communities because they use skewed data. Another concern raised by advocates is that police departments are not transparent about what data are used and how the programs work. Overall, the thesis argues that predictive policing programs can be a valuable tool for law enforcement agencies but must be used in a manner consistent with individuals' Fourth Amendment and civil rights.

Finally, the thesis proposes that these risks and concerns can be mitigated by police departments that establish their legitimacy, are transparent with stakeholders about how the programs work, take accountability, educate stakeholders on the rule of law, respond to stakeholders' questions and concerns, and highlight the positive aspects of the programs. The thesis further recommends that law enforcement agencies establish independent oversight over the programs and train law enforcement officers on the proper use of them in light of individuals' Fourth Amendment rights.

By being transparent with stakeholders and implementing the recommendations suggested in this thesis, law enforcement agencies can ensure that their use of predictive policing programs and other types of technology is both effective and constitutional and will be accepted by the members of the community and Fourth Amendment and civil rights advocates.

ACKNOWLEDGMENTS

Most importantly, I want to thank my beautiful wife, Edna, and our beautiful daughter, Gianna, for their love, support, and patience throughout the past 18 months. It wasn't easy, but my drive to make you proud sustained my will to keep going. To my mom, who sacrificed so much of herself to help me become the man I am today, thank you for your continued support and love throughout the years.

A special thank you goes to Chief Iglesias and Assistant Chief Baldassano for allowing me to participate in such a challenging and prestigious program. Also, I extend a special thank you to Captain Nyhus, who recommended the program and helped me with the extensive application process. I greatly appreciate your assistance. To the faculty and staff of the Naval Postgraduate School and the Center for Homeland Defense and Security, thank you for the first-class education, which I feel honored to have been given. Special thanks go to my thesis advisors, Carolyn Halladay and Lynda Peters, for their patience and guidance throughout the difficult thesis research and writing process. To my writing coach, Colette O'Connor, thank you so much for helping me form and write my thesis and for encouraging me to keep going during the times when I felt like giving up. To Greta Marlatt, thank you for helping me find the research readings that I needed for my thesis and for helping me organize my Zotero library. To Scott, thank you for being a friend during these past 18 months.

Finally, I extend sincere gratitude to my fellow members of the New York City Police Department, especially members of my unit. I feel honored and humbled to represent the greatest police department in the world. Over these past 21 years, I have been truly blessed to work with the greatest men and women in law enforcement.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

In January 2016, in East New York, Brooklyn, police discovered that a man had been killed during the commission of a burglary. The perpetrator had stabbed the victim numerous times and then set him on fire, leaving behind a baseball cap that the department vouchered for DNA testing. Detectives canvassed the area for witnesses and video cameras, attempting to identify a suspect. During the preliminary investigation, they also used the Domain Awareness System (DAS) to search for individuals recently arrested or convicted of burglary who resided in the area of the homicide. The New York City Police Department (NYPD) has used DAS, which integrates and analyzes various data the department has collected in its computer-assisted policing program, for more than a decade.[1] Officers at all department levels use DAS as a crime-fighting and investigative tool in their mission to address crime conditions in the communities they serve.

Among other individuals, DAS identified a man known as "Jahkeem," who lived approximately three streets from where the victim was killed.[2] Blurry video footage obtained from the crime location showed the suspect leaving the building after the crime. Still, one of the detectives who had previously arrested Jahkeem recognized him as the suspect. Jahkeem had been known to leave behind clothing or tools at the scenes of some of his crimes. In addition, the police had a known DNA sample from one of his previous arrests, which the laboratory compared to DNA recovered from the baseball cap. The comparison resulted in a match, providing the police with probable cause to arrest Jahkeem and charge him with homicide.[3]

This story highlights how a computer-assisted program used to establish reasonable suspicion was coupled with other evidence, including DNA, resulting in investigators' obtaining the probable cause needed to arrest an individual for a crime. The homicide

[1] E. S. Levine et al., "The New York City Police Department's Domain Awareness System," *Interfaces* 47, no. 1 (2017): 70.

[2] The name of the suspect has been changed in this thesis.

[3] "Brooklyn Man Sentenced to 45 Years to Life in Prison for Murder of Manhattan Chef," Brooklyn District Attorney's Office, November 8, 2019, http://www.brooklynda.org/2019/11/08/brooklyn-man-sentenced-to-45-years-to-life-in-prison-for-murder-of-manhattan-chef/.

investigation and arrest of Jahkeem might never have happened without the DAS identifying him as a suspect. Investigators corroborated the information from DAS with other data and evidence recovered during the investigation to build a chain of evidence supporting probable cause to arrest and charge Jahkeem with homicide.

A. PREDICTIVE POLICING PROGRAMS

According to Walter L. Perry, predictive policing "is the application of analytical techniques—particularly quantitative techniques—to identify likely targets for police intervention and prevent crime or solve past crimes by making statistical predictions."[4] Predictive policing programs help police departments identify crime trends in their communities using computer-based analytics so that they may apply their resources more efficiently in combating and preventing crime. Similar to the data analytics used in business to forecast market and industry trends to drive sales or marketing strategies, predictive policing analyzes data from various sources and uses the results to "anticipate, prevent and respond more effectively to future crimes."[5] However, predictive policing goes a step further by utilizing analytical techniques informed by machine-learning algorithms and statistical predictions. Figure 1 illustrates the way predictive policing programs work.

[4] Walter L. Perry et al., *Predictive Policing: The Role of Crime Forecasting in Law Enforcement Operations* (Santa Monica, CA: RAND Corporation, 2013), xiii, https://www.rand.org/pubs/research_reports/RR233.html.

[5] Beth Pearsall, "Predictive Policing: The Future of Law Enforcement?," *National Institute of Justice Journal*, no. 266 (2010): 16, https://www.ojp.gov/pdffiles1/nij/230414.pdf.

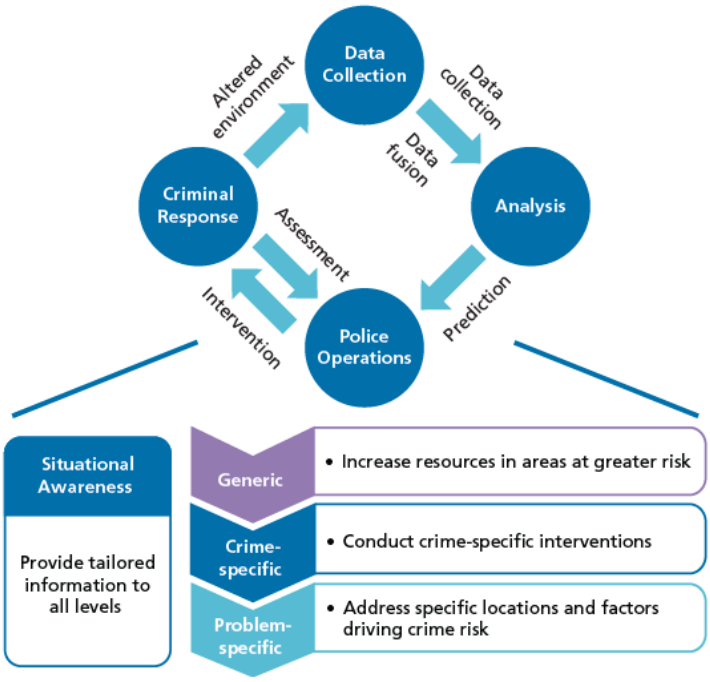

Figure 1. The Prediction-Led Policing Business Process.[6]

Predictive policing programs consist of a four-step process. First, as shown in Figure 1, comes the collection of data to use for analysis.[7] Second is analysis using machine-learning algorithms to inform predictions. The third step involves the police department's positioning available resources to address the crime patterns or trends identified through the process. The final step encompasses the criminals' response to the interventions that the police put in place. As a result of the police executives' allocation of resources to address a predicted crime trend or pattern, law enforcement may effectively address the pattern or trend, or the responsible individuals may relocate to continue their criminal activities. In the latter case, the police executives turn to the predictive policing program again, utilizing new data to identify the new area with a crime pattern or trend to formulate a new strategy.[8] The main components of predictive policing programs are

6 Source: Perry et al., *Predictive Policing*, 12.

7 Walter L. Perry and John S. Hollywood, "Predictive Policing: An Effective Tool, but Not a Crystal Ball," *RAND Blog*, November 14, 2013, https://www.rand.org/blog/2013/11/predictive-policing-an-effective-tool-but-not-a-crystal.html.

8 Perry et al., *Predictive Policing*, 12.

algorithms, which use data from official police sources, such as arrest reports, criminal complaints, and license plate readers (LPRs). Police departments throughout the United States employ predictive policing programs to mitigate crime conditions, identify individuals who may commit crimes, and conduct criminal investigations in an effort to protect the communities they serve.[9]

Algorithms drive how the program analyzes the available data to predict when and where crimes are most likely to take place so that police can prevent them.[10] Algorithms play a large part in today's society, especially with the continued advancement of cell phones and computers. Algorithms are used in the fields of business, public administration, media, social media, health care, and politics.[11] For example, if an individual searches the internet on his cellphone or laptop for a certain style of Nike sneaker and later logs into his Facebook account, he will likely see advertisements for Nike. Another example involves Walmart's learning through analysis of products sold and customer purchases what items will be in demand depending on a store's location and the time of year.[12] Algorithms are a set of instructions and rules that an application uses to help solve, identify, or complete a specific task that is asked of it. In other words, an algorithm is a computational procedure that creates a set of values to analyze data input into a system. The algorithm conducts an analysis of the data and produces output.[13] For example, if a sequence of numbers consisting of 31, 59, 26, 41, and 58 were input into an algorithm program with an instruction to sort the numbers, the output would be the numbers in ascending or descending order.[14]

---

9 Scott Harris, "Man and Machine: Predictive Policing Is the New Law Enforcement Sidekick," *Police Chief* 86, no. 1 (2019), https://www.policechiefmagazine.org/product-feature-man-and-machine/.

10 Harris, 2.

11 Anne-Britt Gran, Peter Booth, and Taina Bucher, "To Be or Not to Be Algorithm Aware: A Question of a New Digital Divide?," *Information, Communication & Society* 24, no. 12 (2021): 1780, https://doi.org/10.1080/1369118X.2020.1736124.

12 Pearsall, "Predictive Policing," 16.

13 Thomas H. Cormen et al., *Introduction to Algorithms*, 3rd ed. (Cambridge, MA: MIT Press, 2009), 5, ProQuest eBook Central.

14 Cormen et al., 5.

The algorithmic analysis of historical data contributes to the effectiveness of predictive policing programs. Armed with this information, especially hotspot mapping, which provides a visualization of the areas experiencing the highest crime, police officials can make informed decisions about utilizing their resources more efficiently to prevent and address identified crime trends and patterns.[15] For example, in New York City, police using the NYPD's DAS can search the CompStat 2.0 portion of the program and conduct a 28-day search of robberies within a specific command's area by inputting whether a weapon was used and the victim's or perpetrator's demographics. The algorithm-based program then outputs all the armed robberies that match the input criteria, including arrest information, whether an individual was arrested, any 9-1-1 calls, and other police data that apply to the specific incidents. The results can then be viewed on a hotspot map that reveals clusters or areas with a high incidence of robberies.[16] With this information, police commanders can put preventive measures in place to thwart further robberies. Figure 2 illustrates the three phases in the algorithm-driven analysis of available data in predictive policing programs.

15 Spencer Chainey, Lisa Tompson, and Sebastian Uhlig, "The Utility of Hotspot Mapping for Predicting Spatial Patterns of Crime," *Security Journal* 21, no. 1–2 (2008): 26, ProQuest.

16 Levine et al., "The New York City Police Department's Domain Awareness System," 77.

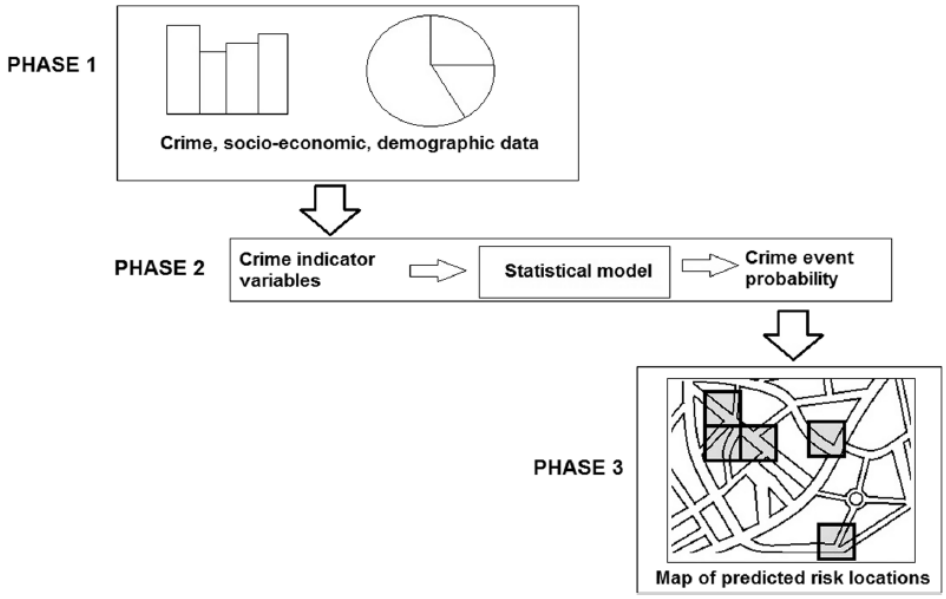

Figure 2. Flow Chart of Predictive Analysis.[17]

The first phase involves the collection of the data analyzed by the algorithms. The second phase encompasses the programmed algorithms' predictive analysis of the data to determine the probability of a crime occurring. The third and final phase is the application-generated map highlighting the areas with a high probability and risk of crime. In turn, the map provides police executives with an overview of identified areas of concern to place their resources accordingly.

Predictive policing programs have become a valuable resource for law enforcement by making officers more efficient and effective in combating crime and helping investigators during their investigations. [18] Predictive policing programs, however, have raised questions about how their use may affect an individual's civil and Fourth Amendment rights. During criminal investigations, the data obtained from predictive

[17] Source: Wim Hardyns and Anneleen Rummens, "Predictive Policing as a New Tool for Law Enforcement? Recent Developments and Challenges," *European Journal on Criminal Policy and Research* 24, no. 3 (2018): 205, ProQuest.

[18] Johanna Canaday, "How the Democratization of Technology Enhances Intelligence-Led Policing and Serves the Community" (master's thesis, Naval Postgraduate School, 2017), 29, https://hdl.handle.net/10945/56879.

policing programs alone are insufficient to establish probable cause. Still, they could provide reasonable suspicion.

In the 1981 U.S. Supreme Court case *United States v. Cortez*, Chief Justice Burger ruled, in delivering the court's opinion, that all the information in possession of law enforcement—including officers' observations, police reports, and "consideration of the modes or patterns of operations of certain kinds of lawbreakers" as corroborated by officers—constitutes the basis for reasonable suspicion.[19] Such suspicion allows an officer to stop temporarily, question, and pat down an individual for weapons; it does not confer the right to arrest and charge an individual. For investigators, reasonable suspicion of an individual leads to the identification of that person as a suspect until they obtain further information or evidence and corroboration either to confirm him as the perpetrator or to rule him out as a suspect.

In 2020, *United States v. Curry* presented the Fourth Circuit Court of Appeals with a case that questioned whether officers had *reasonable suspicion* to stop an individual.[20] In response to a recent increase in violent crime in the Creighton Court neighborhood of Richmond, Virginia, the Richmond Police Department assigned a team of officers to patrol the area. The neighborhood had experienced six shootings and two homicides in the previous three months, with the most recent homicide occurring just 11 days before the incident in question in this case.[21] On September 8, 2017, while on patrol, the officers heard numerous gunshots. The gunfire was confirmed through police dispatch via 9-1-1 calls, but none of the calls provided a description of the shooter. Officers observed numerous individuals walking away from the area that the police believed to be the gunfire's origin. The officers stopped and patted down one individual, Billy Curry, and recovered a firearm from his person. The court found that the police lacked reasonable suspicion in stopping and patting down Curry because their information and observations were limited and

19 United States v. Cortez, 449 U.S. 411 (1981).

20 United States v. Curry, 965 F.3d 313 (4th Cir. 2020).

21 Id. at 313.

vague. The majority opinion also criticized predictive policing programs because of their potential to be ineffective and biased.

Judge Wilkinson, who dissented from the court's ruling, argued that the officers' stop and frisk of Curry was justified and reasonable under the circumstances presented.[22] Judge Wilkinson maintained that the court's decision imposed another requirement on police by prohibiting them from considering the patrol area's history of violence when building their reasonable suspicion to stop and frisk an individual. He further argued that police departments, like Richmond County, have adopted predictive policing programs to make their communities safer by preventing crime before it occurs.[23] Judge Thacker, who concurred with the court's ruling, addressed Judge Wilkinson's dissent: "The 'innovation' of preventive policing, which uses computer algorithms to predict high crime areas, is no longer the shiny new object it may once have appeared to be, but instead has revealed itself to be tarnished with racial bias."[24]

Both *Cortez* and *Curry* examine the complexities that surround reasonable suspicion and the Fourth Amendment. They outline court precedent and lend insight into the nature of "Terry stops" and the standards needed for police to establish reasonable suspicion to stop an individual.[25] In *Curry*, the court ruled that the gunshots the police officers heard, among other information and observations, were insufficient to establish reasonable suspicion.[26] Judge Thacker, in concurring with the court's finding, stated that "predictive policing has been shown to be, at best, of questionable effectiveness, and at worst, deeply flawed and infused with racial bias."[27] In contrast, the court's verdict in *Cortez* held that "the totality of the circumstances—the whole picture—must be taken into account" in determining whether the police have enough specific, articulable information

22 Curry at 313.

23 Id. at 347.

24 Id. at 344.

25 Terry v. Ohio, 392 U.S. 1 (1968).

26 Curry at 313.

27 Id. at 344.

to believe a crime has been or will be committed.[28] Unlike in *Curry*, the decision in *Cortez* recognized that the officers' observations and knowledge, the history of the area, and the identification of a pattern and prior reports, which the officers corroborated, were sufficient to establish reasonable suspicion based on the "totality of the circumstances."[29]

United States v. Curry and *United States v. Cortez* have contributed to the ongoing debate surrounding predictive policing, a controversial approach to law enforcement that uses data analysis and algorithms to identify areas and individuals deemed at a higher risk of criminal activity. In *Curry*, the court ruled that the police officers lacked reasonable suspicion to stop and pat down an individual based on limited and vague information. The court also criticized predictive policing programs for their potential to be ineffective and biased. This case highlights the importance of gathering specific and articulable information to establish reasonable suspicion rather than relying on broad assumptions or predictive models. In contrast, *Cortez* established that "the totality of the circumstances . . . must be taken into account. . . . Officers must have a particularized and objective basis for suspecting the particular person stopped of criminal activity."[30] This case emphasizes the importance of a comprehensive and contextual approach to law enforcement rather than relying solely on data-driven predictions.

B. RESEARCH QUESTION

How can investigators establish probable cause to arrest an individual using a predictive policing program during an investigation while ensuring safeguards to protect an individual's civil liberties and Fourth Amendment rights?

C. LITERATURE REVIEW

This literature review examines the debate on predictive policing and related Fourth Amendment and civil rights concerns, primarily regarding the programs used during criminal investigations. Margo McGehee states that as technology advances daily, the

[28] Cortez at 418.

[29] Id. at 418.

[30] Id. at 411–12.

courts, law enforcement, and society must ensure that advancements do not affect civil rights.[31] Predictive policing programs emphasizing intelligence-led policing have become a powerful tool employed by police departments to protect the communities they serve and help solve crime.[32] Though law enforcement agencies view predictive policing programs as valuable in conducting investigations and preventing and responding to crime conditions, such programs raise concerns. This section examines case law; legal analyses; academic research; and law enforcement, Fourth Amendment, and civil rights perspectives on the topic.

1. Proponents of Predictive Policing

Predictive policing has become essential in fighting crime, countering terrorism, and conducting criminal investigations. Authors Albert Meijer and Martin Wessels assert that predictive policing allows "law enforcement agencies to apply these methods to deploy their resources more efficiently and effectively."[33] Meijer and Wessels describe two specific claims made by proponents about the benefits of predictive policing programs. The first claim is that "resources can be deployed more accurately in place and time."[34] The second claim is that "predictive policing techniques help to identify individuals that potentially will be involved in the act of crime either as a victim or offender."[35] Kelly Koss argues that predictive policing can also help restore low-income and minority communities' Fourth Amendment rights. In this context, predictive policing programs "corroborate an officer's 'high crime areas' designation, which could restore eroded Fourth Amendment protection to these neighborhoods."[36] Authors Ashley Johnson, Eric Egan,

31 Margo McGehee, "Predictive Policing Technology: Fourth Amendment and Public Policy Concerns," *University of Cincinnati Law Review* (2021), https://uclawreview.org/2021/02/17/predictive-policing-technology-fourth-amendment-and-public-policy-concerns/.

32 Canaday, "Democratization of Technology," 29.

33 Albert Meijer and Martijn Wessels, "Predictive Policing: Review of Benefits and Drawbacks," *International Journal of Public Administration* 42, no. 12 (2019): 1033, https://doi.org/10.1080/01900692.2019.1575664.

34 Meijer and Wessels, 1033.

35 Meijer and Wessels, 1034.

36 Kelly K. Koss, "Leveraging Predictive Policing Algorithms to Restore Fourth Amendment Protections in High-Crime Areas in a Post-Wardlow World," *Chicago-Kent Law Review* 90, no. 1 (2015): 303, https://scholarship.kentlaw.iit.edu/cgi/viewcontent.cgi?article=4066&context=cklawreview.

and Juan Londoño further argue that the various technologies available to law enforcement, including biometrics, sensors, and cameras, can better prepare officers to prevent, respond to, and solve crimes within the communities they serve.[37] However, these authors also argue that "police departments should conduct pilot studies on new police technology to ensure its effectiveness in the field."[38]

Predictive policing tools may help achieve greater procedural justice, fair treatment of suspects, and closer relationships with the community. Johnson, Egan, and Londoño discuss how the use of technology can lead to improvements in officer safety, training, and accountability. In terms of responsibility, Bennett Capers observes that some people believe predictive policing programs like police surveillance are a valuable and necessary tool not only to prevent crime but also to monitor for police brutality and abuses, as well as to help reduce racial profiling.[39] Jay Ashraf discusses how the NYPD has combined predictive policing and community policing programs to address crime while building community trust and enhancing community–police relations.[40] Though law enforcement sees predictive policing programs as a crime-fighting and investigative tool, these programs could also serve as a valuable tool for the community to ensure that officers are not violating individuals' Fourth Amendment and civil rights.

2. Opponents of Predictive Policing

Although proponents of predictive policing argue that the program protects communities from crime and terrorism and serves as an investigative tool, opponents maintain that predictive policing programs use biased data that unjustly target low-income and minority communities, resulting in police departments' "over-policing" these

37 Ashley Johnson, Eric Egan, and Juan Londoño, *Police Tech: Exploring the Opportunities and Fact-Checking the Criticisms* (Washington, DC: Information Technology & Innovation Foundation, 2023), 1, https://itif.org/publications/2023/01/09/police-tech-exploring-the-opportunities-and-fact-checking-the-criticisms/.

38 Johnson, Egan, and Londoño, 4.

39 Bennett Capers, "Crime, Surveillance, and Communities," *Fordham Urban Law Journal* 40, no. 3 (2013): 1, https://ir.lawnet.fordham.edu/ulj/vol40/iss3/2/.

40 Muhammad J. Ashraf, "Precision Policing: A Way Forward to Reduce Crime" (master's thesis, Naval Postgraduate School, 2020), 51, https://hdl.handle.net/10945/64864.

communities. Fei Yang warns of several "controversies around the use of predictive policing technologies in crime control and prevention."[41] The first controversy, he claims, is the increased police surveillance that may infringe on individuals' privacy rights as protected under the Fourth Amendment. A second controversy is the lack of transparency regarding the use of predictive policing programs and the type of data police departments collect, especially considering opponents' claims of bias in the data. The third controversy, according to Yang, is the narrow focus of predictive policing programs on individuals in targeted neighborhoods, making them more subject to police action than individuals in areas that are not targeted. Finally, the fourth controversy Yang notes involves the positive and negative results of predictive policing programs. When a predictive policing program anticipates a crime at a location that does not happen or when an individual expected to commit a crime does not, the result is positive for the community. An adverse effect occurs when the predictive policing program fails to identify a crime though one occurs, or the program fails to identify an individual who commits a crime.

Another concern of opponents of predictive policing programs and protectors of the Fourth Amendment is that predictive policing programs may lower the bar for law enforcement to establish reasonable suspicion on individuals, helping them justify more stops.[42] Meijer and Wessels assert that law enforcement agencies, especially those using predictive policing programs, can negatively affect ex-convicts' resocialization into society. Their criminal records supply data used to profile them, thus stigmatizing them and creating the potential that these individuals will return to a life of crime.[43] Ben Jones and Eduardo Mendieta argue that "using information about people's past associations, past behaviors, past run-ins with the law to make predictions about their risk of future criminality freezes people, Medusa-like, in their pasts, suspending them, condemning them

41 Fei Yang, "Predictive Policing," in *Oxford Encyclopedia of Criminology and Criminal Justice*, ed. Henry N. Pontell (Oxford: Oxford University Press, 2019), 11, https://www.researchgate.net/publication/342216493_Predictive_Policing_Oxford_Research_Encyclopedia_Criminology_and_Criminal_Justice_Oxford_University_Press.

42 Tim Lau, "Predictive Policing Explained," Brennan Center for Justice, April 1, 2020, https://www.brennancenter.org/our-work/research-reports/predictive-policing-explained.

43 Meijer and Wessels, "Predictive Policing," 1036.

to permanent stigmatization."[44] The main concern of many opponents of predictive policing is that the programs themselves are biased, not only resulting in the identification of people who are innocent but also subjecting individuals to profiling solely for crimes they committed in the past.

The array of controversies highlighted by Fei Yang and others ranges from intrusive overwatch to uncertain data to the mixed effectiveness of crime prediction. These controversies increase opponents' concerns that predictive policing stigmatizes members of low-income and minority communities, as well as potentially erode the threshold for reasonable suspicion.

D. RESEARCH DESIGN

First, this thesis focuses on the history of predictive policing in the United States and discusses the distinct types of technologies that make up predictive policing as described in government and scholarly articles. The thesis also discusses how law enforcement executives use predictive policing programs to deploy personnel and resources more efficiently and how these programs are vital during investigations.

Next, scholarly works, articles, and theses on predictive policing programs are analyzed for the concerns raised about law enforcement's use of these programs and other types of technology, especially how these types of tools could violate individuals' Fourth Amendment and civil rights.

The thesis then focuses on how law enforcement agencies integrate predictive policing programs into investigations by highlighting real-life scenarios of investigators' obtaining probable cause using these programs. For example, if an investigator obtains a video of a suspect involved in a robbery, the image is sent to the unit that runs the facial recognition program. If a photo submitted matches someone in the police database, the investigator has a lead in the investigation, which gives him reasonable suspicion that the identified individual may have committed the robbery. This thesis identifies the types of

[44] Ben Jones and Eduardo Mendieta, *The Ethics of Policing: New Perspectives on Law Enforcement* (New York: New York University Press, 2021), 283.

other information and evidence that law enforcement must obtain during the investigation to build a case regarding the person identified by the facial recognition match, thereby providing probable cause to arrest the individual.[45] This step involves an analysis of decisions in which the courts have outlined how police officers may use second-hand information to obtain reasonable suspicion of a person. Additionally, the thesis examines case law to establish when reasonable doubt, coupled with other evidence and independently corroborated by the officers, rises to the level of sufficient probable cause for an arrest.

Through examples, this thesis examines safeguards to ensure that investigators' use of predictive policing information during an investigation remains unbiased and that the process to corroborate the information duly protects individuals' civil and Fourth Amendment rights. Finally, the thesis makes recommendations for safeguards with predictive policing programs and other forms of technology that encourage the community and Fourth Amendment and civil rights groups to accept these programs.

45 Alabama v. White, 496 U.S. 325 (1990).

II. THE NYPD'S DOMAIN AWARENESS SYSTEM

The NYPD's DAS, developed in 2008 in collaboration with Microsoft, represents one of various predictive policing programs available to law enforcement agencies throughout the United States.[46] When DAS was created, the department intended that it be used primarily by members of the Counterterrorism Bureau in their efforts to protect the city from terrorist threats after the 9/11 attacks on the city. The goal of the program was to serve as a repository for sensitive police data from complaints, arrest reports, criminal records, and LPRs located throughout the city.[47] It also included access to security cameras located at high-profile, high-risk terrorist targets in the city.[48]

In 2013, the NYPD, along with Microsoft, advanced the availability of the program to every precinct in the city.[49] With this new advancement, DAS replaced the department's use of CompStat to "employ analytics and operations research to inform officer's decisions."[50] CompStat had been the NYPD's first computer-based program utilizing crime data to help with resource allocation and crime prevention in the communities the department served.[51] The expanded capability with DAS has allowed precinct commanders to identify crime trends or patterns in their command areas, enabling them to allocate resources more effectively.[52] It also has presented investigators with a new, effective, and efficient investigative tool for criminal investigations.[53] As Thomas M. Chan states in his thesis on the internet of things in crisis management, the DAS program's "immediate

46 Levine et al., "The New York City Police Department's Domain Awareness System," 73.

47 Stephenie Slahor, "NYPD and Microsoft's DAS . . . Coordinated Surveillance and Crime Data," *Law and Order* 60, no. 11 (2012): 16, ProQuest.

48 Levine et al., "The New York City Police Department's Domain Awareness System," 73.

49 Levine et al., 73.

50 Levine et al., 71.

51 FORA.tv, "Predictive Policing: The Evolution of Law Enforcement?," video, 1:36 of 3:28, YouTube, June 24, 2010, https://www.youtube.com/watch?v=slF-f4KRNYM.

52 Levine et al., "The New York City Police Department's Domain Awareness System," 77.

53 Levine et al., 81.

dissemination of data, directly and indirectly, impacts how the NYPD deploys its personnel and uses data."[54]

With the development of a mobile version of the program in 2014, DAS was made available to every officer on the street through a smartphone or smart tablet. By April 2016, all NYPD officers had been issued a DAS-enabled smartphone, giving officers in the field real-time access and alerts to active 9-1-1 calls and any major incidents throughout the city.[55] The alerts have been essential in improving police responses to emergencies, facilitating evidence collection, and identifying and arresting violent criminals.[56] DAS also has the capability of transmitting flyers of wanted individuals or persons reported missing immediately to all DAS-enabled smartphones.[57] With these capabilities, this new technology potentially enables timelier recoveries, rescues, and, when appropriate, arrests by responding officers.[58]

A. DAS OVERVIEW

While serving as the chief of police for the Los Angeles Police Department (LAPD), former NYPD Police Commissioner William Bratton envisioned a predictive policing model that could enhance community-oriented and intelligence-based policing.[59] The goal of creating a predictive policing program was for the police to be proactive in preventing crime. In an interview during the 2010 *Wired* Business Conference, Bratton explained that after 9/11, law enforcement agencies went into a new era of intelligence and information gathering, which could be seen as an extension of CompStat.[60] The DAS program, unlike CompStat, offers various analytical and investigative functions that can be

54 Thomas M. Chin, "IOT in Crisis Management" (master's thesis, Naval Postgraduate School, 2022), 50, https://www.hsdl.org/c/chds-theses/.

55 Levine et al., "The New York City Police Department's Domain Awareness System," 73.

56 Levine et al., 80.

57 New York City Police Department, *Domain Awareness System: Impact and Use Policy* (New York: New York City Police Department, 2021), 3, https://www.nyc.gov/assets/nypd/downloads/pdf/public_information/post-final/domain-awareness-system-das-nypd-impact-and-use-policy_4.9.21_final.pdf.

58 New York City Police Department, 3.

59 Perry et al., *Predictive Policing*, 4.

60 FORA.tv, "Predictive Policing," 1:36.

vital to an investigation, such as assisting in identifying crime patterns and trends by showing clusters of crime. It also serves as a one-stop shop for investigators to search various computer databases available in the DAS program.[61]

1. Enhanced Crime Pattern Identification and Analysis

The DAS program can analyze criminal complaints and arrests to identify crime patterns or trends in a particular area of the community. Through CompStat 2.0, the database's latest evolution accessed in DAS, investigators can perform a search for data within a 28-day, 56-day, year-to-date, or specific date range for various crimes, criminal complaints, arrests, summonses, 9-1-1 calls, or other data obtained by the police.[62] The system then displays a map of the command's coverage area and dots where robberies, for example, have occurred.

If a cluster of robberies appears in a particular area, the investigator can investigate these complaints and ascertain whether they have similarities. A cluster of robberies could indicate patterns in the location, the day of the week or time of day, the type of victim, or the perpetrator's description.[63] If similar robbery complaint reports, for example, have similar descriptions of the perpetrator, investigators can link these data through a robbery pattern.

By placing similar robbery complaints into a robbery pattern, police executives may observe and identify patterns or trends more easily and distribute resources more effectively in the area to prevent further robberies. Doing so also helps investigators ascertain whether the same individual is committing the robberies in a pattern. In many cases, the pattern involves the same individuals committing the same crimes with the same

61 E. S. Levine and J. S. Tisch, "Analytics in Action at the New York City Police Department's Counterterrorism Bureau," *Military Operations Research* 19, no. 4 (2014): 7, https://www.jstor.org/stable/24838523.

62 New York City Police Department, *Domain Awareness System*, 3.

63 Khadija M. Monk, Justin A. Heinonen, and John E. Eck, *Street Robbery* (Washington, DC: Office of Community Oriented Policing Services, 2010), 4, https://permanent.fdlp.gov/gpo10394/e041021268-pop-strobberyb.pdf.

modus operandi (means of committing the crime).[64] Identifying crime patterns or trends can help investigators corroborate any evidence or information obtained from each robbery complaint to obtain probable cause to arrest an individual.

2. Cross-Reference Data

Through the various data available in the DAS program, investigators can easily gather information and immediately cross-reference it with other available databases. For example, if the investigator can retrieve an image of a potential suspect from a security camera near the location of a crime, he can then submit the image to the Real Time Crime Center's Facial Recognition Unit. The unit can then compare the image to available arrest and parole photo databases.[65] Photos of individuals whose arrests have been dismissed or sealed are not available for comparison. Once the comparison is completed, the Facial Recognition Unit's detective notifies the case investigator whether there is a potential match.[66] The detective from the Real Time Crime Center then forwards the match pedigree to the investigator if a potential match exists. Even if there is a potential match, the case investigator does not yet have sufficient probable cause to arrest the individual, though the information may provide a lead that helps establish reasonable suspicion. Through the NYPD's Enterprise Case Management System, the analyst from the Facial Recognition Unit attaches his findings and report to the investigator's digital case file for court purposes, making them available to the assigned district attorney and the perpetrator's defense attorney upon an arrest.[67]

If the Facial Recognition Unit's analyst has a possible match, the individual's information becomes a lead for the case investigator. The investigator can conduct a criminal record search on the suspect based on the individual's information; in the case of

64 *Merriam-Webster*, s.v. "modus operandi," accessed September 16, 2023, https://www.merriam-webster.com/dictionary/modus+operandi.

65 New York City Police Department, *Facial Recognition Technology*, Procedure No. 212–129 (New York: New York City Police Department, 2020), 1, https://www.nyc.gov/assets/nypd/downloads/pdf/nypd-facial-recognition-patrol-guide.pdf.

66 New York City Police Department, 3.

67 New York City Police Department, 3.

New York, such a search includes a New York State identification (NYSID) number, which is assigned to an individual who has been fingerprinted in the state after being charged with a crime or for civil purposes.[68] If the individual has an NYSID number, investigators can more easily obtain information about the individual, including his last known address, phone numbers, aliases, accomplices, tattoos, and other information attained during the individual's arrest. Any arrests that have been voided, sealed, or dismissed may not be viewed by the investigator without a warrant issued by a judge granting access to the information.[69] With the suspect's NYSID number, the investigator can conduct a criminal record search of the individual through the DAS program, which yields the suspect's criminal history, including past arrests, summonses, and paroles, and probation history. If an arrest on the report is sealed, the investigator cannot view any information related to that arrest. Before DAS, investigators had to go through various individualized databases to conduct their computer checks, print the results, and then compare them individually with other database search results. With the creation of DAS, however, computer database searches have been simplified, making the investigator more efficient.

Another database within the DAS program available to investigators in New York is the New York State Department of Motor Vehicles (DMV) database. Investigators can conduct a DMV check through the DAS program to ascertain whether an individual has a driver's license or a registered vehicle and access a list of vehicles owned by the individual in the past. Based on the information received from the DMV database search, if the suspect has a vehicle, the investigator can run known license plates against data from LPRs that have captured the vehicle while in operation or when parked. LPRs are posted throughout the city, especially on bridges, tunnel entrances, and exits, as well as on mobile police vehicles. The NYPD's LPR database can help investigators flag a vehicle for investigation and identify the vehicle's movement history if it has passed an LPR.[70] The LPR records

68 New York State Division of Criminal Justice Services, *The New York State Criminal History Record* (New York: New York State Division of Criminal Justice Services, 2019), https://www.criminaljustice.ny.gov/ojis/documents/Rap-Sheet-Guide.pdf.

69 Michael Paul Jackson, "Judge Rules NYPD Must Overhaul Its Systems to End Its Unlawful Use of Sealed Arrest Records," Bronx Defenders, March 29, 2023, https://www.bronxdefenders.org/judge-rules-nypd-must-overhaul-its-systems-to-end-its-unlawful-use-of-sealed-arrest-records/.

70 David Keen, "Algorithm Blues," *Development and Change* 51, no. 4 (2020): 1150.

the location and time that the vehicle was observed, an image of the vehicle, and the vehicle's plate number.[71]

B. FROM REACTION TO PREDICTION

Employing an intelligence-centered approach, predictive policing applications model and forecast future crimes based on identified patterns and trends, thus proactively preventing crimes.[72] In exploring several predictive policing tools, this section finds that while computer analytics and statistics have been used in the past to react to crime trends and patterns, some police departments have changed their focus from reactive to proactive to use their resources more efficiently.[73]

1. CompStat

The history of predictive policing and the use of computer statistics to address identified crime patterns and trends can be traced to the NYPD's creation of CompStat in 1994. CompStat (short for Computer Statistics) is a computer program that analyzes data to identify crime patterns so that police officials can properly deploy resources to high-crime areas.[74] The program relies on data from past crimes to track and react to existing crime trends. CompStat is also used as a performance measurement tool to hold police commanders and their officers accountable to the communities they serve.[75] It relies on information sharing, responsibility, and accountability to improve a police department's

71 New York City Police Department, *License Plate Readers: Impact and Use Policy* (New York: New York City Police Department, 2021), 3, https://www.nyc.gov/assets/nypd/downloads/pdf/public_information/post-final/license-plate-readers-lpr-nypd-impact-and-use-policy_4.9.21_final.pdf.

72 Jennifer Bachner, "Predictive Policing: Preventing Crime with Data and Analytics," *Business of Government* (Spring 2014): 87, https://businessofgovernment.org/sites/default/files/Management%20Predictive%20Policing.pdf.

73 Bilel Benbouzid, "To Predict and to Manage: Predictive Policing in the United States," *Big Data & Society* 6, no. 1 (January 2019): 2, ProQuest.

74 Daniel Harsha, "Award: Compstat: A Crime Reduction Management Tool," Harvard Kennedy School, Ash Center for Democratic Governance and Innovation, January 1, 1996, https://ash.harvard.edu/news/compstat-crime-reduction-management-tool.

75 Kathleen Gilsinan and Adam Stephan, "From Compstat to Gov 2.0: Big Data in New York City Management," School of International and Public Affairs Case Consortium at Columbia University, accessed April 26, 2023, https://ccnmtl.columbia.edu/projects/caseconsortium/casestudies/127/casestudy/www/layout/case_id_127.html.

effectiveness in addressing crime.[76] Currently, CompStat operates under its new name, CompStat 2.0.[77]

CompStat was an essential and powerful tool for the NYPD in the 1990s, especially with the high incidence of violence throughout the city. On May 18, 1993, the *New York Post* called the 75th Precinct, which covers Brooklyn's East New York and Cypress Hills neighborhoods, a "killing ground" because someone was killed there every 63 hours.[78] Because of the high crime rate and violence plaguing the city, New Yorkers took to the polls and elected Rudy Giuliani as the city's new mayor.[79] Giuliani, a former U.S. attorney for the Southern District of New York from 1983 to 1989, was known for his tough stance on crime.[80] With his campaign promise of "cracking down on crime," Mayor Giuliani appointed William Bratton as police commissioner on January 10, 1994.[81] Commissioner Bratton and his aides recognized that data would need to be gathered and analyzed rapidly to reduce crime in the city.[82] Commissioner Bratton helped develop and create CompStat, which was seen as a way to address crime while serving as a tool for police executives to measure, monitor, and control officers' activity.[83] A reduction in total crime by 27.44 percent and a decrease in homicides by 38.66 percent citywide were partially attributed to the NYPD's use of CompStat. CompStat was so successful that on January 1, 1996, the Ash Center for Democratic Governance and Innovation at Harvard's Kennedy School

76 Bureau of Justice Assistance and Police Executive Research Forum, *Compstat: Its Origins, Evolution, and Future in Law Enforcement Agencies* (Washington, DC: Police Executive Research Forum, 2013), 2, https://bja.ojp.gov/sites/g/files/xyckuh186/files/Publications/PERF-Compstat.pdf.

77 Levine et al., "The New York City Police Department's Domain Awareness System," 77.

78 Laura Celona and Bruce Golding, "The Reign of Terror When Murder Was King of New York in the '80s and '90s," *New York Post*, December 14, 2017, https://nypost.com/2017/12/13/the-reign-of-terror-when-murder-was-king-of-new-york-in-the-80s-and-90s/.

79 "Giuliani Wins on Crime," *Human Events* 53, no. 46 (1993): 6, ProQuest.

80 Carol L. Fisher, "Quality Leadership," *Biopharm International* 18, no. 5 (2005): 8, https://www.biopharminternational.com/view/editor-chief-quality-leadership.

81 Kathleen Gilsinan and Adam Stepan, *Big Data for Public Safety*, SIPA-14-0004.0 (School of International and Public Affairs Case Consortium at Columbia University, 2014), 2, https://www.sipa.columbia.edu/sites/default/files/2023-01/Case_Big%20Data%20for%20Public%20Safety.pdf.

82 Paul E. O'Connell, "An Intellectual History of the Compstat Model of Police Management" (PhD diss., City University of New York, 2002), 10, ProQuest.

83 Benbouzid, "To Predict and to Manage," 2.

awarded the NYPD its yearly Innovations in American Government Award for the department's novel use of the program from 1993 to 1995.[84] CompStat was adapted for use by other police departments around the United States.[85] Because of the program's success, other major U.S. city police departments, such as the LAPD and the Philadelphia, Miami, and Chicago police departments, adopted CompStat.[86] Notably, the police chiefs of these cities—for example, John Timoney, who served as the chief of the Philadelphia Police Department—were former police executives under Bratton's tenure as the NYPD police commissioner.[87] Timoney was credited with reducing crime in Philadelphia after introducing CompStat to the police department.[88]

2. PredPol

In 2008, while serving as the chief of the LAPD, Bratton, along with researchers from UCLA, conducted a research project with the goal of understanding whether and how the data provided by CompStat could help forecast when and where crimes would occur instead of merely providing a historical overview of crime.[89] The researchers had hoped this new approach would benefit the various police departments in the country dealing with fewer officers and resources because of budget constraints and cuts from the economic recession that affected the country in 2008.[90] Some police departments faced with the dilemma of having to work with smaller budgets and fewer personnel moved from being reactive to crime trends and patterns using CompStat to being proactive in preventing crime

84 Harsha, "Award: Compstat," 2.

85 Bureau of Justice Assistance and Police Executive Research Forum, *Compstat*, 6.

86 Bureau of Justice Assistance and Police Executive Research Forum, 6.

87 Benbouzid, "To Predict and to Manage," 2.

88 Robert Moran, "Crime Reviews Will Be Closed," *Philadelphia Inquirer*, October 27, 2006, 1, ProQuest.

89 "Overview," PredPol, accessed September 9, 2023, https://www.predpol.com/about/.

90 Charlie Beck and Collen McCue, "Predictive Policing: What Can We Learn from Wal-Mart and Amazon about Fighting Crime in a Recession?," *Police Chief*, November 2009, 1, https://controverses.minesparis.psl.eu/public/promo16/promo16_G16/acmcst373ethics.weebly.com/uploads/2/9/6/2/29626713/police-chief-magazine.pdf.

by using various combinations of computer-advanced mathematics, data analytics, machine-learning algorithms, and statistical techniques to forecast potential crime.[91]

As a result of this research project between the LAPD and UCLA, PredPol (short for Predictive Policing) was created. The LAPD and the Santa Cruz Police Department in California were the first to begin using PredPol.[92] Aimed at identifying areas of a community with a historically high instance of crime, the program relies on data that list "the type of crime, the day and time of the crime, and the location of the crime."[93] The program's algorithm then analyzes the data to identify areas where crimes are highly probable. The analytical processing of the data uses specific mathematical formulas or computational procedures to process and analyze all available data. Machine-learning algorithms then process the analyzed data to predict where and when a crime is most likely to occur and offer insight into future crime.[94] Police executives can then review and recommend where to place resources to address crime trends and patterns in their communities more efficiently. Predictive policing has become the new powerful technological tool for departments to be more efficient and better serve their communities.[95]

In November 2009, the National Institute of Justice, the Bureau of Justice Assistance, and the LAPD held a predictive policing symposium with researchers and police officials from various police departments across the United States, along with crime analysts and scientists, all gathering, as Beth Pearsall states, "to discuss and explore the policy implications, privacy issues, and technology of predictive policing."[96] The symposium aimed to discuss predictive policing programs and how they could impact the

91 Simon Egbert and Susanne Krasmann, "Predictive Policing: Not Yet, but Soon Preemptive?," *Policing & Society* 30, no. 8 (2020): 907, https://doi.org/10.1080/10439463.2019.1611821.

92 Andrew Guthrie Ferguson, "Predictive Policing and Reasonable Suspicion," *Emory Law Journal* 62, no. 2 (2012): 268, https://digitalcommons.wcl.american.edu/facsch_lawrev/750/.

93 PredPol, "Overview."

94 David Black, "Here Comes Predictive Policing: The Next Wave of Crimefighting Technology Is Being Tested in New York City," *New York Daily News*, January 24, 2016, https://www.nydailynews.com/opinion/david-black-predictive-policing-article-1.2506580.

95 Beck and McCue, "Predictive Policing," 1.

96 Pearsall, "Predictive Policing," 16.

future of policing. Charlie Beck, former police chief of the LAPD, notes that predictive policing has allowed law enforcement to shift the focus from "what happened to what will happen" and deploy the right amount of personnel and resources to attempt to stop it from occurring.[97] As characterized by former NYPD police commissioner Bratton, with predictive policing, "we have the ability to use the information to save lives, reduce injuries, and improve safety."[98]

3. Domain Awareness System

In 2012, the NYPD expanded CompStat by creating the DAS program in partnership with Microsoft. This new technological tool emphasizes data-driven analysis of an intelligence-led approach to the city's counterterrorism and crime prevention efforts by being more proactive than reactive.[99] The DAS program has become the NYPD's predictive policing tool not only with its ability to help police executives place their resources more efficiently but also as a valuable asset for investigators when conducting their criminal investigations.[100] The program's data, along with other evidence, if corroborated and as part of the "totality of the circumstances test," can help investigators build reasonable suspicion or probable cause to stop and arrest an individual for a crime.[101]

DAS serves as a crime data warehouse, storing data from all the various individual report databases of the NYPD for easy analysis by the program. For example, the NYPD has a database for criminal complaint reports, arrest reports, and domestic violence incident reports.[102] The DAS program uses historical data from 9-1-1 calls, criminal complaints, arrest records, warrants, and other police records with the assistance of the computer application–based algorithm to analyze, identify, and predict crime trends and patterns.[103]

---

97 Pearsall, 17.

98 Pearsall, 19.

99 Jones and Mendieta, *The Ethics of Policing*, 270.

100 "Technology," New York City Police Department, accessed October 5, 2023, https://www.nyc.gov/site/nypd/about/about-nypd/equipment-tech/technology.page.

101 Ferguson, "Predictive Policing and Reasonable Suspicion," 312.

102 Slahor, "NYPD and Microsoft's DAS," 16.

103 Levine et al., "The New York City Police Department's Domain Awareness System," 73.

It also collects data from parking summonses and LPRs.[104] The program then analyzes the available data and provides NYPD executives with a predictive model that illustrates areas associated with crime patterns or trends for optimal resource allocation to address crime accordingly.

C. THE ANALYTICAL AND INVESTIGATIVE CAPABILITIES OF DAS

At the heart of DAS lies the program's ability to analyze various historical and geospatial data sources, including 9-1-1 calls, criminal complaints, arrest records, warrants, and other police records, with computer-based algorithms to identify potential crime trends or patterns.[105] The historical data found in these sources include information on the victims, perpetrators, witnesses, and incident locations. Then, the algorithm-based program analyzes the data to develop hypotheses about potential crime.[106]

1. Identify Patterns and Trends: Comparing Incidents

DAS might identify an area within a police precinct with a large number of robbery incidents during the morning hours. In this case, the precinct commander may place his available resources in the area to prevent further robberies. The results of the application may also serve as a tool for investigators during their investigations. The application can help investigators, for example, identify and locate vehicles of interest involved in a crime using LPRs placed in various city areas and on police department vehicles. These data and other evidence, which must be corroborated, may provide enough evidence for investigators to establish reasonable suspicion or even probable cause to arrest an individual for a crime. For example, an NYPD police executive may query the DAS application for robberies within a 28-day period in his precinct. DAS then analyzes the available data from the aforementioned sources to highlight the robberies on a map, which illustrates locations of reported robberies within the defined parameters. The map helps the police executive visualize the results of the data analysis of robberies in the precinct, thus

104 Levine and Tisch, "Analytics in Action," 73.

105 Levine et al., "The New York City Police Department's Domain Awareness System," 73.

106 Egbert and Krasmann, "Not Yet, but Soon Preemptive?," 30.

allowing him to place his resources in these areas. It also helps with investigations by showing clusters of crimes that may be committed by the same individual or identifying the driving pattern of a suspect in a crime or someone on the NYPD's watchlist.[107]

2. Forecasting Crime

The DAS application used by the NYPD can also forecast crime, especially in areas identified as hotspots.[108] These clusters indicate high concentrations of crime compared to other areas.[109] Identifying areas that are more vulnerable to crime based on historical data gives police departments an opportunity to be proactive in addressing crime patterns and trends.[110]

D. CONCLUSION

With these advances in technology, predictive policing programs have become an essential tool for police department executives in identifying and addressing crime trends and patterns within the communities they serve by effectively placing department resources where they are needed. As technology has developed, police departments have taken advantage of these systems, thereby transforming modern-day policing from a reactive approach to a proactive one. Predictive policing programs, like DAS, have thus profoundly impacted how police departments use innovative technology. In his thesis, Thomas M. Chin states, "New York City's DAS demonstrates how integrating technology in smart cities can improve the safety and security of an urban center."[111] While predictive policing programs have been met with both praise and criticism, the continued use of these programs remains a topic of debate as police departments work to address the concerns raised by Fourth Amendment and civil rights advocates regarding privacy, bias, and the use of historical data.

---

107 Levine et al., "The New York City Police Department's Domain Awareness System," 6, 7.

108 Meijer and Wessels, "Predictive Policing," 1034.

109 Anthony A. Braga, Andrew V. Papachristos, and David M. Hureau, "The Effects of Hot Spots Policing on Crime: An Updated Systematic Review and Meta-Analysis," *Justice Quarterly* 31, no. 4 (August 2014): 634, https://doi.org/10.1080/07418825.2012.673632.

110 Meijer and Wessels, "Predictive Policing," 1033.

111 Chin, "IOT in Crisis Management," 53.

III. FOURTH AMENDMENT AND CIVIL LIBERTY ISSUES IN PREDICTIVE POLICING

The creation and use of predictive policing programs have raised several concerns among Fourth Amendment and civil rights advocates.[112] One of their complaints is that police departments are not transparent about how their programs work and what types of data are being analyzed by computer algorithms. Fourth Amendment and civil rights advocates also express their unease about police accountability particularly regarding whether the programs are being used within the rule of law and what safeguards have been put in place to ensure individuals' rights are not violated. Some advocates claim that predictive policing programs are ineffective while others claim that predictive policing programs potentially violate individuals' Fourth Amendment and civil rights. While no prior court cases or court precedent addresses predictive policing programs as they pertain to the Fourth Amendment, the use of other types of technology to gather information or evidence has been found sufficient to establish reasonable cause or probable cause as long as the information is corroborated with other information or evidence.

Three legal cases—*Terry v. Ohio*, *Katz v. United States*, and *United States v. Tuggle*—have shaped what law enforcement must do to comply with Fourth Amendment requirements and how law enforcement may use technological tools. The Supreme Court first applied a two-prong test in the 1967 *Katz* case to reach its decision.[113] The first part of the test determines whether the individual has an expectation of privacy in the space at issue. The second part of the test determines whether any other person would find that the individual's expectation of privacy is reasonable. In the 1968 *Terry* case, the court upheld that current standards for probable cause to protect citizens from unreasonable intrusions into their privacy and from "unfounded charges of crime."[114] In the 2022 *Tuggle* case, which reiterated the legal test for the expectation of privacy, the Seventh Circuit Court of

112 Lyria Bennett Moses and Janet Chan, "Algorithmic Prediction in Policing: Assumptions, Evaluation, and Accountability," *Policing & Society* 28, no. 7 (2018): 810, https://doi.org/10.1080/10439463.2016.1253695.

113 Katz v. United States, 389 U.S. 347 (1967).

114 Terry at 36.

Appeals determined that recording the exterior of Tuggle's residence did not violate the Fourth Amendment.[115] The court reasoned that Tuggle did not have an expectation of privacy because his house exterior was visible to the public.

A. FOURTH AMENDMENT AND CIVIL RIGHTS CONCERNS

One concern of Fourth Amendment and civil rights advocates is that law enforcement's predictive policing policies vary in how the data are vetted and verified and what measures the police take to ensure that the data are accurate and the methods of collecting information are consistent with the law.[116] The NYPD, for instance, highlights the guidelines for its retention and use of data for DAS in an annual impact and use policy report.[117] In New York State, for example, if an individual is arrested and the case is dismissed or sealed, the DAS application indicates the arrest. However, officials cannot see the personal information of the arrested individual listed on the complaint and arrest report.[118] In 1976, New York State enacted Criminal Procedure Law 160.50, which requires that all records pertaining to criminal cases be sealed if a criminal case has been exhausted without a conviction.[119] In March 2023, Manhattan Supreme Court Judge Lyle Frank ruled in a case between the Bronx Defenders and the NYPD over the department's alleged use of sealed arrest records.[120] He upheld the 1976 law and ordered the department to remove all sealed records from "predictive technologies" that it used, ensuring that DAS excludes such records from queries by law enforcement.[121]

There have also been concerns regarding an individual's privacy because of the predictive policing programs' reliance on heavy collection and analysis of substantial

115 United States v. Tuggle, 4 F.4th 505 (7th Cir. 2021).

116 Moses and Chan, "Algorithmic Prediction in Policing," 810.

117 New York City Police Department, *Domain Awareness System*.

118 New York City Police Department, 6, 7.

119 Act to Amend the Criminal Procedure Law, the Executive Law, the Correction Law, the Judiciary Law and the Civil Rights Law, in Relation to Automatic Sealing of Certain Convictions, A.B. 1029, 2023–2024 Gen. Assemb., Reg. Sess. (N.Y. 2023), https://nyassembly.gov/leg/?default_fld=%0D%0A&leg_video=&bn=A01029&term=2023&Summary=Y&Actions=Y&Memo=Y&Text=Y.

120 Jackson, "Judge Rules NYPD Must Overhaul Its Systems."

121 Jackson.

amounts of data, which may include private and sensitive information.[122] Another argument used by civil rights advocates is that the system is biased, especially in low-income and minority neighborhoods.[123] Studies have revealed that some police departments rely on historical data that are biased, unlawful, or manipulated to conduct their predictive policing programs.[124] Using the results of a predictive policing program based on unreliable historical data falsely reinforces the conclusion that low-income urban areas are crime hotspots. Tim Lau argues that predictive policing programs' use of algorithms "could help reinforce racial biases in the criminal justice system."[125] Proponents argue that the historical data are not biased because predictive policing algorithms rely not only on arrests and officers' reports but also on crimes that victims and witnesses report.[126]

According to critics, predictive policing also raises questions about the Fourth Amendment's protection against unreasonable searches and seizures due to the possibility of increased surveillance and unjustified suspicion of innocent individuals.[127] In addition, civil rights activists state that the use of predictive policing programs can stigmatize some individuals who have committed crimes and served their time in jail. For example, the unfettered use of predictive policing and its potential for profiling could lead to an ex-convict's returning to a life of crime.[128]

Another concern for Fourth Amendment and civil rights activists is the lack of police transparency in how predictive policing programs work.[129] Some advocacy groups like the Brennan Center for Justice have sued police departments for not releasing information on what historical data are being analyzed by the algorithms found in

122 Meijer and Wessels, "Predictive Policing," 1036.

123 McGehee, "Predictive Policing Technology," 7, 8.

124 Lau, "Predictive Policing Explained."

125 Lau, para. 7.

126 Katherine Weathington, "A Critical Study of Geospatial Algorithm Use in Crime Analysis and Predictive Policing" (master's thesis, Marquette University, 2020), 4, ProQuest.

127 "Data Mining, Dog Sniffs, and the Fourth Amendment," *Harvard Law Review* 128, no. 2 (2014): 696, https://harvardlawreview.org/print/vol-128/data-mining-dog-sniffs-and-the-fourth-amendment/.

128 Meijer and Wessels, "Predictive Policing," 1036.

129 Yang, "Predictive Policing," 12.

predictive policing programs.[130] Fourth Amendment and civil rights advocates argue that the communities' citizens want to know how predictive policing programs work and whether it affects their Fourth Amendment rights.[131] They want to voice their input and have their concerns heard and answered before any police technology is used. Advocates like Barry Friedman argue that police engagement with the community is vital before a decision is made regarding the use of modern technology.[132] By not being transparent, police departments may stigmatize individuals and groups through the use of predictive programs, especially those based on profiling.[133]

Proponents of predictive policing programs counter that total transparency in how predictive policing programs work will reveal too much to potential criminals, which will help them anticipate the police's responses to crime conditions, thus risking harm to the community and the police.[134] In New York City, for example, because of pressure to be more open and transparent about ensuring DAS and other technologies are being used in accordance with the protections guaranteed under the First and Fourth Amendments, the New York City Council in 2020 passed the Public Oversight of Surveillance Technology (POST) Act.[135] The POST Act requires the NYPD to be transparent regarding the use of any technology used, especially concerning the DAS application. As part of the act, the NYPD must prepare and publish an impact and use policy report 90 days before any new

130 "Brennan Center for Justice v. New York Police Department," Brennan Center for Justice, August 6, 2021, https://www.brennancenter.org/our-work/court-cases/brennan-center-justice-v-new-york-police-department.

131 Yang, "Predictive Policing," 12.

132 Barry Friedman, *Unwarranted: Policing without Permission* (New York: Farrar, Straus and Giroux, 2021), 326.

133 Meijer and Wessels, "Predictive Policing," 1036.

134 Erik Bakke, "Predictive Policing: The Argument for Public Transparency," *New York University Annual Survey of American Law* 74, no. 1 (2018): 24, https://annualsurveyofamericanlaw.org/wp-content/uploads/2019/08/74-1-Predictive-Policing-The-Argument-for-Public-Transparency.pdf.

135 Creating Comprehensive Reporting and Oversight of NYPD Surveillance Technologies, N.Y.C. Local Law No. 65 (2020) (codified at N.Y.C. Admin. Code § 14–188 and N.Y.C. Charter § 803[c-1]), https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3343878&GUID=996ABB2A-9F4C-4A32-B081-D6F24AB954A0.

surveillance technology is used and issue a yearly policy report.[136] The NYPD must also issue an annual report titled *Domain Awareness System: Impact and Use Policy*.[137] The NYPD publishes this policy report to inform the public not only of how DAS is used but also of any changes to the system and what safeguards have been put in place to ensure that the information obtained is being used lawfully while also guaranteeing that individuals' rights are protected.

B. CASE LAW

Outside of New York, some courts have addressed cases involving predictive policing programs. For example, in *United States v. Curry* in 2020, the Fourth Circuit Court of Appeals examined the question of predictive policing's role in determining reasonable suspicion.[138] In 2017, officers from the Richmond Police Department were patrolling a neighborhood designated a hotspot by predictive policing algorithms because of six shootings and two homicides that had occurred there over the previous three months.[139] While on patrol in this neighborhood, the officers heard gunshots nearby and immediately responded to the area. Meanwhile, transmissions from the dispatcher reported that 9-1-1 calls were coming in, but none of the callers provided a description of the shooter. When the officers arrived on scene, they observed a group of men walking away from an open field near an apartment building. Officers approached an individual named Billy Curry and asked him to lift his shirt. Curry complied with the officer's instructions; however, the officer claimed he could not see what was in Curry's waistband as the man turned away. Then, the officer requested backup and performed a pat-down search of Curry, revealing a revolver in his waistband.[140] The officer based his pat-down search on exigent circumstances, noting the history of violence in the area and concern for the officer's safety.

136 "The Public Oversight of Surveillance Technology (POST) Act: A Resource Page," Brennan Center for Justice, March 5, 2021, https://www.brennancenter.org/our-work/research-reports/public-oversight-surveillance-technology-post-act-resource-page.

137 New York City Police Department, *Domain Awareness System*.

138 Curry at 313.

139 Kaitlynd Hiller, "Predictive Policing and the 'Charter,'" *Manitoba Law Journal* 44, no. 6 (2021): 237, Lexis-Nexis.

140 Hiller, 237–38.

The Fourth Circuit Court of Appeals ruled that the officer's stop and search lacked reasonable suspicion, even though the court acknowledged there was a high incidence of violent crime in the area.[141] In his concurring opinion, Justice Thacker stated that predictive policing programs threaten the Fourth Amendment rights of individuals.[142] Justice Thacker further stated that computer-driven hunches do not raise the level of reasonable suspicion in furtherance of a stop, question, or arrest. In his dissenting opinion, Justice Wilkinson stated, "Richmond, like other municipalities throughout the country, has adopted certain 'predictive policing' strategies to make its streets safer."[143] Based on his fellow Justices' concurring opinions in the case, Justice Wilkinson stated that it would be hard to imagine how predictive policing programs could continue based on the majority's interpretation of the program and how the Fourth Amendment applies.

The evolution of Fourth Amendment jurisprudence, as seen in Supreme Court decisions in *Katz v. United States*, *Smith v. Maryland*, and *Carpenter v. United States*, highlights the court's collaborative efforts in balancing an individual's Fourth Amendment rights with the right of law enforcement to utilize technology in conducting investigations in an ever-advancing world of technology. As technology has advanced from wiretaps to cell phone location tracking, the Supreme Court has redefined the boundaries of an "individual's reasonable expectation of privacy," especially after establishing the two-prong test in *Katz*.[144] In *United States v. Tuggle*, the court considered the public's accessibility to certain information, indicating that while technology continues to expand law enforcement's surveillance capabilities, such expansion does not grant police free rein to access personal data without carefully considering an individual's Fourth Amendment rights.[145] Whether ruling on the intimate nature of cell phone data, as seen in the case of *Riley v. California*, or the potential for continuous surveillance with global positioning systems (GPS), as seen in *United States v. Jones*, the Supreme Court has recognized the

141 Curry at 313.

142 Id.at 345.

143 Curry at 347.

144 Katz at 347.

145 Tuggle at 505.

game-changing power of technology while often favoring the protection of an individual's privacy against unwarranted intrusions, especially when the information is directly personal and intimate and provides a glimpse into an individual's life.[146]

While the Supreme Court has addressed the use of predictive policing programs in establishing reasonable suspicion or probable cause, as discussed in *Curry*, the court's potential analysis of these programs based on precedent may focus on whether the data available through these programs are open information that law enforcement may use and whether the information is sufficient to establish reasonable suspicion or probable cause based on "the totality of the circumstances."[147] The court may also focus on whether the individual considered a suspect has an expectation of privacy, believing that the information available in the programs is too personal, which would require law enforcement to obtain a warrant before using the information in an investigation. The court may also decide whether the data obtained from predictive policing programs, like DAS, can be used by the criminal justice system in analyzing the totality of the circumstances.

C. LEGAL SAFEGUARDS IN THE AGE OF TECHNOLOGY AND PREDICTIVE POLICING PROGRAMS

As technology evolves, the intersection of technology, law enforcement, and an individual's Fourth Amendment and civil rights continues to grow more complex. While prior landmark Supreme Court cases have addressed whether law enforcement's use of technology in an investigation affects an individual's Fourth Amendment rights, as of this writing, no case has directly addressed the Fourth Amendment's role in predictive policing programs. Supreme Court precedent has established crucial safeguards for individuals, reaffirming their rights in the face of law enforcement's evolving use of technology, as explored in the following subsections.

146 Riley v. California, 573 U.S. 373 (2014); United States v. Jones, 565 U.S. 400 (2012).

147 Curry at 316.

1. Katz v. United States, 389 U.S. 347 (1967)

Without a warrant, federal authorities set up a listening device in a telephone booth known to be used by Charles Katz to take illegal gambling wagers.[148] Based on the information obtained, Katz was arrested and convicted of illegal gambling. Katz appealed the conviction based on the premise that the police had violated his Fourth Amendment rights by placing the listening device in the booth where he expected privacy without a search warrant, and the Supreme Court agreed. Supreme Court Justice Harlan, in his concurring opinion, created a two-prong test (the so-called Katz test) to determine whether a person had a reasonable expectation of privacy.[149] The first prong of the test dealt with the question of whether the person had a reasonable expectation of privacy.[150] The second prong of the test questioned whether another person would believe that the person's expectation of privacy [was] reasonable.[151] Katz met these standards, so he had an expectation of privacy that another person would believe was reasonable.

2. Smith v. Maryland, 442 U.S. 735 (1979)

The police, with the cooperation of the telephone company and without obtaining a warrant, placed a pen register on Michael Lee Smith's phone to ascertain the phone numbers that he had been dialing after he was identified as a suspect in making threatening phone calls to a robbery victim.[152] Based on the information obtained from the pen register and other evidence, Smith was arrested and convicted. His attorneys argued that placing the pen register without a warrant violated Smith's Fourth Amendment rights. The Supreme Court held that Smith had no legitimate expectation of privacy when he used his telephone; thus, the police did not need a warrant for the pen register. The court further stated that when Smith voluntarily used his telephone, he assumed the chance that the

148 Katz at 347.

149 Id. at 347.

150 Id. at 361–62.

151 Id.at 361–62.

152 Smith v. Maryland, 442 U.S. 735 (1979).

information—in this case, the phone numbers he dialed—might be turned over to the authorities.

3. United States v. Tuggle, 4 F.4th 505 (7th Cir. 2021)

In November 2021, the Seventh Circuit Court of Appeals ruled in the case of *United States v. Tuggle*, which involved police surveillance of an individual's residence using a pole camera on a public utility pole.[153] A pole camera was positioned to face Travis Tuggle's front door and driveway, which had no fence or other barrier preventing observation of these areas. The pole camera was set up for 18 months and operated 24 hours a day, seven days a week. Based on the video obtained from the pole camera and other evidence, Tuggle was indicted, arrested, and charged with narcotics trafficking.[154] Tuggle argued that his Fourth Amendment rights had been violated because he had an expectation of privacy. The court dismissed this argument, stating that he had no expectation of privacy because his front door and driveway were open to public view.[155] If Tuggle had a fence or some other barrier preventing the public and law enforcement from viewing his property, he would have had a reasonable expectation of privacy, but because the view was open to the public, there was no Fourth Amendment violation.[156]

4. United States v. Jones, 565 U.S. 400 (2012)

A law enforcement task force placed a GPS tracking device on a vehicle registered to the wife of Antoine Jones.[157] Law enforcement obtained a warrant to place the device on Jones's vehicle for 10 days, but the task force placed the device after the warrant had expired. Information obtained from the tracking device was used to indict Jones and several other individuals for narcotics trafficking. The Supreme Court ruled that the task force violated Jones's Fourth Amendment rights by placing the GPS device on his vehicle. In

153 Tuggle at 505.

154 Id. at 505.

155 "Criminal Procedure—Fourth Amendment—Seventh Circuit Holds Long-Term, Warrantless Video Surveillance Is Not an Illegal Search—*United States v. Tuggle*, 4 F.4th 505 (7th Cir. 2021)," *Harvard Law Review* 135, no. 3 (2022): 928–35.

156 Tuggle at 505.

157 Jones at 400.

delivering the court's opinion, the late Supreme Court Justice Anthony Scalia stated that law enforcement's placing the GPS device on Jones's wife's vehicle violated his Fourth Amendment rights as it amounted to an illegal warrantless search of his vehicle, which was one of Jones's personal effects.[158]

5. Florida v. Harris, 568 U.S. 237 (2012)

Clayton Harris was stopped by a sheriff's deputy from the Liberty County Sheriff's Office in Florida for a traffic violation.[159] Aldo, a K-9 (police dog) trained in detecting narcotics, was called to the scene. The K-9 alerted his handler to the driver's side door handle of Harris's vehicle for possible narcotics. Though no narcotics were found, the deputies discovered ingredients commonly used to manufacture methamphetamine and arrested Harris. On a later date, the same dog was used to conduct a search of Harris's vehicle during another vehicle stop. The K-9 alerted his handler to the vehicle again, but no narcotics or contraband was found. During the trial for the first arrest, Harris's defense attorney argued that the K-9's alerts on both occasions had been too unreliable to establish probable cause for a search. The Supreme Court ruled that the totality of the circumstances, which included the dog's training and certification, should be considered when determining whether a K-9's alert provides probable cause.[160]

6. Riley v. California, 573 U.S. 373 (2014)

In this Supreme Court case, police searched the cell phones of individuals who had been arrested without a search warrant.[161] Some of the contents were later used to arrest and convict the individuals. The court found that the warrantless search of the cell phones was a violation of the individuals' Fourth Amendment rights, stating that a cell phone can hold a vast amount of intimate and personal information about an individual, thus requiring a search warrant. Though police can search a person's individual property upon arrest, a

158 Jones at 400.

159 Florida v. Harris, 568 U.S. 237 (2012).

160 Id. at 237.

161 Riley at 373.

cell phone is more personal because of the amount of information and data that it can reveal about an individual's life.[162]

7. Carpenter v. United States, 585 U.S. (2018)

Timothy Carpenter was convicted of committing a series of robberies based on a month's worth of cell phone site location information that investigators had obtained without a search warrant.[163] The information showed that Carpenter had been near the robbery locations during the days and times of these incidents. Based on this information and other evidence, Carpenter was arrested and convicted of committing the robberies. The Supreme Court found that access to Carpenter's cell phone site location information by law enforcement without a search warrant was a violation of his Fourth Amendment rights.[164]

Supreme Court precedent should guide investigators' use of technological tools, thus ensuring they uphold individuals' Fourth Amendment rights during investigations that rely on predictive policing programs. The following is a list of considerations for investigators when using technology.

a. Individual's Expectation of Privacy

By using the two-prong test set by the court in *Katz v. United States*, investigators can evaluate whether the individual has an expectation of privacy and whether others would consider that expectation reasonable.

b. The Necessity of Obtaining a Warrant

Investigators can obtain a warrant if an individual has an expectation of privacy, especially when it comes to a particular area like a home or personal effects like a cell phone, as seen in *Carpenter v. Maryland*. The investigator would still have to prove to the court there is probable cause to obtain the warrant.

---

162 Riley at 373.

163 Carpenter v. United States, 138 S. Ct. 2206 (2018).

164 Id. at 2206.

c. Public Domain

Investigators should recognize that any information or activity that is carried out by an individual in public view is not protected by the Fourth Amendment, as seen in the case of *United States v. Tuggle*.

d. Voluntary Disclosure and Third-Party Information

Investigators should recognize that any information an individual shares with a third party, like a telephone company, as seen in the case of *Carpenter v. Maryland*, is not protected by the Fourth Amendment.

e. Accuracy, Reliability, and Depth of Information

As seen in *Florida v. Harris*, the reliability and accuracy of technology or techniques like K-9 alerts can be used to establish probable cause if corroborated by the investigator. With the use of technology, investigators should recognize that technology often reveals a lot of personal and sensitive information about an individual.

D. CONCLUSION

With the increased complexity of law enforcement's use of technology and an individual's Fourth Amendment and civil rights, concerns surrounding predictive policing programs and their impact on privacy have intensified. There are continued legal concerns regarding the use of predictive policing programs, especially their potential impact on an individual's expectation of privacy and protection from unreasonable search and seizure. Through precedent, the Supreme Court has established a legal framework for the police to ensure their use of technological tools complies with the protections guaranteed to an individual under the Fourth Amendment. With the growth of technology, especially programs and applications used by the police, the courts will be tasked with analyzing and reevaluating court precedent to ensure that individuals' Fourth Amendment and civil rights are not violated when they are stopped or arrested.

IV. PROBABLE CAUSE AND REASONABLE SUSPICION

Integrating predictive policing programs into criminal investigations can be useful and vital to investigators. This chapter assesses how the data acquired from predictive policing programs like DAS, coupled with other evidence, can help investigators establish reasonable suspicion or the probable cause needed to arrest an individual. The Supreme Court has determined that predictive policing program data could be a factor in establishing reasonable suspicion, especially if the data show a high incidence of crime.[165] The chapter begins by defining reasonable suspicion and probable cause. The next part of the chapter examines the various analytical and investigative capabilities of predictive policing programs like DAS that help criminal investigators identify potential suspects. By using real-life scenarios, the chapter also evaluates how the information obtained through DAS can help investigators corroborate other evidence or information to establish reasonable suspicion or probable cause. Finally, the chapter assesses the current measures implemented by the courts to ensure that any evidence obtained by the police to establish reasonable suspicion or probable cause is corroborated to ensure that an individual's Fourth Amendment and civil rights are not violated.

A. CASE LAW

Probable cause and reasonable suspicion are legal standards that law enforcement must meet to conduct police actions such as investigative stops, searches, seizures, and arrests. Many of these legal standards are based on Supreme Court cases that dealt with an individual's rights as granted under the Fourth Amendment. Probable cause is considered the higher standard because it provides the police the right to arrest an individual, obtain a search warrant, and seize an individual's property.[166] In the 1878 Supreme Court case *Stacey v. Emery*, Justice Hunt, in delivering the court's opinion, referenced Judge Washington's definition of probable cause in *Munn v. Dupont*.[167] Judge Washington stated

165 McGehee, "Predictive Policing Technology."

166 Terry at 1.

167 Stacey v. Emery, 97 U.S. 642 (1878).

that probable cause is based on "a reasonable ground of suspicion, supported by circumstances sufficiently strong in themselves to warrant a cautious man in the belief that the party is guilty of the offence with which he is charged."[168] Probable cause, though, is a lower standard of proof than beyond a reasonable doubt, the standard needed for a conviction.

Before the police can make an arrest, conduct a search, seize property, or apply for a search warrant, they must have probable cause. In order for the police to detain and question an individual temporarily or to conduct a pat down of the individual's outer garments for weapons, the officer must have reasonable suspicion.[169] Predictive policing programs like DAS can provide investigators with leads, but the programs' results alone are insufficient to establish the standards for probable cause or reasonable suspicion. However, when the information obtained from the predictive policing program is corroborated by and combined with other evidence, investigators may meet the legal standard of probable cause or reasonable suspicion.[170] The Supreme Court has called such corroboration of observations and evidence "the totality of the circumstances."[171] The totality of the circumstances requires the court to examine all relevant factors, evidence, and circumstances associated with the case at the time police action is taken to make a decision regarding its legality.[172] Two different standards are used for probable cause and reasonable suspicion. For reasonable suspicion, the police can briefly detain and question an individual based on the objectively reasonable belief based on "specific and articulable facts which, taken together with rational inferences from those facts," that the individual may be or has been involved in some criminal activity.[173] For probable cause, which

168 Munn v. Dupont, 3 Wash. 37 (1811), quoted in *Stacey*, 97 U.S. at 645.

169 Terry at 10.

170 Ferguson, "Predictive Policing and Reasonable Suspicion," 290.

171 Illinois v. Gates, 462 U.S. 213 (1983).

172 Schneckloth v. Bustamonte, 412 U.S. 218 (1973).

173 Terry at 21.

requires a higher level of proof, the police must have specific facts or circumstances that provide a substantial basis for the probability that a crime has occurred or is imminent.[174]

Several Supreme Court cases have dealt with reasonable suspicion, including the landmark *Terry v. Ohio* case in 1968. Detective Martin McFadden of the Cleveland Police Department was in plain clothes patrolling the downtown area for pickpockets and shoplifters when he noticed John W. Terry and Richard Chilton, whom McFadden had never seen before in the area.[175] McFadden became suspicious based on his observations, including seeing the men pass one of the stores in the area and look inside the storefront windows several times. When the men met up with another individual, identified simply as Katz in the opinion, Detective McFadden decided to stop all three individuals. While stopping the individuals, McFadden said he turned Terry around to face the two other individuals and felt a revolver inside his overcoat. McFadden then ordered the men into the store, took Terry's coat, and searched the other two individuals, recovering another firearm from Chilton. According to Chief Justice Warren, in his opinion for the court, the initial stop of the individuals was appropriate because of their suspicious behavior. Detective McFadden's experience, along with the individuals' actions, led him to believe a crime was imminent, which provided him with cause to stop them and gave him the right to pat down the individuals' clothing for his and others' safety. In this case, there was sufficient evidence to establish reasonable suspicion that the men were about to commit a crime and that two of them were armed based on the totality of the circumstances.

In another landmark case, the court held that if an officer receives information from a victim, witness, anonymous individual, confidential informant, or other law enforcement officer, the information received may be enough to establish reasonable suspicion if it is observed and corroborated independently by the police. In the 1990 case *Alabama v. White*, Montgomery police officers received an anonymous tip that a woman would be leaving her apartment building at a certain time, carrying a brown attaché case filled with cocaine, and

174 Terry at 235–239.

175 Id. at 1.

driving a brown Plymouth station wagon with a broken right taillight.[176] The suspect would then be heading to Doeby's Hotel. With the information provided by the anonymous tip, which the police corroborated by observing the individual and vehicle and verifying the information, the officers stopped the vehicle and found cocaine in the attaché case, as the anonymous caller had described. The Supreme Court found that the police had reasonable suspicion to stop the individual because the specific details provided by the anonymous caller were corroborated independently by the police.[177]

In the 1983 case of *Illinois v. Gates*, the court examined whether the police met the standard of probable cause, while discussing the sufficiency of the evidence in the case including detailed information received from an anonymous tip, which was then corroborated independently by the police and used to obtain a search warrant under which law enforcement officers seized evidence.[178] An anonymous individual sent a letter to the Bloomingdale Police Department stating that a couple, identified as Sue and Lance Gates, would be traveling to Florida on May 3 to purchase narcotics to bring back to Bloomingdale.[179] The anonymous individual explained that the Gateses lived on Greenway in a condominium and that Sue would be driving their car to Florida while Lance would be flying there. When the couple arrived in Florida, the vehicle was loaded with narcotics. Instead of flying back to Bloomingdale, Mr. Gates drove the vehicle while Mrs. Gates flew home.[180] A detective from the Bloomingdale Police Department opened an investigation and began to corroborate the information provided in the anonymous letter, including the fact that the Gateses lived on Greenway.[181] The investigator requested assistance from members of the Drug Enforcement Administration, who surveilled Mr. Gates as he disembarked from his flight in Florida and then took a taxi cab to a hotel in West Palm Beach, Florida. There, he entered a room registered to his wife. The next day, Gates was

176 White at 325.

177 Id.at 325.

178 Gates at 216–217

179 Id. at 213.

180 Id. at 213.

181 Id.at 213.

observed driving a vehicle registered and owned by Gates. Based on the anonymous letter and the detective's corroboration of the information provided, a search warrant was executed and resulted in the recovery of a large quantity of marijuana from the Gateses' car and another quantity of marijuana, as well as weapons and paraphernalia, from their residence.[182] The judge ruled there had been probable cause to issue a search warrant for the Gateses' residence and vehicle.

The courts have also found that officers' personal knowledge and experience contribute to the totality of the circumstances in determining whether the officers established reasonable suspicion. In 1976, members of the Border Patrol were patrolling the southern central area of Arizona near the Mexican border, an area officers knew from experience was a crossing point in the desert for illegal aliens coming from Mexico to be smuggled into the United States via Arizona's Highway 86.[183] Border Patrol officers discovered several clues over two months, including that an individual nicknamed "Chevron" had been leading these aliens and leaving his boot print at the scene.[184] Based on these clues, the officers believed that Chevron had repeatedly led numerous illegal aliens from the border based on boot patterns that traced his repeated path to the pickup location. The officers also determined that Chevron operated early in the mornings around Milepost 122 on Highway 86 and that he usually worked on weekends. Chevron, they surmised, had made no trips for two weeks, and the trips he had made coincided with good weather. Based on Chevron's patterns, the information that officers had collected, and their professional knowledge, which was corroborated by their own observations, the officers anticipated when and from which direction the suspect would be leading another group of illegal immigrants to the designated pickup location. On January 31, 1977, the officers were successful in arresting Chevron after predicting that he would be there that day. This success was due to their knowledge of the area; identification of Chevron's patterns including the day of the week, time of day, and weather during which he would be carrying out his illegal activities; the type of vehicle that he would be using, and the direction of

182 Gates at 213.

183 Cortez at 419.

184 *Merriam-Webster*, "modus operandi."

flight that he would be taking.[185] The question presented to the court was whether the officers had reasonable suspicion to stop the vehicle. The court found that the totality of the circumstances, based on the pattern identification by the officers, corroborated by and founded on professional experience, gave the officers reasonable suspicion to stop the vehicle. The court's decision highlighted the importance of "considering the entire picture" before determining whether a particularized and objective basis exists for suspecting criminal activity, thereby providing police with reasonable suspicion to stop a suspect.[186]

These Supreme Court cases demonstrate the court's willingness to consider the totality of the circumstances in determining whether the police established reasonable suspicion or probable cause to arrest an individual. In these cases, the court reemphasized the value of considering multiple factors when evaluating whether the officer's actions violated an individual's Fourth Amendment rights. The Supreme Court's approach to the totality of the circumstances considers corroboration, pattern identification, and an officer's professional knowledge when determining the legal standards needed for reasonable suspicion or probable cause.

B. THE ROLE OF PREDICTIVE POLICING PROGRAMS IN PROBABLE CAUSE AND REASONABLE SUSPICION

An investigator can develop the reasonable suspicion to detain temporarily or probable cause to arrest an individual based on information obtained through a predictive policing program and other evidence that the investigator can use to corroborate the information. Leveraging technology and traditional investigative steps can be a powerful combination that aids in solving crimes.

For example, a detective may conduct a 28-day search for robberies in his command using the CompStat 2.0 feature within the DAS program. He notices a cluster of robberies in a particular part of the command area. When the investigator looks at the individual robbery complaints to glean any similar characteristics, he notices three robberies in the cluster show similarities. The investigator creates a pattern and begins to review each case

185 Cortez at 411.

186 Id. at 411.

to ascertain what type of evidence or leads he may have. In one of the robberies in the pattern, he can obtain security video footage of an individual who fits the description of the perpetrator given by the victim. The investigator obtains a still image of the individual, which he then submits to the Facial Recognition Unit to conduct a facial comparison with the images in the arrest and probation database.

The analyst at the Facial Recognition Unit conducts a comparison of the image with images of individuals who have been arrested or who are on parole. The analyst gets a possible match and sends the results back to the detective investigating the robbery pattern. The information sent to the detective includes the individual's photo as well as personal information. The results of the comparison are documented in the robbery pattern investigative case folder in the Enterprise Case Management System. The possible match does not provide probable cause but may provide reasonable suspicion. The robbery pattern investigator then conducts a criminal record search through the DAS program to view the potential suspect's arrest history, last known addresses, and vehicle registration.

The search reveals that the individual has been arrested in the past for robberies like the ones in the robbery pattern being investigated. The search also reveals that the individual owns a 1998 Pontiac Grand Am with New York license plate number 234-ABC. The investigator conducts an LPR search for the vehicle, which yields a photograph from an LPR camera on a police vehicle approximately two streets away from the robbery location and 10 minutes before the robbery. The investigator can verify and corroborate where the individual resides with the information obtained from the individual's criminal arrest history report and DMV records. The investigator goes to the address where the individual lives and observes a security camera near the front door. The investigator then contacts the superintendent of the building, requesting access to the camera system to view footage of the location on the day the robbery occurred. The footage shows the individual leaving his residence approximately 10 minutes before the robbery and then returning to the residence approximately 15 minutes later, wearing the same clothing described by the victim. Information and evidence obtained through the DAS program during the investigation can be important because it can be used to corroborate other information and evidence used in court to constitute the totality of the circumstances in the case.

Based on the investigative steps taken by the investigator and other supporting factors thus far corroborated, the investigator has reasonable suspicion that this individual is responsible for the robbery. The investigator then presents a photo array to the victim. A photo array consists of six photos of individuals, including the suspect, who have been arrested in the past and who match the suspected perpetrator's description. The photos are placed randomly in a folder and then presented to a victim or witness. If the victim or witness picks the suspect, the investigator has established probable cause to arrest the individual. Once the individual is arrested, the investigator can conduct a line-up with the victims or witnesses of the other robberies in the pattern to verify whether the suspect is the perpetrator of these robberies as well.[187]

This scenario illustrates how the analytical/search features in predictive policing programs like DAS combined with other investigative steps taken by the investigator can lead to reasonable suspicion or probable cause. As the courts have said, reasonable suspicion or probable cause can be established based on the totality of the circumstances and if the investigator independently corroborates the evidence and information.[188] The ability for investigators to use data obtained from predictive policing programs like DAS, along with other evidence, as long as it is corroborated, can help them reach the threshold needed to obtain reasonable suspicion or probable cause.

C. CONCLUSION

Predictive policing programs like DAS have the potential to transform criminal investigations by providing investigators with a potentially powerful tool to prevent crime and identify suspects. With the use of data analytics and machine-learning algorithms, police departments can better place their resources in areas dealing with a crime trend or pattern. Predictive policing programs also serve as an investigative tool for investigators to establish reasonable suspicion or probable cause.

187 "Live Police Lineups: How Do They Work?," National Institute of Justice, accessed October 3, 2023, https://nij.ojp.gov/media/image/19686.

188 White at 325.

Fourth Amendment and civil rights activists have raised concerns regarding how the use of such programs and other technological tools by police during investigations can potentially violate individuals' Fourth Amendment rights. The Supreme Court has established guidelines based on legal precedent to address these concerns. Based on these guidelines, investigators can establish reasonable suspicion or probable cause using technological tools if corroborated by the investigator with other information or evidence. The integration of data obtained from predictive policing programs into criminal investigations is a significant step forward in solving crimes. Nevertheless, police must protect individuals' Fourth Amendment rights and ensure that their predictive policing programs are applied fairly and without bias.

THIS PAGE INTENTIONALLY LEFT BLANK

V. CONCLUSION

Predictive policing programs like DAS will continue to develop and grow as technology continues to advance. While there are continued concerns about their use, their benefits in protecting members of the community should not be ignored.[189] Data-driven policing, especially from these programs, helps police executives improve their "strategic and tactical decisions" when ascertaining where to place their officers and resources in areas of need.[190] Police departments that use predictive policing programs will need to continuously evaluate how successful these programs are and how accepting the communities they serve are to such programs, balancing the need to address crime trends and patterns with the mandate to respect individuals' Fourth Amendment rights

Many opponents of predictive policing argue that police departments are not transparent about how the programs are used. As part of the evaluation process of determining whether predictive policing programs are successful, police departments should also consider whether the departments are transparent about how the programs work. Promoting transparency could help ameliorate the concern of predictive policing opponents that police departments are not being forthright about how the program works and what types of data are used.

Some police departments—like the LAPD and the Santa Cruz Police Department, the first police departments in the country to adopt PredPol—have stopped using PredPol as their predictive policing program. The LAPD's chief of police, Michael Moore, has stated that the department would stop using the program due to financial issues caused by the coronavirus epidemic.[191] Chief Moore has attributed the end of the program to financial

189 Ishmael Mugari and Emeka E. Obioha, "Predictive Policing and Crime Control in the United States of America and Europe: Trends in a Decade of Research and the Future of Predictive Policing," *Social Sciences* 10, no. 6 (2021): 10, https://doi.org/10.3390/socsci10060234.

190 Maris Herold and Tamara Herold, "Lessons for the Field: A Checklist for Fair and Just Data-Driven Policing," Police 1, February 10, 2023, https://www.police1.com/chiefs-sheriffs/articles/lessons-for-the-field-a-checklist-for-fair-and-just-data-driven-policing-qBKCQBRpVCoN33UT/.

191 Leila Miller, "LAPD Will End Controversial Program That Aimed to Predict Where Crimes Would Occur," *Los Angeles Times*, April 21, 2020, https://www.latimes.com/california/story/2020-04-21/lapd-ends-predictive-policing-program.

constraints, but critics claim the LAPD stopped using PredPol due to continuous pressure from the community because it "unfairly targeted Latino and black neighborhoods."[192] Before the LAPD preempted its program, other U.S. police departments had stopped using predictive policing programs due to their ineffectiveness in helping the police solve crimes.[193]

Police departments like the NYPD continue to use their predictive policing programs and have touted their success, even though there has been community pressure to end their use. On April 11, 2021, the New York City Council passed the POST Act, which requires the NYPD to be transparent in how it uses technological programs like DAS and when there are updates to the program.[194] The act further requires the police department to state not only how these technological tools are used but also what safeguards have been put in place to ensure that individuals' privacy and civil liberties are protected.[195] The NYPD continues to apply innovative technologies to help the department address crime trends and patterns, such as the use of drones and patrol robots in the subway.[196] In an article from Police 1 by Lexipol, Charles Werner discusses how law enforcement agencies are using drones to conduct various emergency operations, including "patrol-led" functions and forensics collection.[197] Fourth Amendment and civil rights advocates are already raising concerns and questioning whether the use of these technologies will affect individuals' Fourth Amendment rights.[198]

---

192 Miller.

193 Mark Puente, "LAPD Pioneered Predicting Crime with Data. Many Police Don't Think It Works," *Los Angeles Times*, July 3, 2019, https://www.latimes.com/local/lanow/la-me-lapd-precision-policing-data-20190703-story.html.

194 "Public Oversight of Surveillance Technology (POST) Act Impact and Use Policies," New York City Police Department, accessed October 10, 2023, https://www.nyc.gov/site/nypd/about/about-nypd/policy/post-act.page.

195 Brennan Center for Justice, "The Public Oversight of Surveillance Technology Act."

196 Jeffery C. Mays, "400-Pound N.Y.P.D. Robot Gets Tryout in Times Square Subway Station," *New York Times*, September 22, 2023, https://www.nytimes.com/2023/09/22/nyregion/police-robot-times-square-nyc.html.

197 Charles Werner, "11 Ways Police Departments Are Using Drones," Police 1, January 7, 2023, https://www.police1.com/police-products/police-drones/articles/11-ways-police-departments-are-using-drones-V8RZTGOKMjTbWj9Z/.

198 Mays, "400-Pound N.Y.P.D. Robot Gets Tryout."

Predictive policing could also serve other uses. As Fei Yang states, predictive policing programs have been used to predict crimes and identify patterns and trends, but the same technology may also serve to monitor police misconduct.[199] Analyzing officers' disciplinary records and civilian complaints, just as predictive policing programs analyze data to predict and identify patterns and trends, police executives could use algorithm-driven programs to identify officers prone to police abuses and corruption.[200] Some U.S. police departments, such as the Paterson, New Jersey, Police Department and the Elkton, Maryland, Police Department, have contracted with a company called Truleo to help analyze police body camera footage to "promote best practices, train new officers, and mitigate risks."[201] These police departments' use of Truleo shows their willingness to build trust with the community by being transparent about how the program works and highlighting the program's positive results—for example, reduced use of force by officers in the field in obtaining compliance with civilians and improved safety for officers.[202]

As Anthony Finell, vice president of the National Association of Civilian Oversight of Law Enforcement, states, a "collaborative partnership" between the community and the police should be improved and strengthened before a potential incident that results in calls for reform and oversight.[203] By building, improving, and strengthening collaborative relationships between the stakeholders, including members of the community and the police, there will be a better avenue of communication and better understanding and respect in addressing any issues or concerns that one group may have. Any technology used by the police should be explained to the stakeholders to ensure that the police are transparent and open about how the program works and how it is used so that stakeholders have an avenue to voice their questions or concerns.

199 Yang, "Predictive Policing," 16.

200 Yang, 16.

201 "Home Page," Truleo, accessed October 18, 2023, https://www.truleo.co/; "Automated Body Camera Review & Analysis," Truleo, accessed October 18, 2023, https://www.truleo.co/how-it-works.

202 Truleo, *Atwater Case Study* (Truleo, 2023), https://help.truleo.co/hubfs/Case%20Studies/Truleo_Atwater_Case_Study.pdf?_gl=1*1t0021n*_ga*NjE3NTcyNTUyLjE2OTc2NDg2Nzc.

203 Chris Sansone, "Community Oversight of Law Enforcement," Truleo, September 28, 2022, https://www.truleo.co/post/community-oversight-of-law-enforcement.

The future of predictive policing is multidimensional, characterized by the promise of preventing crime and the challenges of ensuring individuals' Fourth Amendment rights are not violated. While the potential of predictive policing programs to transform crime prevention efforts is apparent, so are the risks associated with their use. Balancing the two, ensuring that individual rights and police department transparency are not obscured by the allure and benefits of modern technology, will be significant in the coming years. While initially some police departments used predictive policing due to the financial constraints of the past, others may need to revisit the possibility of using predictive policing programs due to recruitment and staffing issues in the present.[204]

A. RECOMMENDATIONS

One of the major concerns that opponents of predictive policing raise is the lack of police department transparency in how the programs work and what safeguards have been put in place to ensure individuals' Fourth Amendment rights are not violated. Given the potential of technological advances in these programs, police departments must learn to balance the potential benefits of the technology with individuals' Fourth Amendment rights. The police are part of the government while citizens and activists are the stakeholders; thus, governance theory can be used to make recommendations for police departments illustrating to stakeholders the positive uses of predictive policing programs, not only in addressing crime trends and patterns but also during investigations.[205]

Governance theory emphasizes a transparent, collaborative effort between the government and its citizens in policymaking and holds those responsible for creating and implementing the policy accountable.[206] This framework creates public interest because the stakeholders have input into how they are governed, increasing the likelihood they will accept the program and policy being implemented. In this case, the stakeholders in

204 Jessica Horne, "Staff Shortages Hit Law Enforcement," TCS Regional News, May 14, 2022, 1, ProQuest.

205 Friedman, *Unwarranted*, 321.

206 Yu Keping, "Governance and Good Governance: A New Framework for Political Analysis," *Fudan Journal of the Humanities and Social Sciences* 11, no. 1 (2018): 5, https://doi.org/10.1007/s40647-017-0197-4.

predictive policing programs include members of the community and Fourth Amendment and civil rights activists, whom police departments serve. While highlighting the positive uses of the programs, the police can also discuss the Fourth Amendment and ethical safeguards that have been implemented to protect individuals' rights. Through demonstrations of the programs' positive outcomes, police departments may gain the acceptance of communities and advocates.

(1) Legitimacy

Police departments must explain to the stakeholders the importance of predictive policing programs and how they are used to protect communities against crime while also highlighting Fourth Amendment and civil rights safeguards for individuals.

(2) Transparency

Stakeholders are entitled to know what policies or programs being implemented may affect them.[207] By promoting how the program is used and explaining what safeguards protect individuals' rights, police departments can assure stakeholders that the program is being used ethically and within the law. Such promotion can address and alleviate some of the stakeholders' concerns by allowing stakeholders to present their concerns openly to the police regarding the use of predictive policing programs.[208]

(3) Accountability

Police department executives must acknowledge to stakeholders that they will be accountable for any violations or abuses of the program by members of their departments. They must acknowledge that they are responsible and accountable not only to members of their departments but also to the communities they serve.

(4) Rule of Law

It is imperative that police departments, along with members of the district attorney's office, inform stakeholders of how predictive policing can be used while

207 Keping, 5.

208 Herold and Herold, "Lessons for the Field."

remaining within the guidelines of the Fourth Amendment. Both the police department and stakeholders must acknowledge that the law is equitable and respected by all.[209]

(5) Responsiveness

Police departments must immediately respond to stakeholders' concerns or needs.[210] A police department's responsiveness to the stakeholder's concerns shows that there is a mutual understanding and respect for what the other has to say. It shows that the other party's input is valuable and respected, thus fostering a more positive, stronger relationship between the police and stakeholders.

(6) Effectiveness

Police departments should share information and stories with stakeholders that demonstrate the benefits of the program. For example, the police could showcase how the program identified a robbery pattern and how, with the information obtained from it, police executives distributed resources around the area of concern, which helped prevent further robberies and helped identify and arrest the individual responsible for the pattern.

(7) Summary

Implementing these recommendations will have several implications for various aspects of how police departments use technology, including how they build stronger and more open relationships with stakeholders. As predictive policing programs continue to develop and grow because of modern technology, collaboration, planning, understanding, and continuous assessment of the program between the police and stakeholders will help alleviate issues that may arise. The NYPD is an example of a police department that uses predictive policing but is transparent in how it is used; the department makes known what safeguards have been put in place to ensure individuals' Fourth Amendment rights are not violated. While the courts have allowed data obtained from predictive policing programs to be used with other corroborated evidence and information to establish reasonable

209 Keping, "Governance and Good Governance," 5.

210 Keping, 6.

suspicion or probable cause, the courts will need to address the issue of whether data obtained from these programs and used in investigations require less corroboration than is needed for other tips that police might receive.[211] This issue will persist as modern technology evolves and police departments look to adapt technologies to their departments.

In their book titled *Police Tech: Exploring the Opportunities and Fact-Checking the Criticisms*, Johnson, Egan, and Londoño argue that the widespread use of predictive policing programs and other technologies can help the police provide better services like crime prevention, make investigations more efficient, save more lives, and allocate resources more effectively.[212] The authors further argue that "blanket banning" the police from using technology is not the answer to addressing opponents' concerns regarding predictive policing programs and other technologies.[213] The authors recommend that to address opponents' concerns about predictive policing programs and other technologies, police departments should establish "sensible rules and regulations."[214]

B. CONCLUSION

Predictive policing programs reveal both the alluring possibilities of increased crime prevention and the importance of safeguarding individuals' Fourth Amendment rights. Technological advancements continue to assist police in preventing and addressing crime trends and patterns but also present a two-sided equation in that the advancement of these programs can assist police in better directing their resources but may also result in the violation of an individual's Fourth Amendment rights.

Predictive policing programs are seen as a way to address crime trends and patterns. They can also be used by investigators during their investigations. With the use of a predictive policing program, investigators can establish reasonable suspicion or probable cause during an investigation if it is corroborated while ensuring that the program does not violate an individual's Fourth Amendment rights. Prior Supreme Court cases have set the

211 Ferguson, "Predictive Policing and Reasonable Suspicion," 308.

212 Johnson, Egan, and Londoño, *Police Tech*, 24.

213 Johnson, Egan, and Londoño, 25.

214 Johnson, Egan, and Londoño, 25.

guidelines for how police can use technological tools during their investigations, distinguishing between when an individual has an expectation of privacy and when an individual does not, based on the *Katz* two-prong test formulated by the Supreme Court.[215]

Embracing governance theory offers a feasible way to strike a balance between the use of predictive policing programs by the police and an individual's Fourth Amendment rights. By endorsing principles associated with governance theory, such as legitimacy, transparency, accountability, adherence to the rule of law, responsiveness, and effectiveness, police departments can ensure stakeholders' support of the program as well as safeguards to protect an individual's rights.[216] In addition to relieving the fundamental concerns associated with predictive policing, the governance theory framework can be pivotal to building trust and a strong relationship between the police and their stakeholders. A strong relationship must be built on a shared vision, collaborative effort, and mutual respect for both sides.

In conclusion, merging technology, law, ethics, and stakeholder engagement presents a roadmap for the future of predictive policing programs. While this roadmap provides an enticing idea, it must be harnessed carefully to ensure that the core principles of justice, individuals' Fourth Amendment rights, and the stakeholders' trust are not compromised. As the future moves forward with the continued growth of technology, this approach will be important on both sides, realizing the overall vision of safer communities supported by the principles of justice and equity. Law enforcement's use of technology like predictive policing programs to prevent and address crime trends and patterns and help investigators establish reasonable suspicion or probable cause should not be forbidden. Instead, police departments should embrace predictive policing programs. The police departments that implement these programs should create and implement policies, procedures, and safeguards to iterate the proper use of the program, being mindful of individuals' Fourth Amendment rights. Police departments should also be transparent

215 Katz at 347.

216 Keping, "Governance and Good Governance," 5, 6.

about how the programs work to address the concerns that Fourth Amendment and civil rights advocates have raised regarding their use.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

Ashraf, Muhammad J. "Precision Policing: A Way Forward to Reduce Crime." Master's thesis, Naval Postgraduate School, 2020. https://hdl.handle.net/10945/64864.

Bachner, Jennifer. "Predictive Policing: Preventing Crime with Data and Analytics." *Business of Government* (Spring 2014): 86–90. https://businessofgovernment.org/sites/default/files/Management%20Predictive%20Policing.pdf.

Bakke, Erik. "Predictive Policing: The Argument for Public Transparency." *New York University Annual Survey of American Law* 74, no. 1 (2018): 1–27. https://annualsurveyofamericanlaw.org/wp-content/uploads/2019/08/74-1-Predictive-Policing-The-Argument-for-Public-Transparency.pdf.

Beck, Charlie, and Collen McCue. "Predictive Policing: What Can We Learn from Wal-Mart and Amazon about Fighting Crime in a Recession?" *Police Chief*, November 2009. https://controverses.minesparis.psl.eu/public/promo16/promo16_G16/acmcst373ethics.weebly.com/uploads/2/9/6/2/29626713/police-chief-magazine.pdf.

Benbouzid, Bilel. "To Predict and to Manage: Predictive Policing in the United States." *Big Data & Society* 6, no. 1 (January 2019): 1–13. ProQuest.

Black, David. "Here Comes Predictive Policing: The Next Wave of Crimefighting Technology Is Being Tested in New York City." *New York Daily News*, January 24, 2016. https://www.nydailynews.com/opinion/david-black-predictive-policing-article-1.2506580.

Braga, Anthony A., Andrew V. Papachristos, and David M. Hureau. "The Effects of Hot Spots Policing on Crime: An Updated Systematic Review and Meta-Analysis." *Justice Quarterly* 31, no. 4 (August 2014): 633–63. https://doi.org/10.1080/07418825.2012.673632.

Brennan Center for Justice. "Brennan Center for Justice v. New York Police Department." August 6, 2021. https://www.brennancenter.org/our-work/court-cases/brennan-center-justice-v-new-york-police-department.

———. "The Public Oversight of Surveillance Technology (POST) Act: A Resource Page." March 5, 2021. https://www.brennancenter.org/our-work/research-reports/public-oversight-surveillance-technology-post-act-resource-page.

Brooklyn District Attorney's Office. "Brooklyn Man Sentenced to 45 Years to Life in Prison for Murder of Manhattan Chef." November 8, 2019. http://www.brooklynda.org/2019/11/08/brooklyn-man-sentenced-to-45-years-to-life-in-prison-for-murder-of-manhattan-chef/.

Bureau of Justice Assistance and Police Executive Research Forum. *Compstat: Its Origins, Evolution, and Future in Law Enforcement Agencies*. Washington, DC: Police Executive Research Forum, 2013. https://bja.ojp.gov/sites/g/files/xyckuh186/files/Publications/PERF-Compstat.pdf.

Canaday, Johanna. "How the Democratization of Technology Enhances Intelligence-Led Policing and Serves the Community." Master's thesis, Naval Postgraduate School, 2017. https://hdl.handle.net/10945/56879.

Capers, Bennett. "Crime, Surveillance, and Communities." *Fordham Urban Law Journal* 40, no. 3 (2013): 959–92. https://ir.lawnet.fordham.edu/ulj/vol40/iss3/2/.

Celona, Laura, and Bruce Golding. "The Reign of Terror When Murder Was King of New York in the '80s and '90s." *New York Post*, December 14, 2017. https://nypost.com/2017/12/13/the-reign-of-terror-when-murder-was-king-of-new-york-in-the-80s-and-90s/.

Chainey, Spencer, Lisa Tompson, and Sebastian Uhlig. "The Utility of Hotspot Mapping for Predicting Spatial Patterns of Crime." *Security Journal* 21, no. 1–2 (2008): 4–28. ProQuest.

Chin, Thomas M. "IOT in Crisis Management." Master's thesis, Naval Postgraduate School, 2022. https://www.hsdl.org/c/chds-theses/.

Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. *Introduction to Algorithms*. 3rd ed. Cambridge, MA: MIT Press, 2009. ProQuest eBook Central.

Egbert, Simon, and Susanne Krasmann. "Predictive Policing: Not Yet, but Soon Preemptive?" *Policing & Society* 30, no. 8 (2020): 905–19. https://doi.org/10.1080/10439463.2019.1611821.

Ferguson, Andrew Guthrie. "Predictive Policing and Reasonable Suspicion." *Emory Law Journal* 62, no. 2 (2012): 261–325. https://digitalcommons.wcl.american.edu/facsch_lawrev/750/.

Fisher, Carol L. "Quality Leadership." *Biopharm International* 18, no. 5 (2005): 8. https://www.biopharminternational.com/view/editor-chief-quality-leadership.

FORA.tv. "Predictive Policing: The Evolution of Law Enforcement?" Video, 3:28. YouTube, June 24, 2010. https://www.youtube.com/watch?v=slF-f4KRNYM.

Friedman, Barry. *Unwarranted: Policing without Permission*. New York: Farrar, Straus and Giroux, 2021.

Gilsinan, Kathleen, and Adam Stepan. *Big Data for Public Safety*. SIPA-14-0004.0. School of International and Public Affairs Case Consortium at Columbia University, 2014. https://www.sipa.columbia.edu/sites/default/files/2023-01/Case_Big%20Data%20for%20Public%20Safety.pdf.

———. "From Compstat to Gov 2.0: Big Data in New York City Management." School of International and Public Affairs Case Consortium at Columbia University. Accessed April 26, 2023. https://ccnmtl.columbia.edu/projects/caseconsortium/casestudies/127/casestudy/www/layout/case_id_127.html.

Gran, Anne-Britt, Peter Booth, and Taina Bucher. "To Be or Not to Be Algorithm Aware: A Question of a New Digital Divide?" *Information, Communication & Society* 24, no. 12 (2021): 1779–96. https://doi.org/10.1080/1369118X.2020.1736124.

Hardyns, Wim, and Anneleen Rummens. "Predictive Policing as a New Tool for Law Enforcement? Recent Developments and Challenges." *European Journal on Criminal Policy and Research* 24, no. 3 (2018): 201–18. ProQuest.

Harris, Scott. "Man and Machine: Predictive Policing Is the New Law Enforcement Sidekick." *Police Chief* 86, no. 1 (2019). https://www.policechiefmagazine.org/product-feature-man-and-machine/.

Harsha, Daniel. "Award: Compstat: A Crime Reduction Management Tool." Harvard Kennedy School, Ash Center for Democratic Governance and Innovation, January 1, 1996. https://ash.harvard.edu/news/compstat-crime-reduction-management-tool.

Harvard Law Review. "Criminal Procedure—Fourth Amendment—Seventh Circuit Holds Long-Term, Warrantless Video Surveillance Is Not an Illegal Search—*United States v. Tuggle*, 4 F.4th 505 (7th Cir. 2021)." 135, no. 3 (2022): 928–35.

———. "Data Mining, Dog Sniffs, and the Fourth Amendment." 128, no. 2 (2014): 691–712. https://harvardlawreview.org/print/vol-128/data-mining-dog-sniffs-and-the-fourth-amendment/.

Herold, Maris, and Tamara Herold. "Lessons for the Field: A Checklist for Fair and Just Data-Driven Policing." Police 1, February 10, 2023. https://www.police1.com/chiefs-sheriffs/articles/lessons-for-the-field-a-checklist-for-fair-and-just-data-driven-policing-qBKCQBRpVCoN33UT/.

Hiller, Kaitlynd. "Predictive Policing and the 'Charter.'" *Manitoba Law Journal* 44, no. 6 (2021): 224–45. Lexis-Nexis.

Horne, Jessica. "Staff Shortages Hit Law Enforcement." TCS Regional News, May 14, 2022. ProQuest.

Human Events. "Giuliani Wins on Crime." 53, no. 46 (1993): 6. ProQuest.

Jackson, Michael Paul. "Judge Rules NYPD Must Overhaul Its Systems to End Its Unlawful Use of Sealed Arrest Records." Bronx Defenders, March 29, 2023. https://www.bronxdefenders.org/judge-rules-nypd-must-overhaul-its-systems-to-end-its-unlawful-use-of-sealed-arrest-records/.

Johnson, Ashley, Eric Egan, and Juan Londoño. *Police Tech: Exploring the Opportunities and Fact-Checking the Criticisms*. Washington, DC: Information Technology & Innovation Foundation, 2023. https://itif.org/publications/2023/01/09/police-tech-exploring-the-opportunities-and-fact-checking-the-criticisms/.

Jones, Ben, and Mendieta, Eduardo. *The Ethics of Policing: New Perspectives on Law Enforcement*. New York: New York University Press, 2021.

Keen, David. "Algorithm Blues." *Development and Change* 51, no. 4 (2020): 1146–59.

Keping, Yu. "Governance and Good Governance: A New Framework for Political Analysis." *Fudan Journal of the Humanities and Social Sciences* 11, no. 1 (2018): 1–8. https://doi.org/10.1007/s40647-017-0197-4.

Koss, Kelly K. "Leveraging Predictive Policing Algorithms to Restore Fourth Amendment Protections in High-Crime Areas in a Post-Wardlow World." *Chicago-Kent Law Review* 90, no. 1 (2015): 301–34. https://scholarship.kentlaw.iit.edu/cgi/viewcontent.cgi?article=4066&context=cklawreview.

Lau, Tim. "Predictive Policing Explained." Brennan Center for Justice, April 1, 2020. https://www.brennancenter.org/our-work/research-reports/predictive-policing-explained.

Levine, E. S., and J. S. Tisch. "Analytics in Action at the New York City Police Department's Counterterrorism Bureau." *Military Operations Research* 19, no. 4 (2014): 5–14. https://www.jstor.org/stable/24838523.

Levine, E. S., Jessica Tisch, Anthony Tasso, and Michael Joy. "The New York City Police Department's Domain Awareness System." *Interfaces* 47, no. 1 (2017): 70–84.

Mays, Jeffery C. "400-Pound N.Y.P.D. Robot Gets Tryout in Times Square Subway Station." *New York Times*, September 22, 2023. https://www.nytimes.com/2023/09/22/nyregion/police-robot-times-square-nyc.html.

McGehee, Margo. "Predictive Policing Technology: Fourth Amendment and Public Policy Concerns." *University of Cincinnati Law Review* (2021). https://uclawreview.org/2021/02/17/predictive-policing-technology-fourth-amendment-and-public-policy-concerns/.

Meijer, Albert, and Martijn Wessels. "Predictive Policing: Review of Benefits and Drawbacks." *International Journal of Public Administration* 42, no. 12 (2019): 1031–39. https://doi.org/10.1080/01900692.2019.1575664.

Miller, Leila. "LAPD Will End Controversial Program That Aimed to Predict Where Crimes Would Occur." *Los Angeles Times*, April 21, 2020. https://www.latimes.com/california/story/2020-04-21/lapd-ends-predictive-policing-program.

Monk, Khadija M., Justin A. Heinonen, and John E. Eck. *Street Robbery*. Washington, DC: Office of Community Oriented Policing Services, 2010. https://permanent.fdlp.gov/gpo10394/e041021268-pop-strobberyb.pdf.

Moran, Robert. "Crime Reviews Will Be Closed." *Philadelphia Inquirer*, October 27, 2006. ProQuest.

Moses, Lyria Bennett, and Janet Chan. "Algorithmic Prediction in Policing: Assumptions, Evaluation, and Accountability." *Policing & Society* 28, no. 7 (2018): 806–22. https://doi.org/10.1080/10439463.2016.1253695.

Mugari, Ishmael, and Emeka E. Obioha. "Predictive Policing and Crime Control in the United States of America and Europe: Trends in a Decade of Research and the Future of Predictive Policing." *Social Sciences* 10, no. 6 (2021): 1–14. https://doi.org/10.3390/socsci10060234.

National Institute of Justice. "Live Police Lineups: How Do They Work?" Accessed October 3, 2023. https://nij.ojp.gov/media/image/19686.

New York City Police Department. *Domain Awareness System: Impact and Use Policy*. New York: New York City Police Department, 2021. https://www.nyc.gov/assets/nypd/downloads/pdf/public_information/post-final/domain-awareness-system-das-nypd-impact-and-use-policy_4.9.21_final.pdf.

———. *Facial Recognition Technology*. Procedure No. 212-129. New York: New York City Police Department, 2020. https://www.nyc.gov/assets/nypd/downloads/pdf/nypd-facial-recognition-patrol-guide.pdf.

———. *License Plate Readers: Impact and Use Policy*. New York: New York City Police Department, 2021. https://www.nyc.gov/assets/nypd/downloads/pdf/public_information/post-final/license-plate-readers-lpr-nypd-impact-and-use-policy_4.9.21_final.pdf.

———. "Public Oversight of Surveillance Technology (POST) Act Impact and Use Policies." Accessed October 10, 2023. https://www.nyc.gov/site/nypd/about/about-nypd/policy/post-act.page.

———. "Technology." Accessed October 5, 2023. https://www.nyc.gov/site/nypd/about/about-nypd/equipment-tech/technology.page.

New York State Division of Criminal Justice Services. *The New York State Criminal History Record*. New York: New York State Division of Criminal Justice Services, 2019. https://www.criminaljustice.ny.gov/ojis/documents/Rap-Sheet-Guide.pdf.

O'Connell, Paul E. "An Intellectual History of the Compstat Model of Police Management." PhD diss., City University of New York, 2002. ProQuest.

Pearsall, Beth. "Predictive Policing: The Future of Law Enforcement?" *National Institute of Justice Journal*, no. 266 (2010): 16–19. https://www.ojp.gov/pdffiles1/nij/230414.pdf.

Perry, Walter L., and John S. Hollywood. "Predictive Policing: An Effective Tool, but Not a Crystal Ball." *RAND Blog*, November 14, 2013. https://www.rand.org/blog/2013/11/predictive-policing-an-effective-tool-but-not-a-crystal.html.

Perry, Walter L., Brian McInnis, Carter C. Price, Susan C. Smith, and John S. Hollywood. *Predictive Policing: The Role of Crime Forecasting in Law Enforcement Operations*. Santa Monica, CA: RAND Corporation, 2013. https://www.rand.org/pubs/research_reports/RR233.html.

PredPol. "Overview." Accessed September 9, 2023. https://www.predpol.com/about/.

Puente, Mark. "LAPD Pioneered Predicting Crime with Data. Many Police Don't Think It Works." *Los Angeles Times*, July 3, 2019. https://www.latimes.com/local/lanow/la-me-lapd-precision-policing-data-20190703-story.html.

Sansone, Chris. "Community Oversight of Law Enforcement." Truleo, September 28, 2022. https://www.truleo.co/post/community-oversight-of-law-enforcement.

Slahor, Stephenie. "NYPD and Microsoft's DAS . . . Coordinated Surveillance and Crime Data." *Law and Order* 60, no. 11 (2012): 16–17. ProQuest.

Truleo. *Atwater Case Study*. Truleo, 2023. https://help.truleo.co/hubfs/Case%20Studies/Truleo_Atwater_Case_Study.pdf?_gl=1*1t0021n*_ga*NjE3NTcyNTUyLjE2OTc2NDg2Nzc.

———. "Automated Body Camera Review & Analysis." Accessed October 18, 2023. https://www.truleo.co/how-it-works.

———. "Home Page." Accessed October 18, 2023. https://www.truleo.co/.

Weathington, Katherine. "A Critical Study of Geospatial Algorithm Use in Crime Analysis and Predictive Policing." Master's thesis, Marquette University, 2020. ProQuest.

Werner, Charles. “11 Ways Police Departments Are Using Drones.” Police 1, January 7, 2023. https://www.police1.com/police-products/police-drones/articles/11-ways-police-departments-are-using-drones-V8RZTGOKMjTbWj9Z/.

Yang, Fei. “Predictive Policing.” In *Oxford Encyclopedia of Criminology and Criminal Justice*, edited by Henry N. Pontell. Oxford: Oxford University Press, 2019. https://www.researchgate.net/publication/342216493_Predictive_Policing_Oxford_Research_Encyclopedia_Criminology_and_Criminal_Justice_Oxford_University_Press.

THIS PAGE INTENTIONALLY LEFT BLANK

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
   Fort Belvoir, Virginia

2. Dudley Knox Library
   Naval Postgraduate School
   Monterey, California